



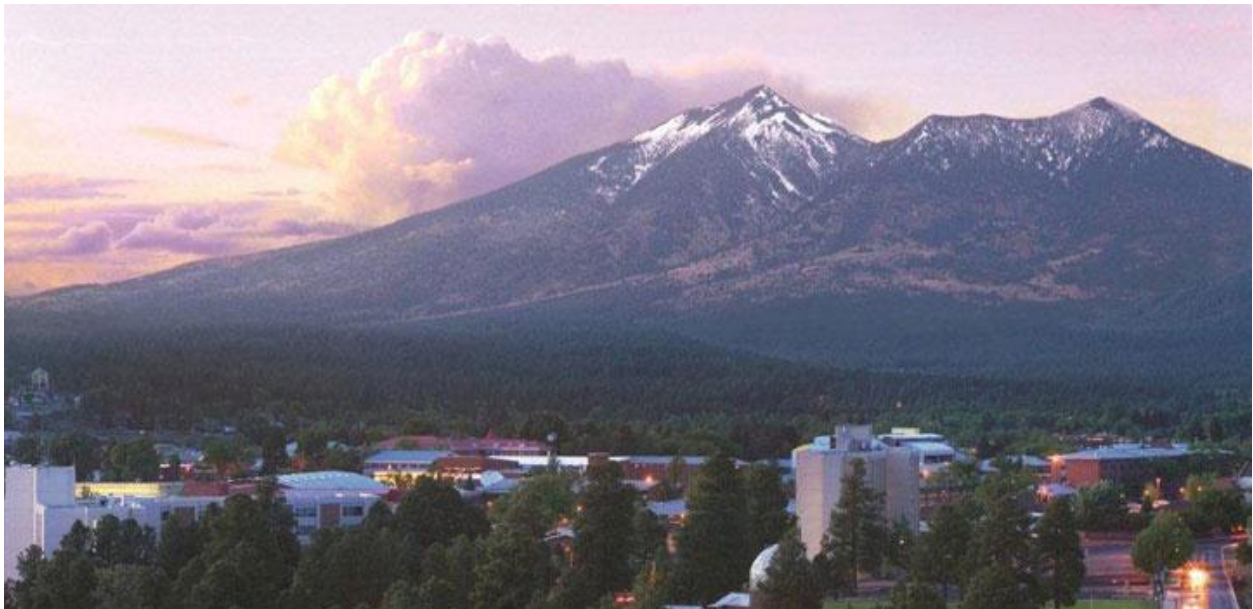
NORTHERN ARIZONA  
UNIVERSITY

*College of Engineering, Forestry & Natural Sciences*

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**School of Forestry**

A Self-Study Report Prepared for the  
Committee on Accreditation  
Society of American Foresters



**February 28, 2013**

**SELF-STUDY REPORT**

**SUBMITTED TO THE SOCIETY OF AMERICAN FORESTERS**

**FOR RE-ACCREDITATION OF THE FORESTRY PROGRAM  
LEADING TO A BACHELOR OF SCIENCE DEGREE  
AT NORTHERN ARIZONA UNIVERSITY**

**Dates of Team Visit:  
April 2-4, 2013**



## **PREFACE**

The Bachelor of Science in Forestry (BSF) program was initiated at Northern Arizona University in 1958, and first became accredited by the Society of American Foresters (SAF) in 1968. It has maintained a continuous record of accreditation by the SAF ever since.

The last SAF accreditation review took place in 2003, with the team visit taking place on April 8-11. The result was re-accreditation through 2013. With this self-study document, we respectfully request your review of our BSF program and consideration for re-accreditation.

# TABLE OF CONTENTS

## VOLUME 1

PREFACE.....	1
TABLE OF CONTENTS.....	2
Standard I: Forestry Program Mission, Goals, and Objectives.....	4
Standard II: Curriculum .....	9
Standard III: Forestry Program Organization and Administration.....	21
Standard IV: Faculty .....	30
Standard V: Students.....	36
Standard VI: Parent Institution Support.....	45
APPENDICES .....	54
APPENDIX A .....	55
School of Forestry Advisory Council Members .....	55
APPENDIX B .....	58
CURRENT CURRICULUM .....	58
SAF Document A-1 General Education Summary – Required Courses.....	58
SAF Document B-1 Forestry Education Summary – Required Courses .....	58
SAF Document B-2 Forestry Education Summary – Restricted Electives .....	58
Curriculum Progression Plans.....	58
School of Forestry Certificates .....	58
APPENDIX C .....	74
NEW CURRICULUM.....	74
SAF Document A-1 General Education Summary – Required Courses.....	74
SAF Document B-1 Forestry Education Summary – Required Courses .....	74
Curriculum Progression Plans.....	74
School of Forestry Certificates .....	74
APPENDIX D.....	91
Fall Course Syllabi.....	91
Spring Course Syllabi .....	189
New Curriculum Course Syllabi .....	311

APPENDIX E .....	351
School of Forestry Assessment Plan.....	351
2010 Assessment Report.....	351
APPENDIX F.....	368
SAF Document C-1 Background Summary for Faculty Reporting to the Forestry Program Head..	368
SAF Document D- Academic Summary for Faculty Reporting to the Forestry Program Head.....	368
APPENDIX G.....	383
School of Forestry Adjunct Faculty .....	383
APPENDIX H.....	386
SAF Document E- Individual Faculty Information .....	386
APPENDIX I .....	758
School of Forestry Faculty Publications, 2004-Present .....	758
APPENDIX J .....	793
SAF Document F-Forestry Graduate Employment Summary .....	793
APPENDIX K.....	795
SAF Document G - Student Data Summary .....	795
APPENDIX L .....	797
Cline Library Report.....	797

**SELF-EVALUATION REPORT**  
**PREPARED BY THE SCHOOL OF FORESTRY**  
**NORTHERN ARIZONA UNIVERSITY**  
**SUBMITTED TO THE SOCIETY OF AMERICAN FORESTERS**  
**FEBRUARY 2013**

**Standard I: Forestry Program Mission, Goals, and Objectives**

*1. Document how the forestry program's mission, goals and objectives (1) are consistent with the SAF Standards for Accreditation, (2) reflect the distinction of forestry as an interdisciplinary profession, (3) respond to the needs of the constituencies that the program seeks to serve, (4) reflect sensitivity to the role of professional foresters in meeting diverse and changing social, cultural, economic, and environmental needs and values, (5) maintain the professionalism and ethical behavior necessary to manage and use forest resources and urban forests and trees for the benefit of society. Show where they appear in publicly disseminated materials.*

The School of Forestry's (SOF) mission statement is provided below. This mission statement is made publicly available through a link on the home page of the SOF's website (<http://nau.edu/cefns/forestry/>).

The fundamental educational mission of the School of Forestry is to foster the intellectual and personal development of our students, at both the undergraduate and graduate levels. We intend that our students be, first of all, liberally educated, secondly, good citizens, and finally, skilled professionals and life-long learners, with training in an integrated approach to forest ecosystem management.

The School of Forestry educates students in ecosystem science and management by integrating instruction in biophysical and human systems. In Forestry, we cross traditional boundaries by applying transdisciplinary and multi-objective approaches to ecosystem studies.

Our scholarship mission features this integrative approach to advance knowledge in ecosystem science and management, to bring this new knowledge back to the classroom, and transfer it to the citizens of Arizona, the Southwest, and elsewhere. Our programs leading to the Master of Forestry, Master of Science in Forestry and Doctor of Philosophy in Forestry play a special role in carrying out our scholarship objectives.

Our mission includes the development of educational and research activities which bring views from a variety of cultures to the classroom and to the management of forest ecosystems.

In addition to this mission statement, more specific goals and objectives can be found in a variety of documents, including the most recent official Strategic Plan ([http://nau.edu/uploadedFiles/Academic/CEFNS/Forestry/Forms/StrategicPlan\\_2005.pdf](http://nau.edu/uploadedFiles/Academic/CEFNS/Forestry/Forms/StrategicPlan_2005.pdf)) and in the SoF's assessment plan. Also, in late 2009 the Dean of the College of Engineering, Forestry and Natural Sciences challenged the SOF to consider what it would take to become the top ranked forestry program in the U.S. and to develop a plan to move the school forward towards that goal. Our response was the "*Proposal for Becoming the Top Ranked Forestry Program in the United States: A Foundation for Excellence.*" While not an official replacement for the SOF's 2005-2010 strategic plan, it is nevertheless an explicit outline of goals for both the short term and going forward approximately five years. While this is viewed largely as an internal document, it can be made available upon request.

### Consistency with SAF Accreditation Standards

There is nothing in the SOF's mission statement, goals and objectives that is known to be inconsistent with the SAF's stated objectives for its accreditation program or with any of the specific SAF accreditation standards. The SAF accreditation standards are typically an important factor that is considered when any major changes within the SOF, especially changes to the BSF curriculum, are considered. For example, a curriculum mapping exercise conducted in 2011 used the SAF curriculum standard as the primary basis for comparison (i.e., we listed our current required courses and identified the specific elements of Standard II that they each address).

### Reflection of the Distinction of Forestry as an Interdisciplinary Profession

The interdisciplinary nature of the forestry profession is recognized explicitly in the second paragraph of the SOF's mission statement. In that paragraph, both the biophysical and human dimension elements of forestry are recognized, and both are well integrated into our curriculum as demonstrated under Standard II. Our distinctive "integrated curriculum" is a very direct reflection of the interdisciplinary nature of the forestry profession. Also, the interdisciplinary nature of the profession is reflected in the range of disciplines represented by our faculty, as demonstrated under Standard IV.

### Responsiveness to Constituencies

In the context of the SAF's accreditation of our BSF program, the two most important constituents served by the SOF are our students and the employers of our students. We also strive to serve the needs of the general public and of various forestry-related organizations through the dissemination of information and by other means such as our youth environmental camps. However, these types of service to constituents are not addressed here since they are not directly related to the SAF's accreditation of our BSF program.

First and foremost, the SOF seeks to serve its students by fulfilling the educational mission described above. We seek to fulfill this mission by offering a well-designed and up-to-date curriculum that prepares our students for professional forestry and related positions, and by delivering that curriculum well. Information on how this is done, including details on the

curriculum, program assessment, student advising, and the hiring, professional development and retention of high quality faculty, is provided in subsequent sections of this document.

The second group of constituents that we serve is the employers of our graduates. We interpret the term employers broadly, but we view our primary employer-constituents as (1) government and tribal agencies engaged in natural resource management and/or environmental protection, (2) forest industries, and (3) non-governmental organizations with a forestry or natural resources-related mission. Because of our physical location in the American Southwest, the SOF tends to serve the needs of the first and third groups more than the forest industry sector, although over the years many graduates have also entered the industry (and forestry consulting) sector.

To be able to respond effectively to the needs of employers, the faculty, staff and administration employ a variety of formal and informal approaches. An example of a formal approach is the creation in 2009 of a SOF Advisory Council (SFAC). The SFAC typically has between 12 and 15 active members (Appendix A). The current members are diverse in terms of their professional experience and their geographic location. This group meets once per year in person, conducts at least one conference call per year, and interacts with the faculty, staff and administrators through a variety of other means. One of the key goals of this group is to provide timely input on the needs of employers.

On a more informal basis, many of the SOF faculty interact frequently with both employers and alumni of the SOF. From the employers, we are able to learn more about their needs. From the alumni, we are able to learn about how well prepared they felt for their first (or subsequent) jobs. The SOF Executive Director and many of the faculty also make an effort to keep up with other sources of information on employer needs, such as employer survey results published in the 2000 Pinchot Institute report on the future of forestry education and the newer “soft skills” report prepared by the APLU<sup>1</sup>.

### Sensitivity to the Role of Professional Foresters in Meeting Diverse and Changing Social, Cultural, Economic, and Environmental Needs and Values

The fourth paragraph of the SOF mission statement explicitly addresses the importance of diversity and its impact on the management of forest ecosystems. The importance of diversity and societal changes are infused throughout the program, from FOR 101, Introduction to Forestry, to several classes taken in the senior year. These concepts are also reinforced through NAU’s Liberal Studies requirements, which include required coursework in the categories of Diversity, Cultural Understanding, and Social and Political Worlds.

The public lands emphasis of our program, and clear need to serve Native American and Hispanic populations dictated by both our geographic location and the strategic goals of the university, also help to instill sensitivity to these needs and values. As described further in

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<sup>1</sup> Sample, V.A. et al. 2000. The Evolution of Forestry Education in the United States: Adapting to the Changing Demands of Professional Forestry. Pinchot Institute for Conservation, Washington, D.C.

Crawford, P. et al. 2011. Comparative Analysis of Soft Skills: What is Important for New Graduates? Association of Public and Land Grant Universities, Washington, D.C.



Standard V, we have taken a number of steps to recruit and retain students from under-represented groups.

Maintenance of the Professionalism and Ethical Behavior Necessary to Manage and Use Forest Resources and Urban Forests and Trees for the Benefit of Society:

The importance of professionalism and ethical behavior is instilled and reinforced in many parts of our program. Although perhaps not as explicit as it could be, it is also strongly implied in the first paragraph of our mission statement.

Both professionalism and ethical behavior are expected of students throughout the program, especially as it relates to the quality of their work and the sanctions imposed for academic dishonesty. Occasional lessons and class discussions are designed to address these issues, and in particular ethical behavior, in ways that apply directly to situations students may find themselves in once they are employed.

***2. Document the process for periodic self-evaluation and revision of the program's mission, goals, and objectives.***

Periodic self-evaluations occur at various levels within the university. They may be in direct response to mandates or they may be the result of informal interactions among faculty, staff, students and other parties associated with the SOF.

One mandate for periodic self-evaluation is the Arizona Board of Regents (ABOR) requirement that academic programs undergo review every seven years. The ABOR policy allows flexibility in this schedule and also in the format of the review for programs, such as our BSF degree, that are also reviewed by external accrediting bodies. In the past, and also in this current case, the process of preparing for SAF re-accreditation has led to a period of reflection and subsequent changes in our program.

At the university level, periodic self-evaluations have also resulted in revisions of our BSF program. The most recent example of this was the re-evaluation of NAU's Liberal Studies program that took place during 2005 and that resulted in revisions to the university's Liberal Studies requirements.

In addition to the periodic self-evaluations that are driven by ABOR and the SAF accreditation cycle, self-evaluations and reflection occur through faculty meetings and retreats, the work of the SOF Curriculum Committee, and during SOF Advisory Council meetings. The review of our graduate degree programs that took place in the spring of 2011 also had an impact on our BSF program, perhaps most notably by providing some of the documentation needed to justify hiring two new faculty members who also serve the needs of the BSF program.

An important form of input to our self-evaluations is the feedback we solicit (and occasionally receive on an unsolicited basis) from our students. We seek feedback on

individual courses through structured course evaluations and in some cases through facilitated discussions managed by qualified external facilitators. We also seek feedback from students in the form of on-line exit surveys administered to graduating seniors each spring. More details on this type of program assessment, as well as on the ABOR-mandated program review process, are provided in the relevant sections of Standard III.

Finally, we occasionally seek input from our alumni. We have conducted two surveys in recent years, one to solicit feedback on what were then called focus areas and another that was conducted as part of this self-study to solicit feedback from recent alumni on their post-graduation employment and on their thoughts about how well the program prepared them for their jobs.

## Standard II: Curriculum

The School of Forestry has long been recognized for its unique curricular structure. Our “integrated curriculum,” as well as the breakdown between the pre-professional and professional programs, has been in place since 1972. Although it has changed over time to reflect changes in student populations and the profession of forestry itself, the core of this curriculum remains intact.

Although we believe that this structure provides an excellent curricular model, in places within this section we have disaggregated the blocks into the more traditional course-based components, since we believe this is needed for the purposes of this self-study. We have tried to do as accurate a job as possible with this disaggregation, but the effort did require some judgment calls that were difficult to make. For example, does field work in “Semester A” that involves the establishment of plots, measuring trees, and then developing silvicultural prescriptions based on these measurements count as course units in Ecology and Biology or Measurement of Forest Resources? As a result of our curriculum structure, the allocation of units among the different categories and the narratives associated with this standard may seem less precise than in a more standard curriculum.

One significant new development in our curriculum since the previous self-study in 2003 is the incorporation of a requirement to complete a “focus area,” which was later revised slightly and renamed “certificate.” These are very similar to concentrations or specializations that are required by some other forestry programs. **In addition, we are in the final stages of a curriculum revision process and will begin implementing the changes in the 2013/2014 academic year. Given the imminent implementation of this new curriculum, we have presented information on both our current curriculum and, where appropriate, on the new curriculum.**

***1. Complete Documents A-1, B-1, and B-2; complete A-2 if needed. Follow the format as presented.***

We have completed these documents for both the current (Forms A-1a and B-1a) and new curriculum (Forms A1-b and B-1b). These can be found in Appendix B for the current curriculum and Appendix C for the new curriculum. We have also included degree progression plans and information on the certificates for the current (2012/2013) and new (for students entering in the Fall of 2013) versions of our curriculum in Appendix B and Appendix C, respectively.

In the introductory section above we introduced a few terms we use in our curriculum, but below we list them again and define them. We also introduce some other terms that are referred to occasionally in the remainder of this self-study.

- Liberal Studies: In addition to its foundation requirements of English Composition and Mathematics (7 credit hours, hereafter abbreviated as “cr”), the

University requires a total of 28 cr of Liberal Studies courses across four distribution blocks (Science and Applied Science, Social and Political Worlds, Aesthetic and Humanistic Inquiry, and Cultural Understanding). Twenty of these 35 cr consist of specific courses required as part of the pre-professional forestry program and the remainder are restricted electives. All forestry students must fulfill these Liberal Studies requirements.

- Pre-Professional Program: The combination of 100- and 200-level forestry courses, certain Liberal Studies courses and CIS 120 (Introduction to Computer Information Systems) required of all forestry students, most of which have to be taken during the freshman and sophomore years. The total credit hour requirement for the pre-professional forestry program is 48, although as mentioned above 20 of these also count towards the Liberal Studies requirement.
- Professional Program: The curriculum that is primarily taken in the junior and senior years. Students have to apply for entrance into the professional program and then generally go through it in a cohort. Students were required to have minimum GPA of 2.5 and a C or better in the pre-professional forestry program to enter this program until the 2012-2013 academic year, after which the minimum GPA was raised to 2.75.
- Integrated Curriculum: This refers to the main parts of the professional program, where the courses are offered in large blocks of time during which material is covered in a multi-disciplinary fashion and often with some degree of team teaching.
- Semester A: The part of the curriculum taught in the fall semester of the junior year (FOR 313, 314, 315 and 316; total of 13 cr).
- Semester B: The part of the curriculum taught in the spring semester of the junior year (FOR 323W, 324W, 325W and 326W; total of 13 cr).
- Semester C: The part of the curriculum taught in the fall semester of the senior year (FOR 413C and 414C; total of 6 cr).
- Semester D: The part of the curriculum taught in the spring semester of the senior year (FOR 423C and 424C; total of 6 cr).
- Forestry Certificates: All students are required to complete one of five certificates, which consist of either 15 or 18 credit hours of courses. The only exception to this is that students may opt to pursue an individualized course of study as a substitute for a certificate with the approval of the Executive Director. The five certificates are (1) Fire Ecology and Management, (2) Forest Health and Ecological Restoration, (3) Human Dimensions, (4) International Forestry and Conservation, and (5) Wildlife Ecology and Management.

Our current curriculum contains many elements common to most forestry programs. We have a curriculum that provides students with a strong basis in biology, forest ecology, and silviculture with a strong second emphasis in forest management. One feature that sets our program aside is our upper division professional program with its cohort structure, team planned and delivered curriculum, and emphasis on integrated forest management. Although students receive a background in the management of each key resource (e.g. timber, recreation, etc.) the integration of this material in the junior year (Semester B) and especially the senior year (Semesters C and

D) provide the students with a comprehensive view of forest management that transcends a more traditional study of individual resources, even going beyond multi-resource to integrated management.

## ***2. Document how oral and written communication skills are reinforced throughout the curriculum.***

### Written Communication Skills

Our current curriculum meets this requirement through the requirement for two foundational courses in writing during the pre-professional program and through significant reinforcement in several of our forestry courses, especially those in the professional program. The new curriculum makes no significant changes to this overall approach.

The foundational writing courses include ENG 105 (Critical Reading and Writing, 4 cr), which is offered through the Department of English, and FOR 215 (Writing in Forestry, 2 cr). The latter course is offered through the SOF and was developed as a replacement for the more traditional technical writing course offered by the Department of English, which we came to believe was not serving the more forestry-specific needs of our students sufficiently well. We typically hire either a graduate student in English or another qualified instructor to teach FOR 215, and that individual coordinates with some of our faculty to ensure the course addresses our needs.

In addition to the required foundational courses, we reinforce the writing skills of our students through the NAU-wide junior-level writing requirement and by “scaffolding” writing so that assignments and expectations grow over the program. A summary of where writing skills are built and reinforced in our program is provided below:

- Prerequisite/pre-professional courses:
  - ENG 105: Critical Reading & Writing, 4 cr
  - FOR 213: Writing in Forestry, 2 cr
- Professional coursework
  - We have significant writing required in the form of traditional laboratory reports in FOR 211, FOR 313, FOR 314, FOR 315, and FOR 316.
  - Our forest management sequence in the junior year (FOR 323W, FOR 324W, FOR325W, and FOR326W) meets the university’s junior level writing requirement of 20 pages of revised writing. We use multiple assignments to meet this requirement including briefing notes, briefing papers, and laboratory reports. In practice this requirement is met solely in FOR 326W, so the “W” designation will be dropped from the other courses in the new curriculum.
  - In FOR 360, two policy-related writing assignments are required and the quality of the writing is a substantial part of the grade.
  - In FOR 414C we require a team-based “Current Conditions” report of 50 to 60 pages as well as additional briefing papers submitted individually.
  - In 424C we require a team-based forest management plan, also of

approximately 50 pages in length.

In addition, the SOF has invested in the part-time employment of a writing tutor for the past several years. The faculty are united in their belief that polished writing skills are crucial to career development and thus the presence of a writing tutor will only serve to enhance those skills. Primarily, assistance is focused on improving the overall quality and clarity of lab reports, research papers, and other forestry-related assignments. Often the instructor of FOR 215 and the writing tutor are the same person.

### Oral Communication Skills

We require one foundational course in oral communication and reinforce this important skill in using a scaffolding approach similar to that described above for writing.

- Prerequisite/pre-professional course:
  - CST 111: Fundamentals of Public Speaking, 3 cr
- Professional coursework
  - Students, as members of teams, present at least three talks with professional-level expectations.
  - These presentations occur in FOR 323W-FOR 326W, as well as in FOR 413C-414C, and FOR 423C-424C.
  - Several other courses that are part of one or more certificates require oral presentations, such as FOR 445 (Wilderness Management) and FOR 415 (Forestry in Developing Countries).

Student presentations in some classes are open to the whole forestry faculty and sometimes also to agency personnel who have worked with the class. The most consistent example of agency personnel being involved is in FOR 445, Wilderness Management, where the students work closely with Forest Service personnel on a project in one of the nearby wilderness areas. Those presentations are typically attended by at least 5 to 6 Forest Service personnel.

By the time they graduate, all of our students will have made multiple oral presentations and should be quite proficient in making presentations, including using associated software such as PowerPoint.

### ***3. For the four areas of study, document how adequate instruction is provided in basic principles, typical applications, and current practices.***

#### Ecology and Biology

All forestry students complete an 8-credit sequence in Biology (BIO 181/181L and 182/182L) and at least 14 credit hours of forestry courses in this subject area. The required forestry courses

that address this subject area most directly include<sup>2</sup>:

- FOR 212: Trees and Forests of North America, 2 cr
- FOR 220: Introduction to Forest and Range Plants, 2 cr
- FOR 213: Ecology and Management of Forest Soils, 3 cr
- FOR 313: Forest Ecology I, 4 cr
- FOR 314: Forest Ecology II, 3 cr

In addition to the 22 credit hours of coursework listed above, ecology and biology is a significant component of FOR 315 (Silviculture Principles, 3 cr) and FOR 316 (Silviculture Applications, 3 cr). We estimate that between the biology coursework and the forestry coursework, all our students receive a minimum of 30 credit hours of instruction in ecology and biology (see Document B-1 for additional details). Some of the certificates also require significant coursework in ecology and/or biology, especially the Wildlife Ecology and Management and the Forest Health and Ecological Restoration certificates.

#### Measurement of Forest Resources

All forestry students complete four courses that are entirely or partially focused on the measurement of forest resources, including:

- FOR 211: Forest Measurements, 3 cr.
- FOR 316: Silviculture Applications, 3 cr.
  - Includes field measurements of timber and subsequent determination of stocking
- FOR 413C/FOR 414C: Forest Ecosystem Assessment I and II, 3 cr each
  - Emphasizes multi-resource forest inventory and subsequent processing of field data into a current conditions report

Students receive limited exposure to forest resource measurements in other courses, such as the brief introduction to GIS in the Semester B course sequence. We estimate that all our students receive a minimum of 10 credit hours of instruction in the measurement of forest resources (see Document B-1 for additional details).

#### Management of Forest Resources

Courses that introduce students to forest management concepts include FOR 101, Introduction to Forestry, and the FOR 315/316 silviculture courses. Management is then addressed in a more direct manner in the Semester B, C and D course sequences. Topics covered in these three course sequences include:

- FOR 323W-326W: Forest Management I-IV, 13 cr (Semester B)

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<sup>2</sup> Please refer to the syllabi in Appendix D for details on the material covered in these courses, both for this and the following three sections.

- Forest management
- Watershed management
- Recreation management
- Wildlife and range management
- Forest operations (stumpage appraisal, harvesting, and roads)
- Collaborative management
- FOR 413C/FOR 414C: Forest Ecosystem Assessment I and II, 3 cr each (Semester C)
  - Development of management goals and resource inventory planning
- FOR 423C and FOR 424C: Forest Ecosystem Planning I and II, 3 cr. each (Semester D)
  - Management planning, planning principles

We estimate that all our students receive a minimum of 17.5 credit hours of instruction in the management of forest resources (see Document B-1 for additional details).

#### Forest Resource Policy, Economics and Administration

The primary policy course taken by all forestry students is FOR 360, Natural Resources Policy. This course examines past, present and emerging policies, laws and issues that affect natural resources management in general and forestry in particular. It also covers the fundamentals of the natural resources policy making process. Additional exposure to forest resource policy is gained in Semester D, which includes a major section devoted to the NEPA planning process.

Forest economics is a component of Semester B, and specifically FOR 324W. Although forest resource administration is not the subject of any specific course, significant content on administration is included in Semester B (e.g., coverage of the main public land management agencies and their missions) and FOR 360.

We estimate that all our students receive a minimum of 6.5 credit hours of instruction in the forest resource policy, economics and administration (see Document B-1 for additional details).

#### ***4. Document how adequate field instruction and practice are provided to ensure that graduates have the opportunity to be competent to practice forestry as professionals.***

Several courses involve significant field components, especially FOR 211, Forest Measurements, FOR 313/314, Forest Ecology, FOR 315/316, Silviculture, and FOR 413/414, Forest Ecosystem Assessment. FOR 220, Introduction to Forest and Range Plants, has historically met *only* in the field after the first week, although the new version of the class to start in the fall of 2014 will combine the lectures previously offered in FOR 212, Trees and Forests of North America, with the labs.

FOR 211 has a lab component, during which the students develop basic field skills such as pacing, map and compass work, and tree measurements. Much of this work takes



place on the NAU Centennial Forest, part of which is located within a 15-20 minute drive from campus.

FOR 220 takes full advantage of the rich biological and ecosystem diversity located within an easy drive of Flagstaff. The earliest labs in this fall semester course involve trips up onto the San Francisco Peaks, where the species found in high-elevation mixed conifer stands are introduced. As the fall progresses, the field trips move to the ponderosa pine and pinyon-juniper forests in the Flagstaff area. Later in the semester field trips move to areas lower in elevation and include drier forest types as well as lower elevation riparian habitats.

The Semester A course sequence includes weekly labs focused on a range of forest ecology and silviculture topics, and includes both “show and tell” type field trips and hands-on labs involving the collection of data and subsequent lab reports. This course makes use of local assets such as the Forest Service’s Fort Valley Experimental Forest, which has many research and demonstration plots that are very useful for teaching ecology and silviculture.

The Semester C course sequence includes extensive collection of multi-resource data in the field, including timber inventory data, stand condition, range condition, fuel loading, and the locations of roads and trails. While a faculty member is present in the field during these labs, the crews are widely dispersed and the students (all seniors) conduct most of this work with very limited faculty oversight. The sites used for this work vary from year to year, and have made use of the NAU Centennial Forest, the Coconino National Forest and the Nature Conservancy’s Hart Prairie Preserve, among others.

***5. Document how the forestry curriculum fosters analytical and critical reasoning skills, including systematic problem solving and decision-making for individuals and in a team environment.***

Several forestry courses, especially in the junior and senior years, strive to foster analytical and critical reasoning skills. In FOR 360, for example, students were asked to compare and contrast the tactics used by John Muir and Gifford Pinchot as they made their respective cases regarding the proposed dam in the Hetch Hetchy Valley of Yosemite National Park. As part of that same assignment, they were asked to put themselves in the shoes of the president and decide if (and why) they would have or have not approved the building of the dam. The class also involves discussion of current policy issues and the arguments for or against them, and an upcoming written assignment described in the next section will also require use of these skills.

During Semester B, students are exposed to socioeconomic aspects of forest management and some of the associated conflicts, and are challenged to think critically about how to deal with them. In Semester D, which serves as our capstone, students are challenged to work together in teams to develop a management plan for a tract of land that incorporates multiple factors and stakeholders, and therefore requires careful analysis.

In addition to the core forestry courses, NAU's Liberal Studies curriculum, which all forestry students are required to complete, is designed in part to foster these same types of skills.

***6. Document how student awareness of historical and current issues and policies affecting resource management and conservation is established.***

We seek to build student awareness of historical and current issues and policies beginning in our students' first year, during which some of these concepts are introduced in FOR 101, Introduction to Forestry. As can be seen in the syllabus for this course (Appendix D), a substantial component of the class includes topics such as the history of the forestry profession, key individuals in forestry and environmental history, and the importance of some key laws.

Both historical and current issues and policies are addressed in considerably more depth in FOR 360, Natural Resources Policy, which students may take in either their junior or senior years. Much of the first month of this course is devoted to the historical roots of forest and natural resource policy, and includes material such as the early land disposition laws, the rise of the conservation movement, the development of the forest reserves/national forests, and the evolution of forest, natural resource and environmental laws and policies right through to the present day. Assignments given to the students this semester in the class include one on history (requiring the students to investigate the history, tactics used by key individuals, and the present-day implications on the Hetch Hetchy Valley case). Their second written assignment will be to investigate a current issue and to draft a written comment that would be submitted as part of forest planning and/or EIS process or sent directly to a member of Congress.

Current issues and policies also may be addressed in any number of other core curriculum classes, such as in Semester B, where a briefing paper on a current management issue, including the policy-related aspects of the issue, is being required this semester. In Semester B the students are also introduced to material such as the Endangered Species Act. In Semester D, the students receive extensive exposure to the National Environmental Policy Act and this section the course has been taught in recent years by a retired Forest Service employee who has extensive first-hand experience with the NEPA process.

In addition to the exposure our students receive within the core curriculum, they are also very likely to be exposed to historic and current issues within some of their certificate courses. For example, the history of fire policies in the U.S. is covered in FOR 251, Introduction to Wildland Fire, and the Wilderness Act is covered in FOR 445, Wilderness Management.

***7. Document that the forestry curriculum provides a variety of educational experiences including lectures, discussion, simulations, computer applications, and individual and group projects in laboratories and field experiences, enabling students to apply the scientific methodologies necessary to attain an array of beneficial forest products, services, and conditions.***

The BSF program offers students a diverse array of educational experiences. Many classes are primarily lecture-based, but almost always they also involve discussions, student presentations and other types of projects. Some of our faculty members also regularly employ forms of active student learning, versions of “flipped classrooms,” and other learner-centered pedagogical approaches.

A variety of computer applications are employed in our curriculum, starting with basics such as the Microsoft Office suite (especially Word, PowerPoint and Excel) and progressing to some degree of exposure to software such as ArcGIS and the Forest Vegetation Simulator. The revised curriculum that will be put in place gradually over the next several years will include a greater degree of emphasis on GIS and other forestry-related software. A greater degree of exposure to forestry-related hardware also is planned. Frankly this has been an area within our curriculum that has been in need of improvement for some time.

Group projects are an important part of our curriculum. Such projects are assigned in all four of the professional program semesters. Examples of such projects include silviculture lab assignments in FOR 315/316, the extensive forest assessment work and final presentation in FOR 413/414, and the management plan done in FOR 423C/424C, Forest Ecosystem Planning I and II. Group projects are also a regular part of some of the forestry certificate courses, such as FOR 445, Wilderness Management.

***8. Document that any distance-learning component of a program is consistent with the program's stated objectives. Distance learning includes off-campus classroom programs, external degree programs, branch campuses, correspondence courses, and off-campus, electronically-based instruction.***

There is no formal distance learning component to the undergraduate program as taken by most of our BSF students. We do offer an on-line version of FOR 101, Introduction to Forestry, which is occasionally taken by a student who plans to transfer into our program, but for the most part this version of the course serves non-majors. We strongly encourage all residential students who have declared forestry as their major to take the in-person version of FOR 101. Students may take other courses required for their degree in a distance format, but this does not include core forestry courses.

We also offer a series of hybrid (distance plus in-person) courses as part of our “401 program,” which serves federal employees involved in wildland fire management. Students in this program may opt to pursue an undergraduate certificate in Fire Ecology and Management, but this is effectively a separate set of courses from those taken by our on-campus BSF students.

**9. Describe the extent to which faculty research enriches the curriculum and opportunities available to students to participate in research activities.**

As described in Standard IV, most of our faculty are engaged in research and many have been quite productive in this area. This benefits the undergraduate program through the material that our faculty are able to share with our students in the classroom or field, through the undergraduate research opportunities that are provided to our students, and in some cases through employment opportunities available as part of faculty members' projects. Faculty members have also invited their research collaborators into their classes to present guest lectures.

Information directly from faculty members' research is shared in many classes, but perhaps is most prominent in Semester A, where local research sites are used to teach about fire and other disturbances, climate change research, and silvicultural treatments. An example is Professor Thomas Kolb's research at the nearby Taylor Woods and the Gus Pearson Natural Area sites, where his work on using thinning to reduce tree water stress serves as the basis of current field trips in both FOR 313 and FOR 315 (Forest Ecology and Silviculture). Another example is Professor Martha Lee, who discusses her research on the users of the Fossil Creek area on the Coconino National Forest in her lectures on recreation management as part of Semester B.

Many students have benefitted from formal (i.e., credit-bearing) undergraduate research projects undertaken with the guidance of faculty members or by working on research field crews. Some of this work has even resulted in peer-reviewed publications, such as the two listed below in which the undergraduate student is highlighted in bold.

- **Bickford, I.N.**, P.Z. Fulé, T.E. Kolb. 2011. Growth sensitivity to drought of co-occurring *Pinus ssp.* along an elevation gradient in northern Mexico. *Western North American Naturalist* 71: 338-348.
- Laughlin, D., J. Chaitanya, P.M. van Bodegom, **Z.A. Bastow**, and P.Z. Fulé. 2012. A predictive model of community assembly that incorporates intraspecific trait variation. *Ecology Letters* 15: 1291–1299.
- **Looney, C.E.**, B.W. Sullivan, T.E. Kolb, J.M. Kane, S.C. Hart. 2012. Pinyon pine (*Pinus edulis*) mortality and response to water addition across a three million year substrate age gradient in northern Arizona, USA. *Plant and Soil* 357: 89-102.

NAU offers some funding to support undergraduate research through a competitive program known as the Hooper Undergraduate Research Awards. Forestry students have been very successful in competing for these funds and have conducted projects on topics as diverse as the role of soil arthropods in belowground litter decomposition with climate change and aspen regeneration and stand dynamics following the Schultz Fire on the Coconino National Forest.

Also, over the years many of our students have had the opportunity to work with the NAU Ecological Restoration Institute (ERI). Many of the students who have worked either with the ERI or SOF faculty have developed their interests in research to the degree that they have gone on to graduate school. Projects have ranged widely, from ecological and biological topics to ones focused on the use of wilderness and recreational areas.

### ***10. Discuss where and how professional ethics are incorporated into the professional curriculum and reinforced by faculty.***

The development of professional ethics in a university setting typically begins with the subject of academic integrity, which at NAU is part of the Student Code of Conduct that all students are introduced to via the Student Handbook (<http://nau.edu/Student-Life/Student-Handbook/>) and various other means, and that is enforced by our faculty. Most course syllabi either contain an explicit policy regarding academic integrity or refer students to the official NAU policy on this subject.

The most significant exposure to forest resource-specific ethics currently is in Semester D, which contains an ethics component that is delivered over a three-week period and that includes a range of exercises, case studies and discussion (see the FOR 423C-424C syllabus for some additional details). Included in this was the use of a commercial product designed to help students assess their own framework and viewpoints as they relate to making ethical decisions.

In FOR 360, Natural Resources Policy, students study Aldo Leopold's essay *The Land Ethic* and are shown how it has impacted the SAF's own Code of Ethics. They are also occasionally asked to consider ethical issues as they affect the passage of laws, environmental justice, and other forest resource issues with an ethical dimension.

Students may be exposed to professional and/or personal ethics in a variety of other courses, including Liberal Studies courses and courses in wilderness or wildlife management, which typically include material on the ethics of wilderness use and the treatment of animals, respectively.

### ***11. The New Curriculum***

Although not specified in the SAF Guidelines we have added this section to describe the curriculum that has now been approved for implementation beginning with the 2013-2104 academic year. Information on this new curriculum is provided in Appendix C, which includes not only Forms A-1 and B-1, but also a document that summarizes the changes and a new degree progression plan that will be used for student advising.

The changes were the result of a two-year-long process of discussion and review, and were driven primarily by the need to (1) make degree progression easier for our students, especially transfer students, (2) update elements of our curriculum, especially how we handle GIS, (3) separate the capstone work from lecture-type content in the senior year, and (4) address the new realities of a reduced faculty and less credit being given for team teaching.

The changes are for the most part organizational, rather than fundamental changes in the material that is taught. The main exceptions to this are (1) dropping the requirement for CIS 120, Introduction to Computer Information Systems, and adding the requirement for FOR 225, GIS Tools in Forestry.

Examples of the organizational changes including breaking up the current FOR 315/316 silviculture component of Semester A into completely separate courses that will be taught in Semester A and C, and breaking up the courses that were part of Semesters C and D into more discrete units.

## Standard III: Forestry Program Organization and Administration

***1. Document that the program is administered by a person carrying the equivalent title and authority of administrators of comparable units in the institution. Present an organizational chart of the forestry program, showing its relationship to the institution's central administration.***

The Forestry BSF program is housed in the SOF, which is one of 10 degree-granting academic units within the College of Engineering, Forestry and Natural Sciences (CEFNS). Each of these academic units is headed by an individual of equivalent authority, although the titles of these individuals vary and include Chair (7 units), Director (2 units), and Executive Director (the SOF). The heads of each of the 10 academic units report directly to the Dean of CEFNS and meet with the Dean as a group on a monthly basis.

The current SOF organization is shown in Figure 1. The SOF includes 20 tenure-track/tenured faculty, three research faculty, several part-time instructors, and 32 adjunct faculty. It also includes five full-time staff members, three part-time staff members (not including staff working on research-related grants) and several student workers. Not listed in Figure 1 are employees that are supported directly by research or extension-related grants and that do not provide administrative or student support to the SOF as a whole. Over 100 part-time and/or temporary employees are hired each year to support the administrative, teaching, research and outreach operations of the SOF.

The SOF is administered by the Executive Director. The Executive Director directly supervises most of the administrative staff, as well as all tenured/tenure-track and part-time faculty with the exception of Regents' Professor Wally Covington. The Executive Director also supervises the research faculty, although in practice they work much more closely with faculty members with whom they collaborate on research or outreach projects. In cooperation with the other full-time faculty, the Executive Director also oversees the appointments of the adjunct faculty.

The SOF relates to the central administration through a chain of command that goes from the Dean of CEFNS, to the Provost & Vice President for Academic Affairs, and finally to the President.

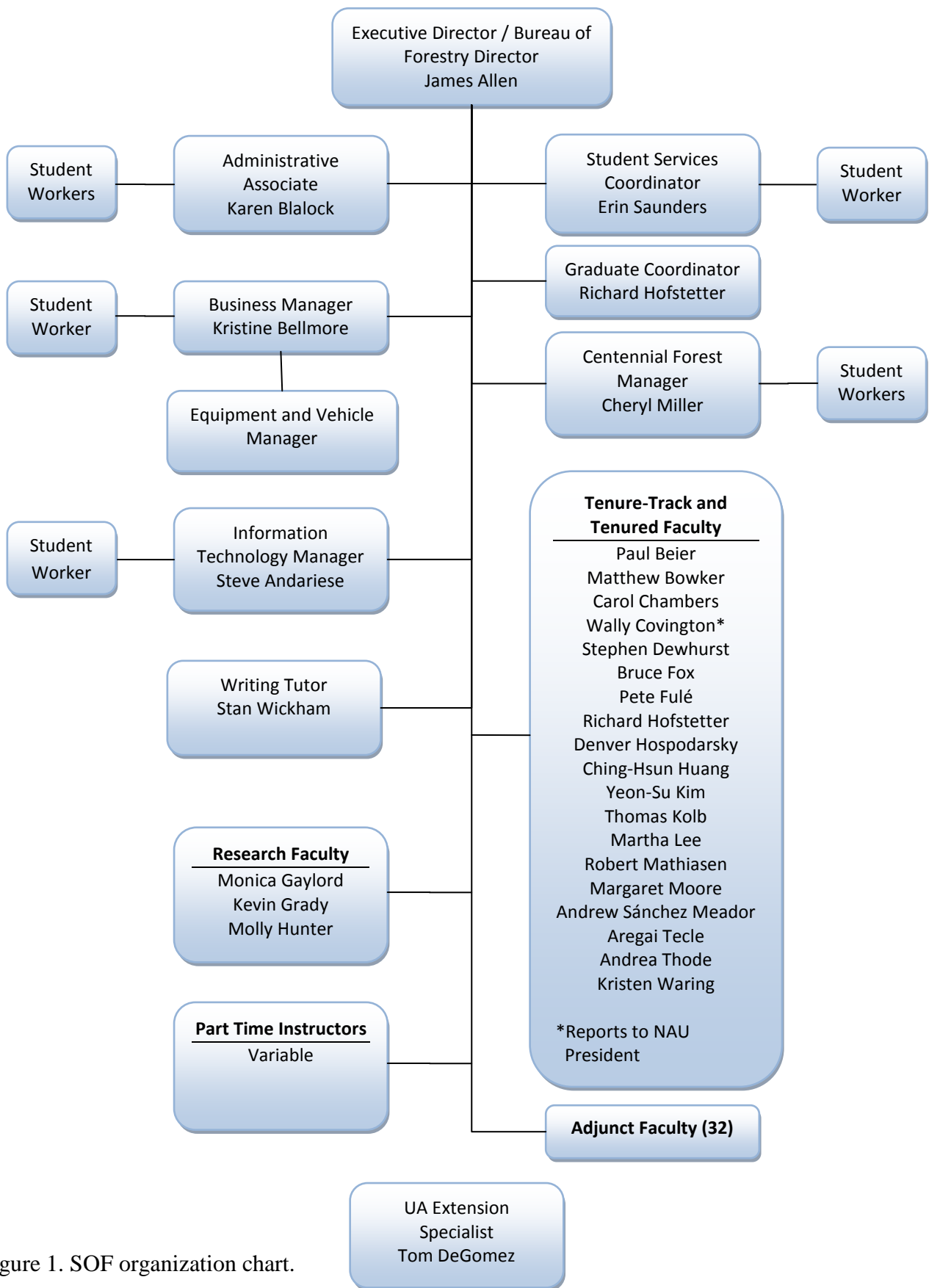


Figure 1. SOF organization chart.



***2. Document that high priority is given to quality instruction through faculty appointments, evaluation, and recognition of performance.***

Quality instruction is a core expectation of all tenured and tenure-track faculty, as well as all part-time faculty. Teaching experience is listed as a preferred qualification for all advertised faculty positions and is typically evaluated in part through a seminar and/or a teaching demonstration during the campus interview process. Numerous opportunities for the improvement of teaching are available once a faculty member is hired, such as taking an SOF course entitled Teaching Practicum (FOR 693) or participating in the teaching-related faculty development programs that are offered by the University several times per year (see Standard VI, Section 3 for more details about this program).

Faculty member's teaching evaluations are included in the files provided to the SOF's Annual Review Committee (ARC) and Faculty Status Committee (FSC) each fall. In the case of the ARC, the teaching evaluations are considered when making a recommendation on the faculty member's annual performance rating. In the case of the FSC, teaching evaluations are considered in the cases of promotion and tenure decisions and for retention recommendations for non-tenured and non-tenure-track faculty.

There are two teaching awards presented each year, including one that is awarded by the faculty and another that is awarded by the student chapter of *Xi Sigma Pi*. In addition, teaching-related performance was one factor considered when recommending faculty members during the fall of 2012 as part of a NAU-wide program to recognize and reward "exemplary performers."

***3. Document that the forestry program has adequate staff resources with competencies needed to support the students, faculty, and administration.***

The SOF has a small but highly effective central support staff consisting of five full-time positions that are supported primarily by state funds, including:

- Administrative Associate
- Business Manager, Senior
- Centennial Forest Manager
- Manager, Information Technology
- Student Services Coordinator

All of the staff positions listed above are filled through competitive searches that include advertised vacancy announcements with specific minimum and preferred qualifications that are appropriate for the position.

In addition, the School supports several other full- or part-time staff positions through a variety of primarily "soft money" funding sources and that may be filled either through competitive searches or waivers of recruitment. These include:

- Diversity Coordinator
- Equipment and Vehicle Manager (part-time and generally filled by a student since budget cuts in 2008/2009)
- Fire Program Coordinator
- Research Associates/Postdoctoral Scholars
- Writing Tutor

A cadre of student workers also supports the general administration of the SOF. They provide standard office support, support to the Business Manager, and staff the IT Help Desk. Usually there are between four and six student workers providing these services.

Several staff positions have been lost in the past five years as a result of state budget cuts to the University. These include:

- Equipment and Vehicle Manager (used to be a full-time position supported with state funds)
- Office Specialist
- Systems Analyst, Senior

Some of the staff support that has been lost over the past five years has been made up for by greater support from other units on campus (e.g., Information Technology Services has centralized some types of support), by increasing the number and/or hours allocated for student workers, and by shifting some responsibilities to soft money-supported positions. The SOF, however, has continued to experience a gradual erosion of support that began prior to the previous accreditation review and has affected some aspects of its operations. Managing shared spaces and equipment, for example, have become more difficult without a full-time and relatively permanent Equipment and Vehicle Manager.

***4. Present the published procedure for evaluating and accepting students and for transferring credit to fulfill the general and professional education requirements in the forestry curriculum at the bachelor's or accredited master's level. Document that transfer courses, advance placement courses, and courses accepted for students in an accredited master's degree program are equal to or exceed the content and standards of the accepting institution's courses. In accordance with the Family Educational Right to Privacy Act (Buckley Amendment), visiting team members may ask to review files for students to assess compliance in this area.***

Admissions requirements for undergraduate freshman students and transfer students are available on the NAU Undergraduate Admissions website (<http://nau.edu/admissions/>). In the case of international undergraduate students, of which there is seldom more than one or two at any one time, there is a separate website available ([http://international.nau.edu/international\\_admissions/](http://international.nau.edu/international_admissions/)). Key details from these websites are presented below.

### Admission of Freshman Students:

Potential freshman will be offered admission if they have a 3.0 or higher core GPA<sup>3</sup> and have no deficiencies in the required college preparatory courses. Applicants will be considered for admission if they have a 2.5 core GPA and have no more than one deficiency in any two areas in the college preparatory courses. If applicants have a combination of a math and lab science deficiency, they are not admissible.

### Admission of Transfer Students:

Transfer students are considered as high school graduates who have enrolled at a college, university or any other school since graduating from high school and have earned at least 12 college credits.

Transfer students will be offered admission if they have earned a minimum of 35 credits and the AGEC or the California IGETC<sup>4</sup> with a cumulative GPA of 2.5; or earned an associate's degree with a cumulative GPA of 2.0. They will be considered for admission if they have a 2.0 or higher GPA (on a 4.0 scale) in at least 24 transferable academic college credits. Transfer students with fewer than 24 transferable academic units, need to submit transcripts of all college work and their high school records.

### Exceptions that Apply to Freshman or Transfer Students:

Students with non-traditional backgrounds may be considered for admission under a different set of requirements, including the following options:

- For students who will be 22 years of age or older when they begin classes at NAU, their overall high school GPA or a combination of high school and any college work will be used for evaluation.
- Students who have earned a GED with the requisite minimum score will be admitted.
- Students who have completed an associate's or higher level degree from a regionally accredited post secondary institution with a minimum 2.0 GPA (A= 4.0) if they are an Arizona resident and a minimum GPA of 2.5 if they are not an Arizona resident will be admitted.
- Students who have completed the AGEC with a minimum 2.5 GPA if they are an Arizona resident and 2.5 GPA if they are a nonresident will be admitted.
- Home schooled students will be admitted if they provide a high school transcript and ACT or SAT composite test scores. ACT scores of at least 22 (Arizona resident) or 24 (non-resident) or an SAT score of at least 1040 (Arizona resident) or 1110 (non-resident) are required.

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<sup>3</sup> GPA is based on a 4.0 scale and is calculated using only the 16 core courses listed under course requirements on the Undergraduate Admissions website.

<sup>4</sup> AGEC: Arizona General Education Curriculum IGETC: Inter-segmental General Education Transfer Curriculum.

### Admission of International Students:

For international students, the academic criteria listed below apply. There is also a requirement to provide proof of financial support.

1. Applicants must submit official transcripts for all secondary and college/university education. All transcripts/marksheets must be submitted in English. A minimum GPA of 2.5 out of 4.0 is required both for freshmen and transfer students.

2. English proficiency: Applicants from countries where English is not the official language must have test scores submitted directly from a testing agency. Options and minimum scores required for admission include:

- TOEFL: 525 PBT, 70 IBT, or 195 CBT.
- IELTS: 6.0 band or higher.
- ACT English Sub Score: 21 or higher.
- SAT Verbal Score: 510 or higher.

Students from countries where English is the official language may submit proof of sufficient English coursework as specified in the admissions guidelines. Also, students who fail to demonstrate sufficient proficiency in English may be admitted but required to take an English placement test upon arriving and, if deemed necessary, enroll in NAU's program in intensive English.

### Acceptance of Transfer and Advance Placement Courses:

The Undergraduate Admissions and Orientation Office evaluates transcripts to determine the number of transfer credits accepted and how those units will count toward satisfying Northern Arizona University's Liberal Studies requirements. Academic departments evaluate transcripts to determine how any transfer courses may count toward students' major and minor requirements. In the SOF this is done by the Student Services Coordinator, although the Executive Director or faculty members may be consulted in some cases.

Articulation agreements have been developed for many in-state and out-of-state colleges, along with course equivalency guides. These guides have been developed by comparison of NAU course content with the courses of those other institutions. In some cases, SOF faculty members have been involved in helping to make equivalency determinations. Most courses for which equivalency determinations have been made are for general education courses, and these are made by articulation agreement coordinators, often in consultation with faculty members from relevant NAU academic units. More detail on the acceptance of transfer courses can be found at: [http://www4.nau.edu/aio/transfer\\_credit\\_policy.htm](http://www4.nau.edu/aio/transfer_credit_policy.htm).

Students who took a College Entrance Exam Board Advanced Placement course in their secondary school and received a score of 4 or 5 on it receive credit *as well as* advanced placement. For some exams, students can receive credit with a score of 3. More details on the

acceptance of advanced placement courses can be found at:

[http://www4.nau.edu/academiccatalog/2011/Introduction/Important\\_Policies/Undergraduate/CreditsTestingPlace/AdvancedPlacement.htm](http://www4.nau.edu/academiccatalog/2011/Introduction/Important_Policies/Undergraduate/CreditsTestingPlace/AdvancedPlacement.htm).

***5. Document that policies and processes for both short- and long-term planning of academic programs detail how periodic reviews and updates are conducted.***

Arizona Board of Regents policy (ABOR 2-208) requires review of all academic programs every seven years. Exceptions may be made, however, for externally accredited programs, which generally can be reviewed on the schedule established by the accrediting organization. While the SOF's graduate programs are reviewed on the ABOR-mandated seven-year cycle, the periodic review of its undergraduate program therefore conforms to the Society of American Foresters' accreditation schedule.

The *Academic Program Review Guidelines* document, which can be accessed at [http://www2.nau.edu/~d-ugstdy/apr/program\\_review\\_guidelines.pdf](http://www2.nau.edu/~d-ugstdy/apr/program_review_guidelines.pdf), provides details on how to conduct a program review. Much of the guidance is relevant in the context of an external accreditation review. This statement from the document applies equally well to the review conducted under the auspices of the SA and highlights the relationship between the program review and planning processes:

“Program reviews are a means to ensure advancement of the quality of Northern Arizona University's academic programs. The process enables a comprehensive assessment of program goals, infrastructures, operations, and outcomes in relation to the mission and strategic plan of the university. The program review process facilitates dialogue among the provost, dean and program leadership that leads to the development of a plan for continued enhancement of the program.”

One outcome of the SAF accreditation process, then, will be the development of a plan of action that will be submitted for approval by the dean and the provost. While a key component of the plan will be to address any immediate concerns raised during the accreditation process, it will also include components that take a longer-term perspective.

Outside of the mandated program review and planning process, other planning efforts are conducted through faculty meetings, curriculum committee meetings, and ad hoc activities. For example, planning on faculty hiring priorities is conducted through a process that involves a call for faculty hiring proposals, which specify the discipline requested and the rationale, followed by a discussion of the proposals received and a vote at a faculty meeting. An example of a recent ad hoc activity was the roughly two-year lifespan of our “curriculum review committee,” which undertook an extensive review and revision of our undergraduate curriculum, the results of which are detailed in Standard II. This group consisted of the regular members of the curriculum committee, plus a number of other faculty members with an interest in curriculum issues.

**6. Document in detail the process and methods for assessing educational outcomes of the specific curricular elements articulated in Standard II. Indicate whether academic and professional goals are being met, the elements most contributing to program success or lack thereof, and the means by which assessment findings are used to enhance program outcomes. Document that the interests of students and external constituents are represented in the assessments.**

Since 2004 the SOF has participated in periodic program assessments that are coordinated by the NAU Office of Academic Assessment. The SOF was awarded the “Seal of Academic Achievement” from the NAU Office of Academic Assessment in 2010. This award recognizes significant implementation of an outcomes assessment plan through the collection and sharing of various outcomes data. The SOF Assessment Plan and the Assessment Report for 2009, the last year that a report was submitted, are provided in Appendix E.



In addition to the university-level program assessment, the SOF assesses its undergraduate program in two other formal ways. First, feedback is sought from students for each course using a structured course evaluation form/questionnaire. During the past ten years, the SOF has generally used a NAU-provided instrument, but in the past two years we have experimented with two commercial products, including the IDEA and SmarterSurveys/SETE course evaluation products. During the fall of 2012, the SOF was one of two academic units to pilot the SmarterSurveys/SETE course evaluation system, which may be adopted for use by the whole campus in the fall of 2013. Second, feedback is obtained about the program, courses, faculty and staff, facilities, and policies via an on-line exit survey that is available to all graduating students in the last month of each spring semester. Results of the survey are distributed to all faculty and may be discussed in faculty or curriculum committee meetings.

Informal means of program assessment are also employed. Like many other forestry programs, our faculty and staff get to know the students well and this leads to informal channels for feedback. This type of feedback can occur in offices, at club meetings, and during trips of various sorts, among other places. The Executive Director maintains an open door policy and attempts to create an environment in which students feel comfortable coming to him to bring up concerns, make suggestions, or make requests. Also, the faculty and some staff have the opportunity to interact with alumni and employers on a relatively frequent basis, and this often

leads to discussions regarding how well our graduates are prepared and how the program might be improved.

While most of the feedback we receive on our program is positive, criticisms of instructors or various aspects of our program do occur. Also, suggestions for curriculum revisions are occasionally made, the most frequent of which, perhaps, has been to incorporate more exposure to GIS into our program. Some of these criticisms and suggestions were important factors that led us to undertake the major curriculum revision described in Standard II. They have also affected both teaching assignments and faculty evaluations.

## Standard IV: Faculty

***1. Complete Document C-1, C-2, and Document D; follow the format as presented. Use Document C-1: Background Summary for Faculty Reporting to the Forest Resources Program Head, to show that faculty have a diversity of backgrounds as evidenced by varied professional experiences and education relevant to forestry from a variety of academic institutions. Use SAF Accreditation Handbook, 2012 Edition Page 35 Document C-2: Background Summary for Faculty Teaching Courses Listed in Forms B-1 and B-2 but NOT Reporting to the Program Head to indicate faculty from other departments or outside agencies who teach required professional courses or restricted electives. Document any use of individuals from outside the forestry program.***

***Use Document D: Academic Summary for Faculty Reporting to the Forest Resources Program Head, to show the budgeted time allocation for faculty members who report to the forest resources program head; include adjunct or contract faculty who hold joint appointments or are otherwise part-time members of the forestry faculty. List vacant positions now authorized and for which funding is available. Do not list emeritus faculty unless actively teaching. Document D must document that a minimum of eight full-time equivalent (FTE) faculty members who participate in the program have their primary academic responsibilities in the forestry program and report to the responsible academic head.***

Document C-1 and Document D are presented in Appendix F. Document C-2 is not applicable in our case.

The School of Forestry currently has 20 tenured or tenure-track faculty, including the Executive Director. It also has three non-tenure-track research faculty. All faculty members except Regents' Professor Wally Covington report to the Executive Director. Dr. Covington's primary assignment is to serve as the Executive Director of the Ecological Restoration Institute and he reports directly to the NAU President. He advises graduate students, but is not active in the BSF program. One faculty member, Andrew Sánchez Meador, has a 51% assignment with the SOF and a 49% assignment with the Ecological Restoration Institute. The Executive Director only supervises the SOF portion of Dr. Sánchez Meador's assignment.

The faculty is diverse in many ways, including their educational backgrounds, forestry sub-disciplines represented, gender and to a lesser degree ethnicity. Faculty members obtained their terminal degrees from a total of 14 different institutions, including institutions from widely varying parts of the U.S. Nine of the 23 faculty members are female which, at 39%, is believed to be one of the highest percentages of any forestry programs in the U.S. Three faculty members are originally from countries other than the United States.

In addition the regular faculty described above, there is one staff member who also regularly serves as an instructor, a variable number of part-time instructors, and 32 adjunct faculty members. The staff member who is involved in undergraduate teaching is Cheryl Miller, the Centennial Forest Manager. The adjunct faculty members participate in the SOF's activities in different ways, such as by serving on graduate student committees, engaging in research with our faculty, providing guest lectures, and occasionally by co-teaching courses. For the most part,



they are more active at the graduate level. A list of adjunct faculty, with a brief description of each, is provided in Appendix G.

***2. Complete Document E: Individual Faculty Information for each forestry faculty member who teaches forestry or forestry-related, professional-level courses required in the curricula.***

This information is provided in Appendix H.

***3. Document that the faculty provide high quality instruction, are empowered to keep the curriculum current and in concert with the program's educational goals and objectives, and provide effective guidance for students.***

The quality of faculty instruction is monitored primarily through structured course evaluations administered to students. Informal feedback is also received occasionally, as well as input from sources such as the annual exit interviews and facilitated discussions that typically take place after the completion of Semester A and Semester B.

In most cases the feedback received on faculty instruction is very positive, but some faculty members have received below average and even poor course evaluations. In a few cases, this involved assistant professors who were in their first or second years. Those faculty members were encouraged to take our Teaching Practicum course (FOR 693), to seek other forms of assistance (e.g., mentoring), and to address specific concerns raised in their evaluations. Virtually all of those faculty members have made very good progress and have seen their evaluations improve considerably. In other cases, it appears that faculty members were not ideal matches with the courses for which their evaluations were below average. Some reassignments or other types of adjustments (e.g., bringing in additional instructors) have been made because of the feedback received.

Faculty are empowered to keep the curriculum content current both in the courses they teach and in the curriculum as a whole. In the case of individual courses, one way that faculty members help keep the curriculum current is through the development of new courses. Since the last self-study, several new undergraduate, co-convened or 500-level courses (the latter of which are open to seniors) have been developed on topics such as non-native species (FOR 443/543), fire monitoring and modeling (FOR 451) and wetlands (FOR 560). All faculty are expected to keep the content of their courses current and are expected to engage in the types of activities such as research and conference attendance that help keep them up to date in their respective fields.

The faculty as a whole are responsible for the overall curriculum, but the Curriculum Committee serves as the focal point for new curriculum proposals and other curriculum-related matters. The Curriculum Committee is chaired by the Executive Director and its other voting members are the Graduate Coordinator and the coordinators of Semesters A, B, C and D. The Student Services Coordinator and the Administrative Associate also attend Curriculum Committee meetings as non-voting members. The Curriculum Committee reviews curriculum proposals and conducts

votes, but the ultimate decision on significant curriculum issues is made by the faculty as a whole, typically through a process of discussion and voting at a faculty meeting.

All faculty members are expected to provide guidance to undergraduate students, but the primary responsibility for academic advising rests with the Student Services Coordinator. Faculty are therefore more involved in providing guidance in other forms, such as guiding students involved in independent studies or undergraduate research, rather than providing advice related to course loads and degree progression. Each of the forestry certificates has one or two faculty members assigned as coordinators, who are occasionally called upon to discuss their certificates with students who are deciding which certificate to choose.

***4. Document faculty expertise in their assigned areas of instruction; ability and effectiveness in instructing; aptitude for working closely with students; and ability to stimulate independent thinking and provide intellectual leadership.***

The background and expertise of each faculty member is presented in Document E (Appendix H). A comparison of our faculty members' educational qualifications and research activity with their assigned areas of instruction (Document D; Appendix F) demonstrates that their interests and expertise are closely aligned with what they teach. As can be seen in Document E, many of our faculty are highly productive researchers and stay very current in their fields through their research, conference attendance, etc. They clearly have the expertise needed to teach their assigned courses and to bring some of the latest information in their respective fields to our students.

Faculty members' aptitude for working closely with students, as well as their ability to stimulate independent thinking and provide intellectual leadership can be demonstrated through a variety of means. One way is to look at the number of undergraduate research (FOR 485) and independent study (FOR 697) courses offered by our faculty this academic year, which are listed just for this academic year in Document D (Appendix F). Several of our faculty have worked very closely with students to conduct undergraduate research, which has then been published and/or presented at conferences. A recent example is a student who works with Associate Professor Richard Hofstetter; the student won second place in the student presentation competition at the 2012 Entomological Society of America National Meeting in Knoxville, TN. Most of our research-intensive faculty have a welcoming attitude towards undergraduates with an interest in research. These faculty have shown a high degree of willingness to offer individualized courses and to employ some of these students as research technicians.

Some of the activities of our student organizations also provide opportunities for close interaction between faculty and students in ways that can stimulate them to think more independently and/or to think more about leadership. We make a significant effort each year to help our students attend professional conferences, for example. Faculty often interact with these students while at these conferences in an informal way, and by doing things like discussing some of the presentations, can help students to broaden their horizons and think a little "bigger" than they might otherwise do. A total of 30 undergraduates attended the 2012 SAF National

Convention in Spokane, and several others attended the national meetings of organizations such as the Association for Fire Ecology and the Entomological Society of America in 2012.

***5. Document faculty involvement in professional development and scholarly activities appropriate to their disciplines.***

Professional development activities can take many forms. Some of these, such as conference participation and both short and semester-length courses, are documented in the faculty's CVs (Appendix H). Below, documentation is provided for one other forms of professional development – faculty sabbaticals. A general overview of scholarly activities is also presented, but much more detail can be obtained through a review of the faculty's CVs.

Faculty Sabbaticals:

NAU and the SOF recognize the importance of faculty sabbaticals for faculty development and renewal. All tenured or tenure-track faculty are therefore eligible for sabbatical after six years of continuous service. Despite challenges such as university-wide budget cuts, no faculty members who have applied have been denied the opportunity to take a sabbatical. Faculty members who took sabbaticals since the previous program review are listed below. In addition, three faculty members have been approved for a sabbatical during all or part of the 2013/2014 academic year, including Paul Beier, Pete Fulé, and Ching-Hsun Huang.

Current faculty members who have taken one or more sabbaticals since the completion of the last self-study in 2003 include:

- Paul Beier: 2006/2007
- Carol Chambers: 2004/2005, 2011/2012
- Stephen Dewhurst: 2012/2013
- Pete Fulé: 2005/2006
- Yeon-Su Kim: 2008/2009
- Thomas Kolb: Fall 2011
- Robert Mathiasen: 2004/2005, 2011/2012
- Margaret Moore: 2007/2008
- Aregai Teclé: 2009/2010
- Andrea Thode: 2011/2012
- Kristen Waring: 2012/2013

The activities undertaken as part of the faculty sabbaticals have been diverse. Three faculty members spent their sabbatical years overseas with the support of Fulbright Fellowships, including Pete Fulé (Spain), Paul Beier (Ghana) and Aregai Teclé (Ethiopia) and others have also spent part of their sabbaticals in other countries, including Carol Chambers (Nicaragua) and Bob Mathiasen (Australia and Mexico). All faculty members are required to submit a report on their sabbatical activities and to present a seminar upon their return.

## Nature and Breadth of Faculty Scholarly Activities

SOF faculty members published at least 487 refereed articles and book chapters from 2004 through 2013 and so far have an additional 11 publications in press (Appendix I). The average rate of publication was 52 per year from 2004 through 2012.

The SOF has been recognized for its research productivity and the impact of its publications in several ways in recent years. The Faculty Scholarly Productivity Index ranked NAU tenth nationwide for research productivity in forestry in 2007 (the last year for which we have access to the ranking). A study published in the *Journal of Forestry* in 2006 ranked NAU sixth among North American forestry programs for the number of citations of its publications per faculty member<sup>5</sup>. The research of some of our faculty members extends into the field of conservation biology, and was clearly one of the main reasons why NAU was ranked in the top 15% of 317 programs nationwide in terms of research productivity in this field<sup>6</sup>. An impressive number of faculty members have “citation classics,” – publications that have been cited 100 times or more. Faculty members with papers cited 100 or more times, according to Google Scholar-based search on 2/15/13, include Jim Allen (1 paper, 1,215 citations of all papers combined), Paul Beier (13 papers; 4,194 citations), Wally Covington (17 papers; 7,063 citations), Pete Fulé (8 papers; 4,794 citations), Tom Kolb (10 papers; 4,582 citations), Margaret Moore (10 papers; minimum of 3,613 citations<sup>7</sup>), and Andi Thode (2 papers, 517 citations).

In addition to the impact that the SOF has among its scientist peers, the School takes pride in the applied nature of its research, its collaboration with management agencies, and the impacts of our research on management actions. Much of our research is funded by government agencies in response to specific management needs. We collaborate with, or do research specifically to serve the US Forest Service, National Park Service, Bureau of Land Management, US Fish and Wildlife Service, Arizona State Lands Department, Arizona Game and Fish Department, federal and local Departments of Transportation, local governments, conservation NGO’s and tribal organizations.

Several faculty contribute substantially to the work of the Ecological Restoration Institute (ERI), which is NAU’s most visible and high-impact effort to join forest science, research, and management. The ERI is led by a SOF faculty member, Wally Covington, and is staffed in part by several SOF graduates. Although the focus of much of the SOF’s research has been in the Southwest, our research efforts extend further afield, including Mexico, Europe, and Africa.

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5 Laband, D.N. and D. Zhang. 2006. Citations, publications and perceptions-based rankings of the research impact of North American forestry programs. *Journal of Forestry* 104(5): 254-261.

6 Grant, J.B., J.D. Olden, J.J. Lawler, C.R. Nelson, and B.R. Silliman. 2007. Academic Institutions in the United States and Canada Ranked According to Research Productivity in the Field of Conservation Biology *Conservation Biology* 21(5): 1139-1144.

7 It is difficult to sort out all the citations for common names like MM Moore, so we stopped counting citations that definitely hers at approximately the number listed.

**6. Document that the program follows its institution's policies and guidelines in the recruitment and retention of faculty that reflect cultural, ethnic, and gender diversity.**

All faculty recruitment efforts are subject to Human Resources and Affirmative Action guidelines, some of which specifically address cultural, ethnic, and gender diversity. One important guideline is to assure that the advertising for all faculty positions includes forms of outreach that will help attract diverse applicants. In addition to outlets such as the *Forestry Source* and *The Chronicle of Higher Education*, faculty positions are therefore advertised in outlets such as *Women in Natural Resources*.

Of the 10 tenure-track faculty hired since the last self-study, three are female and one is from an under-represented group. Also, two of the three research faculty members are female. Out of the 20 tenured or tenure-track faculty, seven are female and three are from an under-represented group (two are in both categories). Although the SOF faculty was not diverse for roughly the first half of its nearly 55-year history, its more recent record of recruiting and especially retaining diverse faculty is relatively strong. All but one of the female faculty members that have ever been hired by the SOF are still on the faculty, including Professor Margaret Moore, the first female faculty member, who was hired in 1986. Of the five faculty members from under-represented groups who were employed by the SOF since the last self-study, three are still on the faculty and one recently retired; only one left for a position elsewhere.

## Standard V: Students

### *1. Complete Document F: Forestry Graduate Employment Summary. Summarize the forestry employment record for the forestry graduates.*

The number of recent Bachelor of Science in Forestry degrees granted by Northern Arizona University has varied from 17 in 2003 to 38 in 2007, with 36 awarded in 2012 (Figure 2). We expect the numbers of graduates to continue to increase slightly in the next few years, as a result of the large increases in enrollment experienced in the previous three years, as described in the following section.

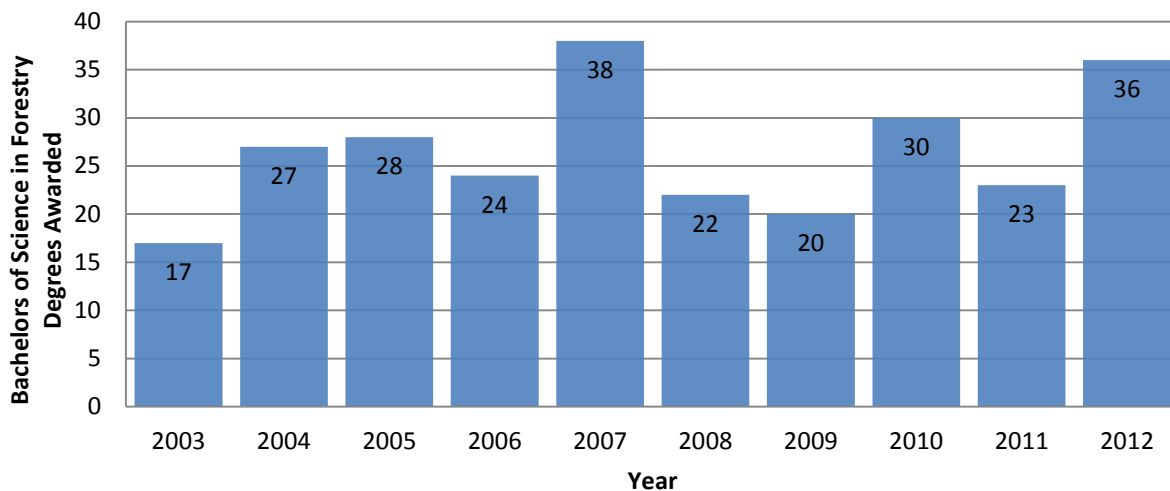


Figure 2. Annual Bachelors of Science in Forestry degrees awarded by the School of Forestry arranged by calendar year.

### Graduate Placement

Based on a graduate employment survey (Document F, Appendix J) conducted in late 2012 and early 2013 of alumni who have graduated in the past 5 years, 83% of our alumni respondents reported that they were employed in forestry or a forestry-related field or were currently in graduate school (Figure 3a). 52% of the respondents are employed in permanent positions and 20% are employed in temporary positions in forestry or a related field and another 14% are currently enrolled in graduate school (Figure 3b and Document F).

Typically, graduates are employed by a federal land management agency such as the Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, or they are working for a state agency (e.g., the Arizona Game and Fish Department, or a State Forest Service or Department of Natural Resources (e.g., Texas Forest Service and Washington State Department of Natural Resources). Utilizing personal knowledge of recent graduates, it is known that at least 33 additional alumni who did not respond to the survey are currently

employed in forestry or a forestry-related field and an additional 8 alumni are currently pursuing graduate studies in forestry.

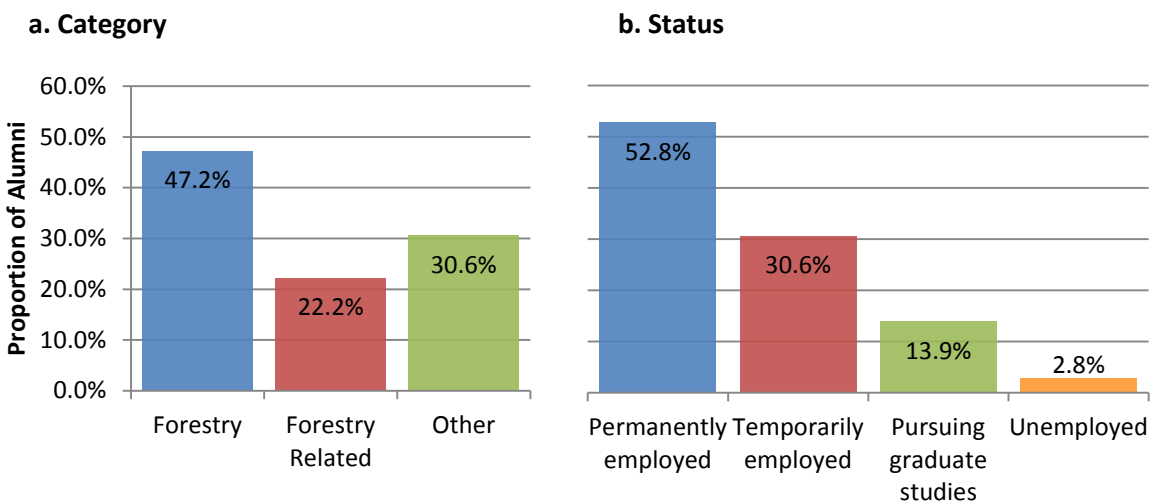


Figure 3. Proportion of recent BSF graduates (n=36) by employer category and employment status based on survey responses.

**2. Document that the program follows institutional policies and guidelines in recruiting and retaining motivated and academically qualified students who reflect cultural, ethnic, and gender diversity. Include data for accredited graduate degree students and identifiable pre-forestry students. Use Document G: Student Data Summary to show the total current undergraduate enrollment by class, gender, and race/ethnic diversity; provide those figures for the previous three years and the expected number during the next three years. Show the number of forestry graduates for the last three years and the expected number during the next three years.**

### Enrollment

At the time of the last SAF accreditation review in 2003, the SOF fall enrollment was 148 students (declared forestry majors), with 53 enrolled in the professional program (Semester A and C combined). As shown in Figure 4, the SOF undergraduate enrollment has fluctuated near 155 students, but has steadily increased since 2008 from 174 students enrolled to an approximately 30-year high enrollment of 256 students for the fall of 2011 (Document G, Appendix K). Enrollment in the professional program has also steadily increased since 2003 to 35% of the total Fall 2012 enrollment. During the Fall 2012 semester there 56 and 34 students enrolled in Semester A and C, respectively.

Although we are not able to predict future enrollment with any degree of certainty, we believe that the rate of enrollment growth will slow and that enrollment is likely to stabilize near its current number. We believe this is likely due to some recent steps we have taken, such as raising the minimum pre-professional GPA required for entrance into the professional program from 2.5 to 2.75. Frankly, we also believe that the current level of enrollment is at or very near our

capacity, given the structure of our professional program, the number of faculty we have available, and the amount and size of our classrooms.

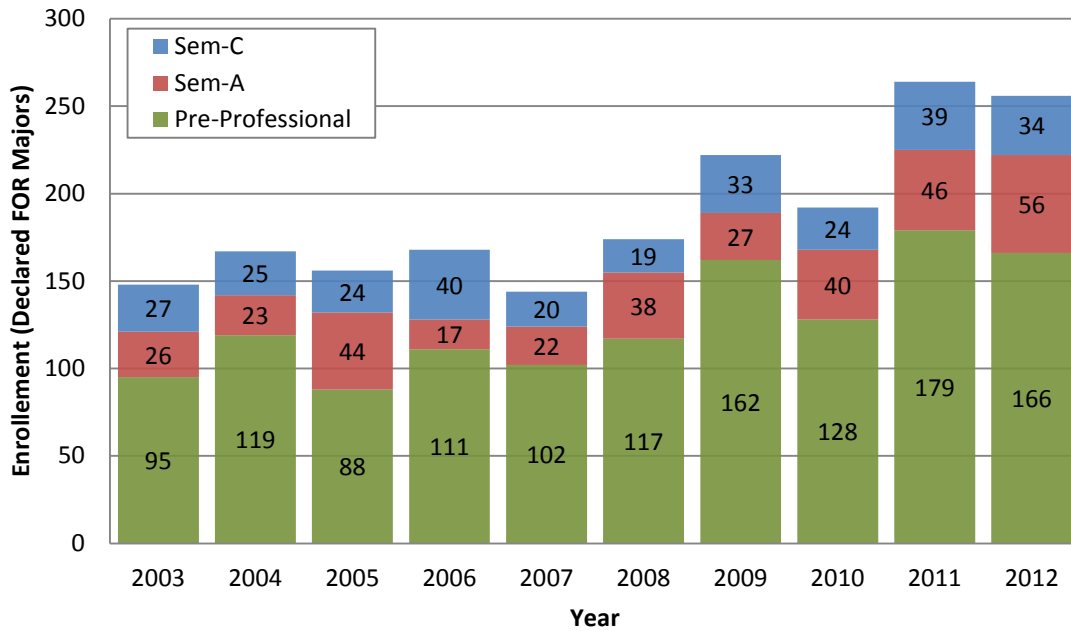


Figure 4. Annual fall enrollment (full and part time) for declared forestry majors.

Since the last SAF accreditation review in 2003 and as shown in Figure 5, the proportion of women enrolled in forestry has increased slightly to its current proportion of 23.8%, up 3% from the previous year. As seen in Figure 6, the proportion of non-white undergraduates enrolled fluctuates around 20%, with Hispanic and Native American students being the largest minorities represented. The School of Forestry has seen small but constant increases in minority enrollment (from 15% in 2003 to 22% in 2012).



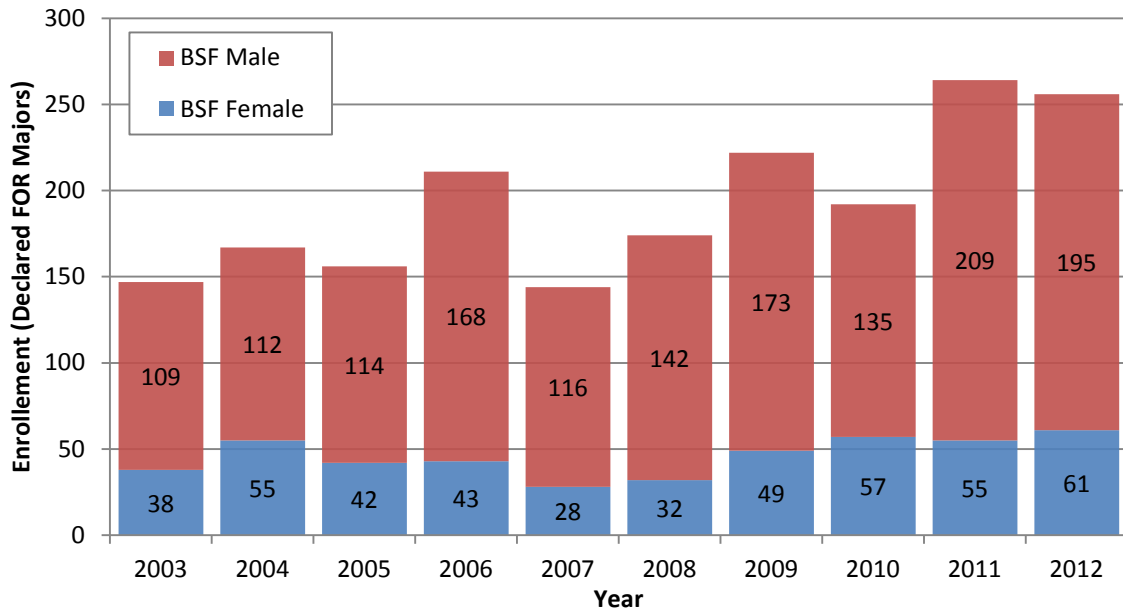


Figure 5. Annual fall enrollment (full and part time) categorized by gender for declared forestry majors.

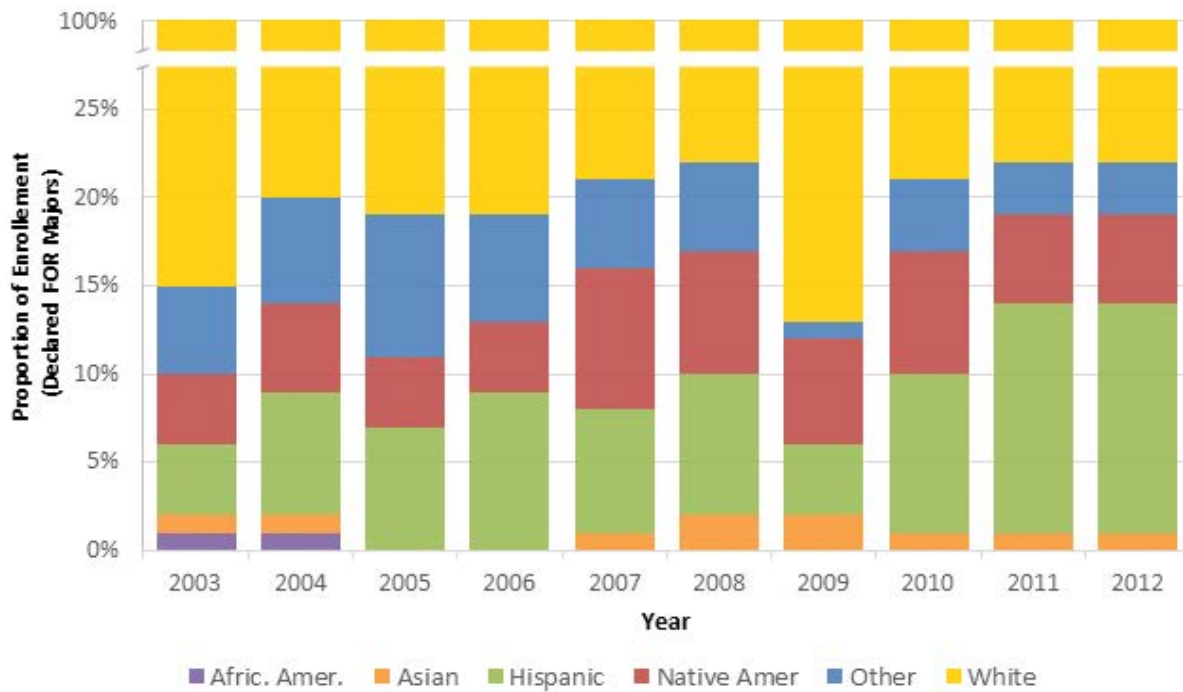


Figure 6. Annual fall enrollment (full and part time) categorized by ethnicity for declared forestry majors.

## Recruitment and Retention

The University, College and School have increased their collective and individual recruitment and retention programs in recent years. The NAU Undergraduate Admissions Office regularly sends information packets to all prospective students, hosts open houses, coordinates campus visits of prospective students and their parents, and produces a variety of promotional materials. Much of this work is coordinated at least to some degree with the colleges and departments.

The SOF plays an active role in student recruitment primarily through the work of the Student Services Coordinator and a group of forestry students known as the Student Ambassadors. Together these individuals help with open houses and other university-level recruiting events and also meet with prospective students and their families as part of their campus visits. These individuals, sometimes with the help of other faculty, staff or students, have also helped staff our school's display at various conferences, including the SAF national conventions, as part of an effort aimed at raising the profile of our school in a way that also benefits recruitment.

The SOF produces some of its own recruiting materials, including traditional materials such as brochures and table-top displays, sometimes with the help of the University Marketing Department. We have also invested time and funds into our website, including adding both a Facebook page and a YouTube channel in recent years, which can be accessed from our SOF homepage.

Upon admission, all forestry students are encouraged to attend our annual fall weekend event, which we call the Forestry Centennial Campout. Here, new students (both freshmen and transfer students) get to know the faculty, meet other new students and explore their "new classroom" - the 47,500 acre NAU Centennial Forest. We view this as an important first step aimed at community-building and student retention.

We believe that our approach to student advising, which is centered around our Student Services Coordinator position, is also an important aspect of our retention efforts. The person in this position plays a vital role in guiding our students through the curriculum and helping them find the support they need if they are encountering academic or other types of difficulties. The Student Services Coordinator also helps our students find summer employment, which is important both for retention and for the longer-term career prospects of our students. Our faculty and staff also play an important role in retention, through the various types of support they provide, assistance in finding opportunities such as undergraduate research, and through strong personal relationships that often develop. More detail on the Student Services Coordinator position is provided in Section 3 below.

Another aspect of our program that we believe aids in retention is the sense of belonging that develops through the "Treehouse" learning community for our freshmen and the various student clubs. Our Forestry Club/Student Chapter of the SAF, for example, meets weekly and engages in a wide variety of service and social activities.

Recruitment and retention aimed specifically at minorities, especially of Native Americans and Hispanics, has long been a concern and priority of both the SOF and Northern Arizona

University. We have made significant efforts to attract minority/underrepresented students through various outreach efforts and through the formation of student support groups. The SOF has worked with, and travelled to, Native American schools (e.g., Cibecue High School, on the White Mountain Apache Reservation) and other institutions with a high diversity population to increase their awareness of NAU and the School of Forestry, as well as introduce their students to current SOF students who are from their tribe or region.

The Executive Director, faculty and staff have presented information about forestry education, careers and the SOF at numerous venues, including Society of American Foresters and Wildlife Society meetings. Several faculty and students also attended the Diversity and International Forestry Reception sponsored by ArborGen at the 2012 SAF National Convention.

Once minority students are in our program, counseling and advising services are available to them through the Student Services Coordinator, the Diversity Coordinator, and through a number of university-level offices. One recent effort has been to build a support network for Native American students by creating the Native American Forestry Support Group. This group meets every two weeks and the meetings include topics such as job opportunities, scholarships, and tribal requirements; it also provides the opportunity for our Native American students to socialize with one another. This group has also brought in guest speakers from AISES (American Indian Science and Engineering Society) and the Intertribal Timber Council.

### Scholarships

To help attract and retain students, the School of Forestry offers over 50 scholarships that are awarded to students annually. The financial assistance that a scholarship provides is important in this time of tuition increases that exceed the rate of inflation. However, the intangible benefits a scholarship gives to students - recognition by the faculty, praise for performance, and acknowledgement of future potential - may mean just as much to the student recipients. We have been very fortunate to have a number of great supporters of our school, who have contributed to existing endowed scholarship funds and established new ones.

Scholarships are currently available from professional affiliates such as the Arizona Water Resources Committee, endowments such as the Charles O. Minor Endowment, and the numerous scholarships that have been established by alumni and friends of the SOF. While some of these scholarships were established 20 or more years ago, we have also had good success in recent years in establishing new scholarships. Through these scholarships, the School awarded approximately \$75,000 to our students last year, an amount that has increased almost every year for the past decade (Figure 7).

Students are informed about the scholarship application process both through email and visits to classes. This process typically starts in early January, with the applications due by February 15<sup>th</sup>. Application forms are available upon request.

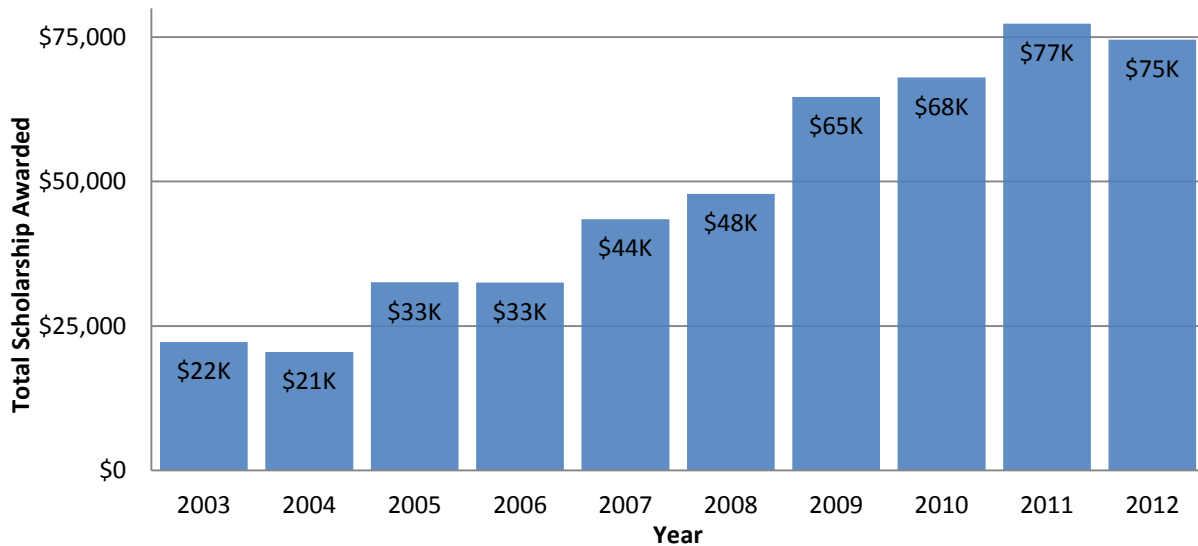


Figure 7. Annual total dollar amounts awarded in scholarships provided by the School of Forestry.

***3. Document the program's commitment to quality student advising. Document that advisors are readily available to students enrolled in the program for counsel regarding the student's academic, professional, and career opportunities.***

Advisement Counseling, Student Services, and Career Development

All undergraduate students are advised by the SOF's Student Services Coordinator and first year students are also co-advised by the Gateway Student Success Center. The Student Services Coordinator works one-on-one with each forestry student to ensure his or her successful progress through the program and if needed, work with the student on ways to increase their success in the University setting. The Student Services Coordinator is also responsible for summer internships and job placement. The School maintains an up-to-date online job placement board and hosts workshops regarding the federal hiring process.

In addition to providing support academically, each semester, the Student Services Coordinator meets with students to:

- develop and improve their résumé and cover letter
- provide information about employers and upcoming employment opportunities
- practice interviewing using common forestry interview questions
- convert their work and research experience into credit through the School's undergraduate fieldwork & research courses (via FOR 408 and 485)
- explore opportunities to expand student careers abroad through the Peace Corps and international forestry study abroad programs

The SOF firmly believes that hands-on work experience is essential to job placement and the faculty and staff is committed to helping students find internships and seasonal positions while in

the forestry program. This is primarily accomplished through a series of seminars and workshops where the students learn to:

- write résumés and cover letters; workshops are held at least once every semester
- develop interview skills
- “interview” with a real forestry employer through mock interviews held each fall in Semester A

Announcements for summer intern positions, volunteer opportunities and permanent jobs are also sent to all undergraduate students via the SOF’s undergraduate and graduate student listservs and via Facebook. Students receive these notices probably on the average at least once per week. Annually, the School of Forestry hosts a Natural Resources Career Fair where students have the opportunity to meet and potentially interview with 15-20 employers. These employers are usually advertising both permanent and summer seasonal positions and in the past have included representatives from local and regional offices of the US Forest Service, National Park Service, and Bureau of Land Management, industry companies such as Weyerhaeuser, state agencies such as the Arizona Game and Fish Department, and non-governmental organizations such as American Conservation Experience. In addition, the NAU Office of Career Services notifies the SOF of recruiting visits by forestry-related employers.

There many opportunities to work and study abroad that students can learn about through both the NAU Center for International Education and the SOF. Every other summer, there is a forestry course offered by Regents’ Professor Mike Wagner in Ghana. This course runs for three weeks and can be taken for credit. There is also a standing exchange program with Southern Cross University in Australia that allows 1-2 seniors each spring to study abroad. Other opportunities arise each year. One such opportunity will be offered in Fall 2013 through USAC (University Studies Abroad Consortium). Dr. Pete Fulé and Dr. Richard Hofstetter will be teaching abroad (in France and Costa Rica, respectively) and several of our students will be travelling with them and using the credits earned towards their BSF degree.

### Student Activities and Registered Student Organizations

Our School and its faculty encourage student participation in extracurricular activities including clubs, sports, and other student groups. Integration of students into a variety of activities and clubs encourages cohort cohesiveness and aids in retention, student academic success, and professional networking. The student organizations also provide opportunities for extracurricular personal growth, socialization, and volunteer activities.

NAU also recognizes approximately 200 other student organizations. Among them are the Association of Residence Halls, Associated Students for Women’s Issues, Native Americans United, Cardinal Key, Mortar Board, the Panhellenic Council, Interfraternity Council, Northern Lights, and many others. Student organizations are organized according to academic, advocacy, cultural, religious, service, special interest, and sports and recreational interest as well as fraternities and sororities.

Forestry faculty serve as advisers for several clubs, including the Forestry Club (also known as the Student Chapter of the Society of American Foresters), *Xi Sigma Pi*, Student Association for Fire Ecology (SAFE), and the Logging Sports Team.

The Forestry Club is an organization for students interested in forestry, ecology, botany, and the environment and currently has a membership of approximately 105. The Forestry Club is recognized by the university through the Office of Student Life and serves as the Student Chapter of the Society of American Foresters. The Forestry Club hosts several annual social events, participates in land management projects with local agencies, and organizes several camping/hiking trips throughout the year. Recent community service projects include the “Adopt an Aspen Fence” in conjunction with the Coconino National Forest; numerous projects with Habitat for Humanity and with Northern Arizona's Society of American Foresters Chapter, firewood collection and donations to the Flagstaff Food Bank. As a testament of this organization’s excellence, the NAU Student Chapter of the SAF was selected as the 2012 Outstanding Student Chapter, which is the second time in the past several years (2012 and 2009) that the NAU chapter has won this national award.

*Xi Sigma Pi* is the forestry honorary society with a membership of approximately 36. The members are active socially, professionally and academically. Guest speakers periodically share their professional expertise with the students at scheduled meetings. Finally, the society helps host the annual statewide FFA forestry Career Development Event for high school-aged students.

The Student Association for Fire Ecology (SAFE) is a student chapter affiliated with the Association for Fire Ecology (AFE) and currently has a membership of approximately 70. SAFE is committed to promoting the application of fire ecology through science and education, serves the local community through a volunteer burn crew, focuses to help students get fire experience.

The SOF recognizes that active student organizations are essential components of a total education program. A significant amount of School funds or support such as vehicle use has therefore been used to support student club activities, such as travel to professional meetings. For example, students routinely attend Northern Arizona SAF chapter meetings and both SAF and AFE national meetings.

## Standard VI: Parent Institution Support

*1. Document the degree to which the parent institution provides resources needed to support the program being considered for accreditation. Document that the parent institution provides adequate funding and other institutional support to (1) allow the program to attract and retain highly qualified faculty, staff, and administrators, and (2) provide for elements critical to the learning environment for professional foresters such as computers, spatial information technologies, specialized laboratories, and field instruction.*

### Attraction and Retention of Highly Qualified Faculty, Staff and Administrators

Through the Office of the Provost and the Dean of the College of Engineering, Forestry and Natural Sciences, financial support is provided to advertise all new tenure-track faculty positions in appropriate national and international outlets. Our two newest faculty positions were advertised in the *Forestry Source*, the *Chronicle of Higher Education* and/or *Science Careers*, the NAUFRP and Ecolog-L listservs, and a variety of more specialized websites or newsletters. The Assistant Professor of Forest Soils and Ecosystem Ecology position attracted over 50 applications, including strong candidates from across the U.S. and from as far away as Australia. Some of our staff positions also attract applicants from a wide geographic range. Our recent Centennial Forest Manager search, for example, drew applications from individuals in Alaska, Florida, Oregon and Vermont.

NAU salaries are known to be below those of our peer institutions, and we have anecdotal evidence that this has discouraged some people from applying for or accepting positions within the SOF. Nevertheless, we have been relatively successful at attracting and retaining high-quality faculty and staff. Reasons for this may be due in part to other aspects of parent institution support (e.g., the Southwest Forest Science Complex described below) and in part to the attractions of living in Flagstaff.

Recent efforts to increase faculty and staff salaries to levels closer to our peer institutions may have helped with retention, although there is no definitive evidence of this for personnel within the SOF. Efforts to match offers made to our faculty by other institutions have been modest during this accreditation cycle and have been generally unsuccessful.

### Provision of a Quality Learning Environment

Three key elements of the learning environment that we provide to our students are highlighted below, including the Southwest Forest Science Complex, our computing resources and other information technologies, and the Centennial Forest.

Southwest Forest Science Complex:

The SOF is housed on the Northern Arizona University campus in the Southwest Forest Science Complex that was completed in 1992. It consists of two wings, joined together by a large central atrium. One wing houses the SOF, while the other is occupied primarily by the Flagstaff Unit of the Forest Service Rocky Mountain Research Station.

Facilities include offices for faculty and graduate students, classrooms with multimedia capabilities, research laboratories, and two modern computer laboratories (one of which is specifically reserved for undergraduate students). Space within the NAU-owned wing of the Southwest Forest Science Complex assigned to the SOF is listed in Table 1.

Table 1. Facilities on the NAU side of the Southwest Forest Science Complex.

<b>Type of Space</b>	<b>Number of Rooms</b>	<b>Square Feet</b>	<b>Total Square Feet</b>
Auditorium	1	1,988	1,988
Lecture Hall	1	866	866
Seminar Room	1	446	446
Classrooms	4	3,200	3,200
<b>Total Classroom Space</b>			6,500
Computer Labs	2	2,674	2,674
Server/Storage Information Technology	2	233	233
	3	390	390
Student Space	2	677	677
Conference Room	2	536	536
Emeritus Faculty Office	1	144	144
Faculty Offices	19	152 (average)	2,900
Faculty Research Labs	12	720 (average)	8,644
Graduate Student Offices	5	351 (average)	1,758
Centennial Forest Offices	2	143	286
Research Offices	4	290 (average)	1,163
Administrative Offices	2	279 (average)	558

The SOF has 12 research labs. While these labs are used primarily to support faculty and graduate student research, undergraduate students also conduct research projects in them or are employed as research technicians. Most of the laboratories are allocated to specific forestry sub-disciplines, including Wildlife, Fire/GIS/Remote Sensing, Human Dimensions, Forest



Management, Entomology, Hydrology, Dendroecology, Silviculture, Ecophysiology, and Ecosystem Ecology. Each laboratory is managed by one or more members of the faculty.

In addition to the 12 labs, there are a number of other facilities with the Southwest Forest Science Complex that support research, including a walk-in cold storage unit, a room containing several freezers and drying ovens, and a fenced storage area on the loading dock for storage of equipment. Also, some of the USDA Forest Service Rocky Mountain Research Station's labs and other facilities are used routinely by SOF faculty and students.

#### Computing Resources and Other Information Technologies:

The SOF maintains 125 desktop or laptop computers for faculty, staff, and specialized research labs; 70 desktop computers in several student PC Labs; and 7 desktop computers in multimedia classroom environments. The SOF also maintains a Microsoft® Windows® Server with ten terabytes of disk space which is backed up nightly to tape. A four-year replacement plan for computers is in place for permanent full-time faculty and staff as well as PC labs, classrooms, and servers. The graduate student PC lab is open to forestry graduate students 24/7; the undergraduate PC lab is open to all forestry students Monday through Friday into the evening and six hours on Sunday evening.

Most faculty and staff members have a black and white laser printer in their office. Additionally the school supports six network accessible high volume printers (three color and three black and white laser printers) as well as a color plotter capable of handling 42 inch wide roll paper. Other peripheral devices supported in the School include several flatbed scanners, a photographic slide scanner, digital cameras, and a digital camcorder.

The above IT infrastructure is supported by the School's IT Team which is comprised of an IT Manager and a student staffed IT Help Desk. The School's IT Team is available to faculty, staff, and students for assistance and consulting services during normal business hours.

In addition to the IT environment within the School, faculty, staff, and students have access to PC/MAC computing labs and two terminal servers on campus. The terminal servers and some campus labs are available 24 /7 during the school year.

Assistance and consulting services are available through the campus Information Technology Services (ITS) department. The ITS Student Technology Center is available 24/7 and staffed by IT professionals and student workers. The Solution Center is available to faculty and staff during normal business hours and is staffed by full-time IT professionals. Additionally, the campus provides in-class and on-line training for faculty and staff in a range of software applications.

The campus supports Microsoft Windows® IIS web servers for individual faculty, staff, and student web sites. In support of the SOF's web site ([nau.edu/forestry](http://nau.edu/forestry)) the campus provides a content management system.

## Centennial Forest:

In April 2000, Governor Jane Hull signed an intergovernmental agreement creating the Centennial Forest to serve as a nationally recognized forest and model for the entire United States. The 75-year agreement between the Arizona State Land Department and Northern Arizona University specifies education, forest health, maintenance of natural forest assets and values, reduction of the risk of wildfire, and long term ecological research as stewardship objectives. The property consists of approximately 47,000 acres of forest, woodland and rangeland; most of the acreage is in two main areas to the southwest and north of Flagstaff (Figure 8). The Centennial Forest is managed by the SOF on behalf of NAU as a whole, but remains under the ownership of the Arizona State Land Division.

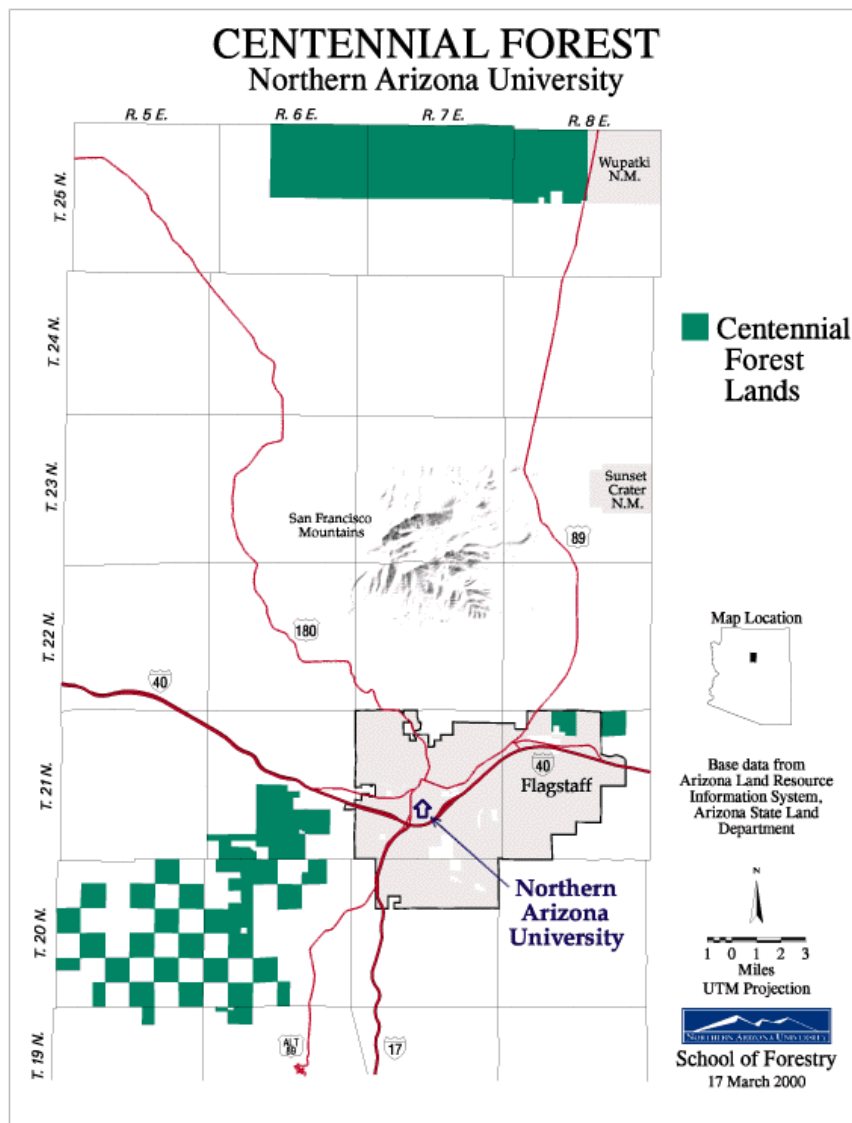


Figure 8. The NAU Centennial Forest.

Some of the most prominent activities on the forest include fuel reduction treatments, forestry research, and environmental education programs for youth. Because of proximity to campus, the southwestern portion of the Centennial Forest also serves as a primary outdoor laboratory for the BSF program.

***2. Compare support for the forestry program, including faculty salaries by academic rank, to other academic units in the parent institution and indicate changes that have occurred or are anticipated in the educational budget. Provide the forestry program budget for the current fiscal year, and indicate by percent how the budget has changed in the last three years in terms of salaries, equipment, supplies, and travel and its relationship to the overall institutional budget. To the extent data for other forestry programs are available, regional comparisons are also encouraged.***

A summary of the SOF budget for the current and previous three fiscal years (FY; July 1 - June 30) is shown below in Table 2. The budget has remained relatively stable over this period, with almost all the variation that did occur being attributable to fluctuations in the size of the faculty and therefore the salary line item. The non-salary portions of the SOF budget compare favorably with related academic units within the College of Engineering, Forestry and Natural Sciences.

Table 2. School of Forestry budget from state sources for the current and previous three fiscal years.

<b>Category</b>	<b>FY 2010</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
Salaries	\$1,634,022	\$1,555,964	\$1,656,749	\$1,785,742
Student Wage	\$30,206	\$30,206	\$30,406	\$31,052
Operations	\$60,930	\$60,930	\$60,930	\$60,930
Professional and Outside Services	\$3,014	\$3,014	\$3,104	\$3,104
In State Travel	\$14,154	\$14,154	\$14,154	\$14,154
Capital	\$42,439	\$42,439	\$42,439	\$42,439
Bureau of Forest Research	\$203,837	\$204,173	\$204,388	\$204,389
<b>Total</b>	<b>\$1,933,762</b>	<b>\$1,856,040</b>	<b>\$2,012,170</b>	<b>\$2,141,810</b>

In addition to the state budget lines in the above table, the SOF maintains a total of 12 local accounts and a variable number of grant accounts. Local accounts are for special purposes and the funds come from a variety of sources. Examples of local accounts include Generated Overhead, Forestry Class Fees, and Forestry Vehicle Operations. Local accounts have been used for purposes such as purchasing equipment used in classes, support for faculty and staff travel, payment of publication page charges, and the purchase of new vehicles for the SOF fleet, including two during the past four years.

On January 31, 2013, there were 33 external grant accounts managed by the School of Forestry, totaling \$4,292,605 over the life of the grants. Grant expenditures in FY 2012 totaled \$3,275,328, but the average for FY10 – FY12 was lower, at \$2,965,951. Major sources of funding on that date included the USDA Forest Service (including the Joint Fire Science

Program; \$1,503,452), USDA-NIFA (\$922,809), the State of Arizona (\$672,254), the Bureau of Land Management (\$148,929), NSF (\$100,671), and the National Park Service (\$82,256). In addition, there are another six external grants totaling \$861,234. A number of School of Forestry faculty members also serve as co-PI on grants managed by the Ecological Restoration Institute, other NAU departments, or other institutions.

Average faculty salaries by rank are presented in Table 3 for the SOF and four other departments or schools within CEFNS. This data comes from the official FY 2013 budget book. Mid-fiscal year salary increases that were enacted in January 2013 are not incorporated into this table because the salaries for the other units are not yet published. However, the new average salaries for SOF faculty are \$91,905 for professors, \$71,584 for associate professors and \$57,000 (i.e., no change) for assistant professors.

Table 3. Average faculty salaries for 9-month appointments for selected academic units within the College of Engineering, Forestry and Natural Sciences. The number in parentheses is the number of faculty used to compute the average.

<b>Faculty Rank</b>	<b>School of Forestry</b>	<b>Biological Sciences</b>	<b>SESES*</b>	<b>CEE**</b>	<b>Chemistry and Biochemistry</b>
Professor***	\$86,784 (9)	\$90,492 (15)	\$85,219 (12)	\$108,478 (3)	\$100,986 (3)
Associate Professor	\$66,848 (6)	\$68,793 (6)	\$75,022 (1)	\$82,815 (5)	\$68,021 (6)
Assistant Professor	\$57,000 (2)	\$60,000 (3)	\$62,515 (2)	\$71,829 (2)	\$61,000 (2)

\* School of Earth Sciences and Environmental Sustainability

\*\* Civil and Environmental Engineering and Construction Management

\*\*\* Excludes Regents' Professors, Endowed Chairs, Professors/Administrators

### ***3. Document that faculty are provided opportunities for development and continuing education.***

All NAU faculty have access to the services provided by the Faculty Development Program (FDP). As stated on their website (<http://www.nau.edu/faculty-development/>), the FDP organizes and conducts offerings aimed at engaging faculty in focused conversations about designing teaching and learning experiences to contribute to a "teaching commons" at Northern Arizona University. The FDP also manages a colleague-to-colleague mentoring program and provides consultations upon request to colleges, departments, committees, and individual faculty. The FDP is staffed by a full-time faculty member/program director and a full-time program coordinator.

The Arizona Board of Regents offers an Education Assistance Program ([http://hr.nau.edu/benefits/additional\\_benefits/educ\\_assist/abor](http://hr.nau.edu/benefits/additional_benefits/educ_assist/abor)) through which all eligible NAU employees may enroll in courses at a highly reduced rate. Eligible employees, which includes all of our tenured and tenure-track faculty and all staff employed at greater than 50% FTE, pay only \$25/semester to enroll in up to 9 credit hours of courses. This benefit has been used more frequently by SOF staff than faculty members, but there have several examples of faculty members enrolling in classes over the past five years. Associate Professor Kristen Waring, who is on sabbatical during the

2012/2013 academic year, is taking several statistics classes and hopes to complete NAU's graduate-level Certificate in Applied Statistics. While they were still relatively new assistant professors, Ching Huang, Andi Thode, and Kristen Waring all took FOR 693 (Teaching Practicum) to improve their teaching skills.

***4. Document that the parent institution provides strong, well-staffed student support programs, and that non-forestry courses and support programs are readily accessible to forestry students.***

In addition to the extensive support provided by the SOF's Student Services Coordinator, many other types of support are available to our students across the NAU campus. An overview of the types of services available can be found in the Student Support Services section of the Student Handbook (<http://nau.edu/Student-Life/Student-Handbook/Support-Services/>).

Forestry students, particularly in their freshman and sophomore years and for subjects such as math and chemistry, make frequent use of academic support services such as supplemental instruction and tutoring. These services are available at the North Campus and South Campus Student Learning Centers (SLCs; <http://nau.edu/student-learning-centers/>). The SLCs also offer other academic support services, such as workshops on improving study skills and short courses on preparation for tests such as the GRE.

More specialized support is available for particular types of students. For example, first-generation and low-income students have access to the Student Support Services program (<http://nau.edu/student-support-services/>), veterans can find additional services through the Student Veterans Center ([http://home.nau.edu/veteransaffairs/student\\_vet\\_center.asp](http://home.nau.edu/veteransaffairs/student_vet_center.asp)), and students with disabilities are supported by Disability Resources (<http://www4.nau.edu/dr/>).

Through Campus Health Services, our students also have access to Counseling Services (<http://www4.nau.edu/counseling/>). Their website message to students reads in part that "Counseling Services works with students to address the psychological challenges they may experience. Our counselors regularly work with depression and anxiety, relationship difficulties, eating and body image concerns, traumatic experiences, and adjustment issues, to name a few."

***5. Document major strengths and weaknesses of the parent institution and supporting departments, including breadth and accessibility, and how they affect the forestry program.***

Despite some budgetary challenges over the past several years, Northern Arizona University remains a strong institution and has been able to make some significant improvements since the previous self-study. Some of the new facilities, such as the Health and Learning Center (<http://home.nau.edu/hlc/default.asp>) and the new student residences, have improved the quality of services offered to our students. New academic services and support structures, such as the University College (<http://nau.edu/university-college/>) and the Lumberjack Mathematics Center (<http://nau.edu/CEFNS/NatSci/Math/Lumberjack-Mathematics-Center/About/>), have been established to assist all undergraduate students. Also, as can be seen in the next section, the Cline Library continues to provide strong support to the SOF and our undergraduate students.

In an effort to promote faculty research, the university created a Vice President for Research office since the last self-study and has built up the staff in that area. While many of the services offered through the VPR's office were in place before (e.g., a faculty grants program), there have been a number of new initiatives that will increase support for faculty research, which will in turn offer benefits to our undergraduate students. Several new grant and support programs have been established by that office, including ones to promote undergraduate research and to support hiring post-doctoral associates.

The most critical weaknesses of the parent institution are related to its tight budget, which has necessitated changes in funding, staffing levels, and organizational structures. Some of these changes, such as the loss of faculty positions and declines in staff support, have been documented elsewhere. The tight budget has also been a contributing factor to faculty salaries, which remain below NAU's peer institutions despite much-appreciated efforts in recent years to increase them.

***6. Document that adequate library facilities, holdings, electronic access to information, and related services are provided.***

A report entitled *Cline Library Support for the School of Forestry Undergraduate Program* is provided in Appendix L. The report was prepared by Laura Rose Taylor, Coordinator of Planning and Assessment for NAU's Cline Library.

Despite ongoing financial limitations on library holdings, Cline Library has continued to provide good support for the SOF's undergraduate, graduate and research programs. Moreover, Cline Library assigns staff specifically to serve as a liaison to the SOF. Some key aspects of Cline Library's support of our undergraduate program include:

- A demonstrated willingness of Cline Library staff to provide assistance to individual students and classes. One of the examples mentioned in the report is FOR 499 (Contemporary Developments), for which a librarian identified field guides and online resources that could be used for field identification during a class trip to the Smoky Mountains in North Carolina.
- Access to dozens of electronic journals pertinent to forestry and related fields of study.
- Access to numerous important databases, including Agricola, BioOne, Forest Science Database, ISI Web of Science, JSTOR, and Science Direct.
- An effective course reserve system.
- An efficient document delivery system for articles not available on campus.
- Access to hard copies of dozens of scientific journals, books and government publications pertinent to forestry and related fields of study.

***7. Document that the parent institution, in collaboration with the unit housing the program, provides a physical environment that is safe, healthful, and conducive to learning.***

Northern Arizona University provides a physical environment that is safe, healthful, and conducive to learning through a variety of means. The campus maintains its own full-service law enforcement agency staffed by sworn police officers certified by the state of Arizona and accredited by the Commission on Accreditation for Law Enforcement Agencies. Campus police patrol the campus on a 24-hour basis, offer a safety escort service on campus, and provide in excess of 100 blue emergency phones that ring directly to their dispatch center. They also offer student programs on a variety of health and safety-related subjects, including:

- alcohol and DUI awareness
- sexual assault and relationship violence awareness
- general safety and property theft prevention
- violence prevention support
- general safety tips and related information

In compliance with the Clery Act, the University produces an annual campus security and fire safety report that is available on line at:

<http://nau.edu/uploadedFiles/Homepage/Landing/cleryreport.pdf>

It is the official policy of Northern Arizona University to prohibit discrimination, to inform individuals of their right to be free from such behaviors, and to promote the safety of all individuals at university sites and activities. The University provides information on this Safe Working and Learning Environment (SWALE) policy on line and requires all new employees to complete a SWALE tutorial.

The SOF contributes to the safety of its students, faculty and staff through its own course-specific safety policies, by coordination with the campus police, building and grounds departments on issues that might affect workplace safety, and by compliance with regulations on matters such as chemical storage and fire codes.

## **APPENDICES**



## **APPENDIX A**

### **School of Forestry Advisory Council Members**

## NAU School of Forestry Advisory Council

### Member List

Lee Alford (BSF, 1969; MSF 1971) , Chair  
Title: Vice President, Weyerhaeuser (Retired)  
Summit, MS

Dan Binkley (BSF, 1977)  
Title: Professor  
Department of Forest, Rangeland and Watershed Stewardship  
Warner College of Natural Resources  
Colorado State University  
Fort Collins, CO

Mary Coulombe (BSF, 1984)  
Title: Chief  
Natural Resources Management  
US Army Corps of Engineers  
Washington, DC

George Sam Foster  
Title: Director  
USDA Forest Service  
Rocky Mountain Research Station  
Fort Collins, CO

Scott Hunt (BSF, 1978)  
Title: Arizona State Forester  
Arizona State Forestry Division  
Phoenix, AZ

Blair Moody (BSF, 1975)  
Title: Biomass and Stewardship Lead  
Medford District BLM/Rogue River-Siskiyou NF  
Medford OR

Molly Pitts (BSF 1998)  
Title: Former Executive Director  
Northern Arizona Wood Products Association  
Now lives in Salida, CO

Steven S. Rosenstock  
Title: Research Biologist  
Arizona Game and Fish Department/WMRS  
5000 W. Carefree Highway  
Phoenix, AZ 85365

Ted Schaefer (BSF, 1975)  
Title: Vice President  
Merrill Lynch  
St. George, UT

David Schmidt (BSF, 1962)  
Title: Owner,  
Schmidt Family Forest, LLC  
Albany, OR

Deanne Shulman (BSF, 1981)  
Title: Senior Emergency Management Specialist (Retired)  
USDA Forest Service  
International Programs  
Washington, DC

John Stephenson (BSF, 1963)  
Title: Forester, Bureau of Land Management (Retired)  
Cornville, AZ

Steve Templin (BSF, 1978)  
Title: Owner  
Templin Forestry  
Boyce, LA

## **APPENDIX B**

### **CURRENT CURRICULUM**

**SAF Document A-1 General Education Summary – Required Courses**

**SAF Document B-1 Forestry Education Summary – Required Courses**

**SAF Document B-2 Forestry Education Summary – Restricted Electives**

**Curriculum Progression Plans**

**School of Forestry Certificates**

## Current Curriculum

### Document A-1: General Education/Pre-professional Summary—Required Courses

Institution Name: Northern Arizona University Academic Year: 2012-2013

Official Degree Program Title: Bachelor of Science in Forestry

Official Option Title: N/A

<b>Required Courses: # &amp; Title</b>	Total Credit Hours		
	Communications	Science and Mathematics	Social Science & Humanities
ENG 105 Critical Reading and Writing in the University Community	4		
MAT 125 Precalculus Mathematics		4	
STA 270 Applied Statistics		3	
CHM 130 Fundamental Chemistry		3	
CHM 130L Fundamental Chemistry I Lab		1	
BIO 181 Unity of Life I: Life of the Cell		3	
BIO 181L Unity of Life I Laboratory		1	
BIO 182 Unity of Life II: Lives of Multicellular Organisms		3	
BIO 182L Unity of Life II: Lives of Multicellular Organisms Laboratory		1	
ECO 284 Principles of Economics: Micro			3
CIS 120 Introduction to Computer Information Systems		3	
CST 111 Fundamentals of Public Speaking	3		
<b>Total Credit Hours</b>	<b>7</b>	<b>22</b>	<b>3</b>

## Current Curriculum

### Document B-1: Forestry Education Summary – Required Courses

Institution Name: Northern Arizona University Academic Year: 2012-2013

Official Degree Program Title: Bachelor of Science in Forestry

Official Option Title: NA

Required <sup>1</sup> Courses # & Title	Credit Hours in SAF- Required Areas of Study <sup>2</sup>				Course Contains Significant Content in (check all that apply):					Total Credit Hours
	Ecology and Biology	Measurement of Forest Resources/ Urban Forests	Management of Forest Resources/ Urban Forests	Policy, Economics, and Administration and Law	Field Work	Ethics	Oral and Written Communications	Integrated Resource Management	Computer Literacy	
FOR 101 Introduction to Forestry	1.0	0.5	1.0	0.5						3.0
FOR 211 Forest Measurements		3.0								3.0
FOR 212 Trees and Forests of North America	2.0									2.0
FOR 213 Forest Soils	3.0									3.0
FOR 215 Writing in Forestry	2.0						X			2.0
FOR 220 Introduction to Forest and Range Plants	2.0				X					2.0
FOR 313 Forest Ecology I	4.0				X					4.0
FOR 314 Forest Ecology II	3.0				X					3.0
FOR 315 Silviculture I	2.0	1.0			X					3.0
FOR 316 Silviculture Applications	2.0	1.0			X					3.0
FOR 360 Natural Resources Policy				3.0		X	X			3.0
FOR 323W Forest Management I			3.0				X	X		3.0
FOR 324 Forest Management II		1.5	1.5						X	3.0
FOR 325W Forest Management III			3.0				X			3.0
FOR 326 Forest Management IV			4.0					X		4.0
FOR 413 Forest Ecosystem Assessment I	1.0	2.0			X	X	X	X	X	3.0
FOR 414C Forest Ecosystem Assessment II		1.0	2.0				X	X	X	3.0
FOR 423C Forest Ecosystem Planning I			2.0	1.0		X	X	X	X	3.0
FOR 424C Forest Ecosystem Planning II			1.0	2.0			X	X		3.0
<b>Total Required Credit Hours</b>	<b>22.0</b>	<b>10.0</b>	<b>17.5</b>	<b>6.5</b>						<b>56.0</b>

- 1 Include only required courses in forestry, natural resource, or other professional areas. Do not include electives, restricted electives, or basic, general education courses such as math, basic sciences, or English.
- 2 See SAF Standard II: Curriculum, for specific areas of study definitions. Credit hours may be distributed among two or more areas of study for a listed course.

# Current Curriculum

## Document B-2: Forestry Education Summary – Restricted Electives

Institution Name: Northern Arizona University

Academic Year: 2012-2013

Official Degree Program Title: Bachelor of Science in Forestry

Official Option Title: NA

Required <sup>1</sup> Courses # & Title	Credit Hours in SAF- Required Areas of Study <sup>2</sup>				Course Contains Significant Content in (check all that apply):					Total Credit Hours
	Ecology and Biology Measurement of Forest Resources/ Urban Forests	Management of Forest Resources/ Urban Forests	Policy, Economics, and Administration and Law	Field Work	Ethics	Oral and Written Communications	Integrated Resource Management	Computer Literacy		
FOR 203 Project Learning Tree	1									1.0
FOR 204 Project Wild	1									1.0
FOR 205 Project Wild Aquatic	1									1.0
FOR 205 Project Wet	1									1.0
FOR 222 Environmental Conservation	1		1	1						3.0
FOR 230 Multicultural Perspectives Of Natural Resource Management			2	1		X		X		3.0
FOR 240 Conservation Biology	2		1					X		3.0
FOR 250 Arizona's Forests and Wildlife	2		1							3.0
FOR 251 Introduction to Wildland Fire	2		2							3.0
FOR 255 International Wildlife Issues	1		1	1		X				3.0
FOR 270 Native American Ecology	3							X		3.0
FOR 283 Forestry in the Wildland Urban Interface			1.5	1.5		X		X		3.0
FOR 340 Environmental Hydrology	3									3.0
FOR 340L Environmental Hydrology Lab	1									1.0
FOR 351 Fire Monitoring And Modeling		2	1							3.0
FOR 370 Indigenous Knowledge: Ecological Implications	3					X		X		3.0
FOR 381 Forest Ecosystem Management	0.5		2.5					X		3.0
FOR 382 Ecological Restoration	2		0.5	0.5				X		3.0
FOR 410 Multiple Resources Silviculture	2		1					X		3.0
FOR 415 Forestry In Developing Countries			2	1						3.0
FOR 425 Forest Management Applications In GIS		3							X	3.0
FOR 430 Leadership And The Environment			3			X		X	X	3.0

FOR 441 Sustainable Forestry In Tropical Ecosystems: International Field	1		1.5	0.5	X			X		3.0
FOR 442 Principles Of Wood Science And Technology	3							X		3.0
FOR 443 Ecology And Management Of Introduced Species In Forests And	2		1					X		3.0
FOR 445 Wilderness Management			2.5	0.5			X	X		3.0
FOR 447 Human-forest Interactions From Community Perspective			2.5	0.5			X	X		3.0
FOR 451 Fire Ecology And Management	1.5		1.5					X		3.0
FOR 452 Forest Pathology	3									3.0
FOR 453 Forest Insects	3									3.0
FOR 454 Forest Health	2.5		0.5					X		3.0
FOR 465 Watershed Restoration	1.5		1	0.5				X		3.0
FOR 479 Ecosystems And Climate Change	1		1	1				X		3.0
										3.0
										3.0
										3.0
										3.0
										3.0
<b>Total Required Credit Hours</b>	45	5	30	9						89

- 1 Include only restricted electives in forestry, natural resource, or other professional areas. Do not include free electives or basic general education courses such as math, basic sciences, or English.
- 2 See SAF Standard II: Curriculum, for specific areas of study definitions. Credit hours may be distributed among two or more areas of study for a listed course.



Freshman Year									
1 <sup>st</sup> term				2 <sup>nd</sup> term					
FOR 101	Introduction to Forestry	3		FOR 212	Trees & Forests of North America	2			
CIS 120	Intro. Comp Info. Systems (SAS)	3		CST 111	Fund. Of Public Speaking (SPW)	3			
MAT 125	Precalculus	4		BIO 181	Unity of Life I (LAB)	3			
ENG 105	Critical Reading & Writing	4		BIO 181L	Unity of Life I-Lab (LAB)	1			
NAU 100	Transition to College	1		STA 270	Applied Statistics (SAS)	3			
				LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3			
				GE	General Elective **	1			
Total units				15	Total units				16

Sophomore Year									
3 <sup>rd</sup> term				4 <sup>th</sup> term					
FOR 211	Forest Measurements	3		FOR 213	Ecology and Mgt. of Forest Soils	3			
FOR 220	Intro. to Forest and Range Plants	2		BIO 182	Unity of Life II	3			
CHM 130	Fundamental Chemistry (SAS) ***	4		BIO 182L	Unity of Life II Lab	1			
CHM 130L	General Chemistry-Lab ***	1		ECO 284	Principles of Economics-Micro (SPW)	3			
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		FOR 215	Writing in Forestry	2			
GE	General Elective **	1		LS/ DIV/ CT	Liberal Studies/Diversity/Certificate*	3			
				GE	General Elective **	1			
Total units				14	Total units				16

Junior Year									
5 <sup>th</sup> term: Semester A-Professional Program				6 <sup>th</sup> term: Semester B-Professional Program					
FOR 313	Forest Ecology I	4		FOR 323W	Forest Management I	3			
FOR 314	Forest Ecology II	3		FOR 324W	Forest Management II	3			
FOR 315	Silviculture Principles	3		FOR 325W	Forest Management III	3			
FOR 316	Silviculture Applications	3		FOR 326W	Forest Management IV	4			
				LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3			
Total units				13	Total units				16

Senior Year									
7 <sup>th</sup> term: Semester C-Professional Program				8 <sup>th</sup> term: Semester D-Professional Program					
FOR 413C	Forest Ecosystem Assessment I	3		FOR 423C	Forest Ecosystem Planning I	3			
FOR 414C	Forest Ecosystem Assessment II	3		FOR 424C	Forest Ecosystem Planning II	3			
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		FOR 360	Natural Resources Policy	3			
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3			
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		GE	General Elective	3			
Total units				15	Total units				15

Liberal Studies Distribution blocks

AHI (6 units)	SPW (6 units)	CU (6 units)	Science (7 units)	Additional 3 units to reach 35 total
	SC 111 (3)		BIO 181/L (4)	
	ECO 284 (3)		CIS 120 (3)	

## **PROGRAM INFORMATION**

- A minimum of 120 units are required for this degree. The Pre-Professional foundation (1<sup>st</sup> – 4<sup>th</sup> term) consists of the following 48 units (or the equivalent for transfer students), which you must satisfactorily complete with a grade of “C” or better before you are eligible to enter the Professional Program:
  - ENG 105 (4 units)
  - MAT 125 & STA 270 (7 units)
  - CHM 130 & 130L or CHM 151 & 151L (5 units)
  - BIO 181/181L (4 units)
  - BIO 182/182L (4 units)
  - ECO 284 (3 units)
  - CIS 120 (3 units)
  - CST 111 (3 units)
  - FOR 101, 211, 212, 213, 215, and 220 (15 units)
- Application and admission to the Professional Program (5<sup>th</sup> – 8<sup>th</sup> term) is required. This is generally done during the 4<sup>th</sup> term. You must complete all of the listed lower-division Pre-Professional courses (above) with a 2.75 GPA before you can be admitted to and enrolled in the Professional Program. Be aware that the 5<sup>th</sup> term only starts in the Fall. Contact the Student Services Coordinator in the School of Forestry for details.
  - \* Some courses must be multiple used in Liberal Studies, Diversity and/or Certificate requirements. For example: Take a liberal studies course that also satisfies a diversity requirement.
  - \* Complete an approved Certificate or the Individualized Concentration for 12-15 units. Certificates require a minimum of 9 units of 300-400 level courses. You must also earn a grade of “C” or better in each Certificate or Concentration course (except FOR 408 or 485). Below is a list of approved certificates. See catalog for requirements.
    - Fire Ecology and Management
    - Forest Health and Ecological Restoration
    - International Forestry and Conservation
    - Human Dimensions of Forest Management
    - Wildlife Ecology and Management
  - \*\* Recitations are available and strongly encouraged for BIO 181, BIO 182, & CHM 130; however they are not required.
  - \*\*\* You must complete CHM 130/130L or CHM 151/151L – CHM 130/130L is recommended.

## **GENERAL INFORMATION**

- This degree progression plan is to be used in conjunction with the academic catalog and degree progress report.
- Students are encouraged to see an Academic Advisor regularly to confirm their academic progress.
- Many courses have pre-requisites. Please check the academic catalog for pre-requisite and placement information.
- Some courses are only offered once a year (Fall term only or Spring term only). Some of these courses may be pre-requisites for future courses. Please check with your department for current course rotations.
- Honors students complete different requirements to meet NAU's Liberal Studies program. Students should consult an Honors Program Advisor for complete information on fulfilling Honors Liberal Studies requirements.
- All students are required to complete at least 120 total units which includes:
  - 35 units of Liberal Studies courses: <http://www4.nau.edu/aio/Articulation/LScourcelist.htm>
  - 6 units of Diversity courses (3 units in Global & 3 units in Ethnic): <http://www4.nau.edu/aio/Articulation/DiversityCourseList.htm>
  - 30 units of upper division courses (300-400 level), 18 of these units must be taken at NAU.
- Enrollment in the English foundations course for Liberal Studies is based off a student's SAT/ACT scores or incoming transfer/test credit, otherwise the student must take the English Placement Exam: <http://www.nau.edu/comp/placement.html>
- Enrollment in the Math foundations course for Liberal Studies requires students to take the ALEKS Math Placement Exam: <http://www.cefn.nau.edu/Academic/Math/studentInformation/Placement/Placement.shtml>

## **CONTACT INFORMATION**

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School of Forestry  
Building 82, Room 126  
Phone: (928) 523-8956  
EMAIL: [Erin.Saunders@nau.edu](mailto:Erin.Saunders@nau.edu)

Debbie Wildermuth  
Academic Services Coordinator  
College of Engineering, Forestry & Natural Sciences  
Building 21, Room 132

Phone: (928) 523-7065  
EMAIL: [Debbie.Wildermuth@nau.edu](mailto:Debbie.Wildermuth@nau.edu)



SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY

**Certificate in**

**Fire Ecology & Management**

Advising Checksheet: 2012-2013 Catalog

18 units, 9 must be completed at NAU

\* Requirement may be waived for students with 4+ season's fire experience

† Course designed for students in the Forestry Federal Agency Training Group

⊗ BSF student track

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	⊗ FOR 251*	Intro to Wildland Fire	F/S	N/A	Before Sem. A

**Choose one course from each block:**

**Ecology:** (FOR students use FOR 313 as it is part of Semester A)

(3)	FOR 310†	Forest Ecology for Professionals	Fall Only	N/A	
(3)	⊗ FOR 313	Forest Ecology I (Sem A)	Fall Only	Admission to BSF, Co requisite FOR 314	Sem. A
(3)	BIO 326	Ecology	F/S	BIO 181 or 181H and (BIO 182 or ENV 230)	

**Measurement, Analysis, & Technology:**

(3)	⊗ FOR 351†	Fire Monitoring and Modeling	Fall Odd	FOR 251	Sem. A/C
(3)	FOR 425†	Forest Mgmt Applications in GIS	Check Louie	N/A	

**Fire Ecology:**

(3)	FOR 450†	Fire Ecology for Professionals	Check Louie	FOR 310	
	⊗ FOR 451		Spring odd	FOR 351	Sem. B/D
(3)	or FOR 551	Fire Ecology and Management	Spring even	Junior Status or higher	Sem. B/D

**Fuel Management:** (FOR students use FOR 315 as it is part of Semester A)

(3)	☼ FOR 315	Silviculture Principals (Sem A)	Fall Only	Admission to BSF, Co requisite FOR 316	Sem. A
(3)	FOR 317†	Silviculture and Fire Principles	Check Louie	FOR 310	
(3)	FOR 318†	Fuel Treatments and Modeling	Check Louie	FOR 317	
(3)	FOR 410 (co-510)	Multiple Resources Silviculture	Spring odd	N/A	

**Management, Planning & Policy:** (FOR students cannot use FOR 360 to fulfill this block)

(3)	☼ FOR 283	Forestry in Wildland Urban Interface	Spring Var.	N/A	Any spring
(3)	FOR 360†	Natural Resources Policy	Spring Only	Department consent required	
(3)	FOR 444†	Wilderness Mgmt for Professionals	Fall Only	N/A	
(3)	☼ FOR 445	Wilderness Mgmt	Fall Only	Upper division coursework in areas related to natural resources mgmt or science	Sem. C
(3)	☼ FOR 447	Human-Forest Interactions from Community Perspective	Fall Only	Instructor consent required	Sem. C

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 251	(3)	_____	_____
Ecology:	FOR 313	(3)	_____	_____
Measurement, Analysis, & Technology:	_____	(3)	_____	_____
Fire Ecology:	_____	(3)	_____	_____
Fuel Management:	FOR 315	(3)	_____	_____
Mgmt., Planning & Policy:	_____	(3)	_____	_____



**SCHOOL OF FORESTRY**  
**NORTHERN ARIZONA UNIVERSITY**  
**Certificate in**  
**Forest Health & Ecological Restoration**  
 Advising Checksheet: 2012-2013 Catalog

\*One course must be taken with Semester A and the other with Semester C  
 \*\*One course must be taken with Semester B and the other with Semester D

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 211	Forest Measurements	F/SS	MAT 125/125H or Higher Pre or Co-requisites STA 270	Fall Soph
(3)	*FOR 382	Ecological Restoration	Fall Only	Instructors Consent required	Sem. A/C
(3)	**FOR 454	Forest Health	Spring only	454: FOR 413/414C, & FOR 415 or 1 BIO/FOR Course	Sem. B/D
(3)	or FOR 443	Ecology & Mgmt of Intro Spp. in Forests & Rnglds	Spring even	443: N/A	Sem. B/D

**Forest Health Track:**

(3)	*FOR 452	Forest Pathology	Fall Only	FOR 313 - 316 or 1 Biology course	Sem. A/C
(3)	**FOR 453	Forest Insects	Spring Only	FOR 313 - 316 or 1 Biology course	Sem. B/D

**Ecological Restoration Track:**

(3)	FOR 251	Intro. To Wildland Fire	F/S	N/A	Any
(3)	†FOR 408	Fieldwork Experience/	ALL	408/485: Department consent required	-----
(3)	or FOR 485	Undergrad Research			

†Students must visit with Student Services Coordinator in advance to determine the options for their INDIV course.

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 211	(3)	-----	-----
Required:	FOR 382	(3)	-----	-----
Required:	FOR 454/443	(3)	-----	-----
<b>Forest Health Track:</b>		<b>(6)</b>		
Required:	FOR 452	(3)	-----	-----
Required:	FOR 453	(3)	-----	-----

**Ecological Restoration Track:**

Required: FOR 251 (3)

Required: FOR 408/485 (3)

**(6)**

(3)

(3)

\_\_\_\_\_  
\_\_\_\_\_

**Student Plan:**



SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY

**Certificate in  
Human Dimensions of Forest Management**

Advising Checksheet: 2012-2013 Catalog

\*One course must be taken with Semester B and the other with Semester D

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	*FOR 360	Natural Resources Policy	Spring Only	Department consent required	Sem. B/D
(3)	FOR 447	Human-Forest Interactions from Community Perspective	Fall Only	Instructor's consent required	Sem. C

**Select a minimum of 9 units from the following:**

(3)	FOR 230	Multicultural Perspectives of Natural Resource Mgmt	Spring Only	N/A	Any Spring
(3)	FOR 283	Forestry in the Wildland-Urban Interface	Spring Var.	N/A	Any Spring
(3)	*FOR 415	Forestry in Developing Countries	Spring Only	1 FOR/1 BIO course	Sem. B/D
(3)	*FOR 430	Leadership and the Environment	Spring Only	Junior status or higher	Sem. B/D
(3)	FOR 445	Wilderness Management	Fall Only	Upper division coursework in natural resources mgmt or science	Sem. A/C
(3)	COM 150	Environmental Communication	F/S	N/A	
(3)	GSP 206	Public Participation & Communication	Spring Only	N/A	
(3)	GSP 402	Environmental Impacts Statements	Fall Only	Junior Status	
(3)	PR 272	Intro to Public Relations	F/S	N/A	

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 360	(3)	_____	_____
Required:	FOR 447	(3)	_____	_____

**9 Additional Units:**

	_____	_____	_____	_____
	_____	_____	_____	_____



SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY

**Certificate in  
International Forestry & Conservation**

Advising Checksheet: 2012-2013 Catalog

\* One course must be taken with Semester B and the other with Semester D

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 240	Intro to Conservation Biology	Spring Only	N/A	Any spring
(3)	*FOR 415	Forestry in Developing Countries	Spring Only	1 FOR or BIO Course	Sem. B/D

**Select 6-9 of the following units:**

(3)	FOR 230	Multicultural Perspective of Natural Resource Mgmt	Spring Only	N/A	Any spring
(3)	*FOR 360	Natural Resources Policy	Spring Only	Department Consent Required	Sem. B/D
(3)	FOR 381	Forest Ecosystem Mgmt	Spring odd	N/A	Spring Soph/Sem. D
(3)	FOR 441	Sustainable Forestry in Tropical Ecosystems: International Field Experience	Spring Only	Instructor Consent Required	Any
(3)	FOR 493	Natural Resource Economics	Fall Only	ECO 284 or 284H	Sem. A/C
(3)	ANT 370	Human Ecology	Various	N/A	
(3)	ENV 440	Conservation Biology	Fall Only	ENV 326 or FOR 313	Sem. C
(3)	PHI 331	Environmental Ethics	F/S	Instructor's consent	After Sem. A
(3)	POS 120	World Politics	F/S/Online	N/A	Any
(3)	POS 361	Politics of Developing Nations	Various	POS 120 or POS 201	
(3)	POS 366/ 370/374	366: Studies In Latin America 370: Asian Politics 374: African Politics	Various	POS 120 or POS 201 or POS 361	
(3)	POS 380	Advanced International Politics	Various	POS 120 or POS 201	
(3)	PRM 300	Ecotourism	Winter or Summer	N/A	



**Select 0-3 of the following units:**

(3)	ANT 301	Peoples of the World	F/S/Online	N/A	
(3)	ANT 302	World Area Studies	Check Louie	N/A	
(3)	ANT 303	Peoples of Latin America	Online	N/A	
(3)	GSP 240	World Geography West	F/S/Online	N/A	
(3)	GSP 241	World Geography East	F/S/Online	N/A	
(3)	GSP 348	Geography Area Studies	Various	N/A	
(3)	CST 323	Intercultural Communication	F/S	Soph Status or higher	

<u>Course</u>	<b>Student Plan:</b>	<u>Semester</u>	<u>Grade</u>
Required: FOR 240	(3)	_____	_____
Required: FOR 415	(3)	_____	_____
Additional Units:	<b>(9)</b>		
Required: _____	(3)	_____	_____
Required: _____	(3)	_____	_____
Required: _____	(3)	_____	_____



**SCHOOL OF FORESTRY**  
**NORTHERN ARIZONA UNIVERSITY**  
**Certificate in**  
**Wildlife Ecology & Management**  
 Advising Checksheet: 2012-2013 Catalog

**Required:** FOR students should plan on taking Sem A for ecology and BIO 478 due to prerequisite issues.

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(4)	BIO 182	Unity of Life II	F/S/SS	N/A	Spring Fresh, Fall/Spring Soph
(4) (7)	BIO 326 & 326L/ or FOR 313 & 314	Ecology  Sem A	Fall/Spring  Fall only	BIO 181/H & (182 or ENV 230)  Professional Prgm admit	-----  Sem. A
(3) (3)	BIO 477/ or BIO 478	Fish Mgmt/  Wildlife Mgmt	Spring even  Fall only	BIO 223 & 425C  BIO 223, Sem A	-----  Sem. C

**Choose one course from each block, at least 6 units must be upper division:**

**Wildlife Biology:**

(3)	BIO 526	Herpetology	Spring odd	BIO 182, 223	(Sem. D)
(3)	BIO 527	Ornithology	Spring even	Junior Status	(Sem. D)
(3)	BIO 528	Mammalogy	Spring odd	Junior Status	(Sem. D)

**Zoology:** BIO 223 is highly recommended based on Federal requirements

(3)	FOR 453	Forest Insects	Spring only	SemA or BIO	Sem. B/D
(4)	BIO 223	Vert. Zoology	Spring only	BIO 181, 182	Soph Spring/Sem. D
(3)	BIO 322	Entomology	Fall only	BIO 181, 182	Sem. A/C
(3)	BIO 340	Genetics & Evolution	Fall/Spring	BIO 181, 182	Sem. B

(4)	BIO 424	Comparative Vertebrate Anat.	Fall odd	BIO 340	Sem. C ( <i>conflicts with BIO 478</i> )
(3)	BIO 425C	Animal Phys	Fall/Spring	CHM130,151L,BIO344	-----
(3)	BIO 525	Ichthyology	Fall even	BIO 223, 425	-----

**Botany:** Forestry students can use FOR 220 but will need an additional upper division course from another block to meet the '6 units of upper division coursework' requirement stated above.

(2)	FOR 220	Plant ID	Fall only	N/A	Fresh/Soph Fall
(3)	BIO 411	Mycology	Various	BIO 181, 182	Soph Spring/Sem. D
(3)	BIO 414	Native Plants of AZ	Fall Odd	BIO 181, 182	Sem. A/C ( <i>conflicts with BIO 478</i> )
(4)	BIO 415	Plant Taxonomy	Spring even	BIO 182, 284/ 345/347/410/411/414/4 26C/431	-----
(3)	BIO 517	Agrostology	Fall even	BIO 415	-----

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>	
Required:	BIO 182	(4)	-----	-----	No. upper division units: _____
Required:	FOR 313-314	(7)	-----	-----	
Required:	BIO 478	(3)	-----	-----	
Wildlife Biology:	-----	(3)	-----	-----	
Zoology:	-----	---	-----	-----	
Botany:	FOR 220	(2)	-----	-----	
1 Additional:	-----	---	-----	-----	
	<i>(upper division)</i>				

## **APPENDIX C**

### **NEW CURRICULUM**

**SAF Document A-1 General Education Summary – Required Courses**

**SAF Document B-1 Forestry Education Summary – Required Courses**

**Curriculum Progression Plans**

**School of Forestry Certificates**

## New Curriculum

### Document A-1: General Education/Pre-professional Summary—Required Courses

Institution Name: Northern Arizona University \_\_\_\_\_ Academic Year: 2013+

Official Degree Program Title: Bachelor of Science in Forestry

Official Option Title: NA

<b>Required Courses: # &amp; Title</b>	Total Credit Hours		
	Communications	Science and Mathematics	Social Science & Humanities
ENG 105 Critical Reading and Writing in the University Community	4		
MAT 125 Precalculus Mathematics		4	
STA 270 Applied Statistics		3	
CHM 130 Fundamental Chemistry		3	
CHM 130L Fundamental Chemistry I Lab		1	
BIO 181 Unity of Life I: Life of the Cell		3	
BIO 181L Unity of Life I Laboratory		1	
BIO 182 Unity of Life II: Lives of Multicellular Organisms		3	
BIO 182L Unity of Life II: Lives of Multicellular Organisms		1	
ECO 280 or 284 Principles of Economics: Micro			3
CST 111 Fundamentals of Public Speaking	3		
<b>Total Credit Hours</b>	<b>7</b>	<b>19</b>	<b>3</b>

# New Curriculum

## Document B-1: Forestry Education Summary – Required Courses

Institution Name: Northern Arizona University Academic Year: 2013+

Official Degree Program Title: Bachelor of Science in Forestry

Official Option Title: NA

Required <sup>1</sup> Courses # & Title	Credit Hours in SAF- Required Areas of Study <sup>2</sup>				Course Contains Significant Content in (check all that apply):					Total Credit Hours
	Ecology and Biology	Measurement of Forest Resources/ Urban Forests	Management of Forest Resources/ Urban Forests	Policy, Economics, and Administration and Law	Field Work	Ethics	Oral and Written Communications	Integrated Resource Management	Computer Literacy	
FOR 101 Introduction to Forestry	1.0	0.5	1.0	0.5						3.0
FOR 211 Forest Measurements		3.0			X					3.0
FOR 213 Forest Soils	3.0				X					3.0
FOR 215 Writing in Forestry			1.0	1.0			X			2.0
FOR 225 GIS Tools in Forestry		2.0							X	2.0
FOR 220 Introduction to Forest and Range Plants	3.0				X					3.0
FOR 313 Forest Ecology I	3.0				X					3.0
FOR 314 Forest Ecology II	3.0				X					3.0
FOR 315 Silviculture I	1.5	0.5	1.0		X					3.0
FOR 319 Forest Operations		1.0	1.0		X					2.0
FOR 360 Natural Resources Policy				3.0		X				3.0
FOR 323W Forest Management I		0.5	4.5				X	X	X	5.0
FOR 324 Forest Management II			3.0					X		3.0
FOR 325 Forest Management III		0.5	2.5					X		3.0
FOR 411 Capstone Preparation			1.0							1.0
FOR 413 Forest Ecosystem Assessment I		3.0			X			X		3.0
FOR 412 Silviculture II	1.5		1.5		X			X		3.0
FOR 423C Forest Ecosystem Planning I				3.0			X	X	X	3.0
FOR 422 Forest Planning				3.0		X	X	x		3.0
<b>Total Required Credit Hours</b>	<b>16.0</b>	<b>11.0</b>	<b>16.5</b>	<b>10.5</b>						<b>54.0</b>

1 Include only required courses in forestry, natural resource, or other professional areas. Do not include electives, restricted electives, or basic, general education courses such as math, basic sciences, or English.

2 See SAF Standard II: Curriculum, for specific areas of study definitions. Credit hours may be distributed among two or more areas of study for a listed course.

Freshman Year								
1 <sup>st</sup> term				2 <sup>nd</sup> term				
FOR 101	Introduction to Forestry	3		ENG 105	Critical Reading & Writing	4		
MAT 125	Precalculus	4		CST 111	Fund. Of Public Speaking (SPW)	3		
BIO 181	Unity of Life I (LAB)	3		BIO 182	Unity of Life II	3		
BIO 181L	Unity of Life I-Lab (LAB)	1		BIO 182L	Unity of Life II Lab	1		
NAU 100	Transition to College	1		STA 270	Applied Statistics (SAS)	3		
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		GE	General Elective **	1		
Total units				15	Total units			
				15				

Sophomore Year								
3 <sup>rd</sup> term				4 <sup>th</sup> term				
FOR 211	Forest Measurements	3		FOR 213	Ecology and Mgt. of Forest Soils	3		
FOR 220	Forest and Range Plants	3		FOR 215	Writing in Forestry	2		
CHM 130	Fundamental Chemistry (SAS) ***	4		FOR 225	GIS Tools in Forestry	2		
CHM 130L	General Chemistry-Lab ***	1		ECO 280	Introduction to Economics (SPW)	3		
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		
				GE	General Elective **	1		
Total units				14	Total units			
				14				

Junior Year								
5 <sup>th</sup> term: Semester A-Professional Program				6 <sup>th</sup> term: Semester B-Professional Program				
FOR 313	Forest Ecology I	4		FOR 323W	Forest Management I	5		
FOR 314	Forest Ecology II	3		FOR 324	Forest Management II	3		
FOR 315	Silviculture I	3		FOR 325	Forest Management III	3		
FOR 319	Forest Operations	2		LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		GE	General Elective **	1		
Total units				15	Total units			
				15				

Senior Year								
7 <sup>th</sup> term: Semester C-Professional Program				8 <sup>th</sup> term: Semester D-Professional Program				
FOR 411	Forestry Capstone Preparation	1		FOR 360	Natural Resources Policy	3		
FOR 412	Silviculture II	3		FOR 422	Forest Planning	3		
FOR 413	Forest Ecosystem Assessment	3		FOR 423C	Forestry Capstone	3		
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		
LS/ DIV/ CT	Liberal Studies/Diversity/Certificate *	3		GE	General Elective	3		
GE	General Elective **	3						
Total units				16	Total units			
				16				

Liberal Studies Distribution blocks

AHI (6 units)	SPW (6 units)	CU (6 units)	Science (7 units)	Additional 3 units to reach 35 total
	CST 111 (3)		BIO 181/L (4)	
	ECO 280 (3)		CHM 130/L (5)	
			STA 270 (3)	

## **PROGRAM INFORMATION**

- A minimum of 120 units are required for this degree. The Pre-Professional foundation (1<sup>st</sup> – 4<sup>th</sup> term) consists of the following 46 units (or the equivalent for transfer students), which you must satisfactorily complete with a grade of “C” or better before you are eligible to enter the Professional Program:
  - ENG 105 (4 units)
  - MAT 125 & STA 270 (7 units)
  - CHM 130 & 130L or CHM 151 & 151L (5 units)
  - BIO 181/181L (4 units)
  - BIO 182/182L (4 units)
  - ECO 280 (3 units)
  - CST 111 (3 units)
  - FOR 101, 211, 213, 215, 220, and 225 (16 units)
- Application and admission to the Professional Program (5<sup>th</sup> – 8<sup>th</sup> term) is required. This is generally done during the 4<sup>th</sup> term. You must complete all of the listed lower-division Pre-Professional courses (above) with a 2.75 GPA before you can be admitted to and enrolled in the Professional Program. Be aware that the 5<sup>th</sup> term only starts in the fall. Contact the Forestry Academic Advisor for details.
  - \* Some courses may be used to fulfill multiple requirements such as Liberal Studies, Diversity and/or Certificate requirements. For example: Take a liberal studies course that also satisfies a diversity requirement.
  - \* Complete an approved Certificate or the Individualized Concentration for 12-15 units. Certificates require a minimum of 9 units of 300-400 level courses. You must also earn a grade of “C” or better in each Certificate or Concentration course (except FOR 408 or 485). Below is a list of approved certificates. See catalog for requirements.
    - Fire Ecology and Management
    - Forest Health and Ecological Restoration
    - International Forestry and Conservation
    - Human Dimensions of Forest Management
    - Wildlife Ecology and Management
  - \*\* Recitations are available and strongly encouraged for BIO 181, BIO 182, & CHM 130; however they are not required.
  - \*\*\* You must complete CHM 130/130L or CHM 151/151L – CHM 130/130L is recommended.

## **GENERAL INFORMATION**

- This degree progression plan is to be used in conjunction with the academic catalog and academic requirements report.
- Students are encouraged to see an Academic Advisor regularly to confirm their academic progress.
- Many courses have pre-requisites. Please check the academic catalog for pre-requisite and placement information.
- Some courses are only offered once a year (fall term only or spring term only). Some of these courses may be pre-requisites for future courses. Please check with your department for current course rotations.
- Honors students complete different requirements to meet NAU's Liberal Studies program. Students should consult an Honors Program Advisor for complete information on fulfilling Honors Liberal Studies requirements.
- All students are required to complete at least 120 total units which includes:
  - 35 units of Liberal Studies courses: <http://www4.nau.edu/aio/Articulation/LScourcelist.htm>
  - 6 units of Diversity courses (3 units in Global & 3 units in Ethnic): <http://www4.nau.edu/aio/Articulation/DiversityCourseList.htm>
  - 30 units of upper division courses (300-400 level), 18 of these units must be taken at NAU.
- Enrollment in the English foundations course for Liberal Studies is based off a student's SAT/ACT scores or incoming transfer/test credit, otherwise the student must take the English Placement Exam: <http://www.nau.edu/comp/placement.html>
- Enrollment in the Math foundations course for Liberal Studies requires students to take the ALEKS Math Placement Exam: <http://www.cefn.s.nau.edu/Academic/Math/studentInformation/Placement/Placement.shtml>

## **CONTACT INFORMATION**

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## SCHOOL OF FORESTRY NORTHERN ARIZONA UNIVERSITY

### Degree & Course Requirements for Wildlife Jobs with Various State & Federal Agencies

#### US FISH & WILDLIFE SERVICE / US GEOLOGICAL SURVEY

##### USFWS Fish & Wildlife Biologist (486)

Positions that involve professional work in biology, agriculture, or related natural resource management.

##### QUALIFICATION REQUIREMENTS:

- Successful completion of a full four-year course of study in an accredited college or university leading to a bachelor's or higher degree;
- Includes a major field (24 semester hours) or study in biological sciences, agriculture, natural resource management, chemistry or related disciplines appropriate to this position or an appropriate combination in education and experience.

##### USFWS Wildlife Refuge Management (485)

Positions that require professional knowledge and competence in the management, administration, and scientific operation of public lands and waters designated as national wildlife refuges. The work involves a variety of land and water based activities including: water and habitat management; land planning; resources identification and allocation; administration; public relations; supervision; and other activities involving wildlife resource utilization, protection, inventory, and evaluation, and maintenance of grasslands, marshes and soils.

##### QUALIFICATION REQUIREMENTS:

- Successful completion of a full four-year course of study in an accredited college or university leading to a bachelor's degree or higher in zoology, wildlife management or an appropriate field of biology;
- Includes at least:
  - 9 semester hours in zoology;
  - 6 semester hours in wildlife courses such as mammalogy, ornithology, animal ecology, or wildlife management and;
  - 9 semester hours in botany or:

- Appropriate combination of education and experiences

### USFWS/USGS Wildlife Biologist (401)

Positions that require professional knowledge and competence in the science of wildlife biology to perform work involving: the conservation, propagation, management, protection, USGS/USFWS Biologist and administration of wildlife species; or the determination, establishment, and application of biological facts, principles, methods, techniques, and procedures necessary for the conservation and management of wildlife resources and habitats.

#### QUALIFICATION REQUIREMENTS:

- Successful completion of a full four-year course of study in an accredited college or university leading to a bachelor's or higher degree in biological science;
- Includes at least 12 semester hours in subjects such as general zoology, invertebrate or vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, entomology or research courses in such subjects. Excess coursework in wildlife biology may be used to meet the zoology requirements where appropriate. Additionally, the position requires:
  - 9 semester hours in wildlife courses such as mammalogy, ornithology, animal ecology, and wildlife management or research courses in the field of wildlife biology and;
  - 9 semester hours in botany or the related plant disciplines or;
  - An appropriate combination of education and experience

### ARIZONA GAME & FISH DEPARTMENT

#### Wildlife Manager (WM)

##### MINIMUM QUALIFICATIONS:

- Must be 21 years of age
- Must be a U.S. citizen
- Must have a bachelor's degree in wildlife science\* or closely related field from an accredited college or university
- Must possess or obtain an Arizona drivers license
- Must be able to pass AZ POST medical exam including full physical, drug screening, hearing and vision tests
- Must pass physical fitness testing

*(\*Special consideration will be given to applications with coursework and/or work experience in wildlife management related fields)*

**LIST A**

*Degrees in List A meet the requirements for Wildlife Management. A transcript review is required.*

<b>Degree</b>	<b>Concentration</b>
Biological Science	Conservation Biology & Ecology Sustainability
Biology	Fish and Wildlife Management
Biology	Zoology

The following degrees require a minimum of four upper divisions (300-400) wildlife management courses to be accepted. All Wildlife Manager I applicants must have two of the four upper division course work in Wildlife Management and/or Wildlife Biology. A transcript review is required.

<b>Degree</b>	<b>Concentration</b>
Biology	Botany
Biology	Cellular and Molecular
Biology	Ecology
Biology	Physiology
Biology	Marine Biology
Biological Science	Animal Physiology & Behavior
Environmental Science	Biology
Natural Resources Science	Conservation Biology
<b>Degree</b>	
Agricultural Science	Forest Technology
Applied Biological Science	Land Use Management
Animal Science	Life Science
Biological Science	Microbiology
Biology	Molecular Biology
Environmental Science	Natural Resources
Environmental Management	Natural Science
Farm and Ranch Management	Parks Management
Forestry	Soil conservation

## CERTIFICATION CATEGORIES FOR UPPER DIVISION WILDLIFE MANAGEMENT COURSES

- a. **Wildlife Management:** Courses emphasizing the principles and practices of wildlife management. Course descriptions are required and should demonstrate training in understanding and manipulating habitat relationships and population dynamics in the context of objectives and influences established by human concerns and activities. (*Conservation biology courses count if they contain a specific focus on management and decision making.*)
- b. **Wildlife Biology:** Courses in biology and behavior of birds, mammals, reptiles, or amphibians. Course descriptions are required. Courses should demonstrate training in understanding the biology of wildlife species and their habitation relationships as the basis for management and must include at least one course dealing solely with the science of mammalogy, ornithology, or herpetology. (*Ichthyology, marine biology-except courses focusing on marine mammals or reptiles, microbiology, entomology, or related courses will not count in this category, but will qualify in the Zoology category.*)
- c. **Ecology:** Courses in general plant or animal ecology (*excludes human ecology*). Course descriptions are required.
- d. **Zoology:** Courses in taxonomy, biology, behavior, physiology, anatomy, and natural history of vertebrates and invertebrates. Course descriptions are required. Courses in genetics, nutrition, physiology, disease, and other biology or general zoology courses are accepted. Ichthyology or fisheries biology courses are accepted.
- e. **Botany:** Courses in general botany, plant genetics, plant morphology, plant physiology, or plant taxonomy. Course descriptions are required. At least one course must deal with plant taxonomy or identification.

## US FOREST SERVICE

**Wildlife Biologists** are hired at many different grade levels.

Recent college graduates may be hired at the GS-5 or GS-7 grade level. They spend up to 2 years in training and development positions, and then may be noncompetitively promoted to the GS-9 grade level. You may also be hired initially for a higher grade level position if you meet higher education and/or experience requirements. Promotion opportunities at GS-11 and above are competitive, and opportunities for advancement to higher grade levels are excellent.

### MINIMUM QUALIFICATIONS:

- Must have a bachelor's degree with a major in biological science or natural resource management with an emphasis in biology or ecology. A master's degree will help you be more competitive for some positions.
- The following minimum course work must also be completed for all positions:
  - 9 semester hours in wildlife subjects such as mammalogy, ornithology, animal ecology, wildlife management, or research courses in the field of wildlife biology;
  - 12 semester hours in zoology subjects such as general zoology, invertebrate and vertebrate zoology, zoology, comparative anatomy, physiology, parasitology, ecology, cellular biology, entomology, genetics, or research in these fields (*Extra or additional course work in aquatic subjects may be used to meet the zoology requirements where appropriate*);
- 9 semester hours in botany or related plant sciences



SCHOOL OF FORESTRY  
 NORTHERN ARIZONA UNIVERSITY  
**Certificate in**  
**Fire Ecology & Management**  
 Advising Checksheet: 2013-2014 Catalog

∞ BSF student track

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 251	Intro to Wildland Fire	F/S	N/A	Before Sem. A

**Choose one course from each block:**

**Ecology:** (FOR students use FOR 313 as it is part of Semester A)

(3)	FOR 313	Forest Ecology I (Sem A)	Fall Only	Admission to BSF, Co requisite FOR 314	Sem. A
(3)	BIO 326	Ecology	F/S	BIO 181 or 181H and (BIO 182 or ENV 230)	-----

**Measurement, Analysis, & Technology:**

(3)	FOR 351	Fire Monitoring and Modeling	Fall Odd	FOR 251	Sem. A/C
(3)	FOR 425	Forest Mgmt Applications in GIS	Check Louie	N/A	-----

**Fire Ecology:**

(3)	FOR 451	Fire Ecology and Management	Spring odd	FOR 251	Sem. B/D
	or FOR 551		Spring even	Junior Status	Sem. B/D

**Fuel Management:** (FOR students use FOR 315 as it is part of Semester A)

(3)	FOR 315	Silviculture Principals (Sem A)	Fall Only	Admission to BSF, Co requisite FOR 316	Sem. A
(3)	FOR 410 (co-510)	Multiple Resources Silviculture	Spring odd	N/A	-----

**Management, Planning & Policy:**

(3)	FOR 483	Forestry in Wildland Urban Interface	Spring only	Junior status	Sem. B/D
(3)	FOR 445	Wilderness Mgmt	Fall Only	Junior status	Sem. A/C

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 251	(3)	-----	-----
Ecology:	FOR 313	(3)	-----	-----
Measurement, Analysis, & Technology:	FOR 351	(3)	-----	-----
Fire Ecology:	-----	(3)	-----	-----
Fuel Management:	FOR 315	(3)	-----	-----
Mgmt., Planning & Policy:	-----	(3)	-----	-----



SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY  
**Certificate in**  
**Forest Health & Ecological Restoration**  
Advising Checksheet: 2013-2014 Catalog

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 211	Forest Measurements	F/SS	MAT 125/125H or Higher Pre or Co-requisites STA 270	Fall Soph
(3)	FOR 382	Ecological Restoration	Fall Only	Instructors Consent required	Sem. A/C
(3)	FOR 454	Forest Health	Spring only	One FOR/BIO/ENV & Junior Status	Sem. B/D

**\*\*Pick either the Forest Health or Ecological Restoration Track**

**Forest Health Track (choose 6 units):**

(3)	FOR 443	Ecology & Mgmt of Intro Spp. in Forests & Rnglds	Spring even	One FOR/BIO/ENV & Junior Status	Sem. B/D
(3)	FOR 452	Forest Pathology	Fall Only	One FOR/BIO/ENV & Junior Status	Sem. A/C
(3)	FOR 453	Forest Insects	Spring Only	One FOR/BIO/ENV & Junior Status	Sem. B/D

**Ecological Restoration Track (choose 6 units):**

(3)	FOR 251	Intro. To Wildland Fire	F/S	N/A	Any
(3)	FOR 443	Ecology & Mgmt of Intro Spp. in Forests & Rnglds	Spring even	One FOR/BIO/ENV & Junior Status	Sem. B/D
(3)	FOR 483	Forestry in the WUI	Spring Only	Junior Status	Sem. B/D

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 211	(3)	_____	_____
Required:	FOR 382	(3)	_____	_____
Required:	FOR 454	(3)	_____	_____
<b>Forest Health Track (choose 2):</b>		<b>(6)</b>	_____	_____
<b>Ecological Restoration Track (choose 2):</b>		<b>(6)</b>	_____	_____
			_____	_____



SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY

**Certificate in  
Human Dimensions of Forest Management**

Advising Checksheet: 2013-2014 Catalog

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 360	Natural Resources Policy	Spring Only	Department consent required	Sem. B/D
(3)	FOR 483	Forestry in the Wildland-Urban Interface	Spring Only	Junior status	Sem. B/D

**\*\*Pick either the Communication or Planning and Management Track**

**Communication Track:**

(3)	COM 150	Environmental Communication	F/S	N/A	Any
(3)	GSP 206	Public Participation & Communication	Spring Only	N/A	Any Spring
(3)	FOR 430	Leadership and the Environment	Spring Only	Junior status	Sem. B/D

**Planning and Management Track:**

(3)	FOR 230	Multicultural Perspectives of Natural Resource Management ( <i>ethnic</i> )	Spring Only	N/A	Any Spring
(3)	GSP 402	Environmental Impacts Statements	Fall Only	Junior status	Sem. A/C
(3)	FOR 445	Wilderness Management	Fall Only	Junior status	Sem. A/C

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>
	Required: FOR 360	(3)	-----	-----
	Required: FOR 483	(3)	-----	-----
<b>Communication Track:</b>		<b>(9)</b>		
	Required: COM 150	(3)	-----	-----
	Required: GSP 206	(3)	-----	-----
	Required: FOR 430	(3)	-----	-----
<b>Planning &amp; Management Track:</b>		<b>(9)</b>		
	Required: FOR 230	(3)	-----	-----
	Required: FOR 402	(3)	-----	-----
	Required: GSP 445	(3)	-----	-----





SCHOOL OF FORESTRY  
NORTHERN ARIZONA UNIVERSITY

**Certificate in  
International Forestry & Conservation**

Advising Checksheet: 2013-2014 Catalog

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(3)	FOR 240	Intro to Conservation Biology	Spring Only	N/A	Any spring
(3)	FOR 415	Forestry in Developing Countries ( <i>G</i> )	Spring Only	Junior Status	Sem. B/D

**Select 9 of the following units:**

(3)	FOR 230	Multicultural Perspective of Natural Resource Mgmt ( <i>E</i> )	Spring Only	N/A	Any spring
(3)	FOR 360	Natural Resources Policy	Spring Only	Department Consent Required	Sem. B/D
(3)	FOR 441	Sustainable Forestry in Tropical Ecosystems: International Field Experience	Various	Instructor Consent Required	Any
(3)	ANT 301	Peoples of the World ( <i>G</i> )	F/S	N/A	
(3)	ANT 302	World Area Studies	Various	N/A	
(3)	ANT 303	Peoples of Latin America ( <i>G</i> )	Various	N/A	
(3)	CST 323	Intercultural Communication ( <i>CU</i> )	F/S	Soph Status or higher	
(3)	ENV 440	Conservation Biology	Fall Only	ENV 326 or FOR 313	
(3)	GSP 240	World Geography West	F/S	N/A	
(3)	GSP 241	World Geography East ( <i>G</i> )	F/S	N/A	
(3)	PHI 331	Environmental Ethics ( <i>AHI</i> )	F/S	Instructor's consent	
(3)	POS 120	World Politics ( <i>CU</i> )	F/S/Online	N/A	
(3)	POS 361	Politics of Developing Nations ( <i>G</i> )	Various	POS 120 or POS 201	
(3)	POS 366/ 370/374	366: Studies In Latin America Politics 370: Asian Politics 374: African Politics ( <i>CU+G</i> )	Various	POS 120 or POS 201 or POS 361	
(3)	POS 380	Advanced International Politics	Various	POS 120 or POS 201	
(3)	PRM 300	Ecotourism ( <i>G</i> )	Various	N/A	

**LANGUAGE OPTION:**

Will accept 1 (3-4 credits) of a "102" equivalent of any foreign language such as SPA, GRE, FRE, JPN, NAV, etc.

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	<u>Course</u>	<b>Student Plan:</b>	<u>Semester</u>	<u>Grade</u>
Required:	FOR 240	(3)	_____	_____
Required:	FOR 415	(3)	_____	_____
Additional Units:		<b>(9)</b>		
Required:	_____	(3)	_____	_____
Required:	_____	(3)	_____	_____
Required:	_____	(3)	_____	_____



**SCHOOL OF FORESTRY**  
**NORTHERN ARIZONA UNIVERSITY**  
**Certificate in**  
**Wildlife Ecology & Management**  
 Advising Checksheet: 2013-2014 Catalog

\*\*The minimum requirements in this certificate, is accepted **only** by the AZ Game & Fish Department.

For requirements with other federal agencies, ask your advisor for the XXX

**Required:**

Units	Course	Title	Offered	Prerequisites	FOR Sequence
(4)	BIO 182	Unity of Life II	F/S/SS	N/A	Before Soph. spring
(4)	BIO 326 & L	Ecology	Fall/Spring	BIO 181 & (182 or ENV 230)	-----
(7)	or FOR 313/314	Semester A	Fall only	Professional Prgm admit	Sem. A
(3)	BIO 477	Fish Management	Spring even	BIO 223 & 425C	-----
(3)	or BIO 478	Wildlife Management	Fall only	BIO 223 & Sem A	Sem. C

**Choose one course from each block, at least 6 units must be upper division:**

**Wildlife Biology:**

(3)	BIO 526	Herpetology	Fall various	BIO 182, 223	Sem. A/C
(3)	BIO 527	Ornithology	Spring only	Junior Status	Sem. B/D
(3)	BIO 528	Mammalogy	Fall only	Junior Status	Sem. A/C

**Zoology:** BIO 223 is highly recommended based on Federal requirements

(3)	FOR 453	Forest Insects	Spring only	SemA or BIO	Sem. B/D
(4)	BIO 223	Vert. Zoology	Spring only	BIO 181, 182	Soph Spring/Sem. D
(3)	BIO 322	Entomology	Fall only	BIO 181, 182	Sem. A/C
(3)	BIO 340	Genetics & Evolution	Fall/Spring	BIO 181, 182	Sem. B
(4)	BIO 424	Comparative Vert Anat.	Fall odd	BIO 340	Sem. C
(3)	BIO 425C	Animal Physiology	Fall/Spring	CHM130, 151L, BIO344	-----
(3)	BIO 525	Ichthyology	Fall even	BIO 223, 425	-----

**Botany:** Forestry students can use FOR 220 but will need an additional upper division course from another block to meet the '6 units of upper division coursework' requirement stated above.

(2)	FOR 220	Forest & Range Plants	Fall only	N/A	Fresh/Soph Fall
(3)	FOR 382/582	Ecological Restoration	Fall only	Instructor consent	Sem. A/C
(3)	FOR 545	Rangeland Ecology & Mgmt.	Spring only	Senior status	Sem. D
(3)	BIO 411	Mycology	Various	BIO 181, 182	Soph Spring/Sem. D
(3)	BIO 414	Native Plants of AZ	Fall Odd	BIO 181, 182	Sem. A/C
(4)	BIO 415	Plant Taxonomy	Spring even	BIO 182 & (one of BIO 284/345/347/410/411/414/426C/431)	-----
(3)	BIO 431	Plant Morphology	Fall even	BIO 181 & BIO 182	Sem. A/C
(3)	BIO 517	Agrostology	Fall even	BIO 415	-----

**Student Plan:**

	<u>Course</u>	<u>Units</u>	<u>Semester</u>	<u>Grade</u>	
Required:	BIO 182	(4)	-----	-----	<b>No. upper division units: _____</b>
Required:	FOR 313-314	(7)	-----	-----	
Required:	BIO 478	(3)	-----	-----	
Wildlife Biology:	-----	(3)	-----	-----	
Zoology:	-----	---	-----	-----	
Botany:	FOR 220	(2)	-----	-----	
1 Additional:	-----	---	-----	-----	
	<i>(upper division)</i>				

## **APPENDIX D**

### **Fall Course Syllabi**



FOR 101: Introduction to Forestry  
Fall 2012

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## School of Forestry

### Syllabus Forest History and Policy Module

**Instructor:** Dr. Bruce Fox  
**Office:** Room 232, Southwest Forest Science Center (SWFSC)  
**Phone:** 928.523.6636  
**Email:** Bruce.Fox@nau.edu  
**Office Hours:** By appointment

#### Module Description

Robin Hood, John Muir, and Rachel Carson—among many others—have all had profound effects on what we call forestry today. They have influenced our land tenure systems, the preservation of land for its aesthetic values, and how we look at the industrial and post-industrial societies. In other words our history has shaped what our forested landscape looks like and how we have used and valued forests over time. A variety of forces—economic, social, and biological—have helped shape our world view. And policy is an expression of these forests in our legal system.

In this module of FOR 101 we will look at some of the key actors and events that have shaped forests and the profession of forestry over time. Although we will look primarily at the European-American origins of forestry, we will also discuss the history and policy that have shaped forestry internationally.

"Those who cannot remember the past are condemned to repeat it" (from George Santayana. 1905-1906 "Life of Reason I").

#### Learning Outcomes:

At the conclusion of this module, you will demonstrate your:

1. Understanding of the historical origins and philosophical underpinnings of the profession of forestry;
2. Knowledge of key individuals in the development of forestry, and what their roles;
3. Knowledge of forestland ownership patterns in the United States;
4. Understanding of key laws, policies, and regulations that govern modern forestry;
5. Knowledge of the forest products industry; and
6. Understanding of how the global environment affects the economics of forestry in the US.









**FOR 203 – Project Learning Tree  
Fall 2012**

1 credit

Saturday, September 15, 9:30 – 4:30

Sunday, September 16, 9:30 – 4:30

Rm. 136, SWFSC (Forestry)

Facilitators: Dr. Marty Lee, Karen Malis-Clark

Office: M. Lee - SWFSC 241

**Objectives:**

Introduce students to Project Learning Tree and the environmental education resources it provides.

Provide students with information and examples of environmental education activities on forests, forestry, and fire.

Give students ideas for adapting Project Learning Tree activities for a variety of audiences.

Give students experience with leading Project Learning Tree activities.

**NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor." You must attend both days of the Project Learning Tree class to pass the class.

Day 1 - Saturday – Introduction to PLT + Focus on Forests (Marty Lee)

9:30 a.m. Introductions, Nametags  
 9:45 Why are you taking PLT?  
 What is Project Learning Tree?  
 10:00 Ponderosa pine forests – past and present  
 Activity – “My Life as a Tree” – p. 329  
 12:00 LUNCH  
 1:00 p.m. How trees function  
 Activity – “Tree Factory” – p. 269  
 Activity – “Every Tree for Itself” – p. 117  
 2:00 Break  
 2:15 Activity – “To Be a Tree” – p. 265  
 3:00 PLT resources and a hike through the guide  
 3:30 Choosing the right activity  
 Select and work on Teachbacks  
 4:30 Adjourn

Day 2 – Sunday – Focus on Fire (Karen Malis-Clark) + Teachbacks

9:30 a.m. Fire in ponderosa pine ecosystems  
 Activity - “Living with Fire”  
 Activity - “Matchstick Forest”  
 Activity – “Zip Game”  
 12:30 LUNCH  
 1:00 Teachbacks – Your Turn to Teach  
 4:00 Final exam  
 Wrap-ups, evaluations  
 4:30 Adjourn



**FOR 204 – Project WILD (6044)**  
**Fall 2012**

1 credit

Saturday, March 13, 9:30 am – 4:30 pm

Sunday, March 14, 9:30 am – 4:30 pm

Rm. 136, SWFSC (Forestry, Bldg 82)

Facilitators: Cheryl Miller (CM) and Shelly Shepherd (SS)

Office hours: by appointment only

Telephone: (928) 523-6727 (CM); (928) 214-1241 (SS)

E-mail: [Cheryl.Miller@nau.edu](mailto:Cheryl.Miller@nau.edu); [SShepherd@azgfd.gov](mailto:SShepherd@azgfd.gov)

Web site: <http://www.projectwild.org>; [www.asgfd.gov](http://www.asgfd.gov)

**Objectives:**

Introduce students to Project WILD and the environmental education resources it provides.

Provide students with information and examples of environmental education activities that teach about wildlife.

Give students ideas for adapting Project WILD activities for a variety of audiences.

Give students experience with leading Project WILD activities.

**NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements

for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor.”

## **Saturday**

9:30 a.m. Introductions, What Animal am I? Why are you taking WILD?  
10:00 What is WILD?  
Mission and goal, history, a look at the national website  
What is Wildlife? Definition and Arizona Wildlife introduction  
Break  
11:00 Activity – “Habitat Lap Sit” (p. 61)  
Activity – Adaptation Artistry (p. 128)  
12:30 p.m. LUNCH  
1:00 Arizona Game and Fish educational materials  
1:30 Hike through the Guide  
2:00 Black footed ferrets and Activity – “Bottleneck Genes” (p. 172)  
3:00 Activity – “Quick Frozen Critters” (p. 122)  
4:00 Select and work on Teachbacks  
VARK homework  
4:30 Adjourn

## **Sunday**

9:30 a.m. What kind of learner are you? VARK  
Understanding your audience  
Choosing the right activities  
10:30 Teachbacks  
12:00 p.m. LUNCH  
12:30 Teachbacks  
1:30 Final: EE Scenarios  
3:00 How will I use Project WILD?  
Wrap Up  
4:30 Adjourn

**FOR 207 – Project WET**  
**Fall 2012**

1 credit

Saturday, September 29, 9:30 a.m. – 4:30 p.m.

Sunday, September 30, 9:30 a.m. – 4:30 p.m.

Rm. 136, SWFSC (Forestry)

**Instructors:** Dr. Marty Lee, Mansel Nelson

M. Lee Office: SWFSC 241, [martha.lee@nau.edu](mailto:martha.lee@nau.edu), 523-6644

**Objectives:**

Introduce students to Project WET and the environmental education resources it provides.

Provide students with information and examples of environmental education activities on water and water conservation.

Give students ideas for adapting Project WET activities for a variety of audiences.

Give students experience with leading Project WET activities.

**NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor."

**Schedule:**

Day 1 – Saturday, Sept. 29

9:30 a.m.      Name tag activity and welcome to Project WET – Marty Lee

- 10:15 a.m.     Water and the Water Cycle  
Activity: “H<sub>2</sub>O Olympics “ – p. 30  
Activity: “The Incredible Journey” – p. 161
- 12:00                     LUNCH
- 12:30 p.m.     Healthy Water, Healthy People – Mansel Nelson, NAU  
Environmental Education Outreach Program  
Sparkling Water – p. 348  
Where are the Frogs? – p. 279  
H+ to OH
- 4:00 p.m.     Select and work on Teachbacks
- 4:30 p.m.     Adjourn

Day 2 – Sunday, Sept. 30

- 9:30 a.m.     Water Conservation – What Can You Do?
- 10:30             History of Project WET  
Websites – [www.projectwet.org](http://www.projectwet.org)  
<http://www.ag.arizona.edu/azwater/wet>  
Hike through the guide
- 11:15             Activity – “The Rain Stick” – p. 442
- 12:00             LUNCH
- 12:30             Activity: “Ice Cream in a Bag” – handout
- 12:45             Final prep for teachbacks
- 1:00             Teachbacks
- 4:00 p.m.     Final Exam  
Wrap-up and evaluations
- 4:30 p.m.     Adjourn

**COURSE TITLE:** FOREST MEASUREMENTS (FOR 211)  
**INSTRUCTOR:** Denver Hospodarsky, PhD, CF (a.k.a. Dr. "H")  
Associate Professor  
Certified Forester #3142  
School of Forestry  
SW Forest Sciences Complex (SWFSC) - Bldg 82  
Office: Rm 104 Ph: 523-7525  
Email: [denver.hospodarsky@nau.edu](mailto:denver.hospodarsky@nau.edu)  
**OFFICE HOURS:** Dr. H: 9-10 MW; 3:30-4:00 TWTH; Drop-in; Or by appointment

**CREW EQUIPMENT:** Room 11, School of Forestry

**CREDITS:** 3

**REQUISITES:** MAT 125 (prerequisite) and STA 270 (prerequisite or corequisite)

**COURSE FORMAT:** Two-hours lecture and 3-hours lab each week

**CLASS TIMES AND LOCATION:**

Lecture Section 1: MoWe 10:20-11:10 Rm 133 SWFSC  
Lecture Section 2: MoWe 11:30-12:20 Rm 133 SWFSC  
Lab Section A: Tu 12:45-3:15 Room 135 SWFSC or field  
Lab Section B: Th 12:45-3:15 Room 135 SWFSC or field  
Lab Section c: We 12:45-3:15 Room 135 SWFSC or field

**COURSE DESCRIPTION:**

This course provides students with fundamental knowledge of forest mapping and measurements. Theoretical and practical skills acquired in this course are essential to the forestry profession.

**COURSE OBJECTIVES:**

Students are expected to learn the fundamental concepts and tools in orienteering, land survey, mapping, tree measurements, sampling, and forest inventory. Students are also expected to develop preliminary knowledge for measuring other forest resources such as wildlife, recreation, water, and range.

**INDIVIDUAL EQUIPMENT:** (You will need the following equipment by your first field-lab session.)

Hard hat (can be purchased from a hardware store: bike helmets will not do)

Topographic map – Bellemont Quadrangle; 1/24,000 (get from DrH)

Engineers scale – 10 to 60 scales (see a bookstore)

Suunto Navigator (brand) Model MC-2 **Azimuth** Compass (or similar mirror-sighting compass).

Clipboard or Tatum (for taking notes in the field, one with hinged cover will help keep your notes clean, dry, and smooth)

Calculator with trigonometric functions

Computer storage device (such as flash drive/memory stick)

Book Bag/Back Pack stocked with drinking water, clipboard, writing instruments, paper, compass, rain gear, hard hat, etc.



Proper field clothing includes: hard hat; sturdy, closed-toe shoes or boots; long pants; rain gear; and cruisers vest (recommended).

**TEXTBOOKS (required):**

Avery, T.E. and H.E. Burkhardt. 2002. Forest Measurements. 5th Ed. McGraw-Hill, New York

Kiser, J. 2010. Surveying for Forestry and the Natural Resources. 2<sup>nd</sup> Ed. John Bell and Associates, Corvallis, Oregon

**EVALUATION:**

Grades will be based on attendance/participation, knowledge of lecture and lab material as follows: lab assignments including reports; reading quizzes; 1 midterm exam; 1 Lab (field) exam; and 1 final exam. Final grades will be based on the scale 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, <60% = F, and distributed as follows:

<b>Participation</b> (including attendance)	3 points
<b>Lab Assignments</b> (see <b>Lab Report Notes</b> )	25 points
Reading Quizzes (5 @ 3 pts. each, unannounced)	15 points
Midterm Exam	17 points Lab/Field Exam
	20 points
Final Exam	<u>20 points</u>
<b>TOTAL</b>	<b>100 points</b>

**NOTE:** Students must receive a grade of "C" or better in FOR 211 to be considered eligible for advancement to FOR 313-316 (Semester A).

**COURSE POLICIES:**

1. Attendance is **REQUIRED** for all lectures, labs and field trip. Roll will be taken. Please be on time, it is professional and courteous. Thank you!

No make-up exams or labs will be allowed without a signed medical excuse.

Lab will proceed "rain or shine." You must wear proper attire and foot gear during field labs. Hard hats must be worn at all times while in the field. No smoking is allowed. Bring water and proper equipment. The vans will not wait for you, so don't be late!

Because much of your lab work will be completed as a member of a 3 or 4-person permanently assigned crew, it is important to your crew's performance that you work with your assigned crew to complete each lab data-gathering assignment.

Although you will collect data in crews, you will work on the final solutions and lab report individually. Please note item in Policy 8, below.

6. You will not be allowed to drive your personal vehicle to field labs, in compliance with NAU policy. If you miss the van, you have missed the lab for the day, unfortunately.

Maps, aerial photos, field equipment, and materials are expensive and should always be handled with care. The student is responsible for repair or replacement of any abused or lost items that is the result of his/her actions.

Plagiarism and other forms of cheating are grounds for dismissal from FOR 211. The complete policy statement on academic integrity can be found in Appendix F of the NAU Student Handbook. Also, please review the professional forester Code of Ethics (attached).

Cell phones must be turned off and stowed during all class times including lab. Do not access your cell phone or check your messages during class. Designated breaks are excepted. Your instructor will remind you of this policy should you forget.

## LECTURE OUTLINE

### WEEK 1 TOPIC

### READING ASSIGNMENT\*\*

1	Course Introduction	Ch.1 A&B;pp.1-6,20-24 K Land Measurements: Horizontal Distance/Direction Section 4-1 to 4-9 A&B; pp.44-52, 121-133 K pp.61-63, 97-99 K;
2	Slope Measurements	Area <b>(no class Monday)</b> Section 4-10 to 4-15 A&B
3	Grid Systems/Legal Description	Section 4-16 to 4-23, 14-6 to 14-9 A&B;pp.265-274K
4	Maps and Mapping	Section 4-24 to 4-29 A&B; pp.151-169 K; Handouts
5	Land Navigation	Handouts
<b>6</b>	<b>Tree Measurements</b>	<b>Ch.7 A&amp;B</b>
7	Calculation of Tree Variables	Ch.8 A&B; Forest Structure Class Notes
8	<b>MIDTERM EXAM</b> Introduction to Sampling Forest Inventory (fixed-area plot sampling)	Section 3-1 to 3-8 A&B Topics from Ch.9 and 10 A&B
9	Forest Inventory	Section 11-1 to 11-17 A&B (variable-radius sampling)
10	Measurement of Other Forest	Ch. 18 A&B, Handouts Resources
11	Forest Fuels	Handouts
<b>12</b>	<b>Aerial Photo Measurements</b>	<b>Ch. 13 A&amp;B, Handouts</b>
13	Measurement of Other Forest Handouts	Ch.18 A&B,Resources
14	Measurements of Other Forest Handouts	Ch. 18 A&B, Resources – cont.
15	Review,"Catch-up"Study for in-class final	
16	<b>FINAL (Lecture)</b>	

**EXAM:**Sec 1 10-12 Noon Dec. 10, Room 133 SWFSC; Sec 2 10-12 Noon Dec. 12, Room 133 SWFSC  
(all lecture and reading material since midterm; not comprehensive)

\*\*A&B = Avery and Burkhart; K = Kiser

## LAB OUTLINE

<u>WEEK</u>	<u>TOPIC</u>	<u>LOCATION</u>
1	Technical report writing; Lab orientation	Office
2	Compass and Pacing	Field
3	Slope Estimation; Slope Correction	Field
4	Topographic Maps	Office
5	Land Navigation and Mapping	Field
6	Tree Measurements	Field
7	Calculation of Tree Variables	Office
8	Fixed-area Plot Sampling	Field
9	<b>No Lab</b> (fixed area plot results calculations)	
10	Variable Radius Plot Sampling	Field
11	Forest Fuels	Field
12	Field Skills Demonstrations	Field
13	<b>No Lab</b> – Thanksgiving Holiday	
14	Review and Practice for field exam	Field
15	<b>Lab/Field Exam</b> (normal lab period)	Field

### Notes about Lab Reports\*:

Week 2 and 3 lab data are to be the basis for one **results-only** lab report worth 4 points and due at your lab on Sep. 18, 19 or 20.

Week 5 lab data are to be the basis for a **methods and results** lab report worth 4 points and due at your lab on Oct. 2, 3 or 4.

Week 6 and 7 lab data are to be the basis for an **introduction, results and literature cited** lab report worth 4 points and due on Oct. 16, 17 or 18.

Week 8 and 10 lab data are the basis for a **results, discussion and literature cited** lab report worth 4 points and due on Nov. 6, 7 or 8.

**Week 11 lab data are the basis for a full lab report worth 9 points and due on Nov. 27, 28 or 29.**

**\*Note: all lab reports are to have an Appendix that includes your field raw data forms.**

Guidelines to Help Succeed in FOR 211

This is probably not only one the most challenging classes you have taken so far, but also an excellent opportunity to learn fundamental concepts and skills for becoming competent forestry professionals. That is why we expect you to perform well. The following guidelines will help you succeed in this class as well as in the professional forestry program:

Work hard. You are expected to study all the material (from class notes AND textbook), deliver all required tasks thoroughly and professionally, attend class and participate actively

Think! Understand, analyze, and integrate all the material you are learning

Take the initiative. You are responsible for your own education

Be consistent and remain focused throughout the course

Respect your classmates and instructors

6) Remember Forest Measurements is a core skill to becoming a forester. Stay motivated by keeping your eye on the prize.

7) Definition of a forester (according to DrH) Forester (vt.) to understand; to act; to lead

## TREES AND FORESTS OF NORTH AMERICA

(Fall 2012 )

Course Name : FOR-212

### Office Hours

Dr. Gaylord has an open door policy and is happy to meet with you. It is best to email (use the course message tool, or [monica.gaylord@nau.edu](mailto:monica.gaylord@nau.edu)) or call (523-3079) to make an appointment. My office is room 204 in the Southwest Forest Science Complex (building 82 on the Flagstaff Mountain campus).

### Course Overview

#### Audience

This course is required for all students majoring in Forestry and for some options in the Parks and Recreation Management program at Northern Arizona University. It is also appropriate for students who are interested in learning about trees and forests, their associated taxonomy (kinda like genealogy) and their ecological niches and characteristics.

#### Prerequisites

There are no prerequisites other than interest in the subject and access to a good computer.

#### Course Structure/Approach

The *web-based version* of FOR212 combines summary information and guidance contained on the course web pages, which introduce the most important course concepts. In addition, there is a recommended textbook and other resources for detailed information and images. All students are expected to actively use the USDA handbook (available on the Web) to develop deeper understandings of the web-page material and to view range maps and pictures. Material is presented by the week to facilitate student learning and assessment. The key to success in this class is checking the course calendar and keeping up. You will be required to take a quiz or exam every week!

#### Course Objectives

Students who successfully complete this course will have the following content- and learning-competencies:

- knowledge of basic principles in *plant identification, classification and taxonomy*
- knowledge of the *scientific and common names*, ranges, physical appearances, and ecological and utilitarian characteristics of many important trees in North America
- knowledge of *major forest types* in North America and their geographic locations and importance
- knowledge and skills in baseline *distance-education technology*, primarily through the use of asynchronous "Blackboard learn" environments, and active linkages to the WWW
- specialized knowledge and skills in the access of *electronic articles* relevant to trees and forests in North America and around the world, primarily through Cline Library's electronic periodicals search and available linkages on the WWW .



**Fall 2012**

**Syllabus: FOR 215 – Writing in Forestry**

**Instructor:** Sandra Knight

**Email:** [sk639@nau.edu](mailto:sk639@nau.edu)

**Office:** Forestry Sciences Complex Rm. 131

**Office Hours:**

Tuesday & Thursday from 12:00pm - 5:00pm

Also by Appointment

*I also tutor Forestry students who need help with writing, so please do not hesitate to come to my office hours for help with your assignments.*

**Course Location:** Forestry Rm. 133

**Course Times:** 4:10-5:00pm MW

**Course Site:** <http://BbLearn.nau.edu> (Log in for your list of courses)

1. Course Description

**Forestry 215: Writing in Forestry**

**Overall Course Goals:**

Acquire communication skills needed to succeed in your Forestry major and professional career

Emphasize clear and logical writing presented in a usable form and appropriate to its intended audience

Develop ways to market your talents and abilities

**Specific Course Learning Objectives:**

Learn to analyze the communication situation—audience, purpose, and context

Communicate effectively with your professor and classmates electronically and in person

Create and revise writing collaboratively

Use technology to research, plan, draft, and design documents that are easy to understand and navigate

Gather, interpret, and document information logically, efficiently, and ethically

Understand the basic terms and concepts of technical and scientific writing

Think critically about texts both in the context of class and in daily life

Develop strategies and styles appropriate for different writing situations

Organize and structure information effectively

**Course Document Types:**

Memos

Résumés and Cover/Application Letters

Emails

Abstracts and Research Writing

Lab Reports

Executive Summaries

Annotated Bibliographies

Literature Reviews

*\*Proposal assignment, completed during Semester B, replaces NAU's Junior-level writing requirement*

## 2. Course Materials

Course materials will include the course textbooks, handouts, PowerPoints, and other materials I will post on Blackboard Learn.

### Required Texts:

Brown, David E. and Neil B. Carmony (editors). 2003. *Aldo Leopold's Southwest*. Albuquerque, NM.

### [Any edition]

McMillan VE. 2006. *Writing papers in the Biological Sciences*. 5th ed. Boston: Bedford/St. Martin's. [5<sup>th</sup> edition required]

## 3. Course Format and Blackboard Site

The course site includes weekly folders with the quizzes, detailed major writing assignment instructions, key supplementary handouts, and readings materials. However, the course site DOES NOT contain all handouts, lectures, and activities we cover in class.

The course **Home Page**, **Course Content**, and left-side navigation menu contain the links you will need.

The **Course Content** is divided into 15 weekly folders each with a link on the Course Content page. The left side navigation menu contains your **Course Email and Discussion Boards**. You may or may not need the chat or discussion boards this semester, but they are available to you. You can also email me through the course site with questions in addition to my email address.

## 4. Course Requirements

The following assignments constitute the requirements of this course. Consult individual assignment instructions for details and requisites of each assignment.

### 4.1 Assignments and Point Breakdown

This course has a total of 600 points, organized into five main categories:

#### Participation

These points are awarded as you participate actively in class discussions, group activities, and peer reviewing and are engaged and paying attention in class. I will take away points if you are tardy, texting, sleeping, talking out of turn, interrupting the class discussions or lectures, or otherwise are rude or fail to participate. **You cannot get points for Class Participation if you are not in class.**

#### Quizzes

Five quizzes (10 pts. each) covering the textbook and other readings are all on the course site. Applicable **Course Content** folders on the course site will contain a link to each quiz. You may not make up a quiz after I have gone over it in class, unless you are absent and speak with me.

#### Leopold Summaries

Aldo Leopold is a person you will be expected to know about as a Forester, and this book represents a clear and accessible bit of scientific writing in the form of short essays. You will choose *three* of the essays by Aldo, one from each of the first three major sections (not the Editor's Notes), and write three summaries of the essays. These summaries will be due throughout the semester for 15 points each. We will talk about how to write a summary in class and discuss good and bad examples.

#### Homework and Class Exercises

For some lessons, I will hand out or post instructions for homework exercises to take home and work on. We will go over each during the following class period. We will discuss the lessons and exercises as a class or in groups, and you will turn in your answers for credit. These are worth 15 points each.

## Writing Assignments

These are the larger writing assignments you will work on at home and turn in to me **in print** on the due date. Points vary from 20 to 80 points per assignment. For any writing assignment worth 50 points or over, you will receive a detailed rubric. We will always go over the rubric in class and sometimes use it for peer review before your final assignments are due.

The table below shows each individual category and writing assignment points.

Assignment Category	Individual Assignments and Point Values		Total Point Values
Class Participation	Participation Points		50
Quizzes	Five Online Quizzes over readings – 10 pts each		50
Leopold Summaries	Three summaries – 15 pts each		45
Homework/Exercises	Five Grammar Assignments		70
Writing Assignments	Personal Statement Memo	20	325
	Résumé and Cover Letter	50	
	Emails	20	
	Abstract for Research Article	25	
	Lab Report	70	
	Executive Summary Assignment	40	
	Annotated Bibliography	20	
	Literature Review	80	
Final Exam			60
<b>Total</b>			<b>600</b>

## 4.2 General Grading Criteria

I will use each of the following criteria to evaluate your work in this course. For major writing assignments worth 50+ points, an assignment-specific rubric based on these criteria will be included in the assignment instructions.

Compliance with assignment requirements and standards

Analysis of the writing situation, including audience, purpose, and context

Structure, organization, and accessibility of information

Development and usability of content and textual elements

Writing styles appropriate for the situation

Appropriate use of graphics

Effective use of design features and formatting

Proper citation and documentation methods

Correctness in grammar and usage

## 4.3 Final Grades

Your final grades will be based on the standard percentage point scale:

600-540 = A; 539-480 = B; 479-420 = C; 419-360 = D; Below 360 = F

## 5. Policies and Procedures

The policies and procedures in this class are meant to ensure fair practice and assessment for all students.

If you have legitimate difficulties meeting the requirements of this course, **notify me before these difficulties turn into late assignments.**



### 5.1 Deadlines

Assignments will incur a 10% penalty **once the due date and time/class period has passed**. After **3 days**, you will receive a 0% on the assignment. One exception to this is if you are at/in the hospital.

### 5.2 Attendance

At the beginning of each class, I will pass around a sign-in sheet. It is **YOUR** responsibility to make sure you have signed the sign-in sheet.

You will lose participation points if you do not attend class. In addition, keep in mind that we will engage in a lot group work during class. Consequently, if you don't attend class, you are not only missing material, you are letting your group down.

If you require additional assistance because you missed a class, I will be more obliged to offer help if you have notified me of legitimate reasons why you could not attend class.

As for tardiness, repeated tardiness will also affect your Participation grade. Keep in mind that we only have 50 minutes per period.

### 5.3 Class Conduct

I expect all students to attend and participate actively in each class session and respectfully engage in class discussions. Rudeness, either to your classmates or to me, will result in a loss of your class participation points or possibly further action. Examples of rudeness include cell phone usage (including ringing) during class, talking to classmates near you while we are having a class discussion or lecture, non-class related internet surfing, and negative, non-constructive comments aimed towards classmates, me, or course materials. On the other hand, productive inquiry and constructive criticism are important parts of learning and always welcomed in this class.

I also expect all students to conduct themselves in a *professional* manner. We will discuss exactly what professionalism means, and I will hold you to these expectations in your coursework, class behavior, and participation.

### 5.4 Academic Integrity

Plagiarism is a common problem in any writing course, and as such, instructors are very good at detecting plagiarism. All outside sources, including sources of graphics, require proper reference in this course. We will discuss in class how to properly cite borrowed material. Any assignment found to be plagiarized will receive a grade of 0, and the student may also fail the course. These include group assignments! Please, for your sake and mine, speak with me if you are having problems completing an assignment, and do not plagiarize.

## 6. A Note on Time Management

You have many tools for completing your work in this course. While 215 is time intensive, you can work more efficiently by reviewing the schedule and materials on the course site thoroughly and planning ahead. If you have a problem completing an assignment or understanding any of the course material, please email, talk to me after class, or make an appointment during my office hours, and I will work with you. Deadlines are important because it is easy to get behind, but I can be flexible if you can show me you are working hard.

### Policies of Northern Arizona University

#### 1. Safe environment policy

NAU's [Safe Working and Learning Environment Policy](#) seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this University.

You may obtain a copy of this policy from the college dean's office. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (523-5181), the academic ombudsperson (523-9368), or NAU's [Office of Affirmative Action](#) (523-3312).

## **2. Students with disabilities**

If you have a documented disability, you can arrange for accommodations by contacting the office of [Disabilities Support Services](#) (DSS) at 523-8773 (voice), 523-6906 (TTY). In order for your individual needs to be met, you are required to provide DSS with disability related documentation and are encouraged to provide it at least eight weeks prior to the time you wish to receive accommodations. You must register with DSS each semester you are enrolled at NAU and wish to use accommodations.

Faculty are not authorized to provide a student with disability related accommodations without prior approval from DSS. Students who have registered with DSS are encouraged to notify their instructors a minimum of two weeks in advance to ensure accommodations. Otherwise, the provision of accommodations may be delayed.

Concerns or questions regarding disability related accommodations can be brought to the attention of DSS or the [Affirmative Action Office](#).

## **3. Institutional review board**

Any study involving observation of or interaction with human subjects that originates at NAU-including a course project, report, or research paper-must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities.

The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures. A copy of the IRB [Policy and Procedures Manual](#) is available in each department's administrative office and each college dean's office and available online by clicking the link. If you have questions, contact Carey Conover, Office of Grant and Contract Services, at 523-4889.

## **4. Academic integrity**

The University takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff, and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix F of NAU's [Student Handbook](#).

## **5. Academic contact hour**

The Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-206, Academic Credit) states: "an hour of work is the equivalent of 50 minutes of class time...at least 15 contact hours or recitation, lecture, discussion, testing or evaluation, seminar, or colloquium as well as a minimum of 30 hours of student homework is required for each unit of credit."

*The reasonable interpretation of this policy is that for every credit hour, a student should expect, on average, to do a minimum of two additional hours of work per week; e.g., preparation, homework, studying.*

## **Academic Integrity**

NAU regards acts of academic dishonesty—including, but not limited to, plagiarism, cheating, fabrication, forging an instructor's signature, stealing tests, copying themes or tests from other students, or using "crib notes"—as very serious offenses.

If you are charged with academic dishonesty, you are subject to the Arizona Board of Regents' Student Code of Conduct and procedures established by NAU, specifically the Academic Dishonesty policy, that are outlined in the [on-line Student Handbook](#).

## FORESTRY 220 – INTRODUCTION TO FOREST and RANGE PLANTS

**Credits:** 2 semester hours  
**Location:** Southwestern Forest Science Complex (SWFSC)  
**Meeting time:** 12:45-5:15 pm, TUESDAY

**Instructor(s):** Dr. Margaret M. Moore, Professor  
235 SWFSC  
Phone: 523-7457  
Email: [margaret.moore@nau.edu](mailto:margaret.moore@nau.edu)  
Office hours: by appointment

### Course Prerequisites:

No formal prerequisites other than an interest in learning plants.

### Course Objectives:

Students successfully completing this course will have the following competencies:

1) Knowledge of and ability to identify important and/or common forest and range plants of northern Arizona; and 2) knowledge of scientific and common names of these plants.

### Course Structure/Approach:

Course emphasis is on *field identification* of common forest and range plants of northern Arizona. After week #1, all classes will be held outside at various field sites near Flagstaff. The School of Forestry will provide transportation. The following equipment is *strongly* recommended for your comfort and protection in the field: long pants, sturdy shoes or boots, water, rain gear.

The class will learn approximately 10 plants each week. After week #2, a quiz will be given at *every* class meeting on approximately 5-7 plants that were introduced previously.

### Grading:

Grades will be based entirely on field quizzes of plants previously introduced in class. Your final grade will be: # of earned points ÷ by the total possible number of points.

*Semester grades* will be based on the percentage of the total number of points earned by each student as follows:

90-100 % = A	60-69 % = D
80-89 % = B	below 60 % = F
70-79 % = C	





**Course Syllabus**  
**Forestry 222: Environmental Conservation**  
**FALL 2012**



**School of Forestry**

**For 222: Environmental Conservation**

Sec 01, LEC 4986 - Credit hours: 3 Class Room: 018

Class period: Tu and Thu 9:35 – 10:50 a.m.

Office hours: Tu and Thu 11:00 to 12:10 a.m. and  
2:00 to 3:00 p.m.

**Instructor: Professor Aregai Teclé, Ph.D.**

**Office: SW Forest Science Building, Room 242**

**Contact Information: Tel. 523 6642**

**e-mail: [aregai.tecle@nau.edu](mailto:aregai.tecle@nau.edu)**

**Course Prerequisites:**

There are no prerequisites for this course.

**Course Description**

This course introduces students to the exciting, highly relevant and broad discipline of environmental science and management. The course contents are interdisciplinary that combine ideas from the natural and social sciences to describe and understand the interconnectedness and interactions between all the things and phenomena we encounter in our surroundings. A critical aspect of the learning processes is knowing the consequences of the actions and interaction and finding appropriate solutions. Specifically, students will become aware of the most important environmental issues in the United States and elsewhere around the world, and then identify real and practical steps that can be taken to toward achieving a more sustainable future. It will endeavor to help students become active participants during their life in developing and applying solutions to environmental problems to improve human quality of life, ecosystem functions and the overall conditions of the earth at the local and global scales.

**Student Learning Expectations/Outcomes for this Course**

After completing this course, students will be able to:













**NORTHERN  
ARIZONA  
UNIVERSITY**

**FOR 250 and FOR 250H:  
Arizona Forests and Wildlife  
Fall 2012**

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## **School of Forestry**

### **Syllabus**

**INSTRUCTOR:** Bruce E. Fox, PhD  
**Office:** Room 232, School of Forestry (Building 82)  
**Telephone:** 928.523.6636  
**e-mail:** [Bruce.Fox@nau.edu](mailto:Bruce.Fox@nau.edu)  
**Web site:** <http://www.for.nau.edu/cms/content/view/17/39/>  
**Student consultation  
(aka "Office") Hours:** By appointment

**COURSE**  
**Day/time:** Tu-Th 9:35-10:50 am  
**Location:** Room 136, Building 82: Southwest Forest Science Complex  
(aka "Forestry Building")  
**Section numbers:**  
FOR 250: 2124  
FOR 250H: 2125  
**Credits:** 3

**COURSE PREREQUISITES:** A sense of humor, curiosity, and a desire to learn

**COURSE DESCRIPTION:**

This course is an introduction to fundamental ecology and management of major forest and vegetation types and wildlife of Arizona. We will begin the semester with an overview of the state of Arizona, its climate, landforms, and land ownership patterns. Following our overview, we will examine some forest (and some non-forest) ecosystems in more depth. We will begin at high elevations (spruce-fir, aspen forests, etc.) and travel down in elevation to the woodland and riparian ecosystems. Finally, we will examine some key current issues relating Arizona's forests and wildlife.

**Distribution Block:** Science/Applied Science

**Essential Skills:** Critical Thinking, Critical Reading

**STUDENT LEARNING EXPECTATIONS/OUTCOMES:**

Upon the successful completion of this course, students will have the knowledge and skills to effectively:

1. Describe Arizona's major forest ecosystems and how they relate to the southwestern region's climate and landforms;
2. Describe how Arizona's major forest ecosystems influence key wildlife species and how these wildlife species influence forest ecosystems; and
3. Describe key current forest and wildlife management issues in Arizona.













**Northern Arizona University  
School of Forestry**

**FOR 251 - Introduction to Wildland Fire**  
Fall 2012  
3 credits

**Time:** Tuesday and Thursday 8:00 - 9:15 a.m.  
**Location:** Southwest Forest Science Complex Rm 136  
**Prerequisites:** None

**Instructor:** Dr. Andrea (Andi) Thode  
Email: andi.thode@nau.edu  
Office: SFSC room 200  
Phone: 928-523-5457

**Office hours:** Stop by or make an appointment. I do have LOTS of meetings so it is best to schedule something with me as it is difficult to just catch me in my office.

**Course description:**

This course provides an introduction to wildland fire. Fire plays a critical ecological role in forests, grasslands, and other systems, and it also has a strong impact on human society. In this course you will be introduced to the basics of fire, including the combustion process and the "fire triangle." We will examine the way fires start, spread, grow, and become extinguished. Fire management strategies, including fire suppression and prescribed burning will be covered. Throughout the course, examples from fire ecology and the social impacts of fire will be used to illustrate fire concepts.

**Text and lectures:**

MacLean, Norman. 1992. Young Men and Fire. University of Chicago Press. \$16.

Additional readings will be provided. Readings will be posted on the course website. Copies of lecture slides will be posted as well.

**Student Learning Expectations:**

This course is designed to introduce the basics of wildland fire. After taking this course, you will have:

- An understanding of the basic physical and chemical attributes of fire
- Knowledge of how terrain, weather, and fuels affect fire behavior
- An understanding of the basic elements of fire management
- Knowledge of fire's effects on soil and vegetation
- An understanding of techniques used to suppress, ignite, and manage fires
- An understanding of the complexity of fire and fuel management in the wildland urban interface
- Knowledge about the use of models commonly used in fire management







**FOR 255: INTERNATIONAL WILDLIFE ISSUES (#5990)**  
Fall 2012 (3 credits)

**General Information:**

**Instructor:** Dr. Yeon-Su Kim

**Office hours:** SWFSC 233, by appointment or drop in

**Telephone:** (928) 523-6643

I am an ecological economist with B.S.(1992) and M.S.(1994) from Seoul National University in South Korea; Ph.D. in Forest Resources from Oregon State University (1998). More about me here:

<http://nau.edu/CEFENS/Forestry/Faculty-and-Staff/Directory/Kim/>

**Class Librarian:** Academic Programs and Course Support – Cline Library [Library.CEFENS@nau.edu](mailto:Library.CEFENS@nau.edu)  
Phone: 928-523-8805.

**E-mail:** Please use the BBLearn "Messages". I will check in the class at least twice per day on weekdays. You will get a response from me within 24 hours.

**Course Prerequisites:** An interest in global issues, wildlife, and a desire to learn.

**Course Description:** This course will provide you with a survey of current issues in wildlife conservation and management from around the globe.

This course is in the *Science/Applied Science* block in Liberal Studies, in that "...students apply knowledge derived from scientific inquiry to address human needs through technological advancements. Students learn practical skills in the creation and application of various technologies. Courses in this block also address the impact of technology on the human condition and the natural world" (Liberal Studies Program).

This course also meets the criteria for the *Global Diversity* requirement with the primary goal of acquiring an understanding of the perspectives of non-Western peoples. As a Liberal Studies course, it provides the opportunity for students to practice, refine, and strengthen skills essential for their development as students and for their long term success. In this course we will specifically address the skill areas of **effective written communication** and **critical thinking** with respect to societal problems related to the environment. Thematically, this course will focus on developing student understanding, awareness, and appreciation of the environment and environmental issues, specifically relating to the global wildlife issues.

This course will be delivered web-based through BBLearn (<http://BBLearn.nau.edu>). The requirements and expectations for the web-based class are no different than those for in-person class. The students in this class are expected to log on to BBLearn **AT LEAST THREE TIMES PER WEEK** to follow lectures and to check their BBLearn messages.

**Course Goals and Objectives:** Upon the successful completion of this course, students will have the knowledge and skills to effectively:

1. Understand the complexity of biological diversity on a global scale (critical thinking and effective written communication).
2. Demonstrate an understanding of how wildlife resources are regulated by humans at a global scale (critical thinking).









**NORTHERN ARIZONA UNIVERSITY**  
**School of Forestry**  
**Undergraduate Fire Ecology Certificate Program**

**FOR 310: Forest Ecology for Professionals**

**Course number:** FOR 310  
**Instructor:** Molly Hunter  
**Course Time:** Monday – Friday 8:00am – 5:00pm

**Contact:** Molly Hunter: molly.hunter@nau.edu

**Course Location:** NAU mountain campus  
Southwest Forest Science Complex, room 034B

**Course Prerequisites:** none

**Course Description:**

This course is designed to introduce the student to the field of forest ecology. Forest Ecology is the study of forest ecosystems. We will be addressing the biotic and abiotic aspects of forest ecosystems that affect structure, composition, and function of forests. These concepts will be addressed at the individual, population, community, landscape and ecosystem levels. The course includes sections in adaptations, entomology/pathology, wildlife, community ecology, ecosystem processes, disturbance and landscape ecology.

**Course Format:**

Oct. 1<sup>st</sup> – Nov. 9<sup>th</sup>: On-line portion of the class  
Nov. 12<sup>th</sup> – Nov. 16<sup>th</sup>: On-campus portion of the class (Note: class will meet on Veteran's Day, Nov. 12<sup>th</sup>)

This class consists of three weeks of reading, assignments and quizzes that are done before attending the class on the NAU campus. Reading assignments and quizzes start October 1st. The "pre-work" assigned for this class is critical. The on-line quizzes and assignments are part of the final grade for the course. The course is designed this way for your own sanity. You will be in-class from 8 am to 5 pm, Monday thru Friday for one week. In order to absorb the amount of information that is presented, you need to do the reading before hand.

**Required Text:**

Gurevitch, J. et al. 2006. The Ecology of Plants. 2<sup>nd</sup> Edition. Sinauer Associates, Inc. Sunderland, MA.

Other readings will be provided by instructor and posted on the course website.





## Guidelines for "Semester A" (FOR313-314-315-316) – Fall 2012

### Coordinators and Weekly Schedule

The first semester of your professional program is divided into two general subject areas: ecology (7 semester hours) and silviculture (6 semester hours). Each general subject area is managed by a sub-coordinator, with one overall coordinator. The coordinators this year are:

- Tom Kolb, ecology sub-coordinator and overall coordinator (Room 202, 3-7491, [tom.kolb@nau.edu](mailto:tom.kolb@nau.edu))
- Andrew Sanchez Meador, silviculture sub-coordinator (Room 234, 523-3448, [andrew.sanchezmeador@nau.edu](mailto:andrew.sanchezmeador@nau.edu))

The sub-coordinators are responsible for the management and implementation of their subject areas, and the coordinator is responsible for the overall course management.

A teaching assistant (T.A.) will assist with instruction of silviculture during field and indoor labs.

- Adam Polinko, Sem A teaching assistant - Silviculture (SWFSC 219 lab, 505-400-6346, [adam.polinko@nau.edu](mailto:adam.polinko@nau.edu)); office hours Wed. 3:10-4:00, Tues. and Thursday 8-9.

Each week *typically* has the following format:

Monday:	9:10-3:10 All-day lab (ecology <i>or</i> silviculture)
Tuesday/Thursday:	9:35-10:50 Ecology lecture 11:10-12:25 Silviculture lecture
Wednesday/Friday:	9:10-10:00 Ecology lecture 10:20-11:10 Silviculture lecture
Wednesday:	12:00-3:10 Afternoon lab (ecology <i>or</i> silviculture)

On most Mondays we will be away from campus the entire day. Students with NAU meal tickets should arrange to have bag lunches made for them on those days; students without meal tickets are responsible for their own lunches.

Please do not plan activities or work starting within one hour of the end of the laboratory periods. On Mondays and Wednesdays, if we return early from a field lab, we expect you to spend time in the computer lab getting started on the lab assignment or report. Occasionally we cannot return to campus on time (weather, traffic, etc.). Therefore, you should view the ending time as approximate.

### Faculty Availability

NAU School of Forestry faculty members try to maintain an "open door" policy; we try to be available as much as possible and encourage you to talk to us about subject material and forestry in general. We like to get to know you and have you know us as we believe it enhances your education. However, students should realize that faculty members have other teaching, research, and administrative responsibilities, so please make an appointment.



















## FOR 340 : Environmental Hydrology Syllabus -- Fall 2011

Instructor: Professor Aregai Feleke

E-mail: aregai.feleke@mau.edu

Office Address: Southwest Forest Science Building, School of Forestry, Room: 242

Classroom: Room 135, Building: Southwest Forest Science Building, School of Forestry

Course hours: 3 Class Days: TTH Class periods: 8:00 - 9:15a.m.

Office hours: TTH from 11:00-12:00a.m. and 2:00 - 3:30 p.m. or by appointment

Course Prerequisites: MAE 114

### Course description

The earth is a suitable habitat for living things because of its unique environment in which water is one of the vital components. Getting adequate water of good quality is essential for proper physiological functioning of the body of living organisms. The lack of adequate quality water is very limiting to the healthy living of individuals and sustainable development of communities (or societies) not only because of its direct effect on life itself, but also because of its effect on almost all other elements that affect life on earth. The environmental problems of water could be due to changes in either or both of its quantitative and qualitative attributes. Quantitative problems occur from either having too much or too little water, while qualitative problems arise from having excessive amounts of foreign materials in the form of contaminants or pollutants in the water. Human lives and the lives of other organisms are obstructed, and the ecology and socioeconomic structure of affected areas are damaged seriously and sometimes even beyond repair due to the presence of either or both quantitative and qualitative hydrologic and water resources problems. Flooding, drought, erosion by water, acid rain, biological, physical, and chemical pollution of water are commonly occurring problems with serious social, cultural, economic and environmental consequences. For these and many other reasons, environmental issues in water resources are and should be at the heart of any educational program that teaches students and field technicians about ecosystem sustainability, biodiversity, resources development, environmental science, and the management and conservation of natural resources.

The topics explored in this course include: (1) an overview of the state of water resources and hydrologic processes; (2) water balance and its components, precipitation, infiltration, evaporation and evapotranspiration; (3) runoff and stream flow characteristics; (4) surface and ground water supply and their desired conditions; (5) causes and effects of acid rain; (6) climate change and its effect on local and global hydrological conditions; (7) flood occurrences, its frequency (or probability of occurrence), its causes, effects and methods of mitigating it; (8) the occurrence and causes of drought and ways of dealing with it; (9) water harvesting; (10) estimating amount of soil erosion and its control practices; (11) human impacts on the hydrologic cycle and water resources; (12) an overview of point and non-point sources pollution; and (13) student paper writing and presentations on selected real world problems.

These important topics of environmental hydrology and water resources problems are adequately covered in the course to provide students with a good background in the subjects. Throughout the











# ECOLOGICAL RESTORATION

Fall Semester, 2012    Online resources through WebCT Vista

**Meeting time and place:**        Tuesdays, 12:45 – 5:15 p.m., Forestry (Building 82), room 133

**Instructor:**                    Dr. Pete Fulé (Forestry room 246C, 523-1463, [Pete.Fule@nau.edu](mailto:Pete.Fule@nau.edu), office hrs Mondays 2-5 or by appointment).

**Course No. & Sequence No.:** FOR 382, FOR 382H and FOR 582, co-convened

## Readings:

Ecological Restoration of Southwestern Ponderosa Pine Forests. 2003. Edited by Peter Friederici.  
Island Press, Washington D.C.  
Other readings as assigned.

## COURSE DESCRIPTION

*"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."* SER (Society for Ecological Restoration) 2002.

The goal of ecological restoration is to regain the natural function, vitality, and sustainability of ecosystems, reducing or even reversing the effects of human-caused damage. With over 7 billion people on earth, our effects on the environment include overusing natural resources, introducing non-native species and eliminating native ones, changing traditional agricultural practices, and disrupting natural disturbance regimes such as floods and fires. Humans have affected our environment since the appearance of our species, but the unprecedented increase in the extent of human-caused change since the industrial revolution (mid-1800's) threatens the sustainability of many species and even ecosystems. Restoration is one key strategy for combating critical environmental problems such as climate change, extinctions, and severe wildfires. But while it's often relatively easy to inflict environmental damage, recovery can be much more difficult. For instance, construction of a dam can disrupt a river's flow, nutrient content, fish reproduction, shoreline vegetation, and the livelihoods of nearby residents. Yet simply removing the dam might not reverse the complex and interconnected elements of ecosystem degradation.

In order to make the best possible decisions, restorationists try to design treatments in a holistic way grounded in ecological science. The characteristics of natural, undamaged ecosystems serve as a point of reference for designing restoration activities. Sources of degradation must be identified and addressed. Restoration goals must be specified and treatments tested, implemented, monitored, and revised as necessary. Social and political support are essential for successful long-term restoration. Restoration activities are occasionally low-cost but usually expensive, so the economics of costs and benefits requires careful analysis, including evaluating the monetary value of "free" services such as clean air and water that ecosystems provide to people.

Concepts and examples of ecological restoration are illustrated in this course by examining current restoration projects in southwestern ecosystems ranging from subalpine forests to grasslands. Drawing upon research and experience, we will see and apply practical methods of designing, applying, and evaluating ecological restoration treatments. Examples and demonstrations will occur on field trips to restoration sites in the













**FOR 413C/414C**  
**Fall 2012**

**School of Forestry**  
**Northern Arizona University**

**Syllabus: Forest Ecosystem Assessment I & II, aka “Semester C”**

**Instructors:** Bruce E. Fox  
Room 232 Forest Science Complex  
523-6636; [Bruce.Fox@nau.edu](mailto:Bruce.Fox@nau.edu)  
Richard A. Van Demark  
[rvsfi@commspeed.net](mailto:rvsfi@commspeed.net)  
Michael Smith  
[MikeSmith.AZ@gmail.com](mailto:MikeSmith.AZ@gmail.com)  
Jeff Jenness  
[jeffj@jennessent.com](mailto:jeffj@jennessent.com)

**Field Equipment: University provided:** Basic field equipment and class-time transportation  
**Student provided:** field clothes (including appropriate high quality boots), rain gear, HARD HAT, and CRUISER’S VEST. Note: for safety reasons, students without this specified field equipment will not be allowed to participate in field activities. Tatum. “Rite in the Rain” field notebook.

**Office Hours:** By appointment. Please contact instructors in class or by e-mail to set up a mutually agreeable time to meet.

**Course Hours:** Monday and Wednesday 9:10am – 2:40pm, Room 136 Forest Science Complex

**Course Prerequisites:** *Semesters A & B:* FOR 313-316, FOR 323W-326W

**Course Description:** This is a linked set of two 3 credit clinical course focused on the techniques of gathering and analyzing biophysical and sociological information for the development of natural resource management plans. Students in the course collect data to determine current conditions and landowner and adjacent landowner concerns.

Forest Ecosystem Assessment forms the first segment of a senior capstone experience which integrates material learned in prior forestry courses as well as introducing new concepts and methods. The course specifically **provides students with the technical knowledge, skills, and experience in gathering biophysical and sociological information and then analyzing and interpreting the data.** Contents include interpretation of remotely sensed imagery, land records, and property boundaries; use of geographic information systems (GIS); learning field protocols for inventory of biophysical features; soil surveys; site classification; stand development pathways; recreation use assessments; and stakeholder assessments.

**Learning Outcomes:**

*By the end of the semester, the successful students will have the skills and knowledge to demonstrate their*

Understanding the relationship between inventory design and information needs;  
Ability to conduct forest land classification;  
Understanding of and ability to characterize current conditions of a forested land;  
Understanding of field/office inventory skills;  
Ability to develop project organization and management skills;  
Ability to use analysis tools such as geographic information systems (GIS);  
Ability to work effectively as part of a team;  
Ability to create written documents that demonstrate the technical competence in the class subject matter and mastery of grammar, mechanics, and format appropriate for the target audience

Ability to create and deliver effective oral presentations that demonstrate competence in the subject matter of the course and mastery of presentational techniques and styles appropriate for the target audience; and  
 Ability to peer review technical documents and presentations;

**Course structure:** A combination of lectures, field data collection, and computer laboratory exercises, including data input and analysis. Lectures will provide direction and assistance in getting started, but more often faculty will serve as consultants working with students individually or in small groups to answer questions and to discuss approaches to problems. Students will be required to work independently and within groups. The use of sources of information and insight beyond the School of Forestry is encouraged and will no doubt be necessary

**Required books and materials:**

- Textbooks and class notes from Semesters A and B
- Tatum or clipboard
- Hard hat
- Compass
- Cruiser’s vest
- Appropriate clothes for field work, including raingear and footwear
- “Rite in the rain” field notebook

**Recommended Resources:**

Avery, T.E., and H.E. Burkhart. 2002. Forest Measurements. Fifth Edition. McGraw Hill, New York, NY. 456 p.

Babbie, E.F. 2006. The Practice of Social Research. 11<sup>th</sup> Edition. Wadsworth Publishing, Belmont, CA. 608 p.

Magurran, A.E. 2004. Measuring Biological Diversity. Blackwell Publishing, Malden, MA. 260 p.

Patton, D.R. 1997. Wildlife Habitat Relationships in Forested Ecosystems. Second Edition. Timber Press, Portland, OR. 442 p.

Smith, D.M., B.C. Larson, M.J. Kelty, and P.M.S. Ashton. 1997. The Practice of Silviculture: Applied Forest Ecology. Ninth edition. John Wiley and Sons, Inc., New York, NY. 560 p.

**Readings:** Assigned readings and other resources will be posted online and/or distributed in class.

**DRAFT/TENTATIVE/SUBJECT-TO-CHANGE but PRETTY CLOSE TO FINAL**

**Course Schedule:**

Week	Day	Date	Topic
1	Monday	August 27	Introduction. Project management. Small group dynamics. Field equipment checkout.
	Wednesday	August 29	Unit orientation field trip. Field skills review.
2	Monday	September 3	Labor Day Holiday. No class
	Wednesday	September 5	Graduation applications with Erin Saunders. Project management. Small group dynamics. Inventory procedures review. Field skills review.
3*	Monday	September 10	Group A: Field skills exam Group B: Field inventory/Rapid assessment/ROS
	Wednesday	September 12	Group A: Field inventory/Rapid assessment/ROS Group B: Field skills exam
4*	Monday	September 17	Group A: GIS I Group B: Inventory
	Wednesday	September 19	Group A: Inventory Group B: GIS I

5*	Monday	September 24	Group A: GIS II Group B: Inventory
	Wednesday	September 26	Group A: Inventory Group B: GIS II
6*	Monday	October 1	Group A: GIS III Group B: Inventory
	Wednesday	October 3	Group A: Inventory Group B: GIS III
7*	Monday	October 8	Group A: GIS IV Group B: Inventory
	Wednesday	October 10	Group A: Inventory Group B: GIS IV
8*	Monday	October 15	Group A: GIS V Group B: Inventory
	Wednesday	October 17	Group A: Inventory Group B: GIS V
9	Monday	October 22	Current Conditions
	Wednesday	October 24	Current Conditions
10	Monday	October 29	Current conditions analysis
	Wednesday	October 31	Current conditions analysis
11	Monday	November 5	Draft Introductions and Unit Descriptions
	Wednesday	November 7	Peer reviews of Draft Introductions and Unit Descriptions
12	Monday	November 12	Current conditions analysis
	Wednesday	November 14	Current conditions analysis
13	Monday	November 19	Current Conditions Reports due
	Wednesday	November 21	Peer reviews of Current Conditions Reports
14	Monday	November 26	Final Current Conditions Report
	Wednesday	November 28	Final Current Conditions Reports due
15	Monday	December 3	Oral Presentations
	Wednesday	December 5	Oral Presentations
16	Monday	December 10. 10am-HIGH NOON	Final Oral Presentations
	Wednesday	December 12. 7:30am-9:30am	Final Oral Presentations

\*Split class

### TENTATIVE Assignment Schedule

You will earn separate grades for FOR 413C and FOR 414C.

Your grade for **FOR 413C** will be based on all your individual work only, including:

Assignment	Points	Due Date
Academic integrity tutorial	P/NP	August 29
Emotional Intelligence Briefing Paper	75	August 31
Small group dynamics	75	September 5
Field skills	P/NP	September 10/12
Progress reports	45	On-going
Rapid Assessment	150	October 1
Worklog/Journal	40	On-going
Instructor assessment of professionalism	50	December 12
GIS	750	September 17-October 17
TOTAL	1,185	

**Note: you must complete all assignments to pass this course.**

**Your grade for FOR 414C will be based on your crew work, including:**

Assignment	Points	Due Date
Group project assessment techniques analysis and recommendation	50	September 17
Workplan	100	September 10
Introduction and Unit Description	100	November 5
Peer review of Introduction and Unit Description	50	November 7
Current Conditions Report	200	November 19
Peer review of Current Conditions Report	50	November 21
Final Current Conditions Report	300	November 28
Oral Presentation	100	December 3 or 5
Peer review of Oral Presentation	25	December 3 or 5
Final Oral Presentation	150	December 10 or 12
Instructor assessment of professionalism	50	On-going
Data compilation and organization	50	December 12
Attendance	10	December 12
TOTAL	1,225	

**Note: you must complete all assignments to pass this course.**

**Course policies:**

**Work submitted late.** Students are required to submit assignments as scheduled. One letter grade (see above) will be deducted for every day that assignments are submitted after the due date and time. In the case of illness or other legitimate reason for submitting an assignment late, students must inform the instructor **BEFORE** the exam or class session.

**Attendance.** Is required at all class sessions unless prior approval is given by the instructor. You have one “vacation day” for the semester. For each absence beyond this, you will receive a 5 point penalty. Crews with perfect attendance will receive a 10 point bonus.

**Safety.** Safety is our number one concern. Although everyone has spent time in the woods, in Semester C you will be in a work setting that requires much more individual and crew attention. As a result, You will not be allowed to participate in field activities unless you have all the appropriate field equipment, including a hard hat and cruiser’s vest. In addition, each crew must check in with one of the instructors at the end of the day in the field and then again when you return to campus. Failure to check in by 3:30 pm on field days will reflect in your professionalism grade. Due to safety and operational concerns, including the potential for limited access and parking, no personal vehicles are allowed for travel during field days.

**Plagiarism and cheating** will not be tolerated. Assignments that include plagiarized material will receive no credit with no option to make up lost points. Refer to the NAU statement of academic integrity below.

**Northern Arizona University Policy Statements**

**SAFE ENVIRONMENT POLICY.** NAU's Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault, or retaliation by anyone at this university. You may obtain a copy of this policy from the college dean's office. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (523-5181), the academic ombudsperson (523-9368), or NAU's Office of Affirmative Action (523-3312).

**STUDENTS WITH DISABILITIES.** If you have a learning and/or physical disability, you are encouraged to make arrangements for class assignments/exams so your academic performance will not suffer because of the disability or handicap. If you have questions about special provisions for students with disabilities, contact the Counseling and Testing Center (523-2261). It is your responsibility to register with the Counseling and Testing Center. Application for services should be made at least eight weeks before the start of the semester. If the Counseling and Testing Center verifies your eligibility for special services, you should consult with your instructor during the first week in the semester so appropriate arrangements can be made. Concerns related to noncompliance with appropriate provisions should be directed to the Disability Support Services coordinator in the Counseling and Testing Center.

**INSTITUTIONAL REVIEW BOARD.** Any study involving observation of or interaction with human subjects that originates at NAU-including a course project, report, or research paper-must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities. The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures. A copy of the IRB Policy and Procedures Manual is available in each department's administrative office and each college dean's office. If you have questions, contact Carey Conover, Office of Grant and Contract Services, at 523-4889.

**ACADEMIC INTEGRITY.** The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff, and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the educational process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. It is the responsibility of individual faculty members to identify instances of academic dishonesty and recommend penalties to the department chair or college dean in keeping with the severity of the violation. Penalties may range from verbal chastisement to a failing grade in the course. The complete policy on academic integrity is in Appendix F of NAU's Student Handbook.

**Classroom Management Statement.** Membership in the academic community places a special obligation on all members to preserve an atmosphere conducive to a safe and positive learning environment. Part of that obligation implies the responsibility of each member of the NAU community to maintain an environment in which the behavior of any individual is not disruptive.

It is the responsibility of each student to behave in a manner which does not interrupt or disrupt the delivery of education by faculty members or receipt of education by students, within or outside the classroom. The determination of whether such interruption or disruption has occurred has to be made by the faculty member at the time the behavior occurs. It becomes the responsibility of the individual faculty member to maintain and enforce the standards of behavior acceptable to preserving an atmosphere for teaching and learning in accordance with University regulations and the course syllabus.

At a minimum, students will be warned if their behavior is evaluated by the faculty member as disruptive. Serious disruptions, as determined by the faculty member, may result in immediate removal of the student from the instructional environment. Significant and/or continued violations may result in an administrative withdrawal from the class. Additional responses by the faculty member to disruptive behavior may include a range of actions from discussing the disruptive behavior with the student to referral to the appropriate academic unit and/or the Office of Student Life for administrative review, with a view to implement corrective action up to and including suspension or expulsion.

### **ACADEMIC INTEGRITY QUIZ**

The goal of this assignment is to provide the opportunity to re-familiarize yourself with the basic elements of academic integrity. This assignment has two parts. The first part pertains specifically to plagiarism. This assignment is set up so that you keep taking it until you earn a perfect score. Not a bad deal. Do remember: you **MUST** earn this perfect score. No joke.

The process is pretty simple.

Go to our BbLearn site. Click on "Assignments" then read the instructions for completing the quiz.

Syllabus

Page 2 of 8



## Syllabus



Fall 2012  
October 29-December 14, 2012

**This class begins October 29 with on-line sessions and requires web access and an NAU e-mail account. The Flagstaff in-person session will meet December 10-13 on the NAU Flagstaff Mountain Campus.**

## COURSE SYLLABUS

**Instructor:** Dr. Marty Lee  
**Office:** Rm. 241, Forestry, NAU Mountain Campus  
**Office Phone:** 928-523-6644  
**E-mail:** martha.lee@nau.edu -- Use this e-mail only for emergencies--all e-mail correspondence for this course should normally be sent using BbLearn e-mail.

**Office Hours:** Because this is an online class I will be holding office hours on-line from the "chat room" in BbLearn on Wednesdays from 8-9 p.m. (Arizona Time). If you call me by phone at my office, please leave a message and I will get back to you ASAP. Please feel free to e-mail me through BbLearn e-mail. Click on the Virtual Office Hours icon in Course Content for office hour "chats."

**Teacher Expectations: What can you expect from me?**

- I will check my BbLearn e-mail daily (except weekends). I will respond to every e-mail within 24 hours. I will reply to your e-mail and will "cc" or include the entire class in each e-mail. Students usually have similar questions and so I do this so everyone can "see" and "hear" what is going on in the class. Please let me know in your e-mail if you would prefer that I not "cc" the class.
- In terms of responding to our discussion question postings, I will read all of the postings but will not respond directly to all the postings. This is a "discussion" area and so we should be discussing as a group. However, I frequently will post comments.
- In terms of grading, I will get the grading done ASAP. This usually means the weekend after everything has been turned in for the week.
- I am here for you so if you have any questions or needs, please contact me!















**FOR 445  
WILDERNESS MANAGEMENT  
Fall 2012**

**Course Time:** TTh 8:00 – 9:15 a.m.  
**Credit Hours:** 3  
**Instructor:** Dr. Marty Lee  
Rm. 241, Forestry  
Phone: 523-6644  
martha.lee@nau.edu  
Office hours: Open door or by appointment

**Course Description:**

After more than 40 years of experience, we are just now recognizing the management implications of designating large and small tracts of lands for permanent preservation. This course will examine wilderness management issues from a multi-disciplinary approach, using current and historical readings along with first-hand experience to begin to understand the complexities involved in managing these areas.

**Course Objectives:**

This course examines the philosophical, historical, legal, ecological, social and cultural aspects of lands managed under the Wilderness Act. It allows students to work collaboratively with Wilderness managers on a Wilderness planning and management project. It is designed to help students develop a personal feeling and sense of stewardship about Wilderness.

**Course Structure:**

The course is broadly divided into two sections. First we will discuss what is meant by the term Wilderness—both philosophically and from a management perspective. We will discuss with managers current wilderness management laws and policies, paying particular attention to what is allowed and prohibited in designated Wilderness including issues such as prescribed fire, grazing, mining, water, Native American rights, and recreation use. The second focus of the course involves working in cooperation with managers from the Forest Service, Arizona Game and Fish, and others in a real-world Wilderness planning and management project.

**Required Texts:**

Leopold, A. A sand county almanac. Latest edition.  
Hendee, J. and C. Dawson. 2002. Wilderness management, 4<sup>rd</sup> edition. Fulcrum Publishing, Golden, CO.  
A lined lab notebook.

**Other readings**

Other readings may be provided as needed

**Evaluation Methods and Deadlines:**

Assignments: There will be 4 written essays each worth 30 points (total 120 pts or 40% of your grade)

Essay topics:

1. What is wilderness? – due September 6
2. Find Your Special Wilderness – due October 11
3. Loving Wilderness to death! – due November 20
4. Developing your own wilderness ethic – due December 6

Reading notebook. At the conclusion of each chapter in the Hendee and Dawson book, the author(s) provide study questions. These questions will serve as a basis for our discussions so have them completed and be ready to discuss them in class. I will randomly call on class members to lead discussions of these questions. Your notebooks will also be of value in writing your essays. I will collect your notebooks periodically and look for evidence of serious effort and thought. Your notebook is worth 60 points (20% of your grade).

Wilderness management project – 110 points (37% of your grade). The project will involve working closely with Wilderness managers and will require out-of-class time, including some weekend work. There will be a written report (80 pts) and an oral presentation (30 pts).

Field day write-up – 10 points (3% of your grade). You are required to attend one of two scheduled field work days where we will work with wilderness managers on trail maintenance or other field work – these will be held on a weekend day. You will prepare a brief write-up of what you did and what you gained from that experience. There will be other work day opportunities – you can earn extra credit by attending these and preparing a brief write-up of your experience. The currently scheduled field days are attached to the syllabus.

	<u>Points</u>
Essays – 4 @ 30 pts each	120
Reading notebook	60
Project	110
Report –	80
Presentation –	30
Field work day write-up	<u>10</u>
<b>Total</b>	<b>300</b>

### **Course Policies:**

Attendance: Required at all class meetings. Students are expected to come to class prepared to discuss issues and concepts developed in class and contained in assigned readings. While class attendance is required, please be cautious about attending class if you are feeling ill. Please inform me by phone or email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class; please take precautions not to infect others, and seek medical attention if your symptoms worsen.

Cell phones: Cell phones must be turned off during class.

Respect for instructors and classmates: Do not get up and leave during class unless it is an

emergency or you have made prior arrangements with me to do so.

Makeup Work: All assignments must be turned in. Late assignments will not be accepted unless there is a compelling reason for the lateness. Points will be deducted from late papers. Makeup policy will follow university guidelines.

See the University Catalog for policy on other issues such as plagiarism and cheating.

**Wilderness Management  
Fall 2012**

**Tentative Course Schedule**

<u>Wk</u>	<u>Dates</u>	<u>Topic</u>	<u>Reading(s)</u>
1	8/28 8/30	Introduction to the course What is Wilderness?	H&D chpt 1, p. 2 -12, Wilderness Act sec. 2(c) (p. 495)
<b>Chpt. 1 Study Questions 1-3 due – journal</b>			
2	9/4	Why do we manage Wilderness? <b>Chpt. 1 Study Questions 4-10 due – journal</b> <b>Complete Wilderness values test (Q10)</b> <b>(H&amp;D p. 26-28) in your journal</b>	H&D chpt 1 p. 12-26
	9/6	Wilderness class project - introduction <b>Essay #1 Due</b>	
3	9/11	Wilderness planning--federal agencies <b>Chpt. 8 Study Questions 1-3 due – journal</b>	H&D chpt. 8 p. 196-203
	9/13	Class project – choosing project teams and start working on project	
4	9/18	History of conservation, American wilderness <b>Chpt. 2 Study Questions due – journal</b>	H&D chpt 2
	9/20	Project work	
5	9/25	Video & discussion – “Wild by Law”	
	9/27	Project work	
6	10/2	The Wilderness Act <b>Chpt. 4 Study Questions due – journal</b>	H&D chpt. 4; p. 495-499, 525-527
	10/4	Project Work	
7 map	10/9	Natl Wilderness Preservation System <b>Chpt. 6 Study Questions due - journal</b>	H&D chpt 6; Wilderness System
	10/11	Project work <b>Essay #2 Due</b>	
8	10/16	Wilderness management principles <b>Chpt. 7 Study Questions due – journal</b>	H&D chpt 7



10/18 Project work

<u>Wk</u>	<u>Dates</u>	<u>Topic</u>	<u>Reading(s)</u>
9	10/23	Wilderness planning <b>Chpt. 8 Study Questions 4-9 due - journal</b>	H&D chpt 8, pp. 203-214
	10/25	Project work	
10	10/30	Wilderness use <b>Chpt. 14 Study Questions 1-2 due – journal</b>	H&D chpt 14 pp. 357-369
	11/1	Project work	
11	11/6	Wilderness users <b>Chpt. 14 Study Questions 3-7 due – journal</b>	H&D chpt 14 pp. 369-390
	11/8	Project work	
12	11/13	Visitor management <b>Chpt. 16 Study Questions 1-6 due - journal</b>	H&D chpt 16 pp. 439-454
	11/15	Project work	
13	11/20	Visitor management <b>Chpt. 16 Study Questions 7-10 due – journal</b> <b>Essay #3 due</b>	H&D chpt 16 pp. 454-482
	11/22	<b>THANKSGIVING HOLIDAY</b>	
14	11/27	Future issues and challenges for Wilderness management	H&D chpt. 17
	11/29	Project work	
15	12/4	Project work	
	12/6	Project work <b>Essay #4 due</b>	

Final Exam: December 13 (Thursday) – 8 a.m. – Presentation to Forest Service

## Course Syllabus

### General Information

College or Department:	School of Forestry
Course Prefix, Number & Title:	FOR 447 Forestry and Community
Semester Offered:	Every Fall
Clock & Credit Hours:	TTh 9:35-10:50; 3 Credit Hours
Instructor:	Denver Hospodarsky, PhD, CF (aka DrH) Associate Professor Certified Forester # 3142
Office:	Southwest Forest Science Complex – Bldg. 82 Room 104 928.523.7525 <a href="mailto:denver.hospodarsky@nau.edu">denver.hospodarsky@nau.edu</a>
Office Hours:	MW 9-10 TWTh 3:30-4:00

**Course Prerequisites** Senior standing, graduate student or consent of instructor

### Course Description

The purpose of this course is to provide students with social science theory, concepts and analytic techniques for understanding human-forest ecosystems, from the perspective of human communities as a fundamental unit of social organization relevant to landscape-level and larger resource processes. The course develops and follows several perspectives in social theory drawing from sociology, anthropology, economics and social psychology in order to better describe, anticipate and affect interactions between communities and their natural environments. Forest management, in its many forms, is considered as a primary adaptive strategy mediating these interactions. Applications of theory, concepts and analytic techniques are made primarily through cases of forest management at the individual community and sub-state regional scales of community and forest interaction.

## **Student Learning Expectations/Outcomes**

The primary learning outcomes for this course include:

- 1) To gain theoretical and conceptual understandings of human-forest resources interrelationships at the community level of analysis, with emphasis on social, cultural, psychological and economic dimensions.
- 2) To apply and expand theoretically and conceptually-based understandings through the analysis of local case studies in forest management.
- 3) To identify and address problems in research methods and data analysis related to understanding human-forest ecosystems.
- 4) To apply critical thinking, analysis and communications skills in the resolution of forest resources management problems.

## **Course Structure and Approach**

Five learning modules have been designed to meet the four course outcomes outlined in the previous section.

Module 1 contains the course introduction and establishes basic concepts in forest resources management used throughout the course. As a general introduction to the course context, Module 1 does not correspond to any particular course outcome.

Module 2, social theories and concepts of community and region, promotes Outcome 1.

Module 3, applications of concepts and theory, serves Outcome 2.

Module 4, analytic tools, serves Outcome 3.

Module 5, implementation of planning and management, is intended to accomplish Outcome 4.

The overall content of the course is presented on the basis of **about** 10% lecture, 70% seminar readings and in-class discussion, and 20% student presentations of seminar issues and approaches to resolving community-forest management issues of particular interest to individual students.

## **Textbook and Required Readings**

The assigned text is Lee, Robert G. and Field, Donald R. 2005. *Communities and Forests: Where People Meet the Land*. Oregon State University press, Corvallis. We will read and discuss several chapters from this text. In addition, a substantial number of additional readings will be assigned.

## Recommended Optional References

Occasionally, the instructor or students may recommend pertinent readings in addition to those in the text and readings list.

## Course Outline

The course is to be delivered according to the following weekly schedule. This schedule, however, will remain somewhat flexible to accommodate students' interest, knowledge and experience with the various topics. For example, students are encouraged to suggest additional readings related to the various module themes.

### WEEKLY SCHEDULE (approx.)

<u>Week</u>	<u>Module</u>
1	
2	
3	
4	
5	

**Note: There will be no class October 23 and 25 so we can attend the Society of American Foresters national convention in Reno, NV**

## Assessment of Student Learning Outcomes

### Methods of Assessment:

Students will keep a reading journal from which they will write five seminar discussion questions per assigned reading. The quality of the journal, study questions and student's contribution to the seminar discussion will be evaluated bi-weekly as they contribute as much as 20% to the course grade.

Term paper # 1: Literature review and synthesis; 30% of course grade.

Term paper #2: Conceptual framework; 30% of course grade.

Final exam – assessment methods; study questions will be provided in advance but exam will be in the class room and closed-book.: 20 %

(A final term paper may substitute for the in-class exam.)

### Timeline for Assessment

Reading journal and contribution to seminar discussion evaluation – bi-weekly.

Term paper #1 – October 20

Term paper #2 – November 22

Final exam – Scheduled final exam period

## **Grading System**

Final grades will be assigned according to the following scale:

A = 100 – 91%

B = 90 – 81%

C = 80 – 71%

D = 70 – 61%

F <= 60%

## **Course Policy**

Retests/makeup tests:	Retests and makeup tests are only available with a doctor's written excuse.
Attendance:	Attendance is required. Seminar-based classes can only succeed when all class members attend and participate in the discussion.
Statement on plagiarism And cheating:	Each student is expected to do his or her own work on all assignments. Plagiarism or cheating in any form will not be tolerated and may constitute grounds for dismissal. We will also abide by the SAF Code of Ethics in the conduct of this class.
University policies:	Please see the NAU Student Handbook.
Cell phones:	Cell phones must be turned off and stowed away at all times while class is in session. If your phone rings during class, the instructor reserves the right to answer it for you.

## **Forestry 452 - Forest Pathology**

### **Course Syllabus**

Course Prefix, Number and Title: FOR452, Forest Pathology

Credit Hours, Clock Hours: 3 credits,

Course Meets: Room 133, Thursday 12:45 – 5:15 p.m. (Lecture/Lab)

Instructor's Name: Dr. Robert Mathiasen

Office - Room 002, Southwest Forest Science Complex

Phone: 523-0882; e-mail: Robert.Mathiasen@nau.edu

Office Hours: open door or by appointment.

**Course Prerequisites:** None

### **Course Description**

This course covers the identification, biology, epidemiology, economic and ecological importance and management of the most commonly occurring tree diseases in western forests. Widely distributed tree diseases in the following categories are discussed in detail - root diseases, stem decays, rust diseases, and mistletoes. Several economically and ecologically important tree diseases will be included under each of the preceding disease categories. Students will be required to develop a thorough knowledge of how to identify and manage the tree diseases selected for discussion. In addition, students will become familiar with pertinent (historical and current) scientific literature related to each of the tree diseases covered in the course. The roles tree diseases play in forest ecosystems will be included as an integral part of the course.

### **Course Objectives:**

1. Students will learn how to identify each of the tree diseases discussed in the course under laboratory conditions, and whenever possible, under field conditions.
2. Students will learn the biological and epidemiological characteristics of each tree disease covered in the course.
3. Students will learn the economic and ecological importance of each tree disease discussed in the course.

4. Students will learn appropriate strategies for managing the selected tree diseases.
5. Students will become familiar with important scientific literature pertaining to each of the tree diseases discussed.

**Course Structure/Approach:** The emphasis of this course will be on students gaining a thorough knowledge of the biology of causal agents and the identification and management of the major diseases affecting trees in western forests. Major tree diseases in the following categories will be covered in detail: root diseases, stem decays, rusts, and mistletoes. This course is not designed as a survey course of a wide range of tree diseases, but will concentrate on those tree diseases that are the most important economically and ecologically in the western United States. Students taking the course will become extremely familiar with the identification and biology of the causal agents associated with the tree diseases, their epidemiology, distribution, management, and ecological importance. Collected specimens representing symptoms and signs of the tree diseases covered in the course will be brought into class frequently. Students will be expected to be able to identify tree diseases using collected specimens representing the selected tree diseases and in many cases under field conditions.

**Field Trips:** When possible, field trips to local forest areas to observe forest tree diseases will be arranged. These will be during laboratory sessions when possible, but one weekend field trip is scheduled for over the Veterans Day Holiday weekend (see course schedule). Students not attending the weekend field trip will be given another assignment in lieu of attending the field trip. This assignment will be due on December 1. Arrangements for field trips will be discussed with students during the first and second class meetings. Transportation to field sites will be provided.

**Recommended Textbook:**

Sinclair, W. A., and H. H. Lyon. 2005. Diseases of trees and shrubs. Cornell University Press.  
(Second Edition)

Readings will be required of students including specific scientific papers on different research efforts related to forest tree diseases covered in the course.

**Other Key References:**

Boyce, John S. 1966. Forest pathology. McGraw-Hill Book Company, NY, 572 p.

Fairweather, M., J. McMillin, T. Rogers, D. Conklin, and B. Fitzgibbon. 2006. Field guide to insects and diseases of Arizona and New Mexico. USDA Forest Service, Southwestern Region, Albuquerque, NM. 269 p.

Geils, B., J. Tovar, and B. Moody. (Tech. Coords.). 2002. Mistletoes of North American conifers. USDA For. Serv. Gen. Tech. Rep. RMRS-GTR-98. 123 p.

Hawksworth, Frank G., and Robert F. Scharpf. 1984. Biology of dwarf mistletoes: Proceedings of the symposium. USDA Forest Service Gen. Tech. Report RM-111, 131 p.

Hawksworth, Frank G., and Del Wiens. 1996. Dwarf mistletoes: Biology, pathology and systematics. USDA Forest Service Agric. Handb. 709, 410 p.

Otrosina, William J, and Robert F. Scharpf. 1989. Research and management of Annosus root disease (*Heterobasidion annosum*) in western North America. USDA Forest Service Gen. Tech. Report PSW-116, 177 p.

Scharpf, Robert F. 1993. Diseases of Pacific Coast conifers. USDA Forest Service Agric. Handb. 521, 199 p.

Shaw, Charles G. And Glen A. Kile. 1991. Armillaria root disease. USDA Forest Service Agric. Handb. 691, 233 p.

Tainter, Frank H., and Fred A. Baker. 1996. Principles of forest pathology. John Wiley & Sons, NY, 805 p.

Walters, James W. 1975. An aid to identifying aspen diseases frequently encountered in the Southwest. USDA Forest Service, Southwest Region, Forest Insect and Disease Management Report R3-75-22, 12 p.

Walters, James W. 1978. A guide to forest diseases of southwestern conifers. USDA Forest Service, Southwest Region, Forest Insect and Disease Management Report R3-78-9, 36 p.

Ziller, Wolf G. 1974. The tree rusts of western Canada. Canadian Forestry Service Publ. No. 1329, 272 p.

**Assignments:** Assigned readings from the references will be used to cover material on each of the topics discussed in class. Because a detailed coverage of each tree disease included in the course will be emphasized, required readings will primarily be from the scientific literature specific to each disease.

**Evaluation Methods:** Course participants will be evaluated on the basis of their performance on quizzes, exams, participation on field trips, and other assignments.

**Examinations:** There will be one midterm (150 points) and a final exam (200 points). The final will be a comprehensive exam, but will emphasize material covered in the last half of the course. Each exam will consist of a combination of true/false, multiple choice, matching, short answer and essay questions. In addition, each exam will include the identification of selected tree diseases based on a variety of collected specimens representing symptoms or signs of the tree diseases covered in the course. In addition to the midterm and final exam, five short lab quizzes (10 points each) may be given at various times during the course. **The final exam will be in Room 133 on December 13 from 12:30 – 2:30 p.m.** Everyone must take the final at the NAU designated time.

**Grading:** Grades will be based on a possible total of 400 points: Midterm - 150 points; Final Exam - 200 points; five possible quizzes – possibly up to 50 points. Grades will be assigned by earned points as follows:

A – 90 - 100% of possible points

B - 80 - 89%



C – 70 - 79%

D – 60- 69%

F - Less than 60% of possible points

**Course Policies:** Policies for the course are described below under Northern Arizona University Policy Statements.

**Attendance:** Class attendance is the responsibility of each participant in the course. No penalty for not attending classes will be assessed, but it is the responsibility of each participant to acquire the material presented in classes they miss from the instructor or other class participants. If a class participant must miss the midterm they should notify the instructor in advance and make arrangements to take the exam at another time. Class participants will only be allowed to take a make-up exam or quiz if they have notified the instructor in advance that they will not be at the scheduled class meeting or on a pre-arranged field trip because of an illness, family emergency, or institutional excuse.

### **Northern Arizona University Policies**

A summary of major university policies is found on the following web page for your information:  
<http://jan.ucc.nau.edu/academicadmin/policy.doc>

**Tentative Syllabus**  
**FOR 493/593**  
**Natural Resource Economics**  
Fall 2010  
TTH 12:45 PM-2:00 PM, 3 credits

**INSTRUCTOR INFORMATION:**

Ching-Hsun Huang: Office: Room 238, Southwest Forest Sciences Complex  
Phone: 928-523-7502, Email: Ching.Huang@nau.edu  
Office Hours: Wednesday 3:00-4:00 PM or by appointment

**COURSE DESCRIPTION:**

FOR 493/593 Natural Resource Economics introduces economic theory and environmental and natural resource issues to students, offers them the tools and techniques to understand and analyze resource decisions and help them design practical policy solutions. Using simple algebra, a basic understanding of microeconomic theory and the concepts of the economics of natural resource systems, this course equips students with the skills and abilities to understand why resource decisions are made and how they can be improved upon in order to achieve the desired balance between utilization and conservation. FOR 493/593 also covers the topics on the economics of sustainability and identifies the interactions between economy, community and environment over the long-term as the subject of sustainability and sustainable development emerges and future environmental policy options are needed for a more sustainable society. FOR 493/593 is a skills-based course which prepares students to work in an interdisciplinary fashion and develop effective public policy with other economists, scientists and land managers.

FOR 493 co-convenes with FOR 593. Graduate students are expected to show higher standards of professionalism and complete work that is about one third higher in quality and quantity than their undergraduate classmates (See the Assessment of Student Learning Outcomes).

**TEXTBOOK:**

Environmental and Natural Resource Economics by Frank A. Ward. Pearson Prentice Hall, 2006. Additional readings will be assigned to supplement the text.

Students are expected to bring a calculator to every class meeting. No calculators will be provided for the quizzes or exams. Prepare extra batteries for your calculator if necessary.

**CLASS FORMAT:**

The class will be a combination of lectures and in-class discussions based on assigned readings.









## **Spring Course Syllabi**

# Syllabus

## FOR 101, Introduction to Forestry

11:10-12:25 (TTH), 3 credits, Room 18 Forestry

**Denver Hospodarsky** (aka DrH), PhD, CF # 3142

**Office:** Room 104, SW Forest Science Bldg.

**Office Hours:** 2:00-4:00 TTh; otherwise Open door (it's almost always open when I'm not in class) or by appointment

**Phone:** 523-7525

**E-mail:** [denver.hospodarsky@nau.edu](mailto:denver.hospodarsky@nau.edu)

This course is designed to give the student an overview of the practice and profession of forestry. The central theme is forestry as a societal function in which forests and other natural resources are managed for the benefit of human and natural ecosystems. In development of this main theme related topics of forest history, forestry as a profession, forest geographic description, forest structure and function, human dimensions of forest management, forest and land measurements, and other related topics will be discussed.

**Goals:** Successful completion of this course will enable you to --

- 1) Gain an understanding of the terminology of forestry and other natural resource management practices used in public and private land management settings.
- 2) Comprehend the forestry profession including employment and career opportunities in natural resources management, and the required qualities of a professional forester.
- 3) Attain an understanding of key concepts of forest management.
- 4) Obtain practical experience with some of the field skills used in the day-to-day management of forest resources.

The course format will be lecture, student presentations, class discussion, videos, field trips, and field forestry demonstrations and hands-on exercises.

**Required Text:** Introduction to Forests and Renewable Resources (8th ed.) by J. Hendee, C. Dawson and W. Sharpe.

**Evaluation Methods:** Three exams, two midterms and one final (100 points each); five short in-class readings quizzes (10 points each); three field work reports (10 points each); one video report (10 points); and one forestry field day exercise and report (100 points)

The final exam is not comprehensive and will cover only the material discussed after the second midterm exam. The final exam must be taken on the date and time specified by NAU for our class.

(Note: The two midterm exams and the final exam will draw about equally from the assigned readings and the instructor's discussion of topics prompted by the readings.)



<b>Grading Scale:</b>	A	90-100%
	B	80-89%
	C	70-79%
	D	60-69%
	F	less than 60%

### Course Policies:

You will be allowed up to three unexcused absences during the semester without incurring any reduction in your course grade. You will receive a 5% reduction in grade for each absence in addition to the allowed three. (The exception to the above absence policy is Forestry Field Day, which is required of all students unless you have obtained written permission for your Field Day absence from your medical doctor. An unexcused absence from Field Day will result in the loss of 100 points.)

Remember, according to the NAU Undergraduate Catalog, "...You are responsible for regularly attending all courses for which you are registered...Your instructors are under no obligation to make special arrangement for you if you are absent."

An important summary of other NAU policies pertaining to this course is found at:

<http://jan.ucc.nau.edu/academicadmin/policy.doc>. It is strongly urged that you review these policies before proceeding with this class.

### Course Assignment Calendar:

<u>Due Date</u>	<u>Assignment</u>
Jan 15	Ch 1 (Text); Forestry Video ( <b>SAF meeting Jan 17-extra credit: extra credit also available for attending SAF meetings in Feb, Mar, and Apr.</b> )
Jan 22	Ch 2; <b>Video Report due Tuesday Jan 22;</b>
Jan 27	Ch 3; <b>Quiz Thursday Jan 31 on Chapter 3</b>
Feb 5	Ch 4; <b>Field Trip on Forest Ecology Thursday Feb 7</b>
Feb 12	Ch 5; <b>Field Trip Report due Tuesday Feb 12; Midterm Exam 1 Thursday Feb 14</b>
Feb 19	Ch 6; Ch 7 (125-129, 134); <b>Quiz Thursday Feb 21 on Chapters 6&amp;7</b>
Feb 26	Ch 8; <b>Field Trip on Fire/Fuels Thursday Feb 28</b>
Mar 5	Ch 9; <b>Field Trip Report due Tuesday Mar 5; Quiz Thursday Mar 7 on Chapter 9</b>
Mar 12	Ch 12
Mar 19	<b>Spring Break</b>
Mar 26	Exam review Tue March 26: <b>Midterm Exam 2 Thursday Mar 28</b>
Apr 2	Ch 13 (277-278, 281-293); Ch 14 (299-313); <b>Quiz Tuesday Apr 2 on Ch 13&amp;14</b>
Apr 9	Ch 17; <b>Field Trip on Forest Measurements Thursday Apr 11</b>

Apr 16 Ch 18 (387-389); Ch 19 (405-419); **Field Trip Report due Tuesday Apr 16; Quiz Thursday Apr 18 on Ch 18 and 19**

**Field Day Sat Apr 20, 9 am – 4 pm; 100 points**

Apr 23 **No class Apr 23 and 25 (work on Field Day report)**

Apr 30 Hand Out: Wildland-urban Interface Forestry; Ch 20); **Field Day Report due Apr 30**

May 9 Final Exam Tuesday May 9; 10-12

\*Field work and report dates are subject to change due to the weather

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FOR 203 – Project Learning Tree  
Spring 2013

1 credit

Saturday, September 15, 9:30 – 4:30

Sunday, September 16, 9:30 – 4:30

Rm. 136, SWFSC (Forestry)

Facilitators: Dr. Marty Lee, Karen Malis-Clark  
Office: M. Lee - SWFSC 241, martha.lee@nau.edu

**Objectives:**

1. Introduce students to Project Learning Tree and the environmental education resources it provides.
2. Provide students with information and examples of environmental education activities on forests, forestry, and fire.
3. Give students ideas for adapting Project Learning Tree activities for a variety of audiences.
4. Give students experience with leading Project Learning Tree activities.

**NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor." You must attend both days of the Project Learning Tree class to pass the class.

Day 1 - Saturday – Introduction to PLT + Focus on Forests (Marty Lee)

- 9:30 a.m. Introductions, Nametags
- 9:45 Why are you taking PLT?  
What is Project Learning Tree?
- 10:00 Ponderosa pine forests  
Activity – “My Life as a Tree” – p. 329
- 12:00 LUNCH
- 1:00 p.m. How trees function  
Activity – “Tree Factory” – p. 269  
Activity – “Every Tree for Itself” – p. 117
- 2:00 Break
- 2:15 Activity – “To Be a Tree” – p. 265
- 3:00 PLT resources and a hike through the guide
- 3:30 Choosing the right activity  
Select and work on Teachbacks
- 4:30 Adjourn

Day 2 – Sunday – Focus on Fire (Karen Malis-Clark) + Teachbacks

- 9:30 a.m. Fire in ponderosa pine ecosystems  
Activity - “Living with Fire”  
Activity - “Matchstick Forest”  
Activity – “Zip Game”
- 12:30 LUNCH
- 1:00 Teachbacks – Your Turn to Teach
- 4:00 Final exam
- Wrap-ups, evaluations
- 4:30 Adjourn



FOR 204 – Project WILD (6044)

Spring 2013

1 credit

Saturday, March 9, 9:30 am – 4:30 pm

Sunday, March 10, 9:30 am – 4:30 pm

Rm. 136, SWFSC (Forestry, Bldg 82)

Facilitators: Cheryl Miller (CM) and Shelly Shepherd (SS)

Office hours: by appointment only

Telephone: (928) 523-6727 (CM); (928) 214-1241 (SS)

E-mail: [Cheryl.Miller@nau.edu](mailto:Cheryl.Miller@nau.edu); [SShepherd@azgfd.gov](mailto:SShepherd@azgfd.gov)

Web site: <http://www.projectwild.org>; [www.asgfd.gov](http://www.asgfd.gov)

### **Objectives:**

Introduce students to Project WILD and the environmental education resources it provides.

Provide students with information and examples of environmental education activities that teach about wildlife.

Give students ideas for adapting Project WILD activities for a variety of audiences.

Give students experience with leading Project WILD activities.

### **NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the

instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor."

## **Saturday**

9:30 a.m. Introductions, What Animal am I? Why are you taking WILD?

10:00 What is WILD?

Mission and goal, history, a look at the national website

What is Wildlife? Definition and Arizona Wildlife introduction

Break

11:00 Activity – "Habitat Lap Sit" (p. 61)

Activity – Adaptation Artistry (p. 128)

12:30 p.m. LUNCH

1:00 Arizona Game and Fish educational materials

1:30 Hike through the Guide

2:00 Black footed ferrets and Activity – "Bottleneck Genes" (p. 172)

3:00 Activity – "Quick Frozen Critters" (p. 122)

4:00 Select and work on Teachbacks

VARK homework

4:30 Adjourn

## **Sunday**

9:30 a.m. What kind of learner are you? VARK

Understanding your audience

Choosing the right activities

10:30 Teachbacks

12:00 p.m. LUNCH

12:30 Teachbacks

1:30 Final: EE Scenarios  
3:00 How will I use Project WILD?  
Wrap Up  
4:30 Adjourn

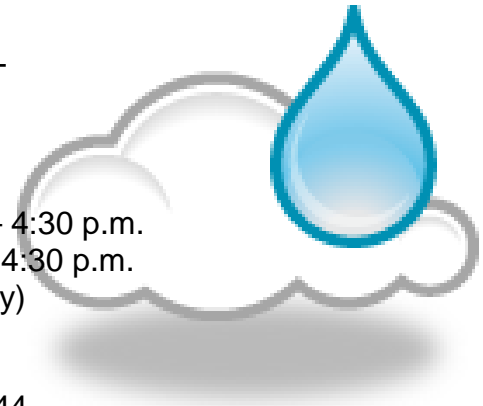
FOR 207 – Project WET  
Spring 2013

1 credit

Saturday, February 16, 9:30 a.m. – 4:30 p.m.

Sunday, February 15, 9:30 a.m. – 4:30 p.m.

Rm. 136, SWFSC (Forestry)



Instructors: Dr. Marty Lee, Mansel Nelson

M. Lee Office: SWFSC 241, [martha.lee@nau.edu](mailto:martha.lee@nau.edu), 523-6644

**Objectives:**

1. Introduce students to Project WET and the environmental education resources it provides.
2. Provide students with information and examples of environmental education activities on water and water conservation.
3. Give students ideas for adapting Project WET activities for a variety of audiences.
4. Give students experience with leading Project WET activities.

**NAU Policies**

See the student handbook: <http://www4.nau.edu/stulife/handbook.htm>

**Academic Honesty:** Academic dishonesty is defined in the student handbook. Unauthorized use of another person's intellectual work is cheating and includes: copying on exams, plagiarizing a student's work, giving unauthorized aid on tests, falsification of data or calculations. Cheating will not be tolerated. Students caught cheating will be given a failing grade on the assignment or exam, and procedures outlined in the student handbook will be adhered to.

**Antidiscrimination:** Discriminatory or derogatory language and/or actions regarding race, gender, ethnic and cultural background, sexual orientation, or physical and mental abilities will not be tolerated. Offenders will be excused from class.

**Disabilities:** If you need course adaptations or special accommodations because of a disability, if you have emergency medical information or if you have special accommodations that need to be shared with the instructors in the event of an emergency, please contact the instructor immediately. If you use an alternative medium for communication, please let the instructor know before the course so appropriate accommodations can be made.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook and states that "...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence...Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor."



## Schedule:

### Day 1 – Saturday, February 16

- 9:30 a.m. Name tag activity and welcome to Project WET – Marty Lee  
10:15 a.m. Activity – “The Rain Stick” – p. 422  
11:30 a.m. History of Project WET  
Websites – [www.projectwet.org](http://www.projectwet.org)  
<http://www.ag.arizona.edu/azwater/wet>  
Hike through the guide  
12:00 LUNCH  
12:30 p.m. Healthy Water, Healthy People – Mansel Nelson, NAU  
Environmental Education Outreach Program  
Sparkling Water – p. 348  
Where are the Frogs? – p. 279  
H+ to OH-  
4:00 p.m. Select and work on Teachbacks  
4:30 p.m. Adjourn

### Day 2 – Sunday, Sept. 30

- 9:30 a.m. Activity: “The Incredible Journey” – p. 161  
10:30 a.m. Water Conservation – What Can You Do?  
12:00 LUNCH  
12:30 Activity: “Ice Cream in a Bag” – handout  
12:45 Final prep for teachbacks  
1:00 Teachbacks  
4:00 p.m. Final Exam  
Wrap-up and evaluations  
4:30 p.m. Adjourn



## **Forestry 212 Spring 2013**

### **Trees and Forests of North America**

<b>Credits</b>	2 semester hours
<b>Location</b>	Room 101 W.A. Franke College Business (Building 81)
<b>Meeting Times</b>	10:20-11:10, Monday and Wednesday
<b>Instructor</b>	Dr. Tom Kolb, Professor of Forestry  202 Southwest Forest Science Complex (Building 82) 523-7491, <a href="mailto:tom.kolb@nau.edu">tom.kolb@nau.edu</a> Office hours: 11:30-2:00 Monday and Wednesday, or by appointment

### **Course Prerequisites**

This course is required for all students majoring in Forestry. It also is appropriate for other students who are interested in learning about trees and forests. There are no prerequisites other than interest in the subject.

### **Course Objectives**

Students who successfully complete this course will have the following competencies: 1) knowledge of basic principles of plant classification and taxonomy; 2) knowledge of the scientific and common names, range, and the physical, ecological, and utilitarian characteristics of many important trees in North America; 3) knowledge of the major forest types in North America and their geographic location and species composition.

### **Course Structure/Approach**

This course will use lectures and discussions to introduce the most important concepts. All students are expected to supplement the material covered in lecture by reading in the assigned text and on the course web (<http://www2.for.nau.edu/courses/for212/>). Once the class covers a tree species (or even before), students should read about that species in the text. The key to success in this class is keeping up.

### **Grading**

Students will be graded by a combination of traditional in-class exams and weekly quizzes.

Weekly quizzes	25%
Exam 1 (gymnosperms)	25%
Exam 2 (angiosperms)	25%
Exam 3 (forest types)	25%

## Other Course Policies

Student attendance at all class activities is an academic policy of NAU. However, situations arise occasionally that prevent a student from attending class. If such a situation occurs, it is the student's responsibility to contact the instructor. Calling or emailing the instructor in advance is a good way to do this. It is the student's responsibility to make up any material (including exams) he/she missed. If you do not inform the instructor of your absence, he is not obliged to let you make up the work.

## Text

The text required for the course is:

**Hardin, J.W., Leopold, D.J., and White, F.M. 2001. *Textbook of Dendrology*. McGraw Hill. 9th Edition.**

Older editions of this book also will work adequately for the course. The book is available at the NAU Bookstore. One copy of the text is on reserve for this course at Cline Library (four-hour check-out in the library).

## Web Enhancement

This is a web-enhanced course. Supporting content for the course is available at: <http://www2.for.nau.edu/courses/for212/>; the weekly quizzes are available on the BB Learn website (<https://bblearn.nau.edu/>) for the course under “assessments.”

## Quizzes

Quizzes will be given most weeks (9 total) and are available only on the BB Learn website (<https://bblearn.nau.edu/>) for the course under “assessments.” The quiz points will make up 25% of your final grade and are meant to promote diligence in studying. Each week's quiz will be open to students starting early Sunday morning and will be due no later than Friday, 9 pm, of the same week. You are expected to take each quiz independently outside of class. You will have only one attempt (30 minutes) for each quiz, except for the first quiz when you will have two attempts in order to learn the online system.

## Exams

Exams are not cumulative except that the material in the last third of the course will revisit the major species of important forest types.

## Other Policies

**NAU Policy on Academic Integrity (from the Student Handbook,** [http://www4.nau.edu/academiccatalog/2011/Introduction/Important\\_Policies/Combined/Grading/AcademicIntegrity.htm](http://www4.nau.edu/academiccatalog/2011/Introduction/Important_Policies/Combined/Grading/AcademicIntegrity.htm))

Northern Arizona University regards acts of academic dishonesty—including, but not limited to, plagiarism, cheating, fabrication, forging an instructor's signature, stealing tests, copying themes or tests from other students, texting for answers, accessing the Internet during "closed" tests, or using “crib notes”—as very serious offenses. Official University policies regarding academic dishonesty are described at: <http://home.nau.edu/images/userimages/awf/9476/ACADEMIC%20DISHONESTY.pdf>

## Spring 2013 Schedule

Jan. 14 M	Introduction/Principles of Taxonomy
Jan. 16 W	Start Gymnosperms/ <i>Pinus</i>
Jan. 21 M	<b>MLK Holiday</b>
Jan. 23 W	<i>Pinus</i>
Jan. 25 F	<u>Week 2 online quiz due</u>
Jan. 28 M	<i>Pinus/Larix</i>
Jan. 30 W	<i>Picea/Pseudotsuga/Tsuga</i>
Feb. 1 F	<u>Week 3 online quiz due</u>
Feb. 4 M	<i>Abies/Cupressus/Calocedrus</i>
Feb. 6 W	<i>Thuja/Chamaecyparis/Juniperus</i>
Feb. 8 F	<u>Week 4 online quiz due</u>
Feb. 11 M	<i>Sequoia/Sequoiadendron</i>
Feb. 13 W	<i>Taxodium /Taxus</i>
Feb. 15 F	<u>Week 5 online quiz due</u>
Feb. 18 M	<b><u>Gymnosperm Exam</u></b>
Feb. 20 W	Start Angiosperms/ <i>Salix/Populus</i>
Feb. 25 M	<i>Betula/Alnus</i>
Feb. 27 W	<i>Quercus</i>
Mar. 1 F	<u>Week 7 online quiz due</u>
Mar. 4 M	<i>Fagus/Castanea</i>
Mar. 6 W	<i>Juglans/Carya/Ulmus/Celtis</i>
Mar. 8 F	<u>Week 8 online quiz due</u>
Mar. 11 M	<i>Magnolia/Liriodendron/Platanus</i>
Mar. 13 W	<i>Prunus/Liquidambar/Tilia</i>

Mar. 18-22	<b>Spring Break</b>
Mar. 25 M	<i>Gleditsia/Robinia</i>
Mar. 27 W	<i>Acer/Aesculus/Cornus</i>
Mar. 29 F	<u>Week 10 online quiz due</u>
Apr. 1 M	<i>Nyssa/Fraxinus/Catalpa</i>
Apr. 3 W	<b><u>Angiosperm Exam</u></b>
Apr. 8 M	Southern Pine Forests
Apr. 10 W	Southern Bottomland Forests
Apr. 12 F	<u>Week 12 online quiz due</u>
Apr. 15 M	Appalachian Highland Forests
Apr. 17 W	Northeastern Forests
Apr. 19 F	<u>Week 13 online quiz due</u>
Apr. 22 M	Boreal Forests
Apr. 24 W	Lake States Forests
Apr. 29 M	Rocky Mountain Forests
May 1 W	Pacific Northwest/ California Forests
May 6 M	<b><u>Forest Types Exam 10:00am</u></b>

# **ECOLOGY AND MANAGEMENT OF FOREST SOILS**

FOR 213, SPRING 2013 (AND SPRING EVERY YEAR)

School of Forestry

*(This syllabus is a draft dated 27 January 2013. Revisions may be made & students will be notified via email)*

## **INSTRUCTOR:**

Dr. Matthew A. Bowker

**CLASS HOURS:** Tu & Th 9:35 – 10:50 (Section 1) & 11:10 – 12:25 (Section 2) , Rm. 136 SWFSC (Bldg. 82)

**OFFICE ADDRESS:** Rm. 236 SWFSC; phone: 523-6600; Email: Matthew.Bowker@nau.edu

**OFFICE HOURS:** T & Th 1:30 – 2:30 pm, or by appointment

**COURSE PREREQUISITES/COREQUISITES:** BIO 181, BIO 182, CHM 130, and CHM 151L

**COURSE DESCRIPTION:** In this course, I will provide an overview of the chemical, physical, and biological properties of forest and rangeland soils through lectures, field trips and class exercises. Additionally, we will discuss the development and classification of soils, how disturbances and forest management activities influence soil properties, and the role of forest soils in global climate change.

**COURSE OBJECTIVES:** By the end of this course, students should have a clear understanding of the properties of forest soils as a medium for plant growth, and how these properties can be positively and negatively affected by management activities. Also students should understand the meaning of the statement “Soils are the foundation of terrestrial ecosystems”.

**COURSE STRUCTURE/APPROACH:** Two, 75m lectures per week. One all-day Saturday field trip will also be required where students will be exposed to how forest soils are described and the field assessment of some of their properties.

**TEXTBOOKS AND REQUIRED MATERIALS:** Brady, NC, and R.R. Weil. 2010. Elements of the Nature & Properties of Soils. 3<sup>rd</sup> Ed., Prentice-Hall, Upper Saddle River, NJ. 614 p. (REQUIRED).

Supplementary Readings from:

Singer, M.J., and D.N. Munns. 2006. Soils – an introduction. 6<sup>th</sup> Ed., Prentice-Hall, Upper Saddle River, NJ. 446 p. Fisher, R.F., and D. Binkley. 2000. Ecology and Management of Forest Soils. 3rd Ed. John Wiley & Sons, New York. 489 p. (selected chapters available on BB-Learn)

Bardgett, R. 2005. The biology of soils: a community and ecosystem approach. Oxford University Press, Oxford, UK.

Occasionally, handouts and selected readings from the primary literature will also be provided. No other materials are required. These include:

Belnap, J. 2003. The world at your feet: desert biological soil crusts. *Frontiers in Ecology & the Environment* 1:181-189.

Marris, E. 2006. Black is the new green. *Nature* 442: 624-626.

Shao, Y. et al. 2011. Dust cycle: an emerging core theme in earth system science. *Aeolian Research* 2: 181-204.

Others TBA

**EVALUATION METHODS AND DEADLINES:** One field report will be required based on the Saturday, all-day field trip. Four exams (three midterms and a comprehensive final) will also be used for evaluation purposes. See below for examination schedule.

**GRADING SYSTEM:** Three Midterm Exams 20% each; Comprehensive Final Exam 30%; Field Report 10%. The course will be graded using the absolute scale: >89%=A, 80-89%=B; 70-79%=C, 60-69%=D, <60%=F. If this scale results in a modal student grade significantly lower than about 75%, a grading curve will be used.

### **COURSE POLICIES:**

**RETESTS/MAKEUP TESTS:** No retests will be provided. Makeup tests will be administered only when the student provides an official medical excuse, or under conditions where the student has notified the instructor in writing at least one-week in advance of missing a test for mutually acceptable personal/professional reasons.

**ATTENDANCE:** Although no official roll will be taken, students are expected to attend all lectures. Attendance and participation at the Saturday field trips is mandatory.

**STATEMENT ON PLAGIARISM AND CHEATING:** Plagiarism and cheating will not be tolerated. A first offense will result in a grade of "F" for the entire course and additional action may be taken.

### **USEFUL WEB LINKS**

<http://soils.usda.gov/> (US Natural Resources Conservation Service - Soils)

<http://soilslab.cfr.washington.edu/S-7/> (Soil Science Society of America Forest and Range Soils Division)

<http://www.pedosphere.com/> (On-line introductory soil science text)

<http://soils.ag.uidaho.edu/soilorders/> (US Soil Taxonomy)

<http://soil.gsfc.nasa.gov/> (GLOBE Soil Science Education)

### **LECTURE OUTLINE:**

<u>WEEK</u>	<u>DATE</u>	<u>TOPIC (reading in Brady &amp; Weils 2010 unless otherwise noted)</u>
1:	15 Jan.	Introduction: Soils are the foundation of terrestrial ecosystems
	17 Jan.	Soil genesis, Soil forming factors (B&W Chapter 2)
2:	22 Jan.	Soil architecture & physical properties (B&W Chapter 4; skip 4.9)
	24 Jan.	Soil architecture & physical properties ( <i>in class texture by feel exercise, hydrometer demonstration</i> )
3:	29 Jan.	Soil porosity & water (B&W Chapter 5)
	31 Jan.	Soil air & climate (B&W Chapter 7; skip 7.11)
4:	5 Feb.	Guest: Erin Saunders – Professional Development & Photos
		Soil & the hydrological cycle (B&W Chapter 6; skip 6.7-6.9)
		Bowker research highlight: Ecosystem engineering of hydrology in Australia
	7 Feb	The colloidal fraction (B&W Chapter 8)
5:	12 Feb.	<b>EXAM 1 (through 5 Feb.)</b>

- 14 Feb. Soil acidity, alkalinity, aridity, salinity (B&W Chapter 9)
- 6: 19 Feb. Highlight: Terra Preta soils (in class videos) (Marris 2006)
- 21 Feb. Mineral nutrition of plants & soils (Singer & Munns Chapter 9)
- 7: 26 Feb. Soil Biota & Ecology: biological soil crusts (Belnap 2003)  
(Guest: Kyle Doherty; *in class microscope demonstrations*)
- 28 Feb. Soil Biota & Ecology: mycorrhizal fungi (Guest Lecturer: Anita Antoninka; **Reading TBA**)  
(*in class microscope demonstrations*)
- 8: 5 Mar. Soil Biota & Ecology: soil fauna & food webs (B&W Chapter 10)  
(Guests: Kara Gibson & Tiffani Falluca; *in class microscope exercise*)
- 7 Mar. Organic Matter (B&W Chapter 11)
- 9: 12 Mar. **EXAM 2 (through 5 Mar.)**
- 14 Mar. Free day, no class – I'm trading you a freebie for attending the field trip
- 10: 18-22 Mar. SPRING BREAK!
- 11: 26 Mar. Nutrient Cycles 1 (B&W Chapter 12)
- 28 Mar. Nutrient Cycles 2 (B&W Chapter 12)
- 12: 2 Apr. Nutrient Management (B& W Chapter 13)
- 4 Apr. Soil Classification (B&W Chapter 2);
- 13: 9 Apr. Finding and using soil survey data/ Focus on Major Forest Soil Orders  
(*in class GIS demonstration*)
- 11 Apr. Fire effects on soil (Fisher & Binkley Chapter 10)
- 12 Apr. **FRIDAY FIELD TRIP-Group 1 12:00 – 5:00 PM**
- 14: 16 Apr. **EXAM 3 (Through 9 April)**
- 18 Apr. Effects of timber harvest & forest thinning on soils (**Reading TBA**)
- 20 Apr. **SATURDAY FIELD TRIP-Group 2 12:00 – 5:00PM**
- 15: 23 Apr. Soil Erosion & the dust cycle (B&W Chapter 14; Shao et al. 2011)
- 25 Apr. Invasive species (Bardgett 6.1)
- FIELD REPORT DUE-Group 1 (beginning of class)**
- 16: 30 Apr. Global Change effects on soil & vice-versa (Bardgett Chapter 6)
- 2 May Review
- FIELD REPORT DUE-Group 2 (beginning of class)**



17:	7 May	Section 1 (normally 9:35- 10:50) - <b>FINAL EXAM (7:30 – 9:30 AM)</b>
	9 May	Section 2 (normally 11:10 – 12:25 - <b>FINAL EXAM (10:00 – 12:00PM)</b>

*NORTHERN ARIZONA UNIVERSITY*

**POLICY STATEMENTS** (Revised 10/23/01)

### **SAFE ENVIRONMENT POLICY**

NAU's Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this university.

You may obtain a copy of this policy from the college dean's office. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (928-523-5181), the academic ombudsperson (928-523-9368), or NAU's Office of Affirmative Action (928-523-3312).

### **STUDENTS WITH DISABILITIES**

If you have a documented disability, you can arrange for accommodations by contacting the office of Disability Support Services (DSS) at 928-523-8773 (voice), 928-523-6906 (TTY). In order for your individual needs to be met, you are required to provide DSS with disability related documentation and are encouraged to provide it at least eight weeks prior to the time you wish to receive accommodations. You must register with DSS each semester you are enrolled at NAU and wish to use accommodations.

Faculty are not authorized to provide a student with disability related accommodations without prior approval from DSS. Students who have registered with DSS are encouraged to notify their instructors a minimum of two weeks in advance to ensure accommodations. Otherwise, the provision of accommodations may be delayed.

Concerns or questions regarding disability related accommodations can be brought to the attention of DSS or the Affirmative Action Office.

### **INSTITUTIONAL REVIEW BOARD**

Any study involving observation of or interaction with human subjects that originates at NAU—including a course project, report, or research paper—must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities.

The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures.

A copy of the *IRB Policy and Procedures Manual* is available in each department's administrative office and each college dean's office. If you have questions, contact Melanie Birck, Office of Grant and Contract Services, at 928-523-8288.

### **ACADEMIC INTEGRITY**

The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix F of NAU's *Student Handbook*.

#### **ACADEMIC CONTACT HOUR POLICY**

The Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-206, Academic Credit) states: “an hour of work is the equivalent of 50 minutes of class time...at least 15 contact hours of recitation, lecture, discussion, testing or evaluation, seminar, or colloquium as well as a minimum of 30 hours of student homework is required for each unit of credit.”

*The reasonable interpretation of this policy is that for every credit hour, a student should expect, on average, to do a minimum of two additional hours of work per week; e.g., preparation, homework, studying.*

## Knight Spring 2013 Syllabus: FOR 215 – Writing in Forestry

**Instructor:** Sandra Knight

**Email:** [sk639@nau.edu](mailto:sk639@nau.edu)

**Office:** Forestry Sciences Complex Rm. 131

**Office Hours:** M/W 10 – 11.30 & 12.30 – 1 p *or by appointment*

**Course Location:** Forestry Rm. 18

**Course Times:** M/W 9.10a – 10a OR M/W 11.30a – 12.20p

**Course Site:** <http://BbLearn.nau.edu>

### 1. Course Description

Overall Course Goals:

Acquire communication skills needed to succeed in your Forestry major and professional career

Emphasize clear and logical writing presented in a usable form and appropriate to its intended audience

Develop ways to market your talents and abilities

Specific Course Learning Objectives:

Learn to analyze the communication situation—audience, purpose, and context

Communicate effectively with your professor and classmates electronically and in person

Create and revise writing collaboratively

Use technology to research, plan, draft, and design documents that are easy to understand and navigate

Gather, interpret, and document information logically, efficiently, and ethically

Understand the basic terms and concepts of technical and scientific writing

Think critically about texts both in the context of class and in daily life

Develop strategies and styles appropriate for different writing situations

Organize and structure information effectively

Course Document Types:

Memos      Lab Reports

Résumés

Application Letters

Emails

Annotated Bibliographies

Abstracts

Literature Reviews

Briefs

### 2. Course Materials

Course materials will include the course textbooks, handouts, PowerPoints, and other materials I will post on Blackboard Learn.

### Required Texts:

Brown, David E. and Neil B. Carmony (editors). 2003. *Aldo Leopold's Southwest*. Albuquerque, NM.

**[Any edition]**

McMillan VE. 2006. *Writing papers in the Biological Sciences*. 5th ed. Boston: Bedford/St. Martin's.

**[5<sup>th</sup> edition required]**

### 3. Course Format and Blackboard Site

The course site includes weekly folders with the quizzes, detailed major writing assignment instructions, key supplementary handouts, and readings materials. However, the course site DOES NOT contain all handouts, lectures, and activities we cover in class.

The course **Home Page**, **Course Content**, and left-side navigation menu contain the links you will need. The **Course Content** is divided into 15 weekly folders each with a link on the Course Content page. The left side navigation menu contains your **Course Email and Discussion Boards**. You may or may not need the chat or discussion boards this semester, but they are available to you. You can also email me through the course site with questions in addition to my email address.

### 4. Course Requirements

The following assignments constitute the requirements of this course. Consult individual assignment instructions for details and requisites of each assignment.

#### 4.1 Assignments and Point Breakdown

This course has a total of 600 points, organized into five main categories:

##### Participation

These points are awarded as you participate actively in class discussions, group activities, and peer reviewing and are engaged and paying attention in class. I will take away points if you are tardy, texting, sleeping, talking out of turn, interrupting the class discussions or lectures, or otherwise are rude or fail to participate. **You cannot get points for Class Participation if you are not in class.**

##### Quizzes

Five quizzes (10 pts. each) covering the textbook and other readings are all on the course site. Applicable **Course Content** folders on the course site will contain a link to each quiz. You may not make up a quiz after I have gone over it in class, unless you are absent and speak with me.

##### Leopold Summaries

Aldo Leopold is a person you will be expected to know about as a Forester, and this book represents a clear and accessible bit of scientific writing in the form of short essays. You will choose *three* of the essays by Aldo, one from each of the first three major sections (not the Editor's Notes), and write three summaries of the essays. These summaries will be due throughout the semester for 15 points each. We will talk about how to write a summary in class and discuss good and bad examples.

### Homework and Class Exercises

For some lessons, I will hand out or post instructions for homework exercises to take home and work on. We will go over each during the following class period. We will discuss the lessons and exercises as a class or in groups, and you will turn in your answers for credit. These are worth 15 points each.

### Writing Assignments

These are the larger writing assignments. Points vary from 20 to 80 points per assignment. For any writing assignment worth 50 points or over, you will receive a detailed rubric. We will always go over the rubric in class and sometimes use it for peer review before your final assignments are due.

The table below shows each individual category and writing assignment points.

<b>Assignment Category</b>	<b>Individual Assignments and Point Values</b>		<b>Total Point Values</b>
Class Participation	Participation Points		<b>50</b>
Quizzes	Five Online Quizzes over readings – 10 pts. each		<b>50</b>
Leopold Summaries	Leopold Summaries – 15 pts. each		<b>45</b>
Homework/Exercises	Four Grammar Assignments		<b>50</b>
	Literature Review Activity		<b>10</b>
	Lab Report Activity		<b>10</b>
Writing Assignments	Personal Statement Memo	20	<b>325</b>
	Résumé and Cover Letter	50	
	Email Assignment	20	
	Abstract	25	
	Lab Report	70	
	Brief	40	
	Annotated Bibliography	20	
	Literature Review	80	
Final Exam			<b>60</b>
<b>Total</b>			<b>600</b>

### 4.2 General Grading Criteria

I will evaluate your work using the criteria listed below. For major writing assignments worth 50+ points, an assignment-specific rubric based on these criteria will be included in the assignment instructions.

Compliance with assignment requirements and standards

Analysis of the writing situation, including audience, purpose, and context

Structure, organization, and accessibility of information

Development and usability of content and textual elements

Writing styles appropriate for the situation

Appropriate use of visuals

Effective use of design features and formatting

Proper citation and documentation methods

Correctness in grammar and usage

#### 4.3 Final Grades

Your final grades will be based on the standard percentage point scale:

600-540 = A; 539-480= B; 479-420 = C; 419-360= D; Below 360 = F

#### 5. Policies and Procedures

The policies and procedures in this class are meant to ensure fair practice and assessment for all students. If you have legitimate difficulties meeting the requirements of this course, **notify me before these difficulties turn into late assignments.**

##### 5.1 Deadlines

Assignments will incur a 10% penalty **once the due date and time/class period has passed.** You will receive a 0% on the assignment after **the following class period.** One exception to this is if you are at/in the hospital.

##### 5.2 Attendance

At the beginning of each class, I will pass around a sign-in sheet. It is **YOUR** responsibility to make sure you have signed the sign-in sheet.

You will lose participation points if you do not attend class. In addition, keep in mind that we will engage in a lot group work during class. Consequently, if you don't attend class, you are not only missing material, you are letting your group down.

If you require additional assistance because you missed a class, I will be more obliged to offer help if you have notified me of legitimate reasons why you could not attend class.

As for tardiness, repeated tardiness will also affect your Participation grade. Keep in mind that we only have 50 minutes per period.

##### 5.3 Class Conduct

I expect all students to attend and participate actively in each class session and respectfully engage in class discussions. Rudeness, either to your classmates or to me, will result in a loss of your class participation points or possibly further action. Examples of rudeness include cell phone usage (including ringing) during class, talking to classmates near you while we are having a class discussion or lecture, non-class related internet surfing, and negative, non-constructive comments aimed towards classmates, me, or course materials. On the other hand, productive inquiry and constructive criticism are important parts of learning and always welcomed in this class.

I also expect all students to conduct themselves in a *professional* manner. We will discuss exactly what professionalism means, and I will hold you to these expectations in your coursework, class behavior, and participation.

## 5.4 Academic Integrity

Plagiarism is a common problem in any writing course, and as such, instructors are very good at detecting plagiarism. All outside sources, including sources of graphics, require proper reference in this course. We will discuss in class how to properly cite borrowed material. Any assignment found to be plagiarized will receive a grade of 0, and the student may also fail the course. These include group assignments! Please, for your sake and mine, speak with me if you are having problems completing an assignment, and do not plagiarize.

## 6. A Note on Time Management

You have many tools for completing your work in this course. While 215 is time intensive, you can work more efficiently by reviewing the schedule and materials on the course site thoroughly and planning ahead. If you have a problem completing an assignment or understanding any of the course material, please email, talk to me after class, or make an appointment during my office hours, and I will work with you. Deadlines are important because it is easy to get behind, but I can be flexible if you can show me you are working hard.

## Policies of Northern Arizona University

### **1. Safe environment policy**

NAU's [Safe Working and Learning Environment Policy](#) seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this University.

You may obtain a copy of this policy from the college dean's office. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (523-5181), the academic ombudsperson (523-9368), or NAU's [Office of Affirmative Action](#) (523-3312).

### **2. Students with disabilities**

If you have a documented disability, you can arrange for accommodations by contacting the office of [Disabilities Support Services](#) (DSS) at 523-8773 (voice), 523-6906 (TTY). In order for your individual needs to be met, you are required to provide DSS with disability related documentation and are encouraged to provide it at least eight weeks prior to the time you wish to receive accommodations. You must register with DSS each semester you are enrolled at NAU and wish to use accommodations. Faculty are not authorized to provide a student with disability related accommodations without prior approval from DSS. Students who have registered with DSS are encouraged to notify their instructors a minimum of two weeks in advance to ensure accommodations. Otherwise, the provision of accommodations may be delayed.

Concerns or questions regarding disability related accommodations can be brought to the attention of DSS or the [Affirmative Action Office](#).

### **3. Institutional Review Board**

Any study involving observation of or interaction with human subjects that originates at NAU- including a course project, report, or research paper- must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities.

The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures.

A copy of the IRB [Policy and Procedures Manual](#) is available in each department's administrative office and each college dean's office and available online by clicking the link. If you have questions, contact Carey Conover, Office of Grant and Contract Services, at 523-4889.

### **4. Academic integrity**

The University takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff, and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix F of NAU's [Student Handbook](#).

### **5. Academic contact hour**

The Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-206, Academic Credit) states: "an hour of work is the equivalent of 50 minutes of class time...at least 15 contact hours or recitation, lecture, discussion, testing or evaluation, seminar, or colloquium as well as a minimum of 30 hours of student homework is required for each unit of credit."

*The reasonable interpretation of this policy is that for every credit hour, a student should expect, on average, to do a minimum of two additional hours of work per week; e.g., preparation, homework, studying.*



## **6. Academic Integrity**

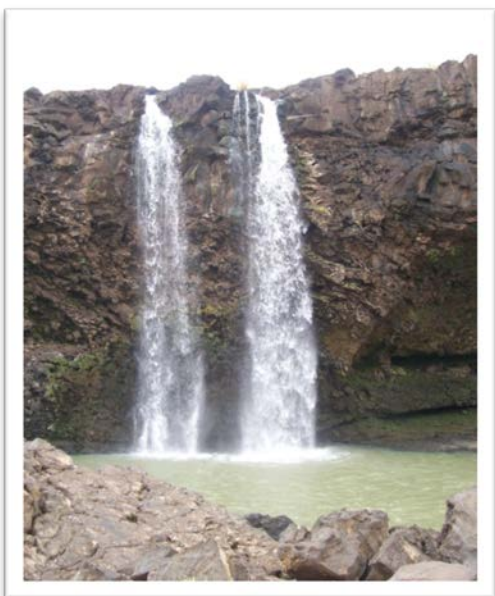
NAU regards acts of academic dishonesty—including, but not limited to, plagiarism, cheating, fabrication, forging an instructor’s signature, stealing tests, copying themes or tests from other students, or using “crib notes”—as very serious offenses.

If you are charged with academic dishonesty, you are subject to the Arizona Board of Regents’ Student Code of Conduct and procedures established by NAU, specifically the Academic Dishonesty policy, that are outlined in the [on-line Student Handbook](#).

## Course Syllabus

### Forestry 222: Environmental Conservation

**SPRING 2013**



#### **School of Forestry**

#### **For 222: Environmental Conservation**

Lecture 3872, Credit hours: **3**, Class Room: **018**

Class period: Tu and Thu 12:45 – 2:00 pm.

Office hours: By appointment. I am in my office most days; please feel free to drop by.

**Instructor: Monica Gaylord**

**Office: SW Forest Science Building, Room 204**

**Contact Information: Tel. 523 3079**

**e-mail: -Monica.Gaylord@nau.edu**

#### **Course Prerequisites:**

There are no prerequisites for this course.

#### **Course Description**

This course provides an introduction to the exciting, highly relevant and broad discipline of environmental science and management. It is an interdisciplinary study that combines ideas from the natural sciences as well as the social sciences to describe and understand the interconnectedness of the different things in our surroundings and their interactions, consequences and ways of handling them. This course will help students identify and understand problems related to the environmental sustainability, natural resources science and management and become active participants during their life in developing and applying solutions to improve human quality of life, ecosystem functions and the overall conditions of the earth at the local and global scales.

#### **Student Learning Expectations/Outcomes for this Course**

After completing this course, students will be able to:

Know and understand major environmental science and management concepts and related issues, their occurrences and consequences;

Know the causes and effects of various environmental problems and their possible solutions;

Learn the definitions and uses of basic environmental terms.

Know about the different, some of them opposing with each other, viewpoints on the environment and its stewardship and any possible solutions.

Critique major improvements in environmental quality that have taken place so far, and determine what needs to be done in the future at levels of spatial scales.

Discuss issues and find satisfactory solutions through consensus and/or making compromises

### **Course Structure/Approach**

The course is divided into three modules taken over 16 weeks. The modules are arranged to reflect their similarity or interconnectedness with each other. The three modules may be grouped as: Module 1, which consists of topics or chapters that are related to environmental problems and ecosystem health and sustainability, factors affecting them and their consequences; Module 2, which comprises of subjects related to energy and water resources, their conservation and environmental sustainability and management in an efficient and reliable manner; and Module 3, which groups topics that relate to sustaining biodiversity, describing sources and methods of handling solid and hazardous wastes, and that address the economic, political and environmental aspects of sustainability. In addition to reading assignments, students will watch and discuss carefully selected relevant videos with global and international content and, for extra credit should attend and learn from one outside public lecture. Students will be required to write a three-page report on a journal article. All these materials together, if used as directed, are expected to provide the students with a good background on the many ecosystem and social issues in the environment we are facing today at the local and global scales.

### **Textbook and Required Materials**

#### **i. Textbook**

Living in the Environment, 17<sup>th</sup> Edition by G. Tyler Miller Jr. and Scott E. Spoolman 2010. ISBN: 0-495-55671-8. It is available in the NAU bookstore and other nearby bookstores. However, students may also purchase the material either in book form or as separate chapters from the publisher as long as it is obtained in a timely manner.

#### **ii. Videos**

The course materials also will include six videos and out of class presentations, students are encouraged to attend. The six videos listed below will be shown in class. It is important to note that these videos are not available for borrowing by students. Hence students are expected to watch them in class at the time scheduled for their presentation. The list of videos is:

1. **Cadillac Desert- Last Oasis. Narrated by Alfre Woodard;**
  2. **Journey to Planet Earth, Season Two: On the Brink narrated by Matt Damon;**
  3. **Journey to Planet Earth, Season One: Rivers of Destiny narrated by Kelly McGillis;**
  4. **Cadillac Desert- Water and the Transformation of Nature: The American Nile Narrated by Alfre Woodard;**
  5. **Journey to Planet Earth: Hot Zones narrated by Matt Damon;**
  6. **Journey to Planet Earth, Season Three: Future Condition narrated by Matt Damon.**
- iii. **Recommended outside class lectures**

Below are websites where you can find on campus seminars. You may attend one of these lectures and write a one page summary and critique for extra points. In addition, the report should include how the seminar relates to environmental conservation.

<http://nau.edu/CEFNS/Forestry/Student-Resources/Seminar-Schedule/>

(Forestry, Wednesdays 4-5)

<https://nau.edu/CEFNS/NatSci/SESES/Seminars/>

(Earth Sciences and Environmental Sustainability; Tuesdays 4-5)

<http://nau.edu/CEFNS/NatSci/Biology/News-Events/>

(Biology; Thursdays from 4-5)

### Course Outline

The following constitutes the course outline, and related text reading and video viewing schedules. Please read each assigned chapter before coming to class so you will be able to participate in class discussions and have a good grasp of the subject matter covered in each lesson.

Topical chapter reading (or video viewing) schedule for Environmental Conservation and related quizzes and examinations.

Week days	<u>Topic /Module</u>	<u>Assigned Material</u>	<u>Text Page</u>	<u>Quiz/ Exam</u>
<b><u>Module 1</u></b>				
Jan. 15 & Jan. 17	Course introduction Environmental Problems, their causes and sustainability	Chapter 1	5	
Jan. 22 Jan. 24	Ecosystems: What are they & how do they work? <b>Cadillac Desert, The Last Oasis</b>	Chapter 3 Video	54 1	Qz 1

Jan. 29 Feb. 31	The Human Population and Its Impact The Human Population and Its Impact	Chapter 6 Chapter 6	125	<b>Qz 2</b>
Feb. 5 & Feb. 7	Climate and Biodiversity <b>Journey to Planet Earth, On the Brink</b>	Chapter 7 Video	147 2	Qz 3
Feb. 12 & Feb. 14	Aquatic Biodiversity	Chapter 8	16	
<b>February 19</b>	<b>EXAM #1 on Thursday, February 19, 2013</b>			
<b><u>Module 2</u></b>				
February 21	Food, Soil and Pest Management	Chapter 12	277	
Feb. 26 & Feb. 28	Water Resources <b>Journey to Planet Earth, Season One: Rivers of Destiny</b>	Chapter 13 Video	317 3	Qz 4
Mar. 5 & Mar. 7	Geology and Nonrenewable Mineral Resources <b>Article summary due Thursday, March 7, 2013</b>	Chapter 14	346	Qz 5
Mar. 12 - Mar. 14	Nonrenewable Energy <b>Cadillac Desert-Water and the Transformation of Nature: The American Nile</b>	Chapter 15 Video	370 4	
Mar. 18 & Mar. 22	<b>SPRING BREAK – No classes</b>			
Mar. 26 & Mar. 28	Energy Efficiency and Renewable Energy	Chapter 16	397	Qz 6
April 2	<b>EXAM #2 on Tuesday, April 2, 2013</b>			
<b><u>Module 3</u></b>				
April 4	Environmental Hazards and Human Health	Chapter 17	436	
Apr. 9 & Apr. 11	Climate disruption and Ozone Depletion <b>Journey to Planet Earth, Hot zones</b>	Chapter 19 Video	492 5	Qz 7
Apr. 16 & Apr. 18	Water Pollution <b>Journey to Planet Earth, Season Three: Future Condition</b>	Chapter 20 Video	528 6	Qz 8
Apr. 23 & Apr. 25	Solid and Hazardous Waste	Chapter 21	557	
Apr. 30 & May 2	Economics, Environment, and Sustainability	Chapter 23	611	Qz 9
Exam week: 5/6-5/10	<b>EXAM #3 on day and time arranged by the University</b>			

### Assessment of Student Learning Outcomes

Each quiz is taken at the end of the corresponding chapter and in the beginning of the next chapter. Some quizzes may cover two chapters. **All the quizzes and exams are closed book exercises and each student is expected to work independently and copying of answers is a serious matter that results with the copying student getting zero in the quiz or exam. Also use of computers or other electronic equipment or use of search engines such as google, yahoo and similar others in**

**the test is absolutely prohibited.** Each exam will test only the chapters and other materials (such as videos) covered since the last exam in the module. Note that there will be **one required regular assignment to complete.** It is a journal article summary (worth 100 points). The length of this regular assignment should not be more than three pages typed in double space.

There will be one Extra Credit (optional) assignment of a one-page written critique of a public lecture. Websites for some possible public lectures for students to attend are listed above. Suggestions of other talks to attend will be provided as information comes. The extra credit report is worth a total of **2** points (to be added to the final weighted grade). Students will submit the one page lecture critique exactly one week after the lecture is given to be considered. Submitting work any time after one week will **NOT** be accepted. All students are expected to attend and participate in classes discussions. Sometimes students may be divided into groups to discuss opposing issues. Students must do their reading assignments beforehand in order to participate in and contribute to the discussions. A total of **30** points are allocated for attendance and participation.

Semester grades will be based on the weighted total as shown below.

<b>Total Assignments</b>	<b>Possible points for each</b>	<b>Total points</b>	<b>Weight</b>
9 Quizzes	@ 10 points	90	10%
3 Exams	@ 150 points	450	20% each
1 Article summary	@ 100 points		20 %
Class attendance and participation	@ 30 points		10%
<b>TOTAL POINTS</b>			<b>100%</b>

### **Grading System:**

Semester grades will be based on a weighted total as shown above. The final grade for the course is determined by the following calculations:

90 -100 % = **A**

80 - 89 % = **B**

70 -79 % = **C**

60 - 69 % = **D**

Below 60 % = **F**

Please be aware that each of the categories indicates the absolute minimum value in order to achieve that grade. Thus, if a student scores **89.94%**, **the individual would receive a B** for the course. However, if the individual has completed the extra credit assignments, I would round up the score to an A. (This would also apply to the other letter grade categories as well).

## **Course Policy**

**Retest/ makeup work:** Makeup tests will be given only if the student(s) had permission to miss the scheduled test beforehand, or if the student was involved in a verifiable emergency or was verifiably ill at the time of the test.

## **University Policies:**

Important policies regarding a Safe Working Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity are found in the Student Handbook at

<http://www4.nau.edu/stulife/handbook.htm>.

**FOR 230**  
**Multicultural Perspectives of Natural Resource Management**  
**Spring 2013**

**Credits:** 3  
**Location:** SWFSC, rm. 133  
**Meeting time:** TTh 8:00 – 9:15 a.m.

**Instructor:** Dr. Marty Lee, Professor, School of Forestry  
**Office:** Rm. 241, SWFSC  
**Phone:** 523-6644  
**e-mail:** [martha.lee@nau.edu](mailto:martha.lee@nau.edu)  
**Office hours:** Monday, Wednesday 1:30 – 3:30 or by appointment

**Course prerequisites:** None

**Course Description:**

The course is designed to introduce students to the effects of culture on environmental management planning and management. “Culture” is used in the narrow sense of ideas, ethics, values, and world views, not in the sense of an entire way of life. The course explores how and why culture affects attitudes of decision-makers and stakeholders involved in natural resource management. We will discuss a range of values within the context of natural resource planning and management. Much of the discussions will occur in learning groups that will report out to the larger group.

Our discussions will focus on natural resource use and management within a multi-value context. Many of our examples will involve forests, parks, and protected areas within the U.S. but we will also look at international values toward nature and natural resources using case studies and guest lectures. We will particularly focus on natural resource management issues involving collaboration between groups and individuals with diverse values.

Collaboration and collaborative decision-making are very much a part of ecosystem management and is being called “a new style of environmental problem solving and management” and involve “building relationships between individuals and groups who have been isolated and alienated from each other” (Wondolleck and Yaffee, 2000 p. 3).<sup>1</sup>

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<sup>1</sup> Wondolleck, J. M. and S. L. Yaffee. 2000. Making collaboration work: lessons from innovation in natural resource management. Washington, D.C.: Island Press.

**Course Objectives:**

By the end of this course you should be able to:

- describe different ways of categorizing ideas and values in order to recognize and compare different cultural positions toward nature and natural resource management;
- appreciate and illustrate the complexities involved in managing ecosystems within a multi-value context;
- identify the characteristics of multi-value and multi-cultural groups and individuals working toward collaboratively managing natural resources and protected areas;
- have a greater realization of and appreciation for your own values toward nature and natural resources and be able to express them in written and verbal form;



work more effectively in a group learning environment, including being able to more clearly express your own and your group's collective ideas and arguments.

### **Course Structure/Approach:**

Throughout the course, students will participate in class discussions as well as work in groups on case studies and problem analysis. There will be a combination of out-of-class individual assignments and in-class group work. A final group project will involve both in- and out-of-class group work.

Each group will be made up of 3-4 individuals. Each group will have:

a **facilitator** – responsible for moderating team discussions, keeping the group on task for each assignment, and ensuring everybody assumes their share of the work

a **recorder**/folder monitor – responsible for picking up the team folder, distributing all class materials and returning papers and assignments to their team-mates. They are responsible for making sure all relevant materials are in the team folder before returning it to the instructor at the end of the class period. Recorders keep all necessary records, including attendance. They prepare group's activities and summarize discussions for their group's oral reports or for submission to the instructor.

a **reporter** – orally summarize the group's activities or conclusions and assist group recorder with the preparation of group reports and summaries..

a **wild card** – assume the role of any missing member or fill in however they are needed.

Roles within each group will be rotated weekly. In your career you will likely hold a number of different positions and play different roles. Learning to assume responsibility for the duties associated with various roles is a key part of your work experience and in the classroom.

Each group will be responsible for maintaining a group folder that will contain handouts, attendance sheets, notes, and group assignments (for example, case study summaries (described below) to be prepared by the group and summarized by the recorder, will be kept in the folder to be collected and graded by the instructor on a regular basis).

Groups will be formed at the beginning of the semester. New groups may be created about the middle of the semester.

### **Textbooks/Course Materials:**

Li, J.L. (Editor). 2007. To harvest, to hunt: Stories of resource use in the American West. Corvallis, OR: Oregon State University Press.

Other Readings: Articles and case studies that are required reading are available as electronic reserves through BbLearn at <http://bblearn.nau.edu>. A list of the readings is attached. The course syllabus and other on-line materials will also be posted on BbLearn.

### **Evaluation Methods and Deadlines:**

There are multiple ways of earning points in the class:

#### Individual Chapter/Reading Summaries (60 points – 20% of your grade)

Each student will prepare a brief 1-2 page summary for each of the readings in Parts I and II of the course. Each summary is worth 5 pts and there are 12 total (beginning with Kellert, chpt 2 – “Values”). These summaries will form the basis for class discussions of the readings. Each summary should include: **(use these as headings in your summary)**

a brief summary of the article or chapter

a description of the values toward nature being expressed by the individuals or groups described in the reading

a brief comparison of the values expressed with your own values toward nature

The reading summaries must be typed, single-spaced and are **due the day we discuss the reading.**

Exams (2 at 50 pts each = 100 pts – 33% of your grade)

Exam dates: Thursday, February 14

Thursday, March 7

Individual Paper (1 @ 35 pts – 11% of your grade)

This paper is a case study analysis that summarizes what you see are the challenges and rewards of managing America's forests and protected areas in a multi-value, multi-cultural context.

Length: 4-5 pages double spaced

Due date: Thursday, April 18

Group Case Study Summaries (8 @ 5 pts each = 40 pts – 13% of your grade)

Groups will be responsible for summarizing 8 case studies. Group members will talk about the various positions of groups and the outcomes discussed in the readings. A written group summary must be prepared along with the discussion. These can be hand written but must be neat and readable. They will be kept in the group folder to be periodically collected and graded. Format for discussing the reading and writing up the summaries:

Decide who the key players are who are involved in the case study.

You will present the positions/issues of the key players to the group and the class (if time is available).

As a group discuss the outcomes, keys to success, factors leading to a lack of success.

Record on your case summary any recommendations you might have for resolving conflicts involving multiple, conflicting values.

Guest Lecture Summaries (3 @ 5 pts each = 15 pts = 5% of your grade)

Each student will prepare a brief 1-page summary for each guest speaker. Summaries are due at the beginning of the class following the guest discussion. Each summary should include:

a brief summary of the lecture/discussion

description of the values expressed

discussion of value conflicts mentioned

recommendations for collaborative management learned from the discussion

Final Group Project (50 pts – 16% of your grade)

The final group project will consist of preparation of a poster, a paper and a 10 minute presentation on an example of a multi-value, multi-cultural natural resource management issue where there are conflicts over values. A portion of the points will be based on a peer-evaluation of group members' participation in the project.

Included in the paper and poster/presentation should be a discussion of:

the situation—the primary issue, conflict, or decision

the setting/location

the players and their values, points of view

the process used to try to achieve the objective(s)

the key outcome(s) of the process

conclusions you would draw from the analysis

sample topics:

Bitterroot grizzly bear reintroduction

Mexican grey wolf reintroduction

Caribou co-management in Canada

## Snowmobile use in Yellowstone National Park

Each group will have 10-15 minutes to present their poster and there will be 5 minutes for questions to be posed to all group members.

Specific requirements for the paper and poster will be discussed later in the semester along with helps on poster making. Begin thinking about your topic early!

The papers will be due and the posters will be presented at a poster session held during the final exam period for the class – **Thursday, May 9, 7:30 am – 9:30 a.m.**

Attendance and class participation (5 pts – 2% of your grade)

**You can't learn if you're not here.** Attendance will be taken regularly and points deducted for multiple absences.

### **Grading Scheme:**

Grades will be based on the total points earned for the semester:

Reading summaries (12)	60 points
Exams (2)	100 points
Individual paper (1)	35 points
Group case study summaries (8)	40 points
Guest lecture summaries (3)	15 points
Final group project	50 points
Attendance	5 points
<b>Total</b>	<b>305 points</b>

A = 274 – 305

B = 243 – 273

C = 213 – 242

D = 182 – 212

F = 181 and below

There may be opportunities to earn extra credit during the course.

### **Course Policies:**

Attendance is critical to the success of this class. Your absence will not only lessen your ability to learn but will also handicap your group. Students will lose points for absences during group discussion and presentations. If a situation arises where you cannot attend or arrive on time, it is your responsibility to notify, **in advance**, the instructor and your team members.

All assignments must be turned in on time and in class unless prior arrangements have been made. No “e” papers will be accepted. There will be no paper rewrites or makeup tests except under extenuating circumstances such as illness or family emergencies. In these instances you must let me know ahead of time in order to make up the work.

Cell phones and other electronic devices must be turned off during class unless given special permission.

We will maintain an atmosphere of collegiality and respect in the class and encourage open and honest discussion, questions, and reflections and course material.

## Tentative Schedule

<b>Date</b>	<b>Topic/Activity</b>	<b>Reading Assignment</b>
T 1/15	Introduction to culture, values	
Th 1/17	Course introduction con't, assign and name groups	
<b>Part I: Culture and values toward nature</b>		
T 1/22	Classifying values toward nature	Kellert, chpt. 2, pp. 9-26 – “Values” - <b>Bb</b>
Th 1/24	Kids and nature	Pyle, 2002, “Eden in a vacant lot: ... Louv, 2006, “Nature-child reunion” - <b>Bb</b>
T 1/29	Native American perspectives	Bengston, “Listening to neglected voices” – <b>Bb</b> Flood and McAvoy, “Voices of my ancestors, their bones talk to me” - <b>Bb</b>
Th 1/31	Hispanic perspectives	Garcia, “Hispanic perspectives and values - <b>Bb</b>
T 2/5	African American values toward nature	Bagby, “African American naturifocal values” - <b>Bb</b>
Th 2/7	Australia – multi-cultural perspectives	Birckhead, “‘Dreaming’ down under” - <b>Bb</b>
T 2/12	Scandinavia forest values	Reunala, “Cultural and spiritual forest values in ...” - <b>Bb</b>
Th 2/14	Exam #1	
<b>Part II: Historic uses of natural resources</b>		
T 2/19	History of land use in Monterey, CA	Li, pp. 57-64 (Hackel)
Th 2/21	Basque shepherders	Li, pp. 74-91 (Bieter)
T 2/26	Columbia River gillnetters	Li, pp. 92-101 (Martin)
Th 2/28	Logging culture	Li, pp. 102-113 (LeMonds)
T 3/5	Japanese internment camps in Arizona	Li, pp. 137-150 (Sakurai)
Th 3/7	Exam #2	
<b>Part III: Managing natural resources in a multi-value, multi-cultural context</b>		
T 3/12	Everglades National Park	Keller & Turek–“Everglades National Park and ...” - <b>Bb</b>
Th 3/14	Southwest national monuments	Keller & Turek, “Navajoland” – <b>Bb</b>
<b>3/18-3/22 SPRING BREAK!</b>		
T 3/26	Devil’s Tower – consensus and conflict	Burton and Ruppert—“Rising to heaven ...” - <b>Bb</b>
Th 3/28	Snowbowl snowmaking decision	Handouts
<b>Date</b>	<b>Topic/Activity</b>	<b>Reading Assignment</b>
T 4/2	Quinault canoe building	Li, pp. 8-14 (Wilkinson)
Th 4/4	Comanaging sea otters	Li, pp. 25-34 (Garza)

T	4/9	Walrus hunting in the Arctic	Li, pp. 15-24 (Kingston)
Th	4/11	California Indian basketweavers	Li, pp. 40-56 (Mathewson)
T	4/16	Introduction to poster making	
Th	4/18	International collaborative research and management	
<b>Paper due</b>			
T	4/23	Collaboration in action	
Th	4/25	International collaboration	
T	4/30	Work day – meet in computer lab	
Th	5/2	Work day – meet in computer lab	
<b>Th</b>	<b>5/9</b>	<b>7:30 – 9:30 a.m. – Poster session and presentations</b>	

## **FOR 230**

Spring 2013

### Course Readings References

Bagby, R. 1996. African American naturifocal values. Pp. 135-144 in, Driver, Dustin, Baltic, Alsner, and Peterson (Eds), Nature and the human spirit: Toward an expanded land management ethic. State College, PA: Venture Publishing Co.

Bengston, D. N. 2004. Listening to neglected voices: American Indian perspectives on natural resource management. J. Forestry 102(1):48-52.

Bieter, J. 2007. Lorenzo's letters: A basque immigrant's experience in the American West. Pp. 74-92 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Birckhead, J. 1996. "Dreaming" down under: The cultural politics of people and country. Pp. 205-214 in, Driver, Dustin, Baltic, Alsner, and Peterson (Eds), Nature and the human spirit: Toward an expanded land management ethic. State College, PA: Venture Publishing Co.

Burton, L. and D. Ruppert. 2002. Rising to heaven or risen from hell? Culture, consensus, and conflict at Devils Tower National Monument. Pp. 123-145 in, L. Burton, Worship and Wilderness: Culture, religion and law in public lands management. Madison: University of Wisconsin Press.

Flood, J. P. and L. H. McAvoy, 2007. Voices of my ancestors, their bones talk to me: How to balance US Forest Service rules and regulations with traditional values and culture of American Indians. Human Ecology Review 14(1):76-88.

Garcia, M.T. 1996. Hispanic perspectives and values. Pp. 145-151 in, Driver, Dustin, Baltic, Alsner, and Peterson (Eds), Nature and the human spirit: Toward an expanded land management ethic. State College, PA: Venture Publishing Co.

Garza, D. 2007. Comanaging sea otter: A model of modern Alaska Native stewardship. Pp. 25-34 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Hackel, S.W. 2007. Shifting patterns of land use in Monerey, California before 1850. Pp. 57-64 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Keller, R. H. and M. F. Turek. 1998. Navajoland – Sharing the gift of changing woman. Pp. 185-215 in, American Indians and national parks. Tucson: University of Arizona Press.

Keller, R.H. and M.F. Turek. 1998. Everglades National Park and the Seminole problem. Pp. 216-231 in, American Indians and national parks. Tucson: University of Arizona Press.

Kellert, S. R. 1996. Values, pp. 9-26 in, The value of life. Washington, D.C. Island Press.

Kingston, D. 2007. Walrus hunting in a changing Arctic. Pp. 15-24 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

LeMonds. 2007. Logger poetry and music: The culture of harvest. Pp. 102-113 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Louv, R. 2006. The nature-child reunion. National Wildlife 44(4):22-30.

Martin, I. 2007. Clifton gillnetters: Their ethnic and occupational identity. Pp. 92-101 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Mathewson, M.S. 2007. California Indian basketweavers and the landscape. Pp. 40-56 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Pyle, R. M. 2002. Eden in a vacant lot: special places, species, and kids in the neighborhood of life. Pp. 305-327 in P. H. Kahn, Jr. and S. R. Kellert (Eds), Children and nature: Psychological, sociocultural, and evolutionary investigations. Cambridge, Mass: The MIT Press.

Reunala, A. 1996. Cultural and spiritual forest values in Scandinavia. Pp. 225-233 in, Driver, Dustin, Baltic, Alsner, and Peterson (Eds), Nature and the human spirit: Toward an expanded land management ethic. State College, PA: Venture Publishing Co.

Sakuri, P. 2007. In wind and sand: Landscape and the reading of Gila River internment camp. Pp. 137-150 in, J. L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

Wilkinson, C. 2007. Return of the canoe journey. Pp. 8-14 in, J.L. Li (Ed), To harvest, to hunt: Stories of resource use in the American West. Corvallis: Oregon State University Press.

*NORTHERN ARIZONA UNIVERSITY*

## **POLICY STATEMENTS**

### **SAFE ENVIRONMENT POLICY**

NAU's Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this university.

You may obtain a copy of this policy from the college dean's office. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (928-523-5181), the academic ombudsperson (928-523-9368), or NAU's Office of Affirmative Action (928-523-3312).

### **STUDENTS WITH DISABILITIES**

If you have a documented disability, you can arrange for accommodations by contacting the office of Disability Support Services (DSS) at 928-523-8773 (voice), 928-523-6906 (TTY). In order for your individual needs to be met, you are required to provide DSS with disability related documentation and are encouraged to provide it at least eight weeks prior to

the time you wish to receive accommodations. You must register with DSS each semester you are enrolled at NAU and wish to use accommodations.

Faculty are not authorized to provide a student with disability related accommodations without prior approval from DSS. Students who have registered with DSS are encouraged to notify their instructors a minimum of two weeks in advance to ensure accommodations. Otherwise, the provision of accommodations may be delayed.

Concerns or questions regarding disability related accommodations can be brought to the attention of DSS or the Affirmative Action Office.

### **INSTITUTIONAL REVIEW BOARD**

Any study involving observation of or interaction with human subjects that originates at NAU—including a course project, report, or research paper—must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities.

The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures.

A copy of the IRB *Policy and Procedures Manual* is available in each department's administrative office and each college dean's office. If you have questions, contact Melanie Birck, Office of Grant and Contract Services, at 928-523-8288.

### **ACADEMIC INTEGRITY**

The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix F of NAU's *Student Handbook*.

### **ACADEMIC CONTACT HOUR POLICY**

The Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-206, Academic Credit) states: "an hour of work is the equivalent of 50 minutes of class time...at least 15 contact hours of recitation, lecture, discussion, testing or evaluation, seminar, or colloquium as well as a minimum of 30 hours of student homework is required for each unit of credit."

*The reasonable interpretation of this policy is that for every credit hour, a student should expect, on average, to do a minimum of two additional hours of work per week; e.g., preparation, homework, studying.*



## *For 240 Introduction to Conservation Biology*

Meeting Times: TuTh 2:20-3:35, 1/14-5/10, 2013  
Location: SWFSC Rm 18  
Instructor: Annika Keeley, E-mail: [atk25@nau.edu](mailto:atk25@nau.edu)  
Office Hours: Tuesdays 1-2 pm & Fridays 10-11 pm, after class, or by appointment

**Course Prerequisites:** None

### **Course Description**

This course is designed to provide students with a knowledge of fundamental concepts in Conservation Biology and to show how these concepts apply to local and global conservation issues.

### **Liberal Studies Information**

This is a Liberal Studies class in the Science/Applied Science distribution block. The course challenges you to more deeply understand the natural environment, to evaluate strategies to conserve biodiversity on a human-dominated planet, to evaluate conflicting claims about proposed conservation interventions, and to develop skills to be an effective citizen throughout life. The geographic scope is global, with much of the material relevant to the developing world and areas outside the USA. The course focuses on developing essential skills in critical thinking.

### **Course Objectives**

The desired outcomes of this course are for you to:

1. Understand the main concepts that are relevant to biodiversity conservation.
2. Develop as an informed citizen by practicing critical thinking skills:
  - Think critically when evaluating material from reading, lectures, and public talks
  - Articulate your thoughts and opinions verbally and in writing
  - Demonstrate your ability to make informed, evidence-based decisions regarding biodiversity conservation
3. Be inspired to take an active role in conservation.

### **Course Structure**

Each 75 minute class is divided into short lectures, in-class exercises, and group discussion. In addition, there will be several participatory group and individual projects that promote active engagement in the issues, and a few guest lectures. You are expected to be prepared for each class by reading the relevant book chapters or assigned supplemental readings prior to class. You are also expected to attend conservation lectures outside of class and complete online and written assignments. This is not a class where you just show up, take notes, and then cram for the exams. Be prepared for 3-5 hours of work per week outside of class. If you work hard, you will learn a lot, and will have fun.

All material that is not provided in class is available on the class BBLearn page ([www.bblearn.nau.edu](http://www.bblearn.nau.edu)). Make sure you can access this page right away!

### **Required Reading**

1. Hunter ML, Gibbs JP. 2007. Fundamentals of Conservation Biology. 3rd Edition. Blackwell Publishing, Ltd. Malden, MA  
[Chapters 1&2 are available on Google Books]
2. Assigned Supplemental Reading: provided via BBLearn ([www.bblearn.nau.edu](http://www.bblearn.nau.edu))







## **FOR 250: ARIZONA FORESTS AND WILDLIFE: SPRING 2013**

### **Course Syllabus**

#### **General Information:**

**Instructor:** Dr. Robert Mathiasen

**Office:** SWFSC Room 002, Office hours are open door or by appointment.

**Telephone:** 523-0882

**E-mail:** [Robert.Mathiasen@nau.edu](mailto:Robert.Mathiasen@nau.edu)

**Class Meetings:** T-Th; 12:45 p.m - 2:00 pm; SW Forest Science Complex, Room 136

**Course Prerequisites:** A sense of humor, curiosity, and a desire to learn.

**Course Philosophy:** We are all life-long learners.

**Course Description:** This course will introduce you to the forest ecosystems and their associated wildlife in Arizona. Forest ecosystems are complex. To understand them, we must examine forest ecology including forest structure and function, the roles of individuals, populations, and communities, and environmental influences on the development of forest ecosystems. We will also examine current issues relating to use, management, and protection of forests and wildlife in Arizona.

We will begin the semester with an overview of the state of Arizona, its climate, landforms, and land ownership patterns. Following our overview, we will examine several forest ecosystems in more depth. We will begin at high elevations (limber pine, spruce-fir, and aspen forests) and travel down in elevation, to riparian and desert ecosystems. Finally, we will apply what we have learned to the study of areas that encompass many of the forest ecosystems we have covered in the class, the "sky islands" of southern Arizona.

This course falls in the *Science/Applied Science* (SAS) block for Liberal Studies, in that "...students apply knowledge derived from scientific inquiry to address human needs through technological advancements. Students learn practical skills in the creation and application of various technologies. Courses in this block also address the impact of technology on the human condition and the natural world" (Liberal Studies Program). As a Liberal Studies course, it provides the opportunity for students to practice, refine, and strengthen skills essential for their development as students and for their long term success. In this course we will specifically address the skill areas of effective critical thinking with respect to societal problems related to the environment. Thematically, this course will focus on developing student understanding, awareness, and appreciation of the environment and environmental issues, specifically relating to the forest ecosystems of Arizona: their structure, function, and the role of wildlife and humans in these systems. Given this subject matter, this course is in the thematic area of Environmental Consciousness.

**Course Goals and Objectives:** Upon the successful completion of this course, students will have the knowledge and skills to effectively:

Describe how forest ecosystems function and how they are likely to respond to change.

Describe how wildlife influence forest ecosystems and how forest ecosystems influence wildlife populations.

Describe the ecological and management issues related to Arizona's forests and wildlife currently faced by natural resource professionals and the public.

Describe how knowledge of ecology and management can help solve problems similar to those currently faced by natural resource managers and the public in Arizona.

**Course Structure:** Class meetings will include lectures, one or two short on-campus field trips, and tree identification of common trees found in northern Arizona. Different forest ecosystems in Arizona will be used to gain knowledge about forest and wildlife ecology, wildlife habitat components, and the inter-related roles of forest and wildlife management.

**Required Book:** Rocky Mountain and Southwest Forests by John Kricher and Gordon Morrison. Peterson Field Guides. 1998. Houghton Mifflin Company, New York, NY.

**Other Reading Requirements:** The reading assignments are contained in the Bb Learn shell for FOR 250 in the Folder - Reading Assignments.

**Covington, W. W. and M. M. Moore.** 1994. Southwestern ponderosa pine forest structure: changes since Euro-American settlement. *Journal of Forestry* 92(1): 39-47.

**Crimmins, W. A.** 2006. Arizona and the North American monsoon system. University of Arizona, Cooperative Extension. AZ 1417.

**Jones, J. R.** 1974. Southwestern mixed conifer and aspen. Res. Paper RM-122. USDA Forest Service.

**Lanner, R. M. and S. B. Vander Wall.** 1980. Dispersal of limber pine seed by Clark's nutcracker. *Journal of Forestry* 78: 637-639.

**Warshall, P.** 1995. The Madrean Sky Island Archipelago: A planetary overview. Pages 6-18 *In* L.F. DeBano, et al., tech. cords. Biodiversity and management of the Madrean Archipelago: The Sky Islands of southwestern United States and northwestern Mexico. USDA For. Serv. Gen. Tech. Rep. RM-GTR-264.

Other course materials are available on-line in Bb Learn for FOR 250. This includes lecture outlines, maps, tables, and other information relevant to the course. Students are encouraged to print hard copies of the lecture outlines, exercises related to videos, and maps/tables and bring them to class.

**Assessment of Outcomes:** I will use written exams to assess your achievement of the learning objectives listed above. There will be two midterm exams (100 points each) and a final comprehensive exam (150 points) (Total exam points possible: 350). Exams may include short definitions, multiple-choice, true/false, map labels, fill-in-the-blank, listings, mini-essay questions, and/or matching questions. Mini-essay questions will take 2 to 4 sentences to answer and will be scored on content. Exams will also include the identification, using common names, of trees commonly found in northern Arizona. Midterm exams are not cumulative – you will only be tested on material since the previous midterm exam. All class participants must take the final exam. The final exam will be a comprehensive exam. All students are expected to take the final exam at the scheduled time: Tuesday, May 7, 12:30 – 2:30 p.m. in Room 136, Southwest Forest Science Complex. **No final exams will be given early.**

There will also be one short paper required worth 25 points. Plus there will be a campus tree walk assignment worth 25 points. These assignments will be discussed in class. The tree walk assignment will be due on April 4 and the short paper will be due on May 2.

In addition, there will be a few in-class quizzes, video worksheets, and possibly a “mini-lab” for students to complete and submit at the end of the class period. These will be worth a total of 100 points. This brings the total number of points possible for the course up to 500 (Exams [350 points] + Short paper [25 points] + Tree Walk [25 points] + In-class assignments [100 points] = 500 points)

**Final grades will be assigned as:** A = 90 – 100 % of 500 possible points; B = 80 – 89.9 %; C = 70 – 79.9 %; D = 60 – 69.9 %; and F = < 60% (less than 300 points)

**Course Policies:** You are expected to come to class prepared, having read the required reading assignment before class. In addition to the specific policies outlined below, you are also responsible for reading and adhering to the Northern Arizona University Policy Statements regarding a Safe Environment, Students with Disabilities, the Institutional Review Board, and Academic Integrity.

**Attendance and Make-Up Work:** The NAU attendance policy is found in the NAU Student Handbook on page 2 and states that “...regular attendance...is the responsibility of the student...each student is accountable for all work missed due to any absence. Instructors are under no obligation to make special arrangements for students who have been absent...it is the responsibility of the student to report the reason for his/her absence to the instructor.”

**Make-up exams for the midterms will be allowed ONLY if the student has contacted the instructor before the exam date and time.** Reasons for taking a make-up midterm exam include illness, a family emergency, or an institutional excuse related to a NAU sponsored activity.

#### **Northern Arizona University Policies**

Important policies regarding a Safe Working Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity are found in the Student Handbook at

<http://www4.nau.edu/stulife/handbook.htm>.

**Northern Arizona University**  
**School of Forestry**

**FOR 251 - Introduction to Wildland Fire**

Spring 2013

3 credits

**Time:** Tuesday and Thursday 9:35-10:50 a.m.

**Location:** Southwest Forest Science Complex Rm 135

**Prerequisites:** None

**Instructor:** Dr. Andrea (Andi) Thode

Email: andi.thode@nau.edu

Office: SFSC room 200

Phone: 928-523-5457

**Office hours:** Stop by or make an appointment. I do have LOTS of meetings so it is best to schedule something with me as it is difficult to just catch me in my office.

**Course description:**

This course provides an introduction to wildland fire. Fire plays a critical ecological role in forests, grasslands, and other systems, and it also has a strong impact on human society. In this course you will be introduced to the basics of fire, including the combustion process and the “fire triangle.” We will examine the way fires start, spread, grow, and become extinguished. Fire management strategies, including fire suppression and prescribed burning will be covered. Throughout the course, examples from fire ecology and the social impacts of fire will be used to illustrate fire concepts.

**Text and lectures:**

MacLean, Norman. 1992. Young Men and Fire. University of Chicago Press. \$16.

Additional readings will be provided. Readings will be posted on the course website. Copies of lecture slides will be posted as well.

**Student Learning Expectations:**

This course is designed to introduce the basics of wildland fire. After taking this course, you will have:

- An understanding of the basic physical and chemical attributes of fire
- Knowledge of how terrain, weather, and fuels affect fire behavior
- An understanding of the basic elements of fire management
- Knowledge of fire’s effects on soil and vegetation
- An understanding of techniques used to suppress, ignite, and manage fires
- An understanding of the complexity of fire and fuel management in the wildland urban interface
- Knowledge about the use of models commonly used in fire management

**Class Schedule and Readings**

The class schedule is handed out separately and is subject to change. Readings will be posted on the class website and announced in class throughout the semester.



## **Field Trip**

There may be one mandatory field trip for this class on a Saturday. The field trip will most likely be scheduled for a Saturday in September or October. The field trip will be either a staff ride on the Dude Fire; a wildfire outside of Payson, AZ where 6 firefighters were killed, or a trip to the Schultz Fire burned area. This is currently being worked out.

## **Coursework**

### Homework Assignments

Homework assignments will be handed out throughout the semester. Assignments are designed to strengthen your understanding of material presented in class. NOTE: I will allow one rewrite per student of a homework assignment. If you wish to rewrite an assignment, you need to contact me via email within 36 hours of the homework being returned in class. 10% of the points will automatically be deducted from rewrites.

### Quizzes

Quizzes will be given throughout the semester. The quizzes are designed to help emphasize important concepts *from the lectures and the readings* and will normally be discussed and self-corrected in class. They will also be useful for you as study guides for the tests. You may make up quizzes ONLY if you contact me before class with a valid reason for missing class. NOTE: On random days, I will collect the quizzes, grade them, and count them toward your grade.

### Short Presentation

Through the semester students will present to the class on “Notable Fires in History”. Students will sign up for presentation slots at the beginning of the semester. Presentations should be 5-10 minutes in length, and both students will do background research as well as present in class. Presentations should include background (e.g. location, size, weather conditions, vegetation types), management taken (e.g. people & equipment, incident command), noteworthy aspects of the fire, and what lessons we learned as a result of the fire. Photos presented in PowerPoint are encouraged.

### Exams

The exams will focus on concepts and examples of wildland fire, with definitions, multiple choice, and short-answer formats. The final exam will be cumulative.

### Participation

Students are expected to attend class. If you cannot attend for some reason, you need to notify the instructor ahead of time. If you miss class, it is your responsibility to ask if you missed something. Missing class is not an excuse for late or missing assignments. If you miss class, you should ask a fellow student for lecture notes.

Part of your participation grade will be based on class attendance. The other part of the participation grade will be a subjective assessment based on my perception of the quantity and quality of your participation throughout the semester (asking questions, participating in the book discussions and other activities, making comments and answering questions). In addition, some group work and other in-class work will be assessed points for participation.

## *Illness*

*While class attendance is required per the above stated policy, please be cautious about attending class if you are feeling ill. Please inform me by email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class; please take precautions not to infect others, and seek medical attention if your symptoms worsen.*

## **Late Work Policy**

Late work will be accepted up to 48 hrs after the due date. Penalties are as follows:

Up to 24 hrs late – 10% of total points deducted

24 to 48 hrs late – 20% of total points deducted

More than 48 hrs late – Zero points

This stated, please email, call or talk to me if you have extenuating circumstances. This must be done BEFORE assignments are due or tests are taken.

## **Performance evaluation**

Grades are given as follows:

A (90-100%)

B (80-89%)

C (70-79%)

D (60-69%)

F (59% or below)

Points are earned as followed:

Participation and attendance 15%

Quizzes 15%

Homework (including presentation) 20%

Mid-term Exams (15% each) 30%

Final Exam 20%

Total 100%

## **Extra credit**

Extra credit can be earned by attending a fire-related School of Forestry Seminar (Wednesday afternoons at 4:00) and writing a 400-600 word essay about the seminar, including a summary, points covered that you recognized from class, and questions you would (or did) ask the speaker. You can check the schedule (<http://www.for.nau.edu/cms/>; go to Student Resources and then Seminars), and I will also announce the fire-related seminars in class

## **Resources for Student Success**

*Successful university students take advantage of services and resources designed to boost learning and achievement. NAU recommends that you begin with:*

[MyFoundations](#)- use this online tool to assess and develop required university skills at your own pace (free for first-time freshmen at NAU Flagstaff)

[Supplemental Instruction](#)- attend these course-specific review sessions whenever offered; proven to reduce D's and F's

[Student Learning Centers](#)- free drop-in, online, and individual tutoring appointments for math, writing, and over 100 courses; available Monday through Friday

[ResourceConnect](#)- your online central navigation point for all NAU student resources

For a full-listing of University College services visit: <http://nau.edu/University-College/>

## **My Foundations Fact Sheet**

*Need to fill a gap? Brush up on your skills? Whether you need to get up to speed for your calculus class or brush up on your essay writing skills, the MyFoundations Self-Assessment and Development tool gets you on track for university-level academics.*

*Free to all incoming first-year NAU Flagstaff students- topics include:*

Math  
Reading  
Writing  
Study Skills

### **How it works**

Self-Assess: Complete a path builder assessment in the topic area of your choice, which creates specific modules for your personalized learning path based on your demonstrated needs for improvement or development

Self-Develop: Complete the learning paths for mastery

Instant feedback

Choose activities that fit your learning style

Work at your own pace

**Where to find it-** MyFoundations is in your course list in BbLearn

**Northern Arizona University Policy Statements**

<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.

These statements address safe environments, students with disabilities, the institutional review board, academic integrity, the academic contact hour policy, and sensitive course materials. You need to be familiar with them.

College and department: Forestry, Engineering and Natural Science; Forestry

## **FOR 283 Forestry in the Wild land-Urban Interface**

SEMESTER OFFERED: Spring Semester

CLOCK HOURS: TTH 8 – 9:15

CREDIT HOURS: 3

INSTRUCTOR: Denver Hospodarsky, PhD, CF (AKA DrH)  
Associate Professor  
School of Forestry  
SW Forest Science Complex (SWFSC) – Bldg. 82  
Office: Room 104 Ph: 928-523-7525  
Email: [denver.hospodarsky@nau.edu](mailto:denver.hospodarsky@nau.edu)

OFFICE HOURS: TTH 2:00-4:00, otherwise Open Door or by Appointment

COURSE PREREQUISITES: None

**COURSE DESCRIPTION:** This course provides an overview of the social and biological complexities of managing forests in wildland-urban interface (WUI). The course focuses on basic theories, concepts, methods, and case studies in order to improve students' understanding and skills for the management and planning of WUI natural resources. An additional focus is placed on understanding how WUI management may differ from the management of similar resource values in wildlands. Emphasis is placed on resource managers' roles in reducing risks to forest and human communities, while sustaining the benefits accruing to both the biophysical and social components of functioning human ecosystems.

### **STUDENT LEARNING**

#### **EXPECTATIONS & OUTCOMES:**

By the end of this course, students should be able to describe and explain the range of issues and strategies involved in WUI management including: collaboration, communications, property rights, fire risk, urban wildlife, forest health and ecological restoration, and meeting multiple landowner objectives. Students will be able to evaluate WUI case studies and demonstrate in writing their rationale for managing the WUI, as they describe it should be managed.

#### **COURSE STRUCTURE & APPROACH:**

Two, 75 minute combination lecture/discussion sessions per week. Sessions will be structured to allow considerable opportunities for discussion and questions in response to the reading material. The case study approach will frequently be used in conjunction with evaluating WUI management issues. Lecture/discussion topics will largely expand upon readings assigned from the text. We'll try to take at least 3 field trips during the normally scheduled class period as weather permits.

## TEXTBOOK & REQUIRED

**MATERIALS:** Duryea, M. and S. Vince (eds.). 2004. Forests at the Wildland-Urban Interface: Conservation and Management. CRC Press, Boca Raton, FL.

## RECOMMENDED

**OPTIONAL REFERENCE:** Bradley, G.A. (ed.). 1984. Land Use and Forest Resources In a Changing Environment: The Urban/Forest Interface. University of Washington Press, Seattle, WA.

**OTHER MATERIALS:** Occasionally additional readings will be assigned and provided.

**COURSE OUTLINE:** (specific topics may be added or deleted as time allows)

Weeks 1 – 3 Introduction: Defining the wildland-urban interface (WUI)  
 (“Are WUI’s really from outer space?”)  
What is the WUI and how will we know it when we see it?  
How is WUI formed?  
Where is WUI located?  
What is the role of forests in the WUI?  
What are the management issues in the WUI?  
What does it mean to manage human ecosystems?

Weeks 4 – 7 Managing WUI forests as human ecosystems  
(yes, humans are an integral part of natural ecosystems too)  
Concepts of forest outputs and values  
Minimizing risk and maximizing benefits to both human  
and forest communities

A) Managing human dimensions  
(values, beliefs, and institutions – oh my!)  
Social-psychological services and benefits  
Quality-of-life  
Property rights  
Economic values  
Perceived environmental risk  
Aesthetics  
Community capacity and capability

B) Managing physical and biological dimensions  
(the natural resources upon which humans depend)  
Ecological services and benefits  
Fire  
Forest health  
Ecological restoration  
Wildlife  
Invasive plants  
Soils  
Hydrologic processes

Weeks 8 – 9	The social context of WUI Forestry (just as surely as death and taxes) Legal Political Administrative “Grass-roots”
Weeks 10–13	Tools for managing WUI forests (the craftsman can never have too many tools; and they must be sharp for the task!) Communications Collaboration Landscape assessment Criteria and indicators Management and planning frameworks Decision support systems
Weeks 14-15	Forest management in action (to think and to act is to be alive!) Private land Public land Quasi-public land

#### ASSESSMENT OF STUDENT

**LEARNING OUTCOMES:** A variety of assessment methods, in sufficient numbers, will be used in order to account for variability in student learning styles and daily vagaries in individual performance.

#### METHODS OF ASSESSMENT:

Two mid-term exams and a final exam will be given in order to assess comprehension of lecture/discussion material. Four unannounced reading quizzes will be given during the semester to encourage students to remain current with the assigned readings, and to evaluate comprehension of topics prior to their treatment in lecture and discussion. Students will keep a reading journal for each assigned reading throughout the course to consist of at least three discussion questions for each reading. DrH will review and grade the content of your reading journal.

#### TIMELINE FOR ASSESSMENT:

Semester	Week 3	Reading Quiz 1
	Week 5	Midterm Exam 1
	Week 7	Reading Quiz 2
	Week 8	Reading Quiz 3
	Week 12	Midterm Exam 2
	Week 14	Reading Quiz 4

- GRADING SYSTEM:** Two midterm exams at 20% each; final exam at 25%; four reading quizzes at 5% each; and a reading journal at 15%. The course will be graded using the scale: > 90% = A; 81 – 90% = B; 71 – 80% = C; 61 – 70% = D; and < 61% = F.
- COURSE POLICY:** This course will be conducted in accordance with the following policies. Please read these policies carefully.
- RETESTS AND MAKEUP TESTS:** No makeup exams, quizzes, or late assignments will be allowed without a signed medical excuse, or under conditions where the student has notified the instructor at least one-week in advance for mutually acceptable personal /professional reasons.
- ATTENDANCE:** Regular attendance is required. Role will be taken at the beginning of each class period. Please be on time in order to be counted on the role, it is both professional and courteous.
- STATEMENT ON PLAGIARISM & CHEATING:** Plagiarism and other forms of cheating are grounds for dismissal from FOR 283. The complete policy statement on academic integrity can be found in Appendix F of the NAU Student Handbook. Be sure to read this statement for your own protection.
- UNIVERSITY POLICIES:** Five NAU Policy Statements are particularly relevant to this class viz., Safe Environment Policy, Students With Disabilities, Institutional Review Board, Academic Integrity, and Academic Contact Hour Policy. These are statements are cited in this syllabus for reference (see pertinent NAU Policy Statements in the Student handbook.)
- OTHER:** Your thinking about WUI forestry issue in this class may benefit from consideration of the forester code of ethics. Please read the Society of American Foresters Code of Ethics.

## Reading Assignments

Weeks	Reading from Vince Text	Notes
1-3	Chapters 1-3	
4-7	Chapters 4-7	
8-9	Chapters 9-10	Spring Break March 18-22
10-13	Chapters 12-15	No Class Week 11, March 27 and 29
14-15	Chapters 16-18	No class Apr. 24 and 26
16	Final Exam	Thursday May 9 7:30-9:30 Room 136

Additional readings may be assigned during the semester



~Course Syllabus~

**Silviculture and Fire Applications**  
**FOR 317, 3 credits**  
**Spring 2013**  
**Hybrid online/classroom/field course**

**This class begins January 21 with on-line sessions and requires web access and an NAU e-mail account. The Flagstaff classroom/field component will meet March 4-7 in Flagstaff, AZ.**

Instructor: Dr. Larissa Yocom

[larissa.yocom@nau.edu](mailto:larissa.yocom@nau.edu)

928-523-1378

Office: Room 205, School of Forestry (Bldg. 82)

**Prerequisites:** An introductory ecology course or FOR 310: Forest Ecology

**Course description:** In the simplest terms, silviculture is applied forest ecology. Throughout the course, you will be introduced to both silvicultural treatments and underlying ecological concepts. By the end of the course, you should be able to distinguish stand structures by species, size, age and horizontal spatial pattern. You will be able to identify the most common silvicultural practices and link them to fire applications and have the knowledge and tools to select an appropriate prescription for a given stand.

**Learning Outcomes:**

**Module 1:**

1. Understand what silviculture is and how it applies to fire management.
2. List and describe the four stages of stand development.
3. Discuss forest strata, the four crown classes, and how these relate to fire.
4. List the steps involved in both gene conservation and tree breeding programs; understand how genetic gain in trees is calculated.
5. Describe basic regeneration mechanisms for trees and how disturbance is linked to regeneration.
6. Discuss the differences between natural and artificial regeneration and the advantages/disadvantages of both.
7. Understand the role of site preparation in silviculture; know why different methods are applied and the means of applying them.









## FOR 318 – Fuel Treatments

### Spring 2012 Syllabus

**Instructor:**

[Molly Hunter](#) - Assistant Research Professor, School of Forestry, NAU  
molly.hunter@nau.edu, 928-523-6650

\*\*Use this e-mail address only for emergencies—all e-mail correspondence for this course should normally be sent using Bb Blackboard Mail\*\*

**Prerequisites:**

An introductory ecology course or FOR 310 Forest Ecology or instructor consent.

**Course description:**

Fire is an important component of many forest ecosystems that has been suppressed since the early 1900's. These same forests now have an abundance of available fuels and high tree densities, leading to high fire hazard. This course will briefly cover the history of fire management in the United States and a sampling of forest types in which fuel treatments may be necessary. Much of the content will delve into the variety of fuel treatments available, along with their success and ecological effects. The field portion of the course will involve use of models that may be used in fuel treatment planning and application. We will also visit examples of fuel treatments in the field.

**Course Outline:****Module 1: Background**

- Unit 1 - History of fire management in the U.S.
- Unit 2 - Forest types and fire regimes of the U.S.
- Unit 3 - Silviculture background

**Module 2: Fuel treatment design and implementation****Module 3: Fuel treatment effects**

- Unit 1 - Treatment effectiveness
- Unit 2 - Other effects of fuel treatments
- Unit 3 - Monitoring

**Module 4: Fuel treatment planning**

- Unit 1 - Social factors
- Unit 2 - Economic factors
- Unit 3 - Landscape planning

**Course Schedule:**

Print out the course schedule. You'll need to refer to it often. This shows due dates for all discussions, assignments, and quizzes. Keep to the recommended schedule of modules as much as possible so that you don't fall behind.

The in-person portion of the course will begin Wednesday March 21<sup>st</sup> and go through Friday March 23<sup>rd</sup>. We will meet on the NAU campus in Flagstaff in the Du Bois Center, the Southwest room. We will meet from 8:00 am to approximately 5:00 pm each day. A schedule of the in-person portion will be provided upon meeting in Flagstaff.

**Required Readings:**

Readings from the current scientific literature will be assigned. Readings will be posted on Blackboard. Hard copies of readings published by the Rocky Mountain Research Station and the Pacific Northwest









## Spring 2013 Semester B 323-326W

CLASS HOURS: MWF 9:10 – 11:10; T 9:35 – 10:50; Th 9:35-12:25; Room 17  
Labs: Tuesday noon – 3:35; Thursday 1:00 – 3:35

COORDINATOR: Dr. Carol Chambers  
OFFICE: SFSC Rm 209  
PHONE: 523-0014  
E-MAIL: Carol.Chambers@nau.edu  
OFFICE HOURS: Open door or by appointment

SEMESTER B	Carol Chambers	Jeff Jenness
FACULTY:	Bruce Fox	Marty Lee
	Ching-Hsun Huang	

### WRITING

CONSULTANT: TBA

### COURSE OBJECTIVES:

The intent of Semester B is to provide students with up-to-date knowledge for managing forestland resources in a social context. We examine the techniques for producing wood, water, and livestock commodities, and recreation and wildlife amenities in distinct units in order to focus on the fundamental principles of management for each product or use of forestlands. We also seek to help students grasp the integrated nature of forest management; not only are the production activities noted above components of an interrelated ecological system, they are parts of a complex social system as well. We will learn not only how to produce commodities and amenities from our forestlands, but how much, for whom, and why.

### COURSE STRUCTURE AND APPROACH:

#### Topic areas covered and faculty:

Biometrics – Fox  
Collaborative management – Lee  
Forest economics – Huang  
Forest level management – Huang  
Forest operations/roads – Fox  
GIS - Jenness  
Recreation management - Lee  
Watershed management – Fox  
Wildlife habitat and range management -  
Chambers

In addition to teaching forest management, the Semester B faculty is committed to teaching and facilitating student development of integrating skills and abilities. These skills and abilities are crucial to your development as forestry professionals. One or more of the following skills will be emphasized in the teaching of each unit:

using graphical, mathematical, and analytical tools  
writing critically and analytically  
evaluating scientific publications  
public speaking and presenting information professionally  
negotiating and participating in group processes  
integrating concepts in a multidisciplinary approach



Welcome to Semester B!

### TEXTBOOKS AND REQUIRED MATERIALS:

#### Required Books

McComb, B. C. 2007. Wildlife habitat management: Concepts and applications in forestry.

Taylor and Francis Publishers, CRC Press, Boca Raton, FL. ISBN 9780849374890

Klemperer, W. David. 2003. Forest resource economics and finance. ISBN 9780974021102

McMillan, V. E. 2001. Writing Papers in the Biological Sciences, 5th edition (older editions also are fine). Bedford-St Martins. ISBN 9780312649715 (*e-book available*)

#### Recommended Books

Davis, L. S.; K. N. Johnson; P. Bettinger; and T. Howard. 2001. Forest management.

4<sup>th</sup> edition. Waveland Press. *Journal of Forestry* – we encourage you to continue to read the J. of Forestry and, when appropriate, we will assign readings from the Journal.

#### Other Required Readings:

Other required readings are listed under individual FOR 323W-326W courses in BbLearn. Syllabi, lecture and lab schedules, the assignment calendar and other individual unit materials will be posted on BbLearn.



### EVALUATION METHODS:

Syllabi will be provided for the individual units in Semester B that will contain the schedules, assignments, and deadlines for that particular unit.

#### Writing:

Semester B is designed to meet the requirements of the junior level writing course required under the Liberal Studies Program. You will write an integrative paper focused on a forest management topic of your choice. You will have the chance to turn in drafts of the paper components to receive feedback before rewriting and turning in the final paper. Details on the paper will be provided in the Semester B lab – Writing Your Briefing Paper – 1/29/13.

The McMillan text is our standard and is used to assess your writing. **We expect you to read McMillan and you are responsible for the information contained in this text!**



## GRADING SYSTEM:

The instructional content of Semester B is grouped into four blocks designated as FOR 323W – FOR326, worth 3, 3, 3, and 4 credits, respectively. Students will earn grades on the basis of how many points they accumulate on exams and graded exercises in each unit in each block during the semester. The topics included, their individual credits, and the number of points that may be earned in each unit are:

FOR 323W, 3 credits:

Forest operations – 2 credits (200 pts)

Briefing paper – topic (5 pts); draft topic background (15 pts); draft management plan (15 pts); final paper (35 pts); oral presentation (15 pts); Land Management Forum (15 pts) -- 1 credit (100 pts.)

FOR 324, 3 credits:

Forest economics -- 1.5 credits (150 pts.)

Biometrics -- 1.0 credit (100 pts.)

GIS (35 pts) + Crew Expectation Exercise (15 pts) -- 0.5 credit (50 pts.)

FOR 325, 3 credits:

Recreation management -- 1.5 credits (150 pts)

Wildlife habitat and range management -- 1.5 credits (150 pts.)

FOR 326, 4 credits:

Forest watershed management -- 1.0 credit (100 pts.)

Forest level management -- 2.5 credits (250 pts.)

Collaborative management -- 0.5 credit (50 pts.)

Grades will be turned in to the registrar for each of the four blocks. To enroll in Semester C, students must receive 70% or more of the total points possible in each of the four blocks.

Evaluation methods include in-class exams, field exams, individual writing assignments, and project reports done independently or by crews. Cheating, plagiarism, excessive cooperation among students on independent projects or other acts of academic dishonesty will result in the assignment of a failing grade for that exam or exercise. Penalties for turning work in late will be at the discretion of the appropriate faculty team leader.

A student may request a change in grade on any exam or exercise if he/she believes an error has been made. The request must be made in writing, including the reasons why the student believes an error has been made, and must be submitted to the faculty team leader within one week after the exam or exercise has been returned to the class. The faculty team leader will respond, in writing, by indicating whether or not a grade change has been made and why.

### Crew Assignments

There will be crew assignments throughout Semester B. These serve several purposes: they teach group skills needed in the forestry profession; they facilitate collaborative learning; and they (hopefully) decrease individual workloads on both students and faculty. If you have problems with a crew you are in, try to address it within the crew. If you are unable to resolve the problem, bring it up with Dr. Chambers, the Semester B coordinator.



## COURSE POLICIES:

### Faculty Availability

The NAU School of Forestry faculty members try to maintain an open-door policy and try to be available as much as possible. We encourage you to talk to us about subject material and forestry in general. We like to get to know you and have you know us. Should we not be available, make an appointment to see the professor at a time convenient to both of you.

NAU Policy on Academic Dishonesty (from the Student Handbook:  
<http://www4.nau.edu/stulife/handbookdishonesty.htm>):

Violations of the Student Code of Conduct which exclusively involve issues of Academic Dishonesty are normally dealt with by faculty and academic administrators. Allegations of academic dishonesty may be initiated by both students, and faculty or where appropriate, by administrative personnel. The faculty member may impose penalties for academic dishonesty in accordance with the course syllabus, program policy, and in direct relation to the nature of the infraction and the degree to which the involved academic work affects the course grade, as well as pursuant to the specific procedures set forth herein. See the Academic

ACADEMIC INTEGRITY means that students and faculty jointly agree to adhere to a code of conduct appropriate to the mutually trusting relationship that must exist between student and teacher. It is the expectation at NAU that all students will conduct themselves in a truthful, straightforward and honest fashion at all times. All NAU students are expected to be familiar with the definitions of academic dishonesty. Not knowing that certain activities qualify as academic dishonesty is not a defense to a charge of academic dishonesty.

ACADEMIC DISHONESTY is a form of academic misconduct that violates the university's academic standards and is subject to disciplinary action under the Student Code of Conduct. Academic dishonesty includes, but is not limited to, the following infractions: cheating, collusion, fabrication, obtaining an unfair advantage, and plagiarism.

Cheating: intentional use of or attempted use of unauthorized materials, information, study aids, or previously prepared solutions in any academic exercise, exam, paper, or other assignment.

Cheating includes (but is not limited to):

Copying another student's work.

Sharing answers for either a take-home or in-class examination.

Using notes, books or web materials on an exam when such aids are forbidden.

Taking an examination in another student's name or having another person take one for a student.

Changing the answers on an examination after it has been graded in order to gain more credit than deserved.

Using a "cheat-sheet" or other prohibited assistance (calculator, cell phone, text messaging, etc.) during an examination.

Working on an examination outside the specified time limits, such as beginning before the faculty member directs students to begin, or continuing to work after the faculty member has declared an end to the examination period.

Using a commercial service or engaging another person (whether paid or unpaid) to prepare assigned work. Unless prohibited by the faculty member for educational reasons, editing and/or proof-reading by another person is not considered cheating.

Collusion: when two or more students work together to produce individually submitted work without the permission of the faculty member. Collusion also occurs when one student produces work and knowingly allows another student to copy it and submit that copy for assessment. In such a case, both students will be considered to have colluded.

Obtaining an unfair advantage: activities that directly or indirectly compromise fair assessment or grading or constrain other students' abilities to successfully complete their assignments

Stealing, reproducing, or circulating exam materials prior to the time authorized by faculty  
Stealing, destroying, defacing or concealing library or other reference materials with the result that others are deprived of their use or that the faculty member cannot check students' work

Possessing, using, or circulating previously administered examinations, unless authorized by the faculty member.

Fabrication/Fraud: unauthorized falsification or invention of any information, data, or citation in an academic exercise.

Plagiarism: representing the words, expressions, productions or creative works of another as one's own in any academic exercise. Examples of plagiarism include:

Complete plagiarism occurs when an essay or other work has been copied word for word from another source or sources (for example, purchase or copying of an online paper) without citation and/or without any original contribution by the student.

Partial plagiarism occurs when another work has been used by a student as part of an assessment or project without proper acknowledgement of the original source. Because of the accessibility of the internet, partial plagiarism can easily occur if students cut and paste from web pages.

Improper paraphrasing occurs when a student changes one or two words in order to make the copied work look like original work instead of properly paraphrasing and citing the material.

Insufficient citation occurs when a student cites a source one time and not again for subsequent uses of the source.

Self-plagiarism occurs when a student reuses his or her own work or data without permission of the faculty member. Even when using one's own material, it must be cited properly. Also, using the same work for different courses without permission of the faculty members is self-plagiarism.

### Attendance and Professionalism

Students are expected to attend all lectures, exams, and field trips during Semester B. Missing a full day in Semester B is equivalent to missing 4-6 lectures in a traditional 3-credit course. We expect students to arrive on time for all lectures, exams, and field trips. We will leave on field trips at the appointed time and cannot wait for late students.

Attendance and punctuality are important aspects of professional behavior and common courtesy. If a situation arises where you cannot attend or arrive on time, it is your responsibility to notify, **in advance**, the faculty team leader responsible for that day's material.

Faculty are not required to make accommodations for students wanting to miss classes for an extended spring break or to leave early at the end of Spring semester for employment. Additional policies and guidelines applicable to individual instructional units will be specified in the syllabi for those units.

Cell phones and other electronic devices are to be turned off during class unless special permission has been granted.

### Turning in Assignments

All assignments such as essays and lab reports are due before Semester B starts on the assigned due date and are to be turned in at the beginning of class or put in the appropriate faculty mailbox in room 116 unless other prior arrangements have been made.

### Forestry Seminar Series:

You are strongly encouraged to attend the Forestry Seminar Series on Wednesday afternoons 4:00-5:00 p.m. in Room 17. This is a great opportunity to learn directly from some of the best researchers in the world (including some of our NAU faculty) about research related to ecology and management of forests and wild lands.



### Weekly Schedule

We meet from 9:10 a.m. to 11:10 on Mondays, Wednesdays, and Fridays; and from 9:35 a.m. to 3:35 on Tuesdays, and Thursdays. On full days when we are in the classroom the lunch time will vary depending on the lab schedule (TTh). You may need to bring a lunch for extended field labs. The lecture and lab schedules are found at the end of the syllabus.



A **typical** week has the following format:

Monday/Wednesday/Fridays: Biometrics, forest economics, forest-level management, or watershed management

Tuesday/Thursday mornings: Wildlife habitat and range management, forest operations, or recreation management

Tuesday/Thursday afternoons: Labs--individual topic and integrated



We encourage students to bring lunch on lab days. We will give advanced notice on days with field trips that may require bringing a lunch.

The University's self-insurance plan does not provide medical coverage to students if injured while participating in University-related activities or academic programs. Students are strongly encouraged to obtain medical/health insurance prior to participation, either through their parents' health insurance plan or by purchasing insurance (such as the package offered through Fronske Health Center).

All students and faculty who drive vehicles on field trips must have gone through the training sessions provided by the Motor Pool. Student van drivers will receive a modest hourly wage for driving time. Van drivers are responsible and accountable for making sure that vans are at the Southwest Forest Sciences Building 15 minutes prior to the vans' departure to the field and returned to the NAU garage after returning from the field when appropriate.



**NORTHERN ARIZONA UNIVERSITY**  
**School of Forestry**

**FOR 351: Fire Monitoring and Modeling**  
**3 credits**

**Instructor:** Dr. Larissa Yocom  
Office: Forestry #205  
Email: larissa.yocom@nau.edu  
Office phone: 928-523-1378  
Office hours: stop by or make an appointment

**Course Time:** Monday/Wednesday 12:30-2:50 pm

**Course Location:** School of Forestry, Room 018

**Course Description:**

Wildland fire is a high-impact disturbance with important ecological and social implications in most of the world's ecosystems. There are currently several existing Fire Monitoring programs used by land managers in the United States. Two of the main monitoring protocols include the National Park Service Fire Monitoring Handbook (FMH) and the USFS Fire Monitoring Program (FIREMON). In addition, many existing vegetation sampling techniques in vegetation community ecology are relevant to monitoring fire effects. The important components of any monitoring program will be discussed, the protocols and sampling techniques of existing fire monitoring programs will be explored, and the positive and negative aspects of each will be examined. Much of the data from fire monitoring can be incorporated into several different Fire Effects and Fire Behavior Models. These models will be explored, and monitoring data will be linked to inputs and outputs from the models. Models that will be addressed include fire behavior, fire hazard, fire effects, weather, and remote sensing models.

**Prerequisites:**

Forestry 251: Introduction to Wildland Fire is required to take this course. Upper division undergraduate students and graduate students are welcome in this class. To do well in the course, students should have a basic understanding of biology, mathematics, and natural resource management. Interested students who have not taken these courses are invited to talk with the instructor about registering for this course.

**Student Learning Expectations:**

This course is designed to introduce the basics of developing a monitoring program and to familiarize you with two existing fire monitoring programs. In addition you will become familiar with the inputs and outputs of existing fire effects and fire behavior models and how they relate to data collected in existing monitoring programs.

At the end of the course, you will have:

- A mastery of the basic components of a monitoring program (Critical reading, critical thinking).
- An understanding of existing fire monitoring programs & the advantages/disadvantages of them (Critical reading, critical thinking).
- A mastery of basic vegetation and fuel sampling techniques that are applicable to fire monitoring in multiple vegetation types (Quantitative/spatial analysis).
- An understanding of fire effects and fire behavior model inputs and outputs (Critical thinking).
- An understanding of the positive and negative aspects of different models (Critical thinking).
- An understanding of how monitoring data can feed into existing fire effects and fire behavior models (Quantitative/spatial analysis).
- The ability to present monitoring and model results to a professional audience (Effective oral and written communication).

#### **Required Text:**

The topics addressed in this class span several topics of study in order to link vegetation sampling techniques, fire monitoring, fire behavior and modeling.

Vegetation sampling and monitoring techniques will be taught from:

- Elzinga, C.L., Salzer, D.W., and Willoughby, J.W., 1998. Measuring and Monitoring Plant Populations. USDI Bureau of Land Management Technical Reference 1730-1. National Business Center, Denver, CO. 492p.  
<http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf>
- Fire Monitoring Handbook, National Park Service,  
[http://www.nps.gov/fire/fire/fir\\_eco\\_mon\\_fmh.cfm](http://www.nps.gov/fire/fire/fir_eco_mon_fmh.cfm)
- FIREMON, available at <http://fire.org>

Fire models are available to the public at <http://fire.org> and are loaded on the School of Forestry computers in the computer labs.

Readings will be provided from technical documentation, the scientific literature, and selected readings from books.

## COURSEWORK

### **Participation/Attendance**

Students are expected to attend classes. Class will include group work that counts towards participation. If you cannot attend for some reason, you need to notify the instructor ahead of time. If you miss class, it is your responsibility to ask if you missed something. Missing class is not an excuse for late or missing assignments. If you miss class, you should ask a fellow student for lecture notes.

### **Quizzes**

Quizzes will be given from time to time throughout the semester.

### **Homework/Lab Assignments**

At least seven homework assignments will be given throughout the semester. These assignments will be based on monitoring concepts and the use of models taught in the course. Basic analyses and a write-up will be turned in. Specifics on the assignments will be given in writing at the time of the assignments.

### **Exams**

The only exam will be the final exam.

### **Term Project/Paper**

Students will be responsible for a term project in which each student designs a framework for independently using two models covered in the course. Students will need to come up with the appropriate management questions to be addressed with the models. Students will also design a monitoring protocol designed to assess your hypothetical management scenario. The term project description and grading rubric will be handed out separately.

### **Term Presentation**

Students will present their term project/paper in class. Presentations will be 15 minutes long and will be scheduled into class sessions during the last week of the semester. Presentations should be approached as though they are being given at a professional meeting or conference. PowerPoint slides are recommended.

### **Late Assignments**

Late assignments will be accepted for the first 2 days after they are due. Assignments that are one day late (**24 hrs or less** from the due date and time) will be docked 10%. Assignments that are two days late (**24-48 hrs** from the due date and time) will be docked 20%. **After 48 hrs**, late assignments will not be accepted and will receive a zero.

## PERFORMANCE EVALUATION

The guidelines below describe the characteristics of excellent academic work, as well as work that is less than excellent. The rubric is organized around “answering a question”, as on a traditional test, but the guidelines below can be easily adapted for presentations, reports, and projects.

- **Excellent:** Clearly and completely addresses the question. Thorough and logical development of thoughts. Points supported by literature. Correct grammar and spelling, citations in proper format.
- **Good:** Complete or nearly complete in addressing the question. Thoughts are generally logically and thoroughly expressed. Most arguments or questions of fact are supported by the literature. Only minor errors of grammar, spelling, or citation format.
- **Needs Improvement:** Incomplete answer or discussion that is tangential to the question. Thoughts sometimes illogical or incomplete. Arguments or questions of fact sporadically supported by the literature. Moderate errors of grammar, spelling, or citation format.
- **Poor:** Answer mostly fails to address the question. Thoughts often illogical or incomplete. Arguments or questions of fact rarely supported by the literature. Substantial errors of grammar, spelling, or citation format.

### Grades are given as follows:

- A (90-100%)
- B (80-89%)
- C (70-79%)
- D (60-69%)
- F (59% or below)

### Points are earned as followed:

Participation and Attendance	5%
Quizzes	10%
Homework	35%
Term Project and Presentation	30%
Final Exam	20%

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Total 100%

### Statement on plagiarism and cheating:

Plagiarism and cheating will not be tolerated in this course. Any instance will result in failure of the assignment and, depending on the circumstances, failure in the course.

## NORTHERN ARIZONA UNIVERSITY

### POLICY STATEMENTS

For full policy statements, see <http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>

#### SAFE ENVIRONMENT POLICY

NAU's Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this university.

You may obtain a copy of this policy from the college dean's office or from the NAU's Affirmative Action website <http://home.nau.edu/diversity/>. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (928-523-5181), or NAU's Office of Affirmative Action (928-523-3312).

#### STUDENTS WITH DISABILITIES

If you have a documented disability, you can arrange for accommodations by contacting Disability Resources (DR) at 523-8773 (voice) or 523-6906 (TTY), [dr@nau.edu](mailto:dr@nau.edu) (e-mail) or 928-523-8747 (fax). Students needing academic accommodations are required to register with DR and provide required disability related documentation. Although you may request an accommodation at any time, in order for DR to best meet your individual needs, you are urged to register and submit necessary documentation ([www.nau.edu/dr](http://www.nau.edu/dr)) 8 weeks prior to the time you wish to receive accommodations. DR is strongly committed to the needs of student with disabilities and the promotion of Universal Design. Concerns or questions related to the accessibility of programs and facilities at NAU may be brought to the attention of DR or the Office of Affirmative Action and Equal Opportunity (523-3312).

#### ACADEMIC INTEGRITY

The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix G of NAU's Student Handbook <http://www4.nau.edu/stulife/handbookdishonesty.htm>.

**NORTHERN ARIZONA UNIVERSITY**  
**Course Syllabus**  
**FOR 360: Natural Resources Policy**  
**Spring 2013**

**General Information:**

Time and place: Monday, Wednesday and Friday; 8:00 – 8:50am

Southwest Forest Science Complex (Bldg. 82), Room 136

Instructor: Jim Allen

Southwest Forest Science Complex, Room 124

Office Phone: 523-5894

Email: [James.Allen@nau.edu](mailto:James.Allen@nau.edu)

Office Hours: By appointment. On most days, I expect to be available immediately after class.

**Course Description:**

This course will examine past, present and emerging policies, laws and issues that affect natural resources management in general and forestry in particular. It will also cover the fundamentals of the natural resources policy making process. The emphasis will be on policy-related topics of relevance to public natural resource management agencies in the United States, but issues affecting the management of private lands and international natural resources management will also receive some attention.

**Learning Outcomes:**

Upon completion of this course, students will be able to demonstrate:

1. An understanding of the historical development and importance of key natural resources policies and laws.
2. An understanding of the policy process as it applies to natural resources management, primarily at the federal level.
3. An understanding of the role played by various parties in the policy process.
4. The ability to think critically about current natural resources policy issues.
5. The ability to communicate their knowledge and thoughts about natural resources policy effectively in writing and through participation in class discussions.

**Course Structure/Approach:**

This course is structured as lecture-only, and in most cases a typical class period will involve a lecture from the primary instructor (but see the section on class participation). Periodically a class period will involve interaction with a guest or will be a structured discussion session among the class on a particular policy-related topic.

**Textbook:**

No textbook is required for this course.

**Assigned Readings:**

Readings will be assigned on a relatively regular basis. They will come from a variety of sources and most will either be posted on Bb Learn or handed out in class. Some assignments will involve reading material posted on the websites of government agencies, non-governmental organizations involved in natural resource management or policy, or news organizations.

At some point in the semester, I also plan to ask you to sign on to a natural resources policy-related blog called **A New Century of Forest Planning**. Some of the posts will then become the

basis for discussions and possibly a written assignment. You can check it out and sign up at any time by going to <http://ncfp.wordpress.com/> and entering your email address.



Source: <http://www.thisnation.com/textbook/processes-policyprocess.html>

**Grading:**

Grading will be based on six quizzes, two exams (a mid-term and a final), two written assignments, and class participation. The percentage of the total grade assigned to each of these is listed below:

Percent of Final Grade

Quizzes (6; 5% each):	30%
Mid-Term Exam	20%
Final Exam	20%
Written Assignments (2; 10% each)	20%
Class Participation	10%

A	90-100%
B	80-89.9%
C	70-79.9%
D	60-69.9%
F	<60%

**Written Assignments:**

An important part of this course is the opportunity that will be provided for students to think critically about a particular natural resource policy or issue, to dig into the topic a little more deeply than was done in class, and then to share their thoughts in writing. More details on these assignments will be provided in separate handouts later in the semester.

**Class Participation:** Student participation is critical to making this course a success. The material in this course *could* be taught entirely in the traditional lecture format, but would be much more interesting if combined with questions, discussions and debate. *Active* participation is expected; staying silent throughout the semester, being absent or late on a frequent basis, or being otherwise disengaged, may result in the loss of all or most of the 10% of the grade allocated to participation.



**Extra Credit:**

Students will have the opportunity to earn up to an additional 5 percent of their final grade by completing an optional written assignment. The primary means for earning this credit will be to attend a public event with some policy-related content. The event must be pre-approved by the instructor and generally will need to be an event that is also attended by the instructor. Examples of the types of events that are likely to qualify include a government agency-sponsored public meeting on a policy issue or a seminar or public presentation on campus that is policy-related. To receive full credit, the write-up must include a well-written summary of the meeting/seminar content and a critical reaction/analysis.

**Tentative Course Outline:****I. Introduction to Natural Resources Policy**

- What is policy? Some definitions and related terms
- Why is understanding policy and the policy process important to natural resource managers?

**II. History of Natural Resources Policy in the United States**

- Eras of policy development in the U.S.
- Nation-building and natural resources exploitation
- Rise of the Conservation Movement
- Marsh, Pinchot and contemporaries, Leopold
- Scientific forestry and sustained yield/multiple use concepts
- The environmental era
- Some policy makers/influencers of the environmental era

**III. Policy and Political Processes**

- The making of laws, regulations, and policies
- The role of agencies, interest groups, and appropriations
- The role of appeals and litigation

**IV. Natural Resources Policy Issues and Public Lands**

- Overview of some key forestry and environmental laws
- Forest Planning Rule
- NEPA
- Endangered Species Act and biodiversity protection
- Evolution of forest management paradigms
- Ecosystem management, adaptive management, collaboration
- Forest health, restoration and fire policies
- Case Study: Kaibab National Forest Plan Revision

**V. Natural Resources Policy Issues and Private Lands**

- Regulation of forestry practices on private lands, Farm Bill
- Forest certification
- Conservation easements, Forest Legacy Program
- Forest biotechnology

**VI. International Policy Issues**

- Climate change and forests, REDD
- Forestry, indigenous peoples and international development

## VII. What Will Drive Natural Resources Policy in the Future?

- Demographic, political, environmental changes (external factors)
- Changes within the natural resources profession (internal factors)

## General Course and NAU Policies

### Course Policies:

**Makeup quizzes and exams:** Students are required to take the quizzes and exams as scheduled. In the case of illness or other legitimate reason, students must inform the instructor BEFORE the quiz or exam.

**Attendance** is expected at all class sessions. Although daily attendance will not be taken, a pattern of frequent absences will be considered when determining the grade for class participation.

**Plagiarism and other forms of cheating** will not be tolerated. Refer to the NAU statement on academic integrity below.

### Northern Arizona University Policy Statements:

**SAFE ENVIRONMENT POLICY.** NAU's Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual orientation, disability, or veteran status and to prevent sexual harassment, sexual assault or retaliation by anyone at this university. You may obtain a copy of this policy from the college dean's office or from the NAU's Affirmative Action website <http://home.nau.edu/diversity/>. If you have concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (928-523-5181), or NAU's Office of Affirmative Action (928-523-3312).

**STUDENTS WITH DISABILITIES.** If you have a documented disability, you can arrange for accommodations by contacting Disability Resources (DR) at 523-8773 (voice) or 523-6906 (TTY), [dr@nau.edu](mailto:dr@nau.edu) (e-mail) or 928-523-8747 (fax). Students needing academic accommodations are required to register with DR and provide required disability related documentation. Although you may request an accommodation at any time, in order for DR to best meet your individual needs, you are urged to register and submit necessary documentation ([www.nau.edu/dr](http://www.nau.edu/dr)) 8 weeks prior to the time you wish to receive accommodations. DR is strongly committed to the needs of student with disabilities and the promotion of Universal Design. Concerns or questions related to the accessibility of programs and facilities at NAU may be brought to the attention of DR or the Office of Affirmative Action and Equal Opportunity (523-3312).

**ACADEMIC INTEGRITY.** The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix G of NAU's Student Handbook <http://nau.edu/Student-Life/Student-Handbook/>.

**CLASSROOM MANAGEMENT STATEMENT.** Membership in the academic community places a special obligation on all members to preserve an atmosphere conducive to a safe and positive learning environment. Part of that obligation implies the responsibility of each member of the NAU community to maintain an environment in which the behavior of any individual is not disruptive.

It is the responsibility of each student to behave in a manner which does not interrupt or disrupt the delivery of education by faculty members or receipt of education by students, within or outside the classroom. The determination of whether such interruption or disruption has occurred has to be made by the faculty member at the time the behavior occurs. It becomes the responsibility of the individual faculty member to maintain and enforce the standards of behavior acceptable to preserving an atmosphere for teaching and learning in accordance with University regulations and the course syllabus.

At a minimum, students will be warned if their behavior is evaluated by the faculty member as disruptive. Serious disruptions, as determined by the faculty member, may result in immediate removal of the student from the instructional environment. Significant and/or continued violations may result in an administrative withdrawal from the class. Additional responses by the faculty member to disruptive behavior may include a range of actions from discussing the disruptive behavior with the student to referral to the appropriate academic unit and/or the Office of Student Life for administrative review, with a view to implement corrective action up to and including suspension or expulsion.

**NORTHERN ARIZONA UNIVERSITY**  
**Course Syllabus**  
**FOR 415/515: Forestry in Developing Countries**  
**Spring 2013**

**General Information:**

Time and place: Mondays and Wednesdays; 12:45 – 2:00 pm  
Southwest Forest Science Complex (Bldg. 82), Room 133

Instructors: Dr. Pete Fulé  
Southwest Forest Science Complex, Room 246C  
Office Phone: 523-1463  
Email: [Pete.Fule@nau.edu](mailto:Pete.Fule@nau.edu)

Office Hours: By appointment. On most days, I should be available immediately after class.

**Course Description:**

Developing countries hold much of the world's forests. These forests provide many goods and services, including wood products, medicinal plants, food, environmental protection, carbon uptake, ecotourism opportunities, and much of the planet's plant and animal biodiversity. While they are very important, forests in developing countries are also at considerable risk due to factors such as deforestation, forest degradation, and climate change. This course begins with an introduction to the concept of developing countries and to their physical and biological environment. The majority of the course is devoted to forest management approaches, including both the biological and socioeconomic aspects of forest management. A number of individual country or regional case studies are also presented.

**Student Learning Expectations/Outcomes:**

By the end of the course students will have:

Developed an understanding of the biology, management, and policy aspects of forests in developing countries.

Acquired an understanding of social, political, economic, and environmental issues as they relate to people from developing countries and how they manage their forests.

Developed an understanding of traditional ecological knowledge and the role of minorities and underrepresented groups in economic development.

Studied the role of women in forest resource management worldwide.

Become familiar with organizations and career opportunities working in international forestry.

At the end of the course students will be able to:

Discuss the differences and similarities between forests in different regions within the developing world.

Demonstrate understanding of major forestry problems such as over-exploitation, deforestation, and loss of biological diversity.

Communicate in writing and oral presentations an understanding of cultural and social aspects of a forest problem in developing countries.

Describe the social and cultural context of the forestry enterprise and how it varies between developing countries and the U.S.

Demonstrate an understanding of how international policies and treaties can achieve improved management of developing country forests.

### **Course Structure:**

This is a three credit lecture course with most of the classes devoted to lectures by the instructors and guest speakers. Approximately 25% of the class periods will be devoted to discussion sessions on specific topics and to student presentations. Students will actively participate, as members of teams, in a special project that they will present to the class near the end of the semester. Because this is a co-convened course, some assignments and expectations will vary depending on whether the student is enrolled in FOR 415 or FOR 515.

### **Textbooks and Required Materials:**

There is no textbook required for this course. Selected readings are required and will be posted on the Blackboard Learn web page and/or handed out in class.

### **Discussion Sessions:**

Four discussion sessions are scheduled in the semester. Articles for discussion will be placed on BBLearn. All students will participate in discussions and graduate students will be assigned to lead discussion sections. Further details will be given in a separate document.

### **Student Project:**

Each student in this class is required to participate in a special project on international forestry. This project is designed to allow students to develop skills working in a team and to pursue in greater detail a topic of particular interest to that group. Teams will consist of a graduate student plus several undergraduate students. Assignment details will be given in a separate document.

### **Assessment of Student Learning Outcomes:**

The rubric or guideline below describes the characteristics of excellent academic work, as well as levels that are less than excellent. The rubric is organized around “answering a question”, as on a traditional test, but the guidelines below can be easily adapted for presentations, reports, and the mid-term essays.

**Excellent:** Clearly and completely addresses the question. Thorough and logical development of thoughts. Points supported by literature. Correct grammar and spelling, citations in proper format.

**Good:** Complete or nearly complete in addressing the question. Thoughts are generally logically and thoroughly expressed. Most arguments or questions of fact are supported by the literature. Only minor errors of grammar, spelling, or citation format.

**Needs Improvement:** Incomplete answer or discussion that is tangential to the question. Thoughts sometimes illogical or incomplete. Arguments or questions of fact sporadically supported by the literature. Moderate errors of grammar, spelling, or citation format.

**Poor:** Answer mostly fails to address the question. Thoughts often illogical or incomplete. Arguments or questions of fact rarely supported by the literature. Substantial errors of grammar, spelling, or citation format.

Excellent participation in discussions means reading and considering the articles ahead of class, actively seeking any additional information needed to understand the concepts, and participating thoughtfully and actively in the class discussion.

Graduate students are expected to display a good knowledge of the scientific literature, including the capability to find literature independently and interpret technical information.

**Grading:**

There will be two in-class exams, a mid-term and a final. The exams will consist primarily of short answer and essay questions, although other types of questions (e.g., multiple choice) may be included.

Grading will be based on the following:

	<b>FOR 415</b>	<b>FOR 515</b>
Mid-Term Exam	30%	25%
Student Project:		
Individual Performance	30%	20%
Project Leadership		10%
Discussion Participation	10%	10%
Discussion Leadership		10%
Final Exam	30%	25%
<b>Total</b>	<b>100%</b>	<b>100%</b>

**Course Outline 2013 (Topics subject to change)**

<b>Date</b>	<b>Topic</b>	<b>Presenter</b>
14 Jan	Intro, syllabus, what is a developing country?	
16 Jan	Physical environment	
21 Jan	<b>Holiday: Martin Luther King, Jr. Day</b>	
23 Jan	Biological environment	
28 Jan	Approaches & challenges to forestry	
30 Jan	Community forestry	
4 Feb	Agroforestry	
6 Feb	Discussion #1 (topic: community/agroforestry)	Graduate students
11 Feb	Indigenous forest management	
13 Feb	Case study: Bolivia, Mexico	

18 Feb	Commercial plantation forestry	
20 Feb	Case study: Swaziland	Dr. Jim Allen
25 Feb	Gender roles	
27 Feb	Discussion #2 (topic: gender roles)	Graduate students
4 Mar	Carbon management, REDD	
6 Mar	Ecotourism	
11 Mar	<b>Midterm Exam</b>	
13 Mar	Non-market forest products	Dr. Yeon-Su Kim
18-22 Mar	<b>Spring Break</b>	
25 Mar	International development policy & legal issues	
27 Mar	Discussion #3 (topic: TBA)	Graduate students
1 Apr	Case study: Pacific islands	Dr. Jim Allen
3 Apr	Case study: Ghana	Dr. Mike Wagner
8 Apr	TBA	
10 Apr	Case study: Honduras	Dr. Erik Neilsen
15 Apr	Student presentations	
17 Apr	Student presentations	
22 Apr	Student presentations	
24 Apr	Peace Corps	Returned PC Volunteers
29 Apr	Case study: Mainpat, India	Amanda Knauf, Emily Fulé
1 May	Discussion #4 (topic: TBA)	Graduate students
6 May	<b>Final Exam 12:30-2:30</b>	

## General Course and NAU Policies

### Course Policies:

**Makeup exams:** Students are required to take the exams as scheduled. In the case of illness or other legitimate reason, students must inform the instructor BEFORE the exam.

**Attendance** is expected at all class sessions unless prior approval is given by the instructor; in the case of illness or other unforeseen events, students should notify the instructor in advance of the class session.

**Plagiarism and cheating** will not be tolerated. This includes using the same (or a very similar) term paper for this class and any other class. Refer to the NAU statement of academic integrity below.

### Northern Arizona University Policy Statements:

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**STUDENTS WITH DISABILITIES.** If you have a learning and/or physical disability, you are encouraged to make arrangements for class assignments/exams so your academic performance will not suffer because of the disability or handicap. If you have questions about special provisions for students with disabilities, contact the Counseling and Testing Center (523-2261). It is your responsibility to register with the Counseling and Testing Center. Application for services should be made at least eight weeks before the start of the semester. If the Counseling and Testing Center verifies your eligibility for special services, you should consult with your instructor during the first week in the semester so appropriate arrangements can be made. Concerns related to noncompliance with appropriate provisions should be directed to the Disability Support Services coordinator in the Counseling and Testing Center.

**INSTITUTIONAL REVIEW BOARD.** Any study involving observation of or interaction with human subjects that originates at NAU-including a course project, report, or research paper-must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities. The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures. A copy of the IRB Policy and Procedures Manual is available in each department's administrative office



and each college dean's office. If you have questions, contact Carey Conover, Office of Grant and Contract Services, at 523-4889.

**ACADEMIC INTEGRITY.** The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff, and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the educational process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. It is the responsibility of individual faculty members to identify instances of academic dishonesty and recommend penalties to the department chair or college dean in keeping with the severity of the violation. Penalties may range from verbal chastisement to a failing grade in the course. The complete policy on academic integrity is in Appendix F of NAU's Student Handbook.

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### Syllabus

**Class Hours: M - W 9:10 a.m. – 12:20 (Lecture or Lab) Room 136 (6 credit Hours)**

**Instructors:**

Yeon-Su Kim	Coordinator, Planning and Analysis Office: Room 233 Forestry Science Complex Phone: 523-6643; E-mail: ysk@nau.edu Office hours: Open door or by appointment
Denver Hospodarsky	Planning, Ethics and NEPA Office: Room 104 Forestry Science Complex Phone: 523-7525; E-mail: Denver.Hospodarsky@nau.edu Office hours: Open door or by appointment
Cheryl Miller	Planning and Analysis Office: Room 100 Forestry Science Complex Phone: 523-6727; E-mail: Cheryl.Miller@nau.edu Office hours: by appointment
Dave Brewer	NEPA

**Course description**

Forest Ecosystem Planning I & II form the second semester capstone experience, which integrates the materials learned in previous forestry courses as well as introduces new concepts. The course includes trainings on Professional Ethics and National Environmental Policy Act.

**Ecosystem Planning/Analysis:** Students will conduct an ecosystem management analysis and develop a forest ecosystem management plan, which considers multiple resources and ecosystem health desired conditions. Students develop desired future conditions for a legacy forest (i.e., forest left to future generations in the future) under their chosen scenario. Students develop a desired legacy forest conditions based on forest ecology and ecosystem management principles learned in FOR 313-316, FOR 323-326, and focus area courses, as well as their own research under the guidance of faculty advisors. Students conduct analyses to determine specific management strategies, which should be undertaken over the planning horizon to achieve the desired condition. This year, Semester D will focus on improving the management of the NAU's Centennial Forest (Historic School Forest).

**Professional Ethics:** this section will help increase your awareness and understanding of the ethical values associated with professional practice in forest ecosystem planning. In this section you will work in groups but with a substantial portion of your assignments being based on your own efforts. We will combine traditional lectures, small group discussions, in-class exercises, and individual assignments throughout this section.

**National Environmental Policy Act:** As with the Professional Ethics section, in this section you will work in groups but with a substantial portion of your assignments being based on your own efforts. We will have a guest presenter, Mr. David Brewer, formally with the US Forest Service and the Ecological Restoration Institute, as our instructor in this section. Your scores will be based on a combination of individual quizzes and an exam, plus a crew-based review assignment (tentative).











## Syllabus For 425

Class Hours:

On-line

Credit Hours: 3

Instructor:

Steve Dewhurst, Associate Professor, School of Forestry

Office: Room 237, Southwest Forest Science Complex

Phone: (928) 523-9647 note: no voice mail;

E-mail: [Steve.Dewhurst@nau.edu](mailto:Steve.Dewhurst@nau.edu) (preferred mode of contact)

Office hours: I am most available (quickest response) on Tuesdays and Thursdays.

### A 401-Series course for in-service professionals

This a course designed for in-service professionals in fire science, fire management, and other forest management related fields. It combines 3 elements: 1) on-line tutorials in key Arc/GIS concepts and techniques, delivered through ESRI, 2) e-lectures describing and demonstrating key tools, concepts and techniques, and 3) a one-week intensive lab experience, using Arc/Map software, held at the Flagstaff Campus March 9-12.

Course Dates, Jan 22nd-Mar 20th, 2009

The class begins February 5th with online sessions. Students will be expected to complete the following ESRI Virtual Campus courses as part of the course:

Learning Arc/GIS Desktop (version 9.2) (24 hours)

Learning Arc/GIS Spatial Analyst (version 9.2) (18 hours)

Students should have completed "Learning Arc/GIS Desktop" by the end of week 3, and "Learning Arc/GIS Spatial Analyst" by the end of week 5. Certificates of Completion provided by ESRI at the end of each Virtual Campus courses will be used as proof of course completion, and must be provided to the instructor by the end of the course in order to obtain credit for them. Students may register for and begin these courses as soon as they have registered, paid their fees, and obtained their NAU e-mail account. Registration codes will only be sent to NAU e-mail addresses!

Students who have already completed these Virtual Campus courses may submit their Certificates of Completion for credit. Students who wish to begin these courses before Feb 5<sup>th</sup> may do so.

### Course Location

This course will be delivered in "hybrid" format. Most course content will be delivered on-line, through the NAU Vista system. 4 days (March 9-12) will be spent in Flagstaff, using NAU



facilities. Students wishing to work with datasets from their professional activities should arrange with the instructor for those datasets to be available for their use at NAU.

### **Class Structure**

The first 2 weeks of the course will be devoted to the completion of the “Learning Arc/GIS Desktop” ESRI Virtual Campus course. This will be done through accomplished through ESRI’s Virtual Campus facility. Registration fees for these courses are included in the NAU course registration fee.

Beginning in week 3, and proceeding through Week 6, students will view e-lectures, delivered in Vista. There will be 4 e-lecture modules, each with a quiz and follow up activities.

Week 7 will be devoted to each student producing a final GIS project using NAU computing facilities, datasets provided by NAU, or datasets pre arranged with the instructor..

### **Technical Requirements**

No special technical requirements. A web browser and internet connection is all you need. However, your web browser will need to support viewing of Flash video, and your Internet connection will need to be fast enough to allow download of large files. The content will be graphics-intensive, and faster connections will work better.

### **Course PreWork**

Students who wish to complete the ESRI Virtual Campus courses before Jan 22nd may do so. Students may register for and begin these courses as soon as they have registered, paid their fees, and obtained their NAU e-mail account. Registration codes will only be sent to NAU e-mail addresses!

### **Textbook Information**

No textbook is required for this course. For students wishing a hardcopy reference, the following is recommended:

Using ArcMap: ArcGIS 9. ESRI Press. ISBN 1589480988.

This book is widely available, both new and used, through Amazon.com and other on-line booksellers. It is recommended that students who wish to purchase this book do so before beginning the “Learning Arc/GIS Desktop” Virtual Campus course, as the book will be most useful in supporting that material.

### **Desired Course Outcomes:**

Upon the successful completion of this course, students should be able to demonstrate:  
A general knowledge of geographic and spatial analysis techniques commonly used in forest management.

Understanding of the relationship between types of spatial data commonly encountered in forest-related applications.

A depth and breadth of understanding of geographic and spatial analysis techniques relevant to forest management.

An awareness of the software and hardware resources available to support geographic and spatial analysis.

The ability to develop a work plan to incorporate geographic and spatial analysis into their management application of interest.

**Grading:**

Grading is by letter-grade. Grades will be calculated as follows:

(50%) On-line quizzes. (4 quizzes on e-lecture material)

(40%) Work plan and demonstration project: Completed during lab week in Flagstaff (40 points)

(10%) Participation

Additional course requirements: Completion of specified ESRI training modules

Readings:

As assigned.

**Course Outline**

Week 1: On-line ESRI modules

Week 2: On-line ESRI modules

Week 3: Basic GIS concepts (e-lectures)

Week 4: GIS data sources (e-lectures)

Week 5: GIS analysis techniques (e-lectures)

Week 6: GIS applications (e-lectures)

Week 7: GIS lab experience (Flagstaff)

## Course Syllabus

FOR 441: Sustainable Tropical Forestry in Ghana, West Africa  
Summer 2013

Credits: 3 semester hours  
Location: Ghana, West Africa (see schedule of activities)  
Dates: July 25- August 15, 2013  
Instructors: Michael R. Wagner  
School of Forestry  
PO Box 15018  
Flagstaff, AZ 86011  
(928) 523-6646  
[Mike.Wagner@nau.edu](mailto:Mike.Wagner@nau.edu)

Paul Bosu  
FORIG  
KNUST Box 63  
Kumasi, Ghana  
011-233-51-60123  
[pbosu@forig.org](mailto:pbosu@forig.org)

### **Course Description:**

Tropical forests provide wood products, medicinal plants, foodstuffs, tourism, environmental protection, habitat for wildlife and humans, and the majority of the planet's plant and animal biodiversity. This course examines a broad range of issues related to tropical wet and dry ecosystems including: their distribution, ecology, and management; deforestation issues and actions; conservation management and preservation; community forestry, natural forest management, plantation forestry and agroforestry; ecotourism and cultural tourism; and gender roles, indigenous knowledge and land tenure issues. All of the issues in this course are raised in the context of the social, political, economic, and cultural conditions under which Africans live and work in Ghana. A three week trip across Ghanaian forests will provide students with first hand experience in tropical forestry.

### **Course Objectives:**

Students will, by the completion of this course:

Understand current trends in the ecology and management of wet and dry tropical forests throughout the world, with a focus on West Africa

Appreciate the major challenges for sustainable management of tropical forests, much beyond traditional silviculture and planning requirements; and

Develop first-hand experience in tropical forest (ecosystem) management in Ghana.  
Understand and participate in forest based economic development through the Bobori Butterfly Sanctuary Ecotourism Project.  
Acquire a social, political, economic and cultural perspective on the role of forestry in the lives of traditional African people.  
Learn the difference in the view of western culture and Ghanaians in how they perceive and value forests.

**Student Learning Expectations/Outcomes:**

- Discuss the differences between the traditional use of forests in tropical and temperate regions
- Demonstrate an understanding of major forestry issues like deforestation, certification and indigenous knowledge that affect developing country forests.
- Describe the social and cultural context in how local Africans view their forest.
- Demonstrate the knowledge of development approaches (i.e. ecotourism, agroforestry) and how the strategies can be effective to achieve broad economic development within a cultural context.

**Course Structure:**

This is a three-week field course.

**Required Textbooks:**

Course-pack

**Recommended (optional) Textbooks:**

Whitmore, T.C. 1998. An introduction to tropical forests. Second Edition. Oxford University Press. New York, 282 pp.

Sharma, N.P. (ed) 1992. Managing the worlds forests. Kendall/hunt publishing Co 665 pp.

**Ecotourism Project:**

The course includes a service learning element on ecotourism. Ecotourism is often cited as a potential strategy to achieve economic development using forests without extracting wood products from the forest. This part of the course is designed to give students the opportunity to actively develop and implement some activity that will improve the potential of the Bobiri Guest House to succeed as an ecotourism business. In 2009 the students did three projects: 1) designed and built an energy efficient wood stove using local “landcrete” clay blocks, 2) developed and executed a fund raising campaign to purchase a new generator and 3) made physical improvements in facilities by painting and repair of cook house and original wooden guest house.

Students will develop project ideas during a series of evening sessions shortly after arrival. A series of articles on ecotourism are included in the course pack. These should be read prior to the first evening session. The initial session will review the goals and constraints of this activity. The ecotourism project must be something that can be accomplished within the time frame of the course (potential follow up is permitted) and must be completed within a budget of \$100 per project. During the second evening ecotourism session, preliminary ideas will be vetted for discussion by the group. During the third evening session revised project proposals will be presented. These may be individual or group projects. During the fourth session proposed projects will be presented to Bobiri senior staff for final approval. Two days are allocated for implementation of ecotourism projects during the second week of the course.

The ecotourism project creates an opportunity for the class to give back something to the Bobiri Guest House and develop an appreciation of difficulties associated with forestry based economic development in the third world.

### **Evaluation and Grading:**

During the course, students will be evaluated based on: a) participation (involvement in activities, synthesis and questioning, and punctuality), b) professionalism. Each student will be assigned 1 day/event during the course to serve as the group host. The host for the day/event will be responsible for obtaining contact information and writing thank you letters from the class to the professional host, and c) a journal describing the main lessons learned each field day. As part of the journal assignments, students should prepare a detailed response to the following synthesis question: contrast Ghanaian and US views of forests and their use. What economic or cultural factors explain this difference? Describe one forest management challenge that Ghanaian foresters face and offer two alternative strategies to address this challenge. Include the answer to this question as the final section of your journal. Journals will be due September 15, and should contain approximately a one-page typed account for each day of the field course and about 3-5 typed pages for your answer to the synthesis question.

### **Assessment of Student Learning Outcomes:**

Instructors for the course are engaged with students from breakfast until the end of each day. During breakfast activities for each day are outlined. Student expectations are reviewed and instructors participate in clarifying what is expected from students that day. Throughout the daily activities student participation and professionalism are assessed. During and after the evening meal a discussion of lessons learned for that day are reviewed. Students are asked to actively participate in the discussion and ask questions about what experiences they had that day and how they connected with the

forestry issues presented. Students are encouraged to complete their journal at the end of each day.

The timeline for assessment is a daily assessment of each student's participation and professionalism and a final assessment of their written journal at the end of the course.

### **Other Course Policies:**

This course will comply with all academic policy statements established by NAU.  
Course Instructor Roles

Instruction for this course is provided by a team of instructors and about 10 professional Ghanaian staff. The senior instructor is Professor Michael R. Wagner, Regents' Professor of International Forestry Emeritus. Dr. Wagner has 31 years experience at NAU and has taught eight previous international field courses (five in Ghana, two in Honduras, one in Panama). Dr. Wagner coordinated international programs in the School of Forestry (SOF) and for many years taught a NAU based course- FOR 415 Forestry in Developing Countries. Dr. Wagner has over 3 years experience working in Ghana. He served as a US Peace Corps volunteer in Ghana from 1973-1975 as an instructor in the Forestry Training School. Since 1973 he has taken about 25 professional trips to Ghana supported by two Fulbright scholarships and has managed several research projects. He has published two books and over 25 scientific papers just on his research in Ghana. He currently is Co-PI on an International Tropical Timber Organization grant to develop and demonstrate methods to restore tropical forest on deforested lands in Ghana. Dr. Wagner co-founded the Bobiri Butterfly Sanctuary in Kubease, Ghana where the course will be centered. Finally, Professor Wagner or "Prof" as he is widely known in forestry circles in Ghana speaks the language of the Ashanti people- Twi at a basic level.

Dr. Paul Bosu, Forestry Research Institute of Ghana, is a co-instructor. Dr. Bosu is an alumni of Northern Arizona University, School of Forestry and among his many duties manages the Bobiri Forest and Butterfly Sanctuary Guest House. Dr. Bosu is a native of Ghana from the Fanti tribal group, but speaks fluent Twi. Dr. Bosu coordinates all the Ghana instructors, provides local logistical support, and stays with the course during the entire 3 weeks. Dr. Bosu is capable of delivering any of the course lectures.

### Important Contact Numbers:

Michael R. Wagner  
School of Forestry  
PO Box 15018  
Flagstaff, AZ 86011  
(928) 523-6646  
[Mike.Wagner@nau.edu](mailto:Mike.Wagner@nau.edu)

Paul Bosu  
FORIG  
KNUST Box 63  
Kumasi, Ghana  
011-233-51-60123  
[pbosu@forig.org](mailto:pbosu@forig.org)

US Embassy in Ghana  
6th and 10th Lanes, Osu  
Telephone: (233) 21-776-601/602  
Fax: (233) 21-701-1813  
After Hours Emergency: (233) 21-775-297  
Email: [acsaccra@state.gov](mailto:acsaccra@state.gov)

### **Medical Information:**

All students participating in this course must demonstrate they are covered by medical insurance. Centers for Disease Control (CDC) recommended vaccines and preventive medical practices are described in the course pack. All CDC recommended procedures must be followed. All students must obtain an International Student Identification card which includes emergency medical evacuation insurance. It will be each attendee's responsibility to make known all medical/allergy conditions to the course instructors by the completion of medical history forms included in your acceptance packets. All precautions will be made to ensure your personal safety during this course and first aid as required will be administered while further medical attention is arranged if needed. As medical first aid ethics require, no medication will be administered to a patient. However, the patient may decide to medicate themselves with the appropriate over the counter products. For additional information consult your medical release forms and risk management statement

*College of Engineering, Forestry and Natural Sciences*  
*School of Forestry*

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**Ecology and Management of Introduced Species in Forests and Rangelands**

**FOR 443 Spring 2012 Course Syllabus**

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**Instructor:** Dr. Kristen M. Waring  
Office/lab: Southwest Forestry Science Complex (Bldg 82) Rm 201/219  
Office Hours: By appt. or open door  
Email: [Kristen.waring@nau.edu](mailto:Kristen.waring@nau.edu) Phone: 523-4920

**Prerequisites:** Basic ecology helpful but not required.

**Course Description:** Introductions of non-native insect, plant, animal and pathogen species have increased at an alarming rate around the world in the past 100 years and tend to have negative ecological and economic impacts once established. This course will introduce students to the ecology of introduced and invasive species, how land managers and policy makers are dealing with introductions and case studies examining the ecology and management of specific introduced species in forests and rangelands.

**Learning outcomes:** Students will be able to

1. Compare and contrast definitions and terminology used in the broad field of invasion ecology/introduced species.
2. Describe invasion ecology in terms of arrival, establishment and spread of invasive species and apply those concepts to management strategies.
3. Identify and describe positive and negative effects of introduced species.
4. Describe the different management strategies employed and their limitations, and the role of policy in introduced species' management.
5. Thoughtfully participate in discussions and dialogue concerning the ecology and management of introduced species worldwide.
6. Conduct a literature search and gather information into a coherent oral presentation on a topic related to invasive species in collaboration with a teammate.

**Course structure:** Primarily lecture format with an emphasis on active learning, including group activities and discussion. Students will work in teams to develop an oral presentation late in the semester. When possible, guest lectures will provide diversity in background, viewpoint and expertise.

**Discussions and active learning:** To facilitate an active learning environment, each student is required to turn in one question *by 10 am the day of each class session* that is based on the readings (textbook or others); questions will be turned in via Bb Learn. These questions are worth 5 points each and count towards the participation grade. You have two 'freebie' class sessions over the course of the semester. Questions should be related to understanding reading material with greater clarity or depth or generating discussion (including controversy).

**Required text:**

Davis, M.A. 2009. *Invasion Biology*. Oxford University Press. 244 pages. ISBN 978-0-19-921876-9.





FIRE ECOLOGY AND MANAGEMENT  
SPRING 2013

**Course number:** FOR 450  
**Prerequisites:** Forest Ecology or knowledge of basic ecology  
**Instructor:** Molly Hunter (molly.hunter@nau.edu)  
**Course location:** NAU, Southwest Forest Science Complex Room 034B

**Text:** Swihara et al. 2006. Fire in California's Ecosystems, Hardcover: 576 pages, University of California Press, 1st edition. ISBN: 0520246055

Other readings will be provided by the instructor as needed.

**COURSE DESCRIPTION**

Wildland fire is a disturbance force with important ecological and social implications in most of the world's ecosystems. This course integrates ecological and cultural aspects of wildland fire, providing a broad foundation for people interested in natural resource management, fire management, and ecological science. We will begin with basics of fire behavior. Next we will look at fire regimes and the ecological effects of fire at various scales ranging from individual organisms to landscapes and continents. Case Studies from around the country will tie concepts learned at the start of the course to different ecosystems with real on the ground issues. The historical interaction of humans with fire will set the stage for understanding principles, techniques, and challenges in present-day fire management, the final portion of the course.

**COURSE FORMAT**

January 28<sup>th</sup> - March 14<sup>th</sup>: On-line portion of the class  
March 11<sup>th</sup> - March 14<sup>th</sup>: On-campus portion of the course

This class consists of six weeks of reading, assignments, quizzes, and completion of a term paper. Reading assignments, quizzes, and instructions for completion of a term paper are given on January 25<sup>th</sup>. The "pre-work" assigned for this class is critical. The on-line quizzes and assignments are part of the final grade for the course. The course is designed this way for to help you absorb material presented in a short amount of time. You will be in class from 8 am to 5 pm, Monday thru Thursday and there will be little time for reading and homework during this time. The quiz schedule is designed to keep you on track. However, if you have extenuating circumstances that keep you from completing the quizzes and assignments on time, please contact the instructor.

**Coursework**

**On-line coursework**

**Readings**

Readings will be assigned starting January 28<sup>th</sup> with the on-line portion of the class. There will be an average of 2-3 hours of reading per day in preparation for the on-campus portion of the class. **DO NOT FALL BEHIND ON THE READINGS** or it will be very difficult to catch up.





**Northern Arizona University  
School of Forestry**

**FOR 451 – Fire Ecology and Management**

Spring 2013

3 credits

**Time:** Tuesday and Thursday 8:00 – 9:15 a.m.

**Location:** Southwest Forest Science Complex Rm 135

**Prerequisites:** FOR 251 – Introduction to Wild land Fire

**Instructor:** Dr. Andrea (Andi) Thode

Email: andi.thode@nau.edu

Office: SFSC room 200

Phone: 928-523-5457

**Office hours:** Stop by or make an appointment. I do have LOTS of meetings so it is best to schedule something with me as it is difficult to just catch me in my office. Around 11:00am on Tuesday/Thursday is often a good time to catch me.

**Course description:**

Wildland fire is a disturbance force with important ecological and social implications in most of the world's ecosystems. This course integrates ecological and cultural aspects of wildland fire, providing a broad foundation for people interested in natural resource management, fire management, and ecological science. This course builds heavily on FOR251-Introduction to wildland fire. We will look at fire effects on biotic and abiotic resources, fire regimes and current issues in fire ecology. Case Studies presented by the students will tie concepts learned at the start of the course to different ecosystems with real on the ground issues. Current issues in fire will be pulled from current webinars, readings and lecture material. The course will include lecture, discussion of the literature, and team projects. The text will be supplemented by other readings and recorded webinars.

**Text and lectures:**

Sugihara et al. 2006. Fire in California's Ecosystems, Hardcover: 576 pages. University of California Press, 1st edition. ISBN: 0520246055

Additional readings will be provided. Readings will be posted on the course website. Copies of lecture slides will be posted as well.

**Student Learning Expectations:**

This course is designed to delve into fire ecology and fire effects. After taking this course, you will have:

An understanding of the ecological theory surrounding fire regimes

Understanding of fire effects on both biotic and abiotic facets of ecosystems

Knowledge and understanding of different fire regimes around the country and internationally

Exposure and understanding of management issues related to fire ecology

Exposure to current topics in fire ecology

In addition to the above learning expectations, students will work on the following skill sets:

Working in groups towards a common goal

Presentation skills

Research skills, review and synthesis of a variety of information

Technical writing skills

Ability to read about and discuss thoughts on a topic

### **Class Schedule and Readings**

The class schedule is handed out separately on the first day of class and is subject to change. Readings are shown on the schedule and will be posted on the class website and announced in class throughout the semester.

### **Field Trip**

Details for a field trip are currently being worked out.

### **Presentation/Mini-lecture/Discussion**

A detailed description and rubric for this portion of the class will be handed out separately on the first day of class. This is a large percentage of the class and is based heavily on collaborative learning.

### **Homework Assignments**

Assignments are designed to strengthen your understanding of material presented in class and in the readings/webinars. In addition, they are meant to introduce you to current topics of interest to you.

#### **Lecture/Webinar Assignment: DUE April 25th**

Homework will include attending three lectures/webinars related to fire that are of interest to you. Sources include the Forestry Graduate Student Association seminar series, the Southwest Fire Science Consortium and other consortia around the country, the Lessons learned center advances in fire practice (<http://wildfirelessons.net/AFP.aspx?Page=AFPOverview>) and the Nature Conservancy's Fire Learning Network. Lectures need to address fire ecology in some sense. If you are not sure, ask me.

**NOTE:** Some webinars will be used in class for inverted lectures. You will not get credit for using these lectures for this homework assignment.

750 words or less total

Topic description – 500 words or less

Describe what you found particularly interesting

Describe what the presenter did well and did not do well  
Discuss questions you have or questions you did ask of the speaker  
These may be turned in at any time but all three are due April 25<sup>th</sup> at the latest

**Fire in CA Ecosystems Textbook Review: DUE April 18th**

I am an editor on the textbook used in this class, *Fire in CA Ecosystems* (all proceeds from the textbook go to the Association for Fire Ecology). We are currently starting the process of revising this book and upper-division undergraduate students are one of the target audiences for this book. Your input and review of portions of this book will be invaluable in the revision process. This is a rare opportunity to give input as a student to a textbook.

For each of the chapters assigned in class, assess the following items:  
How well do the authors fulfill the promises made in the introduction?  
How effective is the authors methodology and organization?  
Do they present frameworks that are useful for understanding and applying the topic?  
Are there better ways to present the information that would have made more sense to you?  
How effectively do the authors make their arguments? How persuasive is the evidence the authors present?  
When conflicting perspectives are presented, is it done well?  
For its audience, what are the chapter's strengths? Weaknesses?  
How clearly is the chapter written? Was anything particularly confusing?  
Are there topics missing that you would have liked to see addressed?  
Do NOT wait until the end of the semester to do this. It is suggested you at least take notes on all these questions as you read the chapters for the first time, think about the lectures/discussions and then re-visit the chapters again. Several well-thought out sentences with details per question is a good goal.

This assignment is due April 18<sup>th</sup> but individual chapter reviews may be turned in throughout the semester.

**Assessments/Exams**

The exams will focus on concepts covered in lectures and readings for the class. A portion of the first exam will address individual group topics to ensure independent learning.

**Participation**

Students are expected to attend class. If you cannot attend for some reason, you need to notify the instructor ahead of time. If you miss class, it is your responsibility to ask if you missed something. Missing class is not an excuse for late or missing assignments. If you miss class, you should ask a fellow student for lecture notes.

Part of your participation grade will be based on class attendance. The other part of the participation grade will be a subjective assessment based on my perception of the quantity and quality of your participation throughout the semester (asking questions,

participating in discussions and other activities, making comments and answering questions). In addition, some group work and other in-class work will be assessed points for participation.

### *Illness*

*While class attendance is required per the above stated policy, please be cautious about attending class if you are feeling ill. Please inform me by email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class; please take precautions not to infect others, and seek medical attention if your symptoms worsen.*

### **Late Work Policy**

Late work will be accepted up to 48 hrs after the due date. Penalties are as follows:  
Up to 24 hrs late – 10% of total points deducted  
24 to 48 hrs late – 20% of total points deducted  
More than 48 hrs late – Zero points

This stated, please email, call or talk to me if you have extenuating circumstances. This must be done BEFORE assignments are due or tests are taken.

### **Performance evaluation**

Grades are given as follows:

- A (90-100%)
- B (80-89%)
- C (70-79%)
- D (60-69%)
- F (59% or below)

Points are earned as followed:

Research Paper/Presentation/Discussion	35%
Homework	20%
Assessments/Exams	30%
Participation	15%
Total	100%

### **Northern Arizona University Policy Statements**

<http://www4.nau.edu/avpaa/UCCPolicy/plcvstmt.html>.

These statements address safe environments, students with disabilities, the institutional review board, academic integrity, the academic contact hour policy, and sensitive course materials. You need to be familiar with them.



## Forestry 453/553 – Forest Entomology – 2013

3 Credits, 4-5:15, T, TH Rm. 133, Southwest Forest Science Complex

Instructor: Dr. Richard Hofstetter, Office Hours: T, TH 1:00-2:00pm, or by appointment, rm 208, Southwest Forest Science Complex, 523-6452, [rich.hofstetter@nau.edu](mailto:rich.hofstetter@nau.edu)

Course description and objectives: Insects and forest trees have co-evolved over millions of years. In this course we will examine the spectrum of interactions that occur between forest insects and their plant/tree hosts. Students will learn basic entomology, identify common forest insect guilds and the impact they have on individual hosts, forest structure, and other forest ecosystem process. Additionally, students will be taught management techniques for forest insects. Although we will focus on insects common in western forests we will discuss other areas of the world and will pay particular attention to some of the exotic insects impacting forests. We explore the ecological role of forest insects and the idea that damage or destruction of forest trees is neither good nor bad but may depend on your philosophical view about the role of forests in society and particular management objectives.

Standard learning expectations/outcomes: At the end of the course students will be able to:

Discuss basic attributes of insects

Identify common forest insects and their damages

Describe the basic biology/life cycle of several key forest insect species

Understand the role that forest insects play in the ecology and succession of forest systems

Describe management techniques used to manage forest insect populations

Grading: The grades in this course will be determined according to the following:

<b>Undergraduates</b>		<b>Graduate students</b>	
Exam I	25%	Exam I	25%
Exam II	25%	Exam II	25%
Final Exam	30%	Final Exam	25%
Report	10%	Report	7.5%
Presentation	10%	Presentation	7.5%
		Grad Class Project	10%

A = >90%, B = >80%, C =>70%, D=>60%, F <60%

Text books and required materials: There is no textbook required for this course. Selected readings are required for this course and will be handed out in class or posted on the course webpage (BBLearn).

Favorite Insect Presentation and Paper: All students will present on their favorite insect. A written paper (3-5 pages, double spaced) will also be handed at the date of the presentation. **Presentations will be 5-10 minutes during April 16-25<sup>th</sup>.** See additional handout for more instructions about the paper and presentation.

Graduate Student Class Project: An additional paper and class presentation is required for all graduate students in this course. The purpose is to get students acquainted with current entomology research and develop organization and communication skills. Each graduate student will give a **15-20 minute presentation** (March 7-12) on a recent discovery (published within the last year) about **insect(s) ecology, function, structure, behavior or similar field** and is general enough to interest everyone. The information presented will be covered in the exam. Sample topics are available from the instructor if needed. Topics need to be approved by the instructors in advance (**by February 7<sup>th</sup>**). Grading criteria will be provided later in the semester. Presentations will occur the week before the second Exam (March). Graduate students will also hand in a written summary (paper) about the topic. Length of summary paper should 3-6 pages double spaced and include a general introduction to the topic (what is new about it), what the discovery is, and how this has or will change entomology or another field. Please include references. Figures and images can also be added to the end of the paper (but not included in the 3-6 page limit).

Field trips: In April, we will attempt to go on a field trip or two during the class period. A Saturday field trip may also be a possibility.

Audits: Auditing students are required to attend lectures

Class Policy: University policy statement is available on the internet at:  
<http://jan.ucc.nau.edu/academicadmin/policy.doc>

### **Attendance:**

You are responsible for regularly attending all lectures. Should an absence from class be unavoidable, you are responsible for reporting the reason to the instructor. (Be aware that Fronske Health Center does not provide documentation of your health problems.) In addition, you are responsible for making up any work you miss. Your instructor is under no obligation to make special arrangements for you if you are absent. You will not be discriminated against for seeking a religious accommodation. The Office of Student Life and the Fronske Health Center do not issue excuses for health or personal reasons. Only the instructor may "excuse" an absence except for Institutional Excuses for activities such as athletic events or other university sponsored activities which are approved by the Office of the Associate Provost-Undergraduate Studies, or the Office of Student Life.

Please note that a student served through the office of Disability Resources may qualify for an attendance policy modification. The Attendance Modification policy can be found at the following address:

[http://www4.nau.edu/dr/assets/docs/Attendance\\_Accommodation.pdf](http://www4.nau.edu/dr/assets/docs/Attendance_Accommodation.pdf)

Students who miss more than two lectures without legitimate excuse will be penalized by a reduction in overall points awarded for the class. Each additional missed lecture will result in a 2% loss of your total grade. Students who miss multiple lectures could receive up to 10% reduction in their total grade.

**Makeup quizzes and tests:**

Students must present information via an email or letter received at least 1 day PRIOR to an exam or quiz date to be excused from a test. Whether the student can retake the test will depend upon information provided by the student and will be decided upon by the instructors. Students with an accepted excuse will be required to take the test within 1 week of their return.

**Plagiarism and cheating:**

The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU's administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner. Severe violations can result in expulsion from NAU.

**Students with Disabilities:**

If you have a documented disability, you can arrange for accommodations by contacting Disability Resources (DR) at 523-8773 (voice) or 523-6906 (TTY), dr@nau.edu (e-mail) or 928-523-8747 (fax). Students needing academic accommodations are required to register with DR and provide required disability related documentation. Although you may request an accommodation at any time, in order for DR to best meet your individual needs, you are urged to register and submit necessary documentation ([www.nau.edu/dr](http://www.nau.edu/dr)) 8 weeks prior to the time you wish to receive accommodations. DR is strongly committed to the needs of student with disabilities and the promotion of Universal Design. Concerns or questions related to the accessibility of programs and facilities at NAU may be brought to the attention of DR or the Office of Affirmative Action and Equal Opportunity (523-3312).

**Forestry 454 - Integrated Forest Health  
Course Syllabus – Spring 2013**

Instructors: Drs. Tom Kolb and Robert Mathiasen  
Offices: SWFSC Room 202 and 002, respectively  
Phone: 523-7491 and 523-0882, respectively  
E-mail: [Tom.Kolb@nau.edu](mailto:Tom.Kolb@nau.edu) / [Robert.Mathiasen@nau.edu](mailto:Robert.Mathiasen@nau.edu)  
Office Hours: Open door or by appointment.  
Class Meets: T-Th, 2:20 – 3:35 p.m.; Room 136

**Course Prerequisites:** Graduate Standing

**Course Structure/Approach:** This will be a three-hour lecture course. The first part of the course will emphasize forest health concepts and principles. The second part of the course will emphasize biotic agents. The third part will emphasize abiotic agents including air pollution. The fourth part will emphasize current research on forest health presented by forest health specialists with the USDA Forest Service and by the graduate students in this class.

**Texts and Required Materials:**

The required text book for the course is:

**Forest Health and Protection** by R. L. Edmonds, J. K. Agee, and R. I. Gara. 2000. McGraw-Hill Co. (Reissued by Waveland Press in 2005). ISBN 1-57766-396-9

Additional reading assignments will be provided to students via handouts distributed in class or on line from pdf files on Blackboard Learn.

**Course Outline:** A tentative class schedule is at the end of this document.

**Assignments:** Assigned readings from the textbook and other readings will be used to support each of the topics discussed in class (see schedule). Student learning will be assessed by in-class exams.

**Evaluation Methods:** Course participants will be evaluated on the basis of their performance on exams (300 points). The total number of possible points is 300.

**Examinations:** There will be two midterm exams (100 points each) and a comprehensive final exam (100 points). Each exam will consist of a combination of true/false, multiple choice, matching, short answer and essay questions. All students are expected to take the final exam at the scheduled time.

**Grading:** Grades will be based on a total of 400 points. Grades will be assigned as follows:  
A – 90-100%; B – 80-89%; C – 70-79%; D – 60-69%; F - < 60%.

**Course Policies:** Class attendance is the responsibility of each participant in the course. No penalty for not attending classes will be assessed, but it is the responsibility of each participant to





## **FOR 485: Undergraduate Hooper Research**

Course Syllabus Spring 2013

Fridays 4:00-5:00PM, Rooms 34A

**Instructor:** Richard Hofstetter, Forestry Room 208, 523-6452, [Rich.Hofstetter@nau.edu](mailto:Rich.Hofstetter@nau.edu)

**Office Hours:** Wed 1:30-2:30, drop-in, or by appointment

**Course Prerequisites:** special permission

### **Course Description**

Research will be carried out by the student in the laboratory and field during the semester. The student will take part in the designing, carrying out and interpretation of experiments. The purpose of the course is to provide students with research experience while working on a question of current scientific interest. Students will learn how science is practiced in forestry/ecology, and will also make new discoveries that will likely lead to scientific publications. Research will be done under the supervision of faculty member Rich Hofstetter. Students are enrolled for 2 credit hours of FOR485. For each credit hour we expect ~3-4 hours of research per week, on average, although more hours may occur if the student is getting paid to perform work on research performed by their mentors.

### **Student Learning Expectations**

Upon completion of this course, students will be able to:

Demonstrate knowledge of experimental design and the use of the scientific method.

Demonstrate an understanding of the process of initiating a research project from conception of a fundamental question to publication.

Demonstrate competence in literature search engines to obtain scientific articles.

Demonstrate the ability to use excel spreadsheets, enter data and make simple statistic interpretations.

Create a poster of their research (with help from mentors).

Write a scientific report of their work.

### **Course Structure/Approach**

The student will meet regularly (every week) as a class and will gain exposure to the scientific method, literature, and other aspects of research during these class periods.

The paper should be in the format of a scientific paper, and should contain the following sections:

i) an Introduction that describes the rationale for the research and the biological question it addresses; ii) a Methods section describing how the experiments were done; iii) a Results section showing any data obtained; and iv) a Discussion explaining what (if any) conclusions were reached from the experiments. Appropriate literature should be cited.

### **Textbook and required materials**

No textbook will be used. Students will be given papers and other materials by the instructor during each weekly discussion. The instructor will provide the papers to the class by posting them on the course web site.

### **Course outline**

A weekly topic schedule will be provided during the first week of classes.

### **Assessment of Student Learning Outcomes**

Grading is on a pass-fail basis. Attendance (20%), participation (20%), project presentation (30%) and project paper (30%) will make up final grade assessment.

### **Attendance policy**

You may miss two classes without penalty *if you notify the instructor in advance* of expected absences. You may not earn a passing grade if you miss more than two discussions. Two occurrences of lateness shall result in one unexcused absence.

### **University policies**

All relevant university policies are incorporated into this syllabus by reference; please see <http://jan.ucc.nau.edu/academicadmin/plcystmt.html> for short summaries of the following: University policies: the Safe Working and Learning Environment, Students with Disabilities, Institutional Review Board, Academic Integrity, and Academic Contact Hour policies.



## **New Curriculum Course Syllabi**

## FOR 220 FOREST AND RANGE PLANTS

### **General Information**

College and Department: College of Engineering, Forestry, and Natural Sciences; School of Forestry

Course prefix, number, and title: FOR 220, Forest and Range Plants

Semester in which course will be offered: Fall semester (even and odd years)

Credit hours: 3 semester hours

Clock hours/meeting times:

One 50-minute meeting each week of the entire class

One afternoon (12:45-5:15pm) lecture/field lab each week offered to multiple sections (3 or 4 based on recent history)

### **Instructor names:**

Dr. Margaret Moore, Professor, School of Forestry

235 SWFSC

Phone: 523-7457

Email: [margaret.moore@nau.edu](mailto:margaret.moore@nau.edu)

Office hours: by appointment

Dr. Thomas Kolb, Professor, School of Forestry

202 SWFSC

Phone: 523-7491

Email: [tom.kolb@nau.edu](mailto:tom.kolb@nau.edu)

Office hours: by appointment

Additional instructors (lecturers, graduate teaching assistants) may teach lab sections depending on enrollment.

### ***Course Prerequisites***

No formal prerequisites other than an interest in learning forest and range plants.

### ***Course Description***

The course will train students in identification, taxonomy, range, and uses of forest and range plants via classroom activities and field labs.

### ***Student Learning Expectations/Outcomes***

Students successfully completing this course will have the following competencies:

- 1) Knowledge of principles of plant classification and taxonomy;
- 2) Knowledge of and ability to identify common forest and range plants of northern Arizona;
- 3) Knowledge and understanding of scientific and common names of these plants;
- 4) Knowledge of the major forest types in North America and their geographic location and species composition.

### ***Course Structure/Approach***

This course will use a combination of classroom activities (e.g., lecture, discussion) and field labs to enhance student learning of identification, taxonomy, range, and uses of forest and range plants. Each week students will attend: 1) one classroom meeting of all students that will focus on enhancing knowledge of dominant forest communities and tree species that occur in major forest regions of the United States or Canada; 2) one afternoon field lab in lab sections of approximately 20 students each that will focus on enhancing identification and knowledge of common forest and range plants via the study of live plants. All field labs will be held outside at various locations near Flagstaff. The School of Forestry will provide transportation. The following equipment is **strongly** recommended for student comfort and protection in the field: long pants, sturdy shoes or boots, water, rain gear.

### ***Textbook and Required Materials***

1. Text: “Field Guide to Forest and Mountain Plants of Northern Arizona,” 2009, Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ.
2. Quiz Pad/Forms: Pad of quiz sheets (~125-150 sheets)

You are **required** to purchase the text and pad of quiz forms. Both of these are available from the NAU Bookstore. The text and quiz pads will be used for field labs. Lastly, students are encouraged to collect plant specimens or pictures each field lab (clippers, sandwich bags, and/or camera may be helpful).

### ***Recommended Optional Materials/References (attach reading list)***

Many web pages exist that contain additional information or color photographs of plants that students might find useful when reviewing important characteristics of species. Do not be confused by the multiple names used for the same plant species (called synonyms). A website that is particularly useful is: <http://plants.usda.gov/>

### ***Course Outline (tentative)***

#### Week 1

Class: Introduction to the course and principles of taxonomy and nomenclature  
Lab: Plant morphological characteristics used in identification

#### Week 2

Class: Boreal region  
Lab: Subalpine/upper mixed conifer community (San Francisco Peaks)

#### Week 3

Class: Rocky Mountain region  
Lab: Subalpine/upper mixed conifer community (San Francisco Peaks)

#### Week 4

Class: Pacific Northwest region  
Lab: High elevation prairie (Hart Prairie)

#### Week 5

Class: California region  
Lab: Lower elevation mixed conifer community (Elden Hills)

#### Week 6

Class: Western riparian forests  
Lab: Riparian community - high elevation (Fry Canyon)

#### Week 7

Class: Review of western forest regions  
Lab: Pinyon-juniper woodland (Walnut Canyon area)

Week 8

Class: Regional midterm exam  
Lab: Urban forest – deciduous trees (NAU Campus)

Week 9

Class: Appalachian region  
Lab: Exotic invasive plants (NAU Campus)

Week 10

Class: Appalachian region  
Lab: Riparian community – mid-elevation (upper Oak Creek Canyon)

Week 11

Class: Northeastern region  
Lab: Evergreen oaks and chaparral (Lower Oak Creek)

Week 12

Class: Southeastern bottomland hardwood region  
Lab: Urban forest – evergreen trees (NAU Campus)

Week 13

Class: Lake States region  
Lab: No class due to Thanksgiving holiday

Week 14

Class: Southeastern pine region  
Lab: High desert shrub community (Beaver Creek area)

Week 15

Class: Review of eastern forest regions  
Lab: Final field quiz (locations to be determined)

Week 16

Class: Regional final exam  
Lab: No meeting

***Assessment of Student Learning Outcomes***

- Methods of Assessment: Student learning will be assessed by frequent quizzes on field identification of forest and range plants and by two in-class exams on regional forest types.
- Timeline for Assessment: Assessments will occur in most weeks of the semester starting in week three.

***Grading System***

Students will earn letter grades in the course based on the following graded activities:

- Field lab quizzes on plant identification – 60% of total grade
- Midterm exam regional forest types – 20% of total grade
- Final exam regional forest types – 20% of total grade

Quizzes on plant identification will be given most field labs on approximately five to eight plants. A larger final field quiz will be given near the end of the semester on approximately 30-40 plants.

Letter grades will be assigned based on traditional guidelines: **A**= 90-100 %; **B**=80-89%; **C**=70-79%; **D**=60-69%; **F**= below 60%.

### ***Course Policy***

- Retests/makeup tests: Students cannot make up the field lab quizzes and are allowed only one excused absence for the field lab quizzes. Students must take the final field lab quiz (no excused absences). Requests for makeup tests for the in-class regional forest type exams must be made with the instructor in advance of the exam and must be well justified by severe illness or essential family or cultural activities. Retests are not offered in this course.
- Attendance: Attendance is essential. It will be impossible to perform well if you are not present at all class meetings.
- Statement on plagiarism and cheating: Obvious occurrences of plagiarism and cheating by students in this course will be handled by assigning a grade of zero on the assignment to the offending student. Reoccurrence will result in assignment of a grade of F to the student for the entire course.
- Student disability: Students who have a disability should provide documentation from NAU Disability Resources the first day (or first week) of class so that we can try to accommodate your specific needs. Students who qualify with a spelling disability will be provided with a master list of plant names during the plant quizzes starting with quiz #1.

### ***University Policy***

- <http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.

## **GIS TOOLS IN FORESTRY FOR 225**

**General Information:**

**College and Department:** College of Engineering, Forestry, and Natural Sciences;  
School of Forestry

**Course prefix, number, and title:** FOR 225, GIS Tools in Forestry

**Semester in which course will be offered:** Spring Semester (even and odd years)

**Credit hours:** 2 semester hours

**Clock hours/meeting times:** One 50 minute lecture and one 3 hr computer lab per week

**Instructor name(s):**

Dr. Stephen M. Dewhurst, School of Forestry

237 SWFSC

Phone: 523-9647

Email: [Steve.Dewhurst@nau.edu](mailto:Steve.Dewhurst@nau.edu)

Office hours: by appointment

Additional instructors (lecturers, graduate teaching assistants) may teach lab sections depending on enrollment.

**Course Prerequisites:**

None

**Course Description :**

This course will train students in basic tools and skills involved with geographic information systems (GIS). We will use lectures and hands-on labs to train the student in the ArcGIS system starting with a survey of technologies and applications such as ArcGIS Explorer and Google Maps. By the end of the course, the student will have an understanding of how GIS maps are made, edited, and analyzed. The student will be introduced to a few spatial problem solving techniques and basic spatial modeling tools. 1hr. lecture, 3 hrs. lab.

**Student Learning Expectations/Outcomes :**

Upon the successful completion of this course, students should be able to demonstrate:

1. A general knowledge of geographic and spatial analysis techniques commonly used in forest management.
2. Understanding of the relationship between types of spatial data commonly encountered in forest-related applications.
3. A depth and breadth of understanding of geographic and spatial analysis techniques relevant to forest management.
4. An awareness of the software and hardware resources available to support geographic and spatial analysis.
5. The ability to develop a work plan to incorporate geographic and spatial analysis into a forestry management application demonstrated in class.
6. An awareness of basic spatial statistics and temporal modeling approaches.

**Course Structure/Approach:**

This course will use a combination of lectures and computer labs to enhance student learning of basic GIS tools and applications in forestry. Each week students will attend: 1) one classroom lecture that includes all students that will focus on geographic information system (GIS) principles ; 2) one computer lab that will focus on hands-on computer training of ArcGIS.

**Textbook and Required Materials:**

Using ArcMap: ArcGIS 9. ESRI Press. ISBN 1589480988.

**Course Outline (tentative):**

Week 1: Basic GIS Concepts – Map Basics, ArcGIS Explorer and Google Maps

Week 2: Basic GIS Concepts - Map Basics, ArcGIS Explorer and Google Maps

Week 3: Basic GIS Concepts – Data Structures

Week 4: Basic GIS Concepts – Data Structures

Week 5: Basic GIS Concepts – Basics of ArcGIS

Week 6: GIS Data Sources – mini project one due

Week 7: GIS Data Sources

Week 8: GIS Analysis Techniques in Forestry (Mid-Term Exam; lecture and lab material)

Week 9: GIS Analysis Techniques in Forestry

Week 10: GIS Analysis Techniques in Forestry (including model building)

Week 11: GIS Analysis Techniques in Forestry – mini project two due

Week 12: GIS Applications in Forestry

Week 13: GIS Applications in Forestry

Week 14: GIS Applications in Forestry – mini project three due

Week 15: Introduction to basic spatial statistics

Week 16: Final Exam (lecture and lab material)

**Assessment of Student Learning Outcomes:**

Students will earn letter grades in the course based on the following graded activities:

1. Computer lab exercise and/or mini-projects – 60% of total grade
2. Midterm exam GIS lectures and lab material – 20% of total grade
3. Final exam GIS lectures and lab material – 20% of total grade

**Grading System:**

Letter grades will be assigned based on traditional guidelines:

A= 90-100 %;

B=80-89%;

C=70-79%;

D=60-69%;

F= below 60%.

**Course Policy:**

Retests/makeup tests: Requests for makeup exams or lab exercises must be made with the instructor in advance of the exam and well justified by severe illness or essential family or cultural activities.

**Attendance:** Attendance is essential. It will be impossible to perform well if you are not present at all class meetings.

Statement on plagiarism and cheating: Obvious occurrences of plagiarism and cheating by students in this course will be handled by assigning a grade of zero on the assignment to the offending student. Reoccurrence will result in assignment of a grade of F to the student for the entire course.

**University policies:**

Attach the Safe Working and Learning Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity policies or reference them on the syllabus. See the following document for policy statements:

<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.



## Silviculture I

### **General Information**

College of Engineering, Forestry, and Natural Sciences; School of Forestry  
FOR 315, Silviculture I  
Fall Semester (even and odd years)  
3 semester hours

### **Clock hours/meeting times:**

Schedule will vary, depending on weather and subject matter.  
Lectures, when held, will be M and/or W and/or F from 9:10-10:00  
Labs, when held, will be M and/or W from 12:40-3:50

### **Instructor name(s):**

Dr. Kristen Waring, School of Forestry  
201 SWFSC  
Phone: 523-4920  
Email: [Kristen.Waring@nau.edu](mailto:Kristen.Waring@nau.edu)

Office hours: by appointment

Additional instructors (lecturers, graduate teaching assistants) may teach lab sections depending on enrollment.

### **Course Prerequisites**

Admission to professional forestry program

### **Course Corequisites**

FOR 313 and FOR 314

### **Course Description**

Silviculture is applied forest ecology. This course, paired with FOR 313 and FOR 314 (Forest Ecology I and II, respectively), introduces students to the application of ecological knowledge to the management of forests. Students will be introduced to the principles and theories of silviculture both in the classroom and in forest-based field labs.

### **Student Learning Outcomes**

By the end of the course, you should be able to identify, define, and explain the most common silvicultural practices and their relationship to forest ecology. Specifically, by the end of the course, successful students (i.e. you) will have the skills and knowledge to:

- Define and explain basic silvicultural principles;
- Define and explain silvicultural-related terminology;
- Describe the relationships between silvicultural principles and applications;
- Describe the underlying ecological concepts directly relevant to silviculture;
- Describe the most common tools and practices used in silviculture and understand how to use and modify those tools and practices to meet management objectives;

**Course Structure/Approach.**

The course will combine traditional in-class lectures with field lectures and labs. The field labs will enhance and reinforce classroom material. Therefore attendance at labs is essential for your success. We will go out in the field unless the weather is absolutely abysmal or safety issues are of concern.

**Required Texts**

Avery, T.E. and H.E. Burkhart. 2002/2005. Forest Measurements, 5th edition. McGraw-Hill, Inc. New York, NY. 408pp.

Nyland, R.D. 2002. Silviculture Concepts and Applications, 2nd edition. McGraw-Hill Companies, Inc. New York, NY. 633pp.

Other readings available through BbLearn

**Optional / Additional Resources**

Helms, J.A. 1998. The Dictionary of Forestry. Society of American Foresters, Bethesda, MD. Available free online: [www.dictionarofforestry.org](http://www.dictionarofforestry.org)

McComb, B.C. 2007. Wildlife habitat management: Concepts and applications in forestry. Taylor and Francis Publishers, CRC Press, Boca Raton, FL. 319pp.

Smith, D.M., Larson, B.C., Kelty, M.J. and P.M.S. Ashton. 1997. The Practice of Silviculture: Applied Forest Ecology. 9th Edition. John Wiley & Sons, Inc. New York, NY. 537pp.

## Course Outline (tentative)

Week	Topic	Readings
1	Introduction to silviculture; begin sampling review  Review of sampling	N: Ch 1  AB: Review Ch 2 and 3  AB: Review Ch 2 and 3
2	Tree breeding & applications; gene conservation	L: Zobel and Talbert, Ch1 L: DeWald and Mahalovich 1997
3	Site classification & productivity; site trees	AB: Ch 15 (312-320) N: Ch 6 (117-129)
4	Stand dynamics I & II	L: Smith et al. Ch 2

5	Regeneration ecology	L: Smith et al. Ch 7 (161-183) N: Ch 4 (64-76)
6	Site preparation	N: Ch 5 (86-89); (92-99); (109-116)
7-8	Artificial regeneration	N: Ch 6 (117-126); (131-142) N: Ch 7 (145-151); (145-172)
9	Natural regeneration	N: Ch 8 (177-188)
10	Silvicultural systems & introduction to prescriptions	N: Ch 2 (17-40) L: Long et al. 2010
11-12	Tree and stand growth	N: Ch 12 (256-265) N: Ch 15 (339-350);
13	Thinning methods	N: Ch 17 and 18
14	Stand density & thinning	N: Ch 7 (200-211, 227-235); AB: Ch 15 (321-332)
15	Review	

#### Assessment of Student Learning Outcomes

#### Methods and Timeline:

Assessment	Points	Date of Assessment
Short exam (3 at 25 points each)	75	End of weeks 3, 6, 9
Long exams (3 at 50 points each)	150	End of weeks 5,10,14
Lab reports (8 at 25 points each)	200	Beginning of weeks 3,4,6,7,9,10,11,12
Participation (25 points)	25	On-going
<b>TOTAL</b>	<b>450</b>	

Grades are based on lecture and lab material, plus overall course participation. Lecture content is graded through the use of exams. The lab grade is a direct outcome of eight graded lab write-ups. Finally, participation will be graded based on:

Attendance in both lecture and labs;  
Submittal of assignments related to participation labs; and

Pop quiz and other lecture participation activities.

Lab grading:

Lab grades are assigned using the following categories:

<b>Letter grade</b>	<b>Percent</b>
<b>A+</b>	100
<b>A</b>	95
<b>A-</b>	90
<b>B</b>	85
<b>B-</b>	80
<b>C</b>	75
<b>C-</b>	70
<b>D</b>	65
<b>D-</b>	60
<b>F</b>	55
<b>not completed</b>	0

For each graded lab, 20% of the grade will be related to writing. See Semester A guidelines for an overview of how writing will be graded. Writing grades of less than a B- require a re-write to earn credit for the lab.

Crew-based labs: When a crew works together to turn in a single lab assignment, crew evaluation forms are also required from each member of the crew, for each member of the crew. Lab credit will not be given without the required evaluation forms. This includes a self-assessment. Poor overall crew evaluations will result in grade reduction for that lab and crew member. For example, if, in a three person crew, both crew members rate the third member poorly in most categories on the evaluation, this will result in a reduction for that member. The reduction will be at least a half-grade but the exact reduction will depend on the situation and may be more.

**Grading System:**

Points earned	Grade
90+	A
80-89	B
70-79	C
60-69	D
<60	F

Grades are assigned based on the exact percentage earned and are not rounded.

## Course Policies

Assignments are due at 9:10 am on the due date unless otherwise noted. These should be turned by email or to my mailbox in the main office or outside my office door (Rm. 234). Late assignments are accepted for 12 hours (reduced ½ letter grade) and 24 hours (reduced 1 full letter grade) after the due date and time.

Attendance is important and required. If you need to miss a lab section, you must contact the instructor in advance and provide your legitimate reason for missing. Lecture sections are important as well and I expect attendance and respect.

While class attendance is required per the above stated policy, please be cautious about attending class if you are feeling ill. Please inform me by phone or email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class; please take precautions not to infect others, and seek medical attention if your symptoms worsen.

Respect: Respectful and professional behavior is expected and required at all times. Show up on time, no cell phones or iPods in class, laptops and other electronics to be used only for note-taking. Wait until the session is over before packing your bags. Do not disrupt the classroom environment or you may be asked to leave.

You WILL be graded on grammar and spelling in addition to content on all written assignments and exams. Grading rubrics will be provided for all lab assignments.

Emails to Instructors will receive a response within 36 hours unless announced otherwise in class (i.e., if instructor is traveling or in the field without internet).

Graded assignments and exams will generally be returned within one week if possible.

Overall course grades will be posted on Bb Learn periodically throughout the semester. The instructor will let you know when updates occur.

Cheating and plagiarism will not be tolerated. Be careful when sharing data or assignments even as examples. The NAU policy on cheating and plagiarism can be found in the online student handbook.

University Policies:

For Northern Arizona University policy statements, please reference the online student handbook, <http://www4.nau.edu/stulife/handbook.htm>

## **FOR 319 : Forest Operations Syllabus**

### **General Information:**

College of Engineering, Forestry, and Natural Sciences; School of Forestry

Course prefix, number and title: FOR 319 Forest Operations

Semester in which course will be offered: Every fall semester

Credit Hours: 2

Clock hours: Lectures: Tu 8:00-8:50 Laboratories: Tu 12:45-3:35

**Instructor:** Dr. Bruce E. Fox

Room 232, Forest Sciences Building (Building 82)

928.526.0148

[Bruce.fox@nau.edu](mailto:Bruce.fox@nau.edu)

Office hours: by appointment

Course prerequisites: admission to the professional forestry program

### **Course Description:**

This course will focus on forest operations: the skills, knowledge, and attitudes required to successfully implement forest management practices. To this end, we will read about, discuss, and provide opportunities for you to acquire and/or improve skills (*e.g.* computational skills necessary to accurately calculate stumpage values and culvert sizes) and expand knowledge (*e.g.* learning the elements of road design and maintenance).

### **Student Learning Outcomes:**

By the end of this course the successful student will be able to By the end of this course the successful student will be able to

Correctly calculate current stumpage values;

Describe the capabilities, limitations, and optimal conditions under which major harvesting systems and equipment operate;

Analyze field harvesting and road construction activities for their efficiency, effectiveness, and environmental effects;

Compare and contrast the operation of wood processing facilities of different types and different scales;

Use aerial photography to identify potential road locations and timber harvest units

Define and explain basic timber harvesting, road construction, and road maintenance terminology;

Prescribe specific road maintenance treatments based on road conditions and landowner objectives; and

Calculate optimal culvert sizes based on biophysical attributes of a watershed, estimated precipitation, and landowner objectives.

### **Course Structure and Approach:**

A. The delivery method will be a combination of in-class lectures and discussions supplemented by videos, films, and slide presentations. In addition, we will have one lab per week

B. Completing assigned readings prior to the instructional period where they are assigned will greatly aid you to understand and appreciate the material covered in class.

**Textbook and Required Materials**

Required text: Weaver, William E. and Danny K. Hagans. 1994. *Handbook for forest and ranch roads*. Mendocino County Resource Conservation District. 161p. + appendices

Other required readings will be available through BbLearn. Reading list is attached.

## Course Schedule

### Subject Outline and Reading Assignments

Week	Subject	Reading
1	Introduction: Operations overview and components	None
2	Converting facilities	<a href="http://www.rfu.org/cacw/basic.html">http://www.rfu.org/cacw/basic.html</a> Falk*
3	Converting facilities Harvesting	<a href="http://www.afandpa.org/ourindustry.aspx?id=438">http://www.afandpa.org/ourindustry.aspx?id=438</a> Stark <i>et al.</i> *
4	Harvesting	Greulich <i>et al.</i> * Sang-Kyun* Introduction and Conclusion Stokes, <i>et al.</i> *(skim)
5	Harvesting	Burton* Anderson and Lockaby* Studier*
6	Field Trip: Sawmill tour	Kretschmann* WDNR*



7	Appraisal	Bardon* Uliabbarri* pp. 11-14 WDNR*
8	Lab/Field Trip: Culvert sizing and design and/or appraisal	Kramer* Chapters 1 & 4
9	Aerial photography	Avery and Berlin* Chapters 2, 3, and 11
10	Roads: Design principles and Drainage	Kramer* Chapters 1, 2 & 3 W&H* Chapters I, II, III & IV
11	Roads: Maintenance	Kramer* Chapter 6 W&H* Chap. V & VI
12	Field trip: Forest Energy Corporation, Showlow	W&H* Chap. VII & VIII
13	Roads: Maintenance and Closure	Kramer* Chapter 6 W&H* Chap. IX
14	Field trip: Camp Navajo and Kaibab NF Harvesting and Roads	
15	Round-up & Catch-up	Andréassian*

\*Available through BbLearn

### Assessment of Student Learning Outcomes

Ten 10 minute quizzes worth 5 points each. Quizzes will take place during the first ten minutes of lecture and/or laboratory periods. Quizzes will not be announced beforehand. Quizzes will be closed book/notes/neighbors. No make up quizzes will be given.

Individual work.

Four laboratory/homework assignments worth 25 points each. Crew work.

Timber appraisal

Timber sale preparation,

Field Operations, or Culvert Sizing Road Layout and/or Field Operations

Culvert sizing and/or Field operations

Take-home final examination. Individual work. [75 points]

Academic integrity quiz: P/NP

### Grading system

Percent of points earned	Grade
90-100	A
80-89.9	B
70-79.9	C
60-69.9	D
<60	F

### Course Policies

- A. NO make-up or re-tests of the quizzes will be given.
- B. Attendance. You know the drill: be at the right place at the right time ready to go. If you cannot attend a class or lab, please let me know as soon as possible.
- C. Statement on Plagiarism, Cheating, and Academic Integrity. Do not engage in the first and second items on this list and always fully meet the expectations of the third item. Students charged with academic dishonesty are subject to the Arizona Board of Regents' Code of Conduct and procedures outlined in the *NAU Student Handbook*. Let us not go there; it's not fun for any of us.
- D. Other policies. In this class we will adhere to the "Classroom Management" policy included in the *NAU Student Handbook*, as well as *the Safe Working and Learning Environment*, *Students with Disabilities*, *Institutional Review Board*, and *Academic Integrity policies* as described at:  
<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>

- G. Preparation. Please fully engage in this activity!
- H. No late assignments accepted except in very extenuating circumstances.

### **Reading List**

Anderson, Christopher J. and B. Graeme Lockaby. 2011. The Effectiveness of Forestry Best Management Practices for Sediment Control in the Southeastern United States: A Literature Review. *Southern Journal of Applied Forestry*. 35(4): 170-177.

Practices for Sediment Control in the Southeastern United States: A Literature Review. *Southern Journal of Applied Forestry*. 35(4): 170-177.

Andréassian, Vazken. 2003. Waters and forests: from historical controversy to scientific debate *Journal of Hydrology*. 291:1-27.

Avery, Thomas E. and Graydon L. Berlin, 1985. *Interpretation of Aerial Photographs*, Burgess Publishing Company.

Bardon, Robert E. 2011. Timber Sales A Planning Guide for Landowners. AG-640 (Revised). North Carolina Cooperative Extension Service

Burton, T.A. 1997. Effects of basin-scale timber harvest on water yield and peak streamflow. *Journal of American Water Resources Association*, 33(6): 1187-1196.

Falk, Robert H. 2010. Wood as a Sustainable Building Material In *Wood Handbook*. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: Chapter 1.

Greulich, Francis R., Donald P. Hanley, Joseph F. McNeel, and David Baumgartner. 1999. A Primer for Timber Harvesting. Washington State University Extension. EB 1316.

Han-Sup Han, Harry W. Lee, and Leonard R. Johnson. 2004. Economic feasibility of an integrated harvesting system for small-diameter trees in southwest Idaho. *Forest Products Journal* 54(2): 21-27

Kramer, Brian W. 2001. Forest road contracting, construction, and maintenance for small forest woodland owners. Research Contribution 35, Forest Research Laboratory, Oregon State University, Corvallis.

Kretschmann, David E. 2010. Commercial Lumber, Round Timbers, and Ties. In *Wood Handbook*. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: Chapter 6.

Odom, Bob, Paul D. Frey, Don Powell, J. Dale Givens, Jan Boydston, and Billy Davis. 2001. Recommended Forestry Best Management Practices for Louisiana. Louisiana Department of Agriculture and Forestry.

Sang-Kyun Han, Han-Sup Han, Deborah S. Page-Dumroese, and Leonard R. Johnson. 2009. Soil compaction associated with cut-to-length and whole tree harvesting of a coniferous forest. *Canadian Journal Forest Research* 39:976-989

Stark, Nicole M.; Cai, Zhiyong; Carll, Charlie G. 2010. Wood-Based Composite Materials Panel Products, Glued-Laminated Timber, Structural Composite Lumber, and Wood–Nonwood Composite Materials

In *Wood Handbook*. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: Chapter 11.

Stokes, Bryce J. Colin Ashmore, Cynthia L. Rawlins, and Doris L. Sirois. 1989. “Glossary of terms used in timber harvesting and forest engineering”. USDA Forest Service. General Technical Report SO-73. 33p.

Uliabarri, C.A. and K.F. Wellman 1997. Natural Resource Valuation: A Primer on Concepts and Techniques. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830

Weaver, William E. and Danny K. Hagans. 1994. *Handbook for forest and ranch roads*. Mendocino County Resource Conservation District. 161p. + appendices (W&H)

Wisconsin Department of Natural Resources (WDNR). 2003. Conducting a Successful Timber Sale: A primer for landowners DNR Publication PUB-FR-254 2003

## **SYLLABUS**

### **Forest Management I-III or Semester B**

#### **General Information**

College of Engineering, Forestry and Natural Sciences; School of Forestry  
FOR 323W, 324, 325 Forest Management I-III, Semester B  
Spring semester (odd and even years)  
11 credit hours  
Clock hours: MWF 9:10-10; 10:20-11:10; 11:30-12:20  
MW 12:40-3:50 (labs)

#### **Instructors:**

Dr. Carol Chambers, Professor, School of Forestry, Coordinator  
Rm , SWFSC (Building 82)  
Email: [Carol.Chambers@nau.edu](mailto:Carol.Chambers@nau.edu)  
Office hours: by appointment

Dr. Ching-Hsun Huang, Associate Professor, School of Forestry  
Rm. , SWFSC (Building 82)  
Office hours: by appointment

Dr. Aregai Tecle, Professor, School of Forestry  
Rm. , SWFSC (Building 82)  
Email: [Aregai.Tecle@nau.edu](mailto:Aregai.Tecle@nau.edu)  
Office hours: by appointment

Dr. Marty Lee, Professor, School of Forestry  
Rm. 241, SWFSC (Building 82)  
Phone: 523-6644  
Email: [Martha.Lee@nau.edu](mailto:Martha.Lee@nau.edu)  
Office hours: by appointment

#### **Course Prerequisites**

FOR 313, 314-Forest Ecology I, II; FOR315-Silviculture I

#### **Course Description**

The courses making up Semester B will provide students with up-to-date knowledge for managing forest resources within a social context. We examine techniques for producing wood, water, livestock commodities, recreation and wildlife amenities, focusing on the fundamental principles of management. We also help students grasp the integrated nature of forest management. This is accomplished through readings, discussions, guest speakers, field and indoor labs, and writing. One of the courses making up Semester B is designed to meet the junior level writing requirements as defined under the Liberal Studies Program. Students will write an integrative paper focused on a forest management topic of their choice.

### **Student Learning Expectations/Outcomes**

Students successfully completing these courses will be able to:

- demonstrate their knowledge and application of forest economics;
- demonstrate their knowledge and application of watershed management;
- demonstrate their knowledge and application of recreation management;
- demonstrate their knowledge and application of wildlife habitat and range management;
- demonstrate their knowledge and application of forest level management;
- demonstrate their knowledge and application of GIS;
- demonstrate a basic knowledge of collaborative management;
- demonstrate their ability to writing critically and analytically through development of a research or management proposal;
- demonstrate their ability to integrate concepts described above in a multidisciplinary approach.

### **Course Structure and Approach**

This series of courses uses a combination of classroom activities (e.g., lecture, discussion) and field and indoor labs to enhance student learning of the following topics:

- forest economics
- watershed management
- recreation management
- wildlife habitat and range management
- collaborative management
- forest level management
- GIS

Students will also be exposed to and gain practice in using graphical, mathematical and analytical tools, evaluating scientific publications, public speaking and presenting information professional, negotiating and participating in group processes, and critical and analytical writing.

### **Textbook and Required Materials**

Required Books:

- McComb, B.C. 2007. Wildlife habitat management: Concepts and applications in forestry. Taylor and Francis Publishers, CRC Press, Boca Raton, FL
- Klemperer, W. David. 2003. Forest resource economics and finance.
- McMillan, V.E. 2001. Writing papers in the biological sciences, 4<sup>th</sup> edition. Bedford-St. Martins. **You should already have this book.**

Recommended Books:

- Davis, L.S.; K.N. Johnson; P. Bettinger; and T. Howard. 2001. Forest management. 4<sup>th</sup> edition. Waveland Press
- *Journal of Forestry* – we encourage students to continue to read the *J. of Forestry* and, when appropriate, we will assign readings from the *Journal*.

Other Required Readings:

- Other required readings are listed under individual FOR 323W-325 courses in BbLearn.

Syllabi, lecture and lab schedules, an assignment calendar and other individual unit materials will be posted on BbLearn.

### **Assessment of Student Learning Outcomes**

Syllabi will be provided for the individual units in Semester B that will contain the schedules, assignments, and deadlines for that particular unit.

### **Grading System**

The instructional content of Semester B is grouped into three classes designated as FOR323W, FOR324, and FOR325, worth 4, 4, and 3 credits, respectively. Students will earn grades for each course based on points accumulated on exams and graded exercises in each unit in each class during the semester. The topics included and their individual credits for each unit are:

- FOR323W – 5 credits
  - Recreation management – 1.5 credits
  - Forest economics – 1.5 credits
  - Individual forest management proposal – 0.7 credit
  - GIS – 0.5 credit
  - Collaborative management – 0.5 credit
  - Small group dynamics and integrated labs – 0.3 credit
- FOR324 – 3 credits
  - Wildlife habitat and range management – 1.5 credits
  - Watershed management – 1.5 credits
- FOR325 – 3 credits
  - Forest management – 3 credits

Grades will be turned in to the registrar for each of the four classes. Students must receive 70% or more of the total points possible in each of the four classes to enroll in FOR411, FOR412, and FOR413.

### **Course Policies**

Evaluation methods include in-class exams, field exams, individual writing assignments, and project reports done independently or by crews. Cheating, plagiarism, excessive cooperation among students on independent projects or other acts of academic dishonesty will result in the assignment of a failing grade for that exam or exercise. Penalties for turning work in late will be at the discretion of the appropriate faculty.

A student may request a change in grade on any exam or exercise if he/she believes an error has been made. The request must be made in writing, including the reasons why the student believes an error has been made, and must be submitted to the faculty member within one week after the exam or exercise has been returned to the class. The faculty member will respond, in writing, by indicating whether or not a grade change has been made and why.

There will be crew assignments throughout Semester B. If you have problems with a crew you are in, try to address it within the crew. If you are unable to resolve the problem, bring it up with the Semester B coordinator.

The NAU School of Forestry faculty members try to maintain an open-door policy and try to be available as much as possible. We encourage you to talk to us about subject material and forestry in general. We like to get to know you and have you know us. Should we not be available, make an appointment to see the professor at a time convenient to both of you.

NAU Policy on Academic Integrity (from the Student Handbook:

<http://www4.nau.edu/stulife/handbookdishonesty.htm>):

Violations of the Student Code of Conduct which exclusively involve issues of Academic Dishonesty are normally dealt with by faculty and academic administrators, rather than the Dean of Students. Allegations of academic dishonesty may be initiated by both students, and faculty or where appropriate, by administrative personnel. Informal procedures (see sections I and II of this Appendix) apply when the student has no previous record of academic dishonesty after an examination of the records by the Associate Provost for Academic Administration, and when the proposed sanctions do not include suspension or expulsion of the student. Formal procedures (see section III of this Appendix) apply when there is a record of previous academic dishonesty, or when there are other aggravating circumstances or when recommended sanctions include suspension or expulsion.

ACADEMIC INTEGRITY means that students and faculty jointly agree to adhere to a code of conduct appropriate to the mutually trusting relationship that must exist between student and teacher. Those values will not allow either to take credit for work not their own, or to be deceitful in any way, or to take unfair advantage of other students or of each other, or to be other than totally truthful and straightforward in all that they do.

ACADEMIC DISHONESTY is a form of misconduct that is subject to disciplinary action under the Student Code of Conduct and includes the following: cheating, fabrication, fraud, facilitating academic dishonesty and plagiarism.

Plagiarism: any attempt to pass off other's work as your own

Cheating: any attempt to gain an unfair, hidden advantage over one's fellow students

Fabrication: any attempt to present information that is not true

Fraud: any attempt to deceive an instructor or administrative officer of the university

Furthermore, any attempt to facilitate any act of academic dishonesty on the part of oneself or others shall constitute a violation of this policy.



Attendance and Professionalism: Students are expected to attend all lectures, exams, and field trips during Semester B. Missing a full day in Semester B is equivalent to missing 4-6 lectures in a traditional 3-credit course. We expect students to arrive on time for all lectures, exams, and field trips. We will leave on field trips at the appointed time and cannot wait for late students.

If a situation arises where you cannot attend or arrive on time, it is your responsibility to notify, **in advance**, the faculty member responsible for that day's material. Faculty are not required to make accommodations for students wanting to miss classes for an extended spring break or to leave early at the end of Spring semester for employment.

Cell phones and other electronic devices are to be turned off during class unless special permission has been granted.

All assignments (essays, lab reports, etc.) are due before Semester B starts on the assigned due date and are to be turned in at the beginning of class or put in the appropriate faculty mailbox in room 116 unless other prior arrangements have been made.

The University's self-insurance plan does not provide medical coverage to students if injured while participating in University-related activities or academic programs. Students are strongly encouraged to obtain medical/health insurance prior to participation, either through their parents' health insurance plan or by purchasing insurance (such as the package offered through the Health Center).

All students and faculty who drive vehicles on field trips must have gone through the training sessions provided by the Motor Pool. Student van drivers will receive a modest hourly wage for driving time. Van drivers are responsible and accountable for making sure that vans are at the Southwest Forest Sciences Building 15 minutes prior to the vans' departure to the field and returned to the NAU garage after returning from the field when appropriate.

Week	Dates	Monday		Tuesday		Wednesday		Thursday			Friday	
		9:10-10	10:20-11:10	9:35-10:50	Lab 12-3:35	9:10-10	10:20-11:10	9:35-10:50	11:10-12:25	Lab 1-3:35	9:10-10	10:20-11:10
1	1/14-1/18	Introduction	Introduction	Recreation	Crew Member Expectations-C	Biometrics	GIS-C	Recreation-C	Recreation-C	GIS-C	Biometrics	GIS-C
2	1/21-1/25	HOLIDAY- MLK Day		Wildlife	GIS-C	Biometrics	Economics	Recreation	Recreation	Recreation	Biometrics	Economics
3	1/28-2/1	Biometrics	Economics	Wildlife	Writing Your Briefing Paper	Biometrics	Economics	Recreation	Recreation	Recreation (GIS)-C	Biometrics	Economics
4	2/4-2/8	Biometrics	Economics	Wildlife	Biometrics-C	Biometrics	Economics	Wildlife	Recreation	Economics-C	Biometrics	Economics
5	2-11-2/15	Biometrics	Economics	Wildlife	Biometrics-C	Biometrics	Economics	Wildlife	Recreation	Economics-C	Biometrics	Economics
6	2/18-2/22	Economics	Economics	Land mgmt discussion	Land Mgmt Forum (I)	Forest Level	Economics	Wildlife	Recreation	Economics-C	Forest Level	Economics
7	2/25-3/1	Forest Level	Economics	Wildlife	Wildlife (GIS)-C	Forest Level	Economics	Wildlife	Recreation	Forest Level-C	Economics	Economics
8	3/4-3/8	Forest Level	Operations	Wildlife	Wildlife	Forest Level	Operations	Wildlife	Recreation	Recreation	Forest Level	Operations
9	3/11-3/15	Forest Level	Operations	Wildlife	Wildlife	Forest Level	Operations	Wildlife	Recreation	Forest Level-C	Forest Level	Operations
3/18-3/22		SPRING BREAK										
10	3/25-3/29	Forest Level	Watershed	Operations	Operations-C	Forest Level	Watershed	Operations	Operations	Visual Quality Operations-C	Watershed	Watershed
11	4/1-4/5	Forest Level	Watershed	Operations	Briefing Paper Consultation	Forest Level	Watershed	Operations	Operations	Watershed	Forest Level	Forest Level
12	4/8-4/12	Forest Level	Watershed	Operations	Operations-C	Forest Level	Watershed	Operations	Operations	Forest Level-C	Forest Level	Watershed
13	4/15-4/19	Forest Level	Watershed	Operations	Operations-C	Forest Level	Watershed	Operations	Operations	Forest Level-C	Forest Level	Watershed
14	4/22-4/26	Forest Level	Watershed	Operations	Picture Canyon (I)	Forest Level	Watershed	Collaborative	Collaborative	Watershed	Forest Level	Watershed
15	4/29-5/3	Forest Level	Collaborative	Collaborative	Presentation Prep	Forest Level	Collaborative	Collaborative	Collaborative	Collaborative	Forest Level	Collaborative
Finals	5/6-5/10	Presentations (10-noon)		Presentations (7:30-9:30) Facilitated evaluation (12:30-2:30)		Presentations (7:30-9:30)						

C=Computer lab, meet in Room 109  
I=Integrated lab  
GIS=GIS lab

## **Syllabus**

### **FOR 411 : Forestry Capstone preparation**

#### **General Information**

**College and Department: College of Engineering, Forestry, and Natural Sciences;  
School of Forestry**

Course prefix, number, and title: FOR 411, Forestry Capstone Preparation

Semester in which course will be offered: Fall Semester

Credit hours: 1

Clock hours/meeting times: One 50-minute lecture period per week

**Instructor name(s): TBD**

#### **Course Prerequisites**

FOR 323W, FOR 324, & FOR 325

#### **Course Description**

This is the first in a two-course sequence that also includes FOR 423, Forestry Capstone. The goal of this course is to assist students in the preparation of a capstone plan that is well conceived and developed fully enough to be implemented in FOR 423. This course will include (1) discussion of the goals and rationale for capstone projects, (2) information on the overall capstone process from initial planning through the preparation of the final presentation and report, (3) an overview of research methods that may be used in capstone projects, and (4) the development of a capstone proposal.

#### **Student Learning Expectations/Outcomes**

Upon the successful completion of this course, students should be able to demonstrate:  
The ability to prepare a capstone *plan* that is well conceived, well written and has a high probability of resulting in a successful capstone *project*.  
The ability to apply research, information synthesis, and analytical skills to the development of forestry-related project proposal.  
The ability to present the details of the plan in an oral presentation.

#### **Course Structure/Approach**

This course will use a combination of lectures and meetings with the instructor to discuss project ideas and progress in the development of the capstone plan. Students may develop capstone plans/projects either individually or in teams of up to four individuals. In addition to the development of a formal, written capstone plan, students will also prepare an oral presentation on their plan that will be presented around mid-semester, which will allow for feedback from their fellow students and any others who attend.

#### **Textbook and Required Materials**

No textbook will be required. Occasional reading materials will be assigned and will either be handed out in class or posted on BB Learn.

## Tentative Course Outline

Week 1: Course Introduction

Week 2: Topic Brainstorming - What have others done? Does it need to be “research?” Is the goal clear? Will a project mentor be needed?

Week 3: Components of a Good Plan and Plan Formatting

Week 4: Project Methods - What methods will you use? How can you ensure that your project is “doable?” What should be in the Methods section of the proposal?

Week 5: One-On-One or Team Meetings to Discuss Project Ideas (no class at regular time)

Week 6: **Proposal/Project Topic Due**; Guidelines for Student Presentations

Week 7: One-on-one or team meetings to discuss plan progress and presentation

Week 8: Student Presentations and Discussion of Capstone Plans

Week 9: Student Presentations and Discussion of Capstone Plans

Week 10: Student Presentations and Discussion of Capstone Plans

Week 11: Student Presentations and Discussion of Capstone Plans (if needed, or else topic TBA)

Week 12: **Draft Plans Due**

Week 13: One-on-one or team meetings to discuss plan progress and to receive feedback on draft

Week 14: Preparation of final plans, instructor available for consultations

Week 15: **Final Plans Due**

## Assessment of Student Learning Outcomes

Students will earn letter grades in the course based on the following graded activities:

Identification of Suitable Topic by Deadline	10%
Capstone Project Plan (oral presentation)	15%
Draft Capstone Project Proposal	20%
Final Capstone Project Plan (written proposal)	45%*
Class Participation	10%

\*Peer feedback will be a component of this grade for team projects.

Letter grades will be assigned based on traditional guidelines:

**A**= 90-100 %

**B**=80-89%

**C**=70-79%

**D**=60-69%

**F**= below 60%

## Course Policy

Assignment deadlines: Failure to meet deadlines for the graded assignments usually will mean forfeiture of at least 50% of the points unless approved in advance by the instructor.

**Also, to pass this course, the Final Capstone Project Plan must be turned in on time and must receive a grade of C or better, regardless of the other points earned.**

Attendance and participation: Class attendance is viewed as essential to student success in this course. Also, active participation in class discussions and presentation question and answer sessions is expected of all students.

Statement on plagiarism and cheating: Obvious occurrences of plagiarism and cheating by students in this course will be handled by assigning a grade of zero on the assignment to the offending student. Reoccurrence will result in assignment of a grade of F to the student for the entire course.

**University policies:** Attach the Safe Working and Learning Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity policies or reference them on the syllabus. See the following document for policy statements:

<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.

## **SYLLABUS**

### **FOR 412 : SILVICULTURE II**

#### **General Information**

College of Engineering, Forestry, and Natural Sciences; School of Forestry

FOR 412, Silviculture II

Fall Semester (even and odd years)

3 semester hours

Clock hours/meeting times:

Schedule will vary, depending on weather and subject matter.

Lectures, when held, will be MWF from 9:10-10:00

Labs, when held, will be M and/or W from 12:40-3:50

#### **Instructor name(s):**

Dr. Kristen Waring, School of Forestry

201 SWFSC

Phone: 523-4920

Email: [Kristen.Waring@nau.edu](mailto:Kristen.Waring@nau.edu)

Office hours: by appointment

Additional instructors (lecturers, graduate teaching assistants) may teach lab sections depending on enrollment.

#### **Course Prerequisites**

FOR 315 – Silviculture I

#### **Course Description**

This is a course in advanced silviculture. This course, in combination with FOR 413 (Forest Ecosystem Assessment), will provide students with quantitative skills necessary for the development of specific silvicultural prescriptions to meet management goals. Skills will be developed both in the classroom and in forest-based field labs.

#### **Student Learning Outcomes**

By the end of the course, you should be able to identify the most common silvicultural practices and link them to multiple resource objectives and have the knowledge and tools to select an appropriate prescription for a given stand. Specifically, by the end of the course, successful students (i.e. you!) will have the skills and knowledge to:

Describe the most common tools and practices used in silviculture and understand how to use and modify those tools and practices to meet management objectives;

Explain growth and yield dynamics for both even and uneven-aged stands;

Identify assess management goals and objectives;

Evaluate silviculturally-related real-world scenarios and situations both quantitatively and qualitatively; and

Develop silvicultural prescriptions that meet management goals.

### Course Structure/Approach.

The course will combine traditional in-class lectures with field lectures and labs. The field labs will enhance and reinforce classroom material. Therefore attendance at labs is essential for your success. We will go out in the field unless the weather is absolutely abysmal or safety issues are of concern.

### Required Texts

Avery, T.E. and H.E. Burkhart. 2002/2005. Forest Measurements, 5th edition.

McGraw-Hill, Inc. New York, NY. 408pp.

Nyland, R.D. 2002. Silviculture Concepts and Applications, 2nd edition. McGraw-Hill Companies, Inc. New York, NY. 633pp.

Other readings available through BbLearn

**L = available on Bb Learn**

**N = Nyland 2002 M = McComb 2007**

**AB = Avery&Burkhart 2005**

### Optional / Additional Resources

Helms, J.A. 1998. The Dictionary of Forestry. Society of American Foresters, Bethesda, MD. Available free online: [www.dictionaryofforestry.org](http://www.dictionaryofforestry.org)

McComb, B.C. 2007. Wildlife habitat management: Concepts and applications in forestry. Taylor and Francis Publishers, CRC Press, Boca Raton, FL. 319pp.

Smith, D.M., Larson, B.C., Kelty, M.J. and P.M.S. Ashton. 1997. The Practice of Silviculture: Applied Forest Ecology. 9th Edition. John Wiley & Sons, Inc. New York, NY. 537pp.

### Course Outline (tentative)

WEEK	LECTURE TOPIC	READING
1	Pure even-aged stands	N: Ch 13 (277-291); Ch 14 (313-333)
2	Uneven-aged stands	N: Ch 11 L: Smith et al Ch 15; O'Hara & Gersonde 2004 (opt)
3	Vegetatively reproduced stands (Short Exam II)	N: Ch 13
4	Mixed species stands	L: Smith et al Ch 16
5	Release operations, forest pruning,	L: Penn State 1997; O'Hara et

	fertilizer applications, and herbicide use	al. 1996 Smith et. al Chap 6
6	Fire and fuels treatments	N: Ch 5 (106-116); L: Hunter et al. 2007 (23-47)
7	Management objectives: Timber	
8	Management objectives: Restoration and forest health	N: Ch 21 (483-502); L: Waring and O'Hara 2005
9	Management Objectives: Watershed and wildlife	M: Ch 6 (79-92); Ch 7 (99-109)
10	Management Objectives: Recreation	L: Shelby et al. 2005
11	Landscape objectives	L: Crow and Gustafson 1997; M: Ch14 (205-211)
12	Agroforestry	N: Ch 6 (129-131) L: Long and Nair 1999
13	Marking guides and implementation	tba
14	Regional silviculture	tba
15	Review/wrap-up/questions	

### Assessment of Student Learning Outcomes

Methods and Timeline:

Assessment	Points	Date of Assessment
Short exam (3 at 25 points each)	75	End of weeks 3, 6, 9
Long exams (3 at 50 points each)	150	End of weeks 5,10,14
Lab reports (8 at 25 points each)	200	Beginning of weeks 3,4,6,7,9,10,11,12
Participation (25 points)	25	On-going
<b>TOTAL</b>	<b>450</b>	



Grades are based on lecture and lab material, plus overall course participation. Lecture content is graded through the use of exams. The lab grade is a direct outcome of eight graded lab write-ups. Finally, participation will be graded based on:

1. Attendance in both lecture and labs;
2. Submittal of assignments related to participation labs; and
3. Pop quiz and other lecture participation activities.

***Lab grading:***

Lab grades are assigned using the following categories:

Letter grade	Percent
A	90-100
B	80-89
C	70-79
D	60-69
F	<60
not completed	0

For each graded lab, 20% of the grade will be related to writing. See Semester A guidelines for an overview of how writing will be graded. **Writing grades of less than a B- require a re-write to earn credit for the lab.**

*Crew-based labs:* When a crew works together to turn in a single lab assignment, **crew evaluation forms are also required** from each member of the crew, for each member of the crew. **Lab credit will not be given without the required evaluation forms.** This includes a self-assessment. Poor overall crew evaluations will result in grade reduction for that lab and crew member. For example, if, in a three person crew, both crew members rate the third member poorly in most categories on the evaluation, this will result in a reduction for that member. The reduction will be at least a half-grade but the exact reduction will depend on the situation and may be more.

**Grading System:**

Points earned	Grade
90+	A
80-89	B
70-79	C
60-69	D
<60	F

*Grades are assigned based on the exact percentage earned and are not rounded.*

### **Course Policies**

1. Assignments are due at 9:10 am on the due date unless otherwise noted. These should be turned by email or to the instructor's mailbox in the main office or outside my office door (Rm. 234). Late assignments are accepted for 12 hours (reduced ½ letter grade) and 24 hours (reduced 1 full letter grade) after the due date and time.
2. Attendance is important and required. If you need to miss a lab section, you must contact the instructor in advance and provide your legitimate reason for missing. Lecture sections are important as well and instructors expect attendance and respect.
3. While class attendance is required per the above stated policy, please be cautious about attending class if you are feeling ill. Please inform me by phone or email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class; please take precautions not to infect others, and seek medical attention if your symptoms worsen.
4. Respect: Respectful and professional behavior is expected and required at all times. Show up on time, no cell phones or iPods in class, laptops and other electronics to be used only for note-taking. Wait until the session is over before packing your bags. Do not disrupt the classroom environment or you may be asked to leave.
5. You WILL be graded on grammar and spelling in addition to content on all written assignments and exams. Grading rubrics will be provided for all lab assignments.
6. Emails to Instructors will receive a response within 36 hours unless announced otherwise in class (i.e., if instructor is traveling or in the field without internet).
7. Graded assignments and exams will generally be returned within one week.
8. Overall course grades will be posted on Bb Learn periodically throughout the semester. The instructor will let you know when updates occur.
9. Cheating and plagiarism will not be tolerated. Be careful when sharing data or assignments even as examples. The NAU policy on cheating and plagiarism can be found in the online student handbook.

### **University Policies:**

For Northern Arizona University policy statements, please reference the online student handbook, <http://www4.nau.edu/stulife/handbook.htm>

## Course Syllabus

**COLLEGE AND DEPARTMENT:** Forestry, Engineering and Natural Science; Forestry

**FOR 422 Forest Planning**

**SEMESTER OFFERED:** Spring Semester

**CLOCK HOURS:** TTH 8 – 9:15

**CREDIT HOURS:** 3

**INSTRUCTOR:** Denver Hospodarsky, PhD, CF (AKA DrH)

Associate Professor

School of Forestry

SW Forest Science Complex (SWFSC) – Bldg. 82

Office: Room 104 Ph: 928-523-7525

Email: [denver.hospodarsky@nau.edu](mailto:denver.hospodarsky@nau.edu)

**OFFICE HOURS:** TTH 9:30-11, otherwise Open Door or by Appointment

**COURSE PREREQUISITES:** FOR413

**COURSE COREQUISITES:** FOR423C

### COURSE DESCRIPTION:

Forest Planning describes the process of discovery and preparation that occurs both before and after management actions, which are conducted to achieve prescribed resource outcomes on forest lands. This process is recorded in a planning document, and this ‘plan’ serves as both process record and guide for future management activity. FOR422 Forest Planning establishes the theoretical foundations of the planning process and lays out the many procedures of planning, including NEPA, so as to result in effective and efficient resource management practices. The roles of professional leadership and ethics in planning success are also stressed.

### STUDENT LEARNING

#### EXPECTATIONS & OUTCOMES:

By the end of this course, students should be able to understand the theories and concepts of planning and the range of issues and strategies involved in forest planning including: public participation and collaboration, planning goal setting, current conditions assessment, trends analysis, alternatives formulation, alternatives assessment, alternative selection and management plan development, plan implementation, plan monitoring, and plan updating.

Students should also understand the practice of NEPA planning on federal lands, and the concepts of leadership and ethics that are a foundation of professional resource planning practice.

### COURSE STRUCTURE & APPROACH:

Two, 75 minute combination lecture and discussion sessions per week. Sessions will be structured to allow considerable opportunities for discussion and questions in response to the lecture material. Small-group learning activities will frequently be used in conjunction with evaluating planning issues and procedures. Lectures topics will largely expand upon readings assigned from the texts.

### TEXTBOOK & REQUIRED MATERIALS:

Bettinger, P., K. Boston, J.P. Siry, D.L. Grebner, 2009. Forest Management and Planning. Elsevier, New York.

Eccleston, C., J.P. Doub. 2012. Preparing NEPA Environmental Assessments: A User's Guide to Best Professional Practices. Taylor and Francis, Boca Raton, FL.

**COURSE OUTLINE:**

- Weeks 1 –3 Course introduction; planning theory and concepts
- Weeks 4 – 7 Forest planning issues and processes
- Weeks 8–13 NEPA planning procedures for federal lands management
- Weeks 14-15 Planning case study analysis

**ASSESSMENT OF STUDENT**

**LEARNING OUTCOMES:**

A variety of assessment methods, in sufficient numbers, will be used in order to account for variability in student learning styles and daily vagaries in individual performance.

**METHODS OF ASSESSMENT:**

Two exams will be given to assess comprehension of lecture and discussion material. Four announced quizzes will be given during the semester to encourage students to remain current with the assigned readings, and to evaluate comprehension of topics prior to their treatment in lecture and discussion. One case study analysis report will be assigned as a summary project in the class. Analysis Group work involved will be evaluated in terms of both overall group performance and individuals' contributions to the group effort.

**TIMELINE FOR ASSESSMENT:**

Semester	Week 3	Quiz 1
	Week 5	Quiz 2
	Week 7	Mid-term exam
	Week 9	NEPA Quiz 1
	Week 12	NEPA Quiz 2
	Week 13	NEPA Exam
	Week 15	Planning case study analysis Report
	Week 16	Final exam

**GRADING SYSTEM:**

Two exams at 20% each; final exam at 25%; four quizzes at 5% each; and a planning case study analysis at 15%. The course will be graded using the scale: 90-100% = A; 80 – 89% = B; 70 – 79% = C; 60 – 69% = D; and < 60% = F.

**COURSE POLICY:**

This course will be conducted in accordance with the following policies. Please read these policies carefully.

**RETESTS AND MAKEUP TESTS:**

No makeup exams, quizzes, or late assignments will be allowed without a signed medical excuse, or under conditions where the student has notified the instructor at least one-week in advance for mutually acceptable personal /professional reasons.

**ATTENDANCE:**

Regular attendance is required. Role will be taken at the beginning of each class period. Please be on time in order to be counted on the role, it is both professional and courteous.

**STATEMENT ON PLAGIARISM & CHEATING:**

Plagiarism and other forms of cheating are grounds for dismissal from FOR 283. The complete policy statement on academic integrity can be found in Appendix F of the NAU Student Handbook. Be sure to read this statement for your own protection.

**UNIVERSITY POLICIES:**

Five NAU Policy Statements are particularly relevant to this class viz., Safe Environment Policy, Students With Disabilities, Institutional Review Board, Academic Integrity, and Academic Contact Hour Policy. These are statements are cited in this syllabus for reference (see pertinent NAU Policy Statements in the Student handbook:  
<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.)

**OTHER:**

Your thinking about forest planning in this class may benefit from consideration of the forester code of ethics. Please read the Society of American Foresters Code of Ethics.

## **Syllabus**

### **FOR 423C : Forestry Capstone**

#### **General Information**

College and Department: College of Engineering, Forestry, and Natural Sciences; School of Forestry

Course prefix, number, and title: FOR 423C, Forestry Capstone

Semester in which course will be offered: Spring Semester

Credit hours: 3

Clock hours/meeting times: Two 75-minute class periods per week; scheduled team meetings; mandatory presentations during final week of semester

**Instructor name(s):** TBD

#### **Course Prerequisites**

Completion of FOR 411 with a grade of C or better.

#### **Course Description**

Students will implement the capstone project they conceived in FOR 411. This course will culminate in the preparation of a formal capstone report and an oral presentation that will be open to the School of Forestry community.

#### **Student Learning Expectations/Outcomes**

Upon the successful completion of this course, students should be able to demonstrate:  
The ability to apply research, information synthesis, and analytical techniques to the successful implementation of a forestry-related project of the student(s) own design.  
The ability to communicate project results clearly both in writing and in an oral presentation.

#### **Course Structure/Approach**

This course will use a combination of lecture periods and scheduled meetings with the instructor to discuss the implementation of your capstone project. *The course is designed in part to simulate a real-life work environment, in which you are responsible for completion of a specific project, but your time is not as micro-managed as it is during a typical class.*

#### **Textbook and Required Materials**

No textbook will be required. Occasional reading materials may be assigned and will either be handed out in class or posted on BB Learn.

#### **Tentative Course Outline**

Week 1: Course Introduction

Week 2: Project Methods – Discussions/lectures on specific methods to be used by one or more teams

Week 3: Project Methods - Discussions/lectures on specific methods to be used by one or more teams

Week 4: One-On-One or Team Meetings to Discuss Project progress (no class at regular time)

Week 5: Student Progress Reports and Group Discussion/Feedback\*

Week 6: Student Progress Reports and Group Discussion/Feedback\*

Week 7: Student Progress Reports and Group Discussion/Feedback\*

Week 8: Student Progress Reports and Group Discussion/Feedback\*

Week 9: One-On-One or Team Meetings to Discuss Project progress (no class at regular time)

Week 10: One-On-One or Team Meetings to Discuss Project progress (no class at regular time)

Week 11: Project work, instructor available for consultations

Week 12: Project work, instructor available for consultations

Week 13: Project work, instructor available for consultations

Week 14: Project work, instructor available for consultations

Week 15: Project presentations; reports due

\*Approximately three presentations per class period.

Assessment of Student Learning Outcomes

Students will earn letter grades in the course based on the following graded activities:

Team Progress Reports and Discussion	10%
Final Capstone Project Report	40%
Final Capstone Presentation	25%
Peer Evaluations (3)	15%*
Participation in Meetings, Other Students' Presentations	10%

\*For individual projects, there points will be distributed evenly among the three assignments listed above this one.

Letter grades will be assigned based on traditional guidelines:

A= 90-100 %

B=80-89%

C=70-79%

D=60-69%

F= below 60%.

### **Course Policy**

Assignment deadlines: Failure to meet deadlines for the graded assignments usually will mean forfeiture of at least 50% of the points unless approved in advance by the instructor. Also, to pass this course, the Final Capstone Presentation and Report must be completed on time and must be deemed acceptable, regardless of the other points earned.

Attendance and participation: Class attendance is viewed as essential to student success in this course. Also, active participation in class discussions and presentation question and answer sessions is expected of all students.

Statement on plagiarism and cheating: Obvious occurrences of plagiarism and cheating by students in this course will be handled by assigning a grade of zero on the assignment to the offending student. Reoccurrence will result in assignment of a grade of F to the student for the entire course.

University policies: Attach the Safe Working and Learning Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity policies or reference them on the syllabus. See the following document for policy statements:  
<http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>.



## **APPENDIX E**

**School of Forestry Assessment Plan**

**2010 Assessment Report**

# **Bachelors of Science in Forestry**

## **Program Overview**

### **Vision**

The vision of the Bachelors of Science in Forestry (BSF) is to train Professional Foresters.

### **Program Description**

The BSF degree program at Northern Arizona University was initiated in 1958. It is the only BS degree in Forestry in the Southwestern US that is accredited by the Society of American Foresters, and one of about 48 accredited BS degrees in forestry in the US.

Students earning the BSF are expected to become:

- Professional foresters
- Managers of public or private forests
- Lifelong learners
- Critical thinkers

## **Assessment Plan**

### **Development and Foundation**

The learning outcomes expected for BSF graduates are strongly shaped by accreditation requirements of the Society of American Foresters, as well as the values and teaching and learning philosophies of the faculty of the NAU School of Forestry. Our BSF program is reviewed and accredited every 10 years. Our most recent review occurred in 2003, and accreditation was extended through the year 2013.

Identification of desired educational outcomes and assessment tools is a key component of the BSF program. In 1994, the faculty began a comprehensive review of the BSF degree with the goal of identifying key competencies required of all graduates. This review was completed in 1995 with the key results reported in a peer-reviewed article in 1996:

Fox, B.E., T.E. Kolb, and E.A. Kurmes. 1996. An integrated forestry curriculum: The Northern Arizona University experience. *Journal of Forestry* 94(3):16-22).

Next, we surveyed recent graduates of the BSF program and their employers about skills and abilities needed for success in forestry. The results of this survey were used to further refine learning outcomes and assessment tools, and were presented and published in a conference on teaching in 1998:

Fox, B.E., L.E. DeWald, T.E. Kolb, M.E. Lee, and D.B. Wood. 1998. Assessing a forestry education: The Northern Arizona University Experience. Page 81-85 In: C.G. Heister (compiler), *Proceedings of the Second Biennial Conference on University Education in Natural Resources*. Utah State University, Logan, Utah).

A similar review and refinement of competencies occurred in 1999-2000. Our development of learning outcomes is driven by the questions: “what do we want graduates of the BSF program to be?, what should they know?, and how can we assessment their knowledge and abilities?”

The underlying educational philosophy of the BSF focuses on the integrated instruction of students in forest ecosystem science and management. Five forestry courses are required in the freshman and sophomore years and focus on basic training in plant identification, biogeography of forests, soil science, and forest measurements. Most courses taken in freshman and sophomore years are largely used to meet university liberal studies and diversity requirements, and to provide a background in mathematics, chemistry, biology, and writing needed to prepare students for entry into the professional forestry curriculum in the junior year. The professional curriculum uses a team-taught immersion approach in two 13-credit hour blocks of courses across two semesters in the junior year (FOR313-316, forest ecology and silviculture; FOR323-326, forest management) and two 6-credit-hour blocks of courses, one in each semester of the senior year (FOR413-414, forest ecosystem assessment; FOR423-424, forest ecosystem planning). Students are also required to choose one of six 12 hour focus areas to promote deeper learning in a specific forestry discipline.

### **Purposes and Uses of Assessment**

The purposes of program evaluation and assessment of learning outcomes of the BSF are to: 1) provide feedback to the School of Forestry about refinement of coursework and the structure and content of the overall program; 2) provide information required for program accreditation by the Society of American Foresters, 3) demonstrate to students, stakeholders, cooperators, and administrators the efficacy of the program; 4) provide feedback to students about their progress in the program.

### **Student Learning Outcomes**

We have articulated 155 specific competencies expected of graduates of the BSF program. Below we present these competencies for key portions of the pre-professional curriculum taken in the freshman and sophomore years, and the professional curriculum taken in the junior and senior years. Our assessment plan follows these competencies on page 10.

<b>Course</b>	<b>Competency</b>
FOR101 Introduction to Forestry	1. Understanding of the forestry profession: terminology, concepts, and current topics - broad and engaging. 2. Excitement about our profession. 3. Knowledge of the Forestry curriculum and focus areas.
FOR211 Forest Measurements	4. Knowledge and skills in sampling and inventory of natural resources 5. Skill in office data analysis, summary and interpretation
FOR213 Forest Soils	6. Knowledge and comprehension of basic geology,

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	geomorphology and soil taxonomy
FOR212 Trees and Forests of North America	7. Knowledge and comprehension of soil physical, chemical and biological properties
	8. Knowledge of basic principles of plant classification and taxonomy
	9. Knowledge of the scientific and common names, range, physical appearance, and ecological and utilitarian characteristics of many important trees in North America
	10. Knowledge of the major forest types in North America, their geographic location, and species composition of major forest types.
FOR220 Forest and Range Plants	11. Knowledge, comprehension, and skill in forest and range plant identification
	12. Knowledge and comprehension of taxonomy and basic autecology of plants
FOR 313-6, Silviculture	13. Knowledge/comprehension of land forces controlling forest vegetation
FOR 313-6, Silviculture	14. Knowledge/comprehension of the stages of forest stand dynamics and its manipulation
FOR 313-6, Silviculture	15. Knowledge/comprehension of basic tree morphology and plasticity and its manipulation – density, crowns & boles
FOR 313-6, Silviculture	16. Knowledge/comprehension of tree physiological responses to silviculture – leaves and crowns
FOR 313-6, Silviculture	17. Knowledge/comprehension of site productivity and its manipulation – site index curves and equations
FOR 313-6, Silviculture	18. Knowledge/comprehension of stand density effects and its manipulation – SDI and density management diagrams
FOR 313-6, Silviculture	19. Knowledge/comprehension of the role of tree breeding programs – phenotypes (plus trees) and genotypes, seed orchards and grafting
FOR 313-6, Silviculture	20. Knowledge/comprehension of nurseries and nursery stock types – bare-root, containerized and combinations
FOR 313-6, Silviculture	21. Knowledge/comprehension of even-aged stand management: purpose, advantages, concepts and terminology – clearcut, seedtree and shelterwood
FOR 313-6, Silviculture	22. Knowledge/comprehension of multi-aged stand management: purpose, advantages, concepts and terminology – individual-tree and group selection, BDq
FOR 313-6, Silviculture	23. Knowledge/comprehension of site preparation and competition control tools and techniques – fire, mechanical, chemical and combinations
FOR 313-6, Silviculture	24. Knowledge/comprehension of stand density effects and its manipulation – SDI and density management diagrams
FOR 313-6, Silviculture	25. Knowledge/comprehension of artificial regeneration: purposes, advantages, concepts, tools and techniques – direct seeding and planting, seedling survival and spacing
FOR 313-6, Silviculture	26. Knowledge/comprehension of natural

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	regeneration: purposes, advantages, concepts, tools and techniques – seed production, dispersal and survival, spatial and temporal patterns
FOR 313-6, Silviculture	27. Knowledge/comprehension of prescribed fire and underburning - tools and techniques, fuel types and surveys, ecological restoration
FOR 313-6, Silviculture	28. Knowledge/comprehension of thinning tools and techniques – marking guidelines (spacing and limits) and procedures, ecological restoration
FOR 313-6, Silviculture	29. Knowledge/comprehension of harvesting equipment and proper use – concepts, advantages and terminology
FOR 313-6, Silviculture	30. Knowledge/comprehension of prescriptions for various management objectives: timber production, forest health restoration and maintenance, agroforestry, wildlife habitat enhancement – micro- and macro-scale, watershed and riparian
FOR 313-6, Silviculture	31. Knowledge/comprehension of ecosystem management and community/urban forestry implications for silvicultural prescriptions
FOR 313-6, Silviculture	32. Knowledge/comprehension of dominant silvicultural themes in various regions of the United States
FOR 313-6, Silviculture	33. Comprehension of how environmental and genetic factors affect phenotypes, adaptation, and competition
FOR 313-6, Silviculture	34. Knowledge/comprehension of C3/C4 pathways, implications for range plant communities
FOR 313-6, Silviculture	35. Knowledge/comprehension of the use of population models in ecology
FOR 313-6, Silviculture	36. Knowledge of factors that influence population size
FOR 313-6, Silviculture	37. Knowledge and comprehension of predator-prey relationships
FOR 313-6, Silviculture	38. Knowledge and understanding of wildlife habitats and habitat relationships including the role and characteristics of ecotones
FOR 313-6, Silviculture	39. Knowledge and comprehension of wildlife and domestic ungulate impacts on vegetation
FOR 313-6, Silviculture	40. Knowledge and comprehension of biotic interactions in forests
FOR 313-6, Silviculture	41. Knowledge of definitions, measurement, and arguments about biodiversity
FOR 313-6, Silviculture	42. Knowledge and comprehension of factors that influence community biodiversity
FOR 313-6, Silviculture	43. Knowledge of management approaches for maintaining biodiversity
FOR 313-6, Silviculture	44. Knowledge and comprehension of definitions of disturbance
FOR 313-6, Silviculture	45. Knowledge of the concept of scale in disturbance, different types of disturbance and their effects on forest and range condition, evolutionary context of disturbance
FOR 313-6, Silviculture	46. Knowledge and comprehension of the implications of changing disturbance regimes

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FOR 313-6, Silviculture	47. Knowledge and comprehension of succession terminology, and environmental changes during succession
FOR 313-6, Silviculture	48. Knowledge and comprehension of life history characteristics of early and late successional plants
FOR 313-6, Silviculture	49. Knowledge and comprehension of different theories of succession
FOR 313-6, Silviculture	50. Knowledge and comprehension of factors that affect rate of succession
FOR 313-6, Ecology	51. Knowledge and comprehension of the hydrological cycle, its components, and factors that influence these components
FOR 313-6, Ecology	52. Knowledge and comprehension of flows and cycles of elements and energy in ecosystems
FOR 313-6, Ecology	53. Knowledge of the major factors that influence flows and cycles of elements and energy in ecosystems
FOR 313-6, Ecology	54. Knowledge and comprehension of the definition, measurement, importance, and major factors that influence ecosystem net primary production
FOR 313-6, Ecology	55. Knowledge and comprehension of the importance of vegetation/ecosystem classification
FOR 313-6, Ecology	56. Knowledge of systems of vegetation/ecosystem classification
FOR 313-6, Ecology	57. Knowledge of vegetation/ecosystem classification tools
FOR 313-6, Ecology	58. Knowledge and comprehension of the importance of scale in vegetation/ecosystem classification
FOR 313-6, Ecology	59. Knowledge and comprehension of the relationships between landscape pattern and selected processes
FOR 313-6, Ecology	60. Knowledge of the role of insects and fungi in forest ecosystems
FOR 313-6, Ecology	61. Knowledge of concepts of forest health
FOR 313-6, Ecology	62. Comprehension of biology, epidemiology, and management of major southwestern forest insects and diseases
FOR 313-6, Ecology	63. Comprehension of how forest insects and diseases affect all forest resources including recreation, wildlife, timber
FOR 313-6, Products/wood Technology	64. Knowledge of how ecological characteristics and silvicultural practices can affect, and be affected by extraction of forest products
FOR 323-326, Forest management	65. Understanding of planning processes and decision-making in a multi-goal and multiple resource context
FOR 323-326, Forest management	66. Identification and application of appropriate forestry principles in developing integrated forest plans.
FOR 323-326, Forest management	67. Understanding of how to work as analysts to incorporate stakeholder issues and concerns in goal identification and tradeoff analysis
FOR 323-326, Forest management	68. Application of forest management principles in a unique, culturally influenced context and are aware of benefits which can accrue to creative forest management.

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FOR 323-326, Forest management	69. Understanding of the human-nature relationship as reflected in recreation and attitudes toward forest management
FOR 323-326, Forest management	70. Understanding of the current demographics of recreation use of wildlands
FOR 323 FOR 323-326, Forest management	71. Description and application of the prominent recreation management frameworks, including methods for inventorying recreation resources.
FOR 323 FOR 323-326, Forest management	72. Description of the most widely used methods used to assess the economic value of recreation
FOR 323-326, Forest management	73. Description of the predominant techniques used to assess visual quality
FOR 323-326, Forest management	74. Understanding of the types of resource impacts associated with recreation use and can describe methods for mitigating impacts.
FOR 323-326, Forest management	75. Understanding of the social impacts of recreation on local communities
FOR 323-326, Forest management	76. Recognition of the significance of different spatial scales
FOR 323-326, Forest management	77. Application of more sophisticated field methods to estimate forest growth
FOR 323-326, Forest management	78. Application of theoretical and practical knowledge on empirical growth and yield modeling -- whole-stand, size-class and individual-tree stand-growth models -- Multi-stand modeling systems (FVS, LMS)
FOR 323-326, Forest management	79. Understanding of the fundamental aspects of process-based growth modeling
FOR 323-326, Forest management	80. Knowledge of goals that influence timber management decisions
FOR 323-326, Forest management	81. Implementation of basic valuation and financial analyses, including timber sale appraisal
FOR 323-326, Forest management	82. Calculation and interpretation of the physical and financial criteria used to determine optimal management regimes for timber stands
FOR 323-326, Forest management	83. Students understand how silvicultural activities can be employed to enhance goal achievement at the forest level
FOR 323-326, Forest management	84. Understanding of the functions of problem identification, goals, criteria, variables, constraints, and objective functions in decision analysis
FOR 323-326, Forest management	85. Recognition of the need to incorporate risk and uncertainty in decision analysis
FOR 323-326, Forest management	86. Understanding of the regulated forest concept and how to achieve regulation under both area and volume control,
FOR 323-326, Forest management	87. Formulation of mathematical programming models, to apply these models in problem-solving, and to interpret solutions
FOR 323-326, Forest management	88. Formulation of contemporary forest management models using linear programming,
FOR 323-326, Forest management	89. Understanding of the concept of product definition and utilization, e.g., logs and log-rules, and their effect on valuation.

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FOR 323-326, Forest management	90. Demonstration of knowledge of the basic concepts of professional ethics
FOR 323-326, Forest management	91. Demonstration of characteristics of effective leadership
FOR 323-326, Forest management	92. Knowledge of the basic elements of road design, maintenance, closure, and rehabilitation and how these elements impact forested watersheds
FOR 323-326, Forest management	93. Evaluation of the impacts of forest management alternatives on erosion and sediment yield, peak flow, and water yield
FOR 323-326, Forest management	94. Knowledge and comprehension of how to manage the factors that affect the ability of animals to survive and reproduce
FOR 323-326, Forest management	95. Knowledge and comprehension of how management of other resources affects wildlife populations
FOR 323-326, Forest management	96. Knowledge and comprehension of how management of other resources affects wildlife populations
FOR 323-326, Forest management	97. Knowledge and comprehension of how agencies manage wildlife
FOR 323-326, Forest management	98. Understanding of wildlife as a commodity and of the impact of wildlife on other commodities
FOR 323-326, Forest management	99. Understanding of single species and multi species approaches to management (ecological indicators, umbrella species, keystone species, functional groups, etc)
FOR 323-326, Forest management	100. Understanding of how to inventory, evaluate, and monitor wildlife populations and their habitats
FOR 323-326, Forest management	101. Ability to contrast wildlife and habitat management values by considering traditional ecological knowledge
FOR 323-326, Forest management	102. Knowledge and comprehension of ethical issues in wildlife management
FOR 323-326, Forest management	103. Knowledge and comprehension of key wildlife forestry issues and tools
FOR 323-326, Forest management	104. Knowledge and comprehension of levels of decision-making: constitutional, social choice, and operational
FOR 323-326, Forest management	105. Knowledge and comprehension of fundamental sources of values and ideas for the purposes of forest policy in the United States
FOR 323-326, Forest management	106. Knowledge and comprehension of fundamental values and ideas with the periods of forest and range policy in the United States;
FOR 323-326, Forest management	107. Recognition and understanding of two contrasting models for public decision-making in the United States, that of the “procedural republic” and “collaboration and politics of place.”
FOR 323-326, Forest management	108. Description of the different ways to define community
FOR 323-326, Forest management	109. Placement of major past and present policy direction in the US forest sector within one or the other of these two models.
FOR 323-326, Forest management	110. Description of the methods of dispute resolution in the procedural republic or local collaboration and

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FOR 323-326, Forest management	communities of place.
	111. Description of the relationships among assessments and decisions at large landscape, small landscape, and project levels.
FOR 323-326, Forest management	112. Description of the distinctive features of a profession and how the profession of forestry is a profession, including the role of ethics in the self-image of a profession.
FOR 323-326, Forest management	113. Definition of science in a public context, the disputes about the role of science in planning, and the connection between the science of forestry and the profession of forestry.
FOR 323-326, Forest management	114. Understanding of the concept of rangeland and how rangelands differ around the world
FOR 323-326, Forest management	115. Understanding of the social value of rangeland
FOR 323-326, Forest management	116. Understanding of the effect of herbivory on rangelands
FOR 323-326, Forest management	117. Knowledge of the process of range assessment and the concept of range condition
FOR 323-326, Forest management	118. Understanding of the concept of managing for proper use/carrying capacity of rangelands (e.g., stocking rate, AUMs, distribution, wildlife considerations, and grazing systems)
FOR 323-326, Forest management	119. Understanding of the relationships between goals and objectives and information needs.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	120. Understanding of the relationships between inventory design and information needs.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	121. Understanding of Continuous Forest Inventory (CFI) plots and relation to forest change estimation
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	122. Ability to conduct forest land classification, and use for transfer of information
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	123. Introductory understanding of non-traditional forest product inventory, e.g., manzanita, mushrooms
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	124. Introductory understanding of human assessment, e.g., assessment of community dependence on forest resources.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	125. Understanding of Field/office inventory skills
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	126. Knowledge of project organization / management
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	127. Introductory understanding of database design, ability to effectively use existing database application, understanding of data verification process.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	128. Moderate level understanding of growth and yield modeling
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	129. Ability to write technical reports

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assessment) and FOR423-424 (Forest ecosystem planning)	
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	130. Knowledge of effective Geographic Information Systems (GIS)
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	131. Ability to work effectively as part of a team
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	132. Ability to lead teams
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	133. Effective oral communication of technical material
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	134. Understanding of and ability to develop estimates of current forest condition
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	135. Understanding the process of goal formation through public participation,
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	136. Understanding of the process of how goals and objectives are modified through planning and public participation.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	137. Understanding of the relationships between goals and objectives and management analysis.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	138. Ability to specify forest management goals in terms of desired future conditions.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	139. Ability to quantify desired future conditions.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	140. Ability to translate forest management problems into mathematical models.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	141. Ability to apply principles of timber, recreation, and wildlife management (e.g. economics, ROS and scenery management system, and wildlife habitat relationships) in developing and analyzing management activities.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	142. Ability to select silvicultural prescriptions to accomplish specific forest goals.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	143. Understanding of biotic factors that influence forest condition and sustainability as related to management goals.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	144. Ability to develop stand-specific prescription/marketing guide to address Dwarf Mistletoe concerns WRT goal
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	145. Advanced DSS skills, ability to analyze and interpret output of mathematical models.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	146. Ability to analyze management plan results in terms of goals, goal criteria, and desired future conditions.
FOR 413-414 (Forest ecosystem	147. Ability to develop and analyze implementation

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assessment) and FOR423-424 (Forest ecosystem planning)	activities, ability to recognize need for revised planning analysis.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	148.Ability to conduct revised planning analysis.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	149.Ability to refine information needs (inventory and monitoring) based on planning and implementation analysis.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	150.Effective business skills, ability to conduct business resource analysis.
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	151.Ability to write technically
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	152.Ability to manage individual time
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	153.Ability to make oral presentation, and understanding of presentation software
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	154.Understanding of effective GIS analytical skills
FOR 413-414 (Forest ecosystem assessment) and FOR423-424 (Forest ecosystem planning)	155.Understanding of and ability to conduct ecosystem management (multi-resource) trade-off analysis

## Implementation Assessment Plan Components

One component of our assessment plan is difficult to put in tabular form, and will be described in this paragraph. We conduct a facilitated evaluation of each of the integrated courses in our professional program which are taken in students' junior and senior years. At the end of the semester, we hire a skilled facilitator to elicit student responses to a series of open-ended questions about overall course coordination, and learning and teaching approaches. At the end of the evaluation, students are free to provide other comments about the course. No faculty are present at the evaluation. The facilitator summarizes all comments in a written document keeping the identity of each commenter anonymous. The document is provided to all Forestry faculty and administrators. We find this approach to course evaluation to be very valuable in providing detailed feedback about the efficacy of specific learning and teaching approaches. Such feedback is used to improve our teaching and learning strategies every year.

The following table summarizes assessment practices for the BSF degree. Assessment is focused on the desired outcome of our senior capstone course, FOR 423-424, Forest Ecosystem Planning, in which students complete their training to become Professional Foresters by prepare a management plan that requires use of all 155 competencies listed above. We list the indicators used to assess the outcome, and how data will be collected, analyzed, and reported. Last, feedbacks based on assessment are described.

Bachelors of Science in Forestry

Mission: To train students to become Professional Foresters.

Outcome: Professional forester				
How/where is outcome learned?	Evidence/Indicator(s)	Collection Method(s)	Analysis Method(s)	Feedback Procedures
The entire curriculum	<p>Student preparation of a multi-resource management plan</p> <p>Accreditation by the Society of American Foresters</p> <p>Graduates are successful Professional Foresters</p>	<p>Critique of management plans by instructors in FOR 423-424</p> <p>Critique of a random sample of management plans by Professional Foresters every five years (starting 2005)</p> <p>Preparation of a self-study report and hosting the external review team</p> <p>Graduate and employer surveys the 2 years prior to accreditation (2013 is the next scheduled accreditation review).</p> <p>Exit interviews with graduates the 2 years prior to accreditation (2013 is the next scheduled accreditation review)</p>	<p>% of plans that are acceptable</p> <p>% of plans that are favorably reviewed</p> <p>Accreditation report and recommendation</p> <p>Open-ended questions about graduates' performance as a Professional Forester</p> <p>Open-ended questions about efficacy of the degree program in training students to become Professional Foresters</p>	<p>To students, the Coordinator of Academic Programs, and Director of the School of Forestry</p> <p>To faculty, the Coordinator of Academic Programs, and Director of the School of Forestry</p> <p>To faculty, the Coordinator of Academic Programs, Director of the School of Forestry, University Program Review Committee, University Provost, and University President</p> <p>To faculty, the Coordinator of Academic Programs, and Director of the School of Forestry</p> <p>To faculty, the Coordinator of Academic Programs, and Director of the School of Forestry</p>

Northern  
Arizona  
University

**Annual Report on Degree Program  
Assessment of Student Learning**

**University Assessment Committee  
Office of Academic Assessment**

**Purpose:** The purpose of the *Annual Report on Degree Program Assessment of Student Learning* is to provide information about progress in assessment efforts for each degree program within your academic unit. Only one report is requested of each academic unit, as this report will accommodate multiple degree plans. (You can still submit separate reports if you prefer.) The report will be made available publicly at the Office of Academic Assessment website and will be available to appropriate accrediting agencies. It is recommended that your unit use your assessment report and results to celebrate achievements of student learning as well as to identify potential areas for future curriculum improvement. The University Assessment Committee will review your report to provide constructive feedback, as well as to identify particular academic units for potential assessment awards and/or mini-grants to support continuing assessment efforts.

Please email this completed form as an attachment to **[d-ooa@jan.ucc.nau.edu](mailto:d-ooa@jan.ucc.nau.edu)**.

CONTACT INFO:

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Date:	February 18, 2010
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Degree Program(s) reported here:	Forestry (B.S., M.F., M.S., and Ph.D.)

ASSESSMENT REPORT:

**Instructions:** Please answer the following **five** questions to the best of your ability for each degree program offered within your unit. *You may use the table provided on the next page, or you may create your own report format.*

1. Summarize your **assessment activities** during the past year for each degree program. *(e.g. faculty discussions, new survey design, data collection, revised assessment plans or learning outcomes, etc.).*

**B.S. Program:** We continue to operate under the general guidelines of our current assessment plan, which was submitted in October 2004.

The 155 competencies identified in the 2004 plan continue to be considered important, but are not addressed individually in our annual assessment. A key element of our assessment approach continues to be how students perform in their senior-level capstone course (FOR 423-424). This provides an integrated opportunity to assess student learning, including their knowledge of technical forestry skills and their skills in critical areas such as written and oral communication. FOR 423-424, as well as our other forestry courses, continue to be revised based on formal and informal assessment results.

Another key element of our B.S. program assessment continues to be the facilitated discussions (course evaluations by our students) held at the end of the semester in some of our professional program courses (Semester A, B, C, and D). The most recent such facilitated discussion was held at the end of Semester A, in December of 2009. These discussions are facilitated by an individual from outside the School of Forestry. The results of these discussions are available to the instructors and are used to help plan the following year's course.

An assessment effort we worked on over the past two years was a "Sunset Review" of our focus areas. Focus areas were implemented as a new requirement for the B.S. degree program in 2001. Our School of Forestry's Strategic Plan calls for all focus areas to be reviewed after five years; although we missed this goal by one year, we began a review of the five original Focus Areas during the Fall 2007 semester. Our approach to this review was based on (1) a request to each Focus Area Coordinator to provide a summary report addressing issues such as current enrollment, delivery of the required courses, and amount of time required to serve as the coordinator and (2) a survey of recent graduates to solicit their opinions on how well the focus area requirement has contributed to their education and subsequent career development. Both of these were initiated in the fall of 2007. Discussions about the results of this work began in earnest during the 2008-2009 academic year; during that same year a number of new considerations related to the budget and the need to streamline programs became part of the discussion.

We also continued to implement our on-line exit survey for seniors. The survey asks undergraduates for a wide variety of feedback, including on the curriculum, the quality of various support services, extra-curricular activities, etc.

In addition to our ongoing assessment efforts, we are scheduled for our next accreditation visit by the Society of American Foresters (SAF) in 2013. We will need to start planning for the self-study at least two years before that. SAF accreditation is critical to the continuing success of our B.S. degree program and provides a reasonable level of assurance that our program meets national-level standards for undergraduate forestry education. The SAF accreditation process is gradually evolving towards a more "outcomes based" approach and therefore is very much in line with NAU's approach to assessment.

**Graduate Programs (M.S., M.F., and Ph.D):** The graduate programs continue to operate under the guidelines of their current assessment plans, which are specific to each degree program (although they also have much in common); all are dated October 2004. For each degree program, a table was produced which describes specific outcomes, how they are evaluated, and how each type of assessment information is "fed back" into the program. Each outcome is evaluated by an individual or individuals (e.g., the Graduate Coordinator, course instructors, the student's committee and the Executive Director). The types of outcomes listed do not call for an annual discussion on the part of the faculty. Since much of the feedback comes to the Graduate Coordinator, that individual is expected to play a key role in identifying any major concerns that arise and sharing them with the faculty. Several discussions at Curriculum Committee or faculty meetings have been held as follow-ups to feedback received by the Graduate Coordinator.

In addition, a graduate student attends all faculty meetings and meetings of the school's curriculum committee to provide feedback about graduate programs and policies to the faculty, and to facilitate communication of curricular and other pertinent issues to graduate students.

We also continued to implement our on-line exit survey for graduate students, which is similar to the one described above for undergraduates.

***A seven-year review of our graduate programs will need to be initiated in 2010-2011, so planning for this will need to begin soon.***

2. Describe specific **assessment findings** related to the **learning outcomes** assessed for each degree program, including any pertinent context surrounding the findings. Please

include the **learning outcomes themselves**. (e.g. 77% of seniors performed at the “proficient” level of competency in problem solving, which is where we aimed to be this year using a new scoring rubric...)

- a. Please attach any tables, graphics, or charts to the end of this report.

### **B.S. Program:**

The reports of the facilitated discussions after our professional program semesters continue to be a rich source of information. The information in those reports generally indicates that students are satisfied with the courses, support the team teaching approach used in these courses, and like the way the field and lecture elements of the courses build on each other. They also indicate some potential problems areas, which the faculty that form part of the team for a particular semester (e.g., “Semester A”) work to address for the following year. Despite the cost of these facilitated reviews (~\$600 each), we continue to support them - especially for the first year (Semester A and B) - so that we can respond to the concerns and suggestions of each new cohort of students.

**Graduate Programs:** As mentioned above, the graduate level assessment plans do not call for annual data synthesis or review by the faculty. Given the type of feedback received recently by the Graduate Coordinator (e.g., quality of theses/dissertations and performance of students at their defenses) and through the regular teaching evaluations, it appears that quality of the program is still quite good. Some of the same broad concerns highlighted in the previous reports still remain as important concerns, however, including the need for more opportunities for students to gain teaching experience (especially for Ph.D. students), the lack of tuition waivers and low stipends. We have also identified some concerns about graduate student advising through our informal feedback mechanisms, which we are now working to address.

3. Describe how assessment **feedback** has been provided to students, faculty, and staff. (e.g. report for faculty, executive summary for the dean, web page for students, alumni newsletter, discussion with students in class or club event, etc.)

**B.S. Program:** Our on-line exit surveys are shared with key individuals such as the Executive Director, Graduate Coordinator, Student Services Coordinator, and IT Manager. We no longer post the results to our website due to the personal nature of some comments. Other types of assessment information (e.g., the results of the facilitated discussions after Semesters A, B, C and D) are not disseminated widely, but are available to SOF administrators and to the faculty who are involved in the specific courses.

**Graduate Programs:** There has been no formal dissemination of assessment results for our graduate programs in the last year, other than through sending the on-line exit survey to appropriate individuals and through discussions at curriculum committee and/or faculty meetings about specific issues raised about the program, mainly by our Graduate Coordinator.

4. In what ways have you **used assessment findings** to celebrate student achievements and/or to improve the curriculum this past year? (e.g. prizes to students, hosting student parties, changes to curriculum, student projects, learning goals, assessment strategies, etc.)

**B.S. Program:** The results of the facilitated discussions with students after Semesters A, B, C, and D are made available to the group of faculty responsible for teaching the course (both in the current year and for the next year). The group that teaches the course in the following year generally discuss the results in their pre-semester meetings and occasionally make adjustments of various types (e.g., how much to emphasize particular topics and how to avoid excessive redundancy). Beginning in the fall of 2008, several changes were made to Semester C that made the course more structured and challenging, which

is based to a large degree on comments received from students from the facilitated discussions and through other, more informal channels.

The most significant change in our curriculum since the last assessment report is the decision to eliminate almost all of our focus areas (8 out of 9) and replace them with a lower number of certificates (4 through the SOF and one that will be offered jointly with the Department of Biological Sciences). This was a direct result of the Sunset Review mentioned earlier and subsequent discussions of some of the information obtained through that review. These changes were submitted this academic year and recently approved by the UCC (the joint certificate is still pending), and will be implemented beginning in the fall of 2010.

**Graduate Programs:** Individual elements of the overall approach to assessment clearly are exercised on a regular basis. Perhaps the best example of this is the assessment of the learning outcomes as demonstrated by the quality of a student's thesis or dissertation. It is not uncommon that students are required to improve these documents following their assessment by their graduate committees. A number of minor changes to the graduate curriculum have been made since the last assessment report, in part based on feedback received from students. For example, in the last year we have made the following improvements to the graduate curriculum and related assessment efforts based in part on assessment feedback from students: 1) A new evaluation form for graduate assistants was developed and is being regularly implemented; 2) An out-dated and under-enrolled graduate degree option (Master of Forestry – Tropical Field Studies) was deleted; 3) A proposal to help graduate students by reducing the number of thesis/dissertation units in the semester of graduation from three to one was developed by the Graduate Coordinator and proposed to the University Graduate Council for approval (pending).

Bigger picture assessment (beyond that of the individual student's performance) of the graduate programs has been more limited recently, but with the next seven-year assessment due to begin by next spring, this will be changing soon.

5. Describe any changes to your assessment plans, or any challenges or educational experiences with the **assessment process** this past year that you would like to share.
  - a. Please submit any **revised/updated assessment plans** to the Office of Academic Assessment along with this report.

No changes have been made to the existing assessment plans since the last report. We expect that some changes will be proposed beginning next year, when we begin to make use of the new three-year cycle for assessment. Upcoming seven-year reviews and accreditation cycles are also likely to help drive a refinement of our existing plans, all of which date to 2004.



**ALTERNATIVE TABLE FORMAT:**

<b>Degree-Program Assessment Activities</b> Please list assessment activities and progress this past year for each program.	<b>Assessment Findings:</b> How well are your students achieving the <i>learning outcomes</i> assessed?	<b>Feedback:</b> How have faculty, staff, students, and/or other stakeholders been informed about your findings?	<b>Use of Findings:</b> How have you used these assessment findings to celebrate successes and/or to improve curriculum?

***(For additional rows, place cursor within last box and hit "Tab".)***

## **APPENDIX F**

**SAF Document C-1 Background Summary for Faculty Reporting to the Forestry Program Head**

**SAF Document D- Academic Summary for Faculty Reporting to the Forestry Program Head**

Document C-1: **Background Summary for Faculty Reporting to the Program Head**

Institution Name: Northern Arizona University

Academic Year: 2012-2013

Official Degree Program Title: Forestry

Official Option Title: N/A

Faculty Member	Academic Rank	12mo./9mo.	Major Field	Highest Degree Held Degree/Yr./Inst.	Experience (years)		
					Present Inst.	Other Inst.	Non-Academic
Allen, James	Professor; Executive Director	12 month	Forest and Wetland Ecology	Ph.D./1994/ Louisiana State University	7	6	17
Beier, Paul	Regents' Professor	9 month	Wildlife Ecology and Conservation Biology	Ph.D./1988/ University of California, Berkeley	21	6.25	.3
Bowker, Matthew	Assistant Professor	9 month	Forest Soils and Ecosystem Ecology	Ph.D./2006/Northern Arizona University (Biology)	1	0	8
Chambers, Carol	Professor	9 month	Wildlife Ecology	Ph.D./1996/ Oregon State University	17	8	0
Covington, Wally	Regents' Professor; Executive Director, ERI	9 month	Forest Ecology	Ph.D./1976/Yale University	38	0	0

Faculty Member	Academic Rank	12mo./9mo.	Major Field	Highest Degree Held Degree/Yr./Inst.	Experience (years)		
					Present Inst.	Other Inst.	Non-Academic
Dewhurst, Stephen	Associate Professor	9 month	Forest Management	Ph.D./1999/Northern Arizona University (Forestry)	15 <sup>8</sup>	8	2
Fox, Bruce	Professor	9 month	Forest Management	Ph.D./1980/University of Michigan	27	6	8
Fulé, Pete	Professor	9 month	Ecological Restoration and Fire Ecology	Ph.D./1996/ Northern Arizona University	15	0	4
Gaylord, Monica	Assistant Research Professor	9 month	Forest Entomology and Forest Health	Ph.D./2009/Northern Arizona University	3.5	0	5
Hofstetter, Rich	Associate Professor	9 month	Forest Entomology and Forest Health	Ph.D./2004/Dartmouth College	7	3	2
Hospodarsky, Denver	Associate Professor	9 month	Forest Sociology	Ph.D./1993/ Oregon State University	21	0	0
Huang, Ching-Hsun	Assistant Professor	9 month	Forest Economics and Management	Ph.D./1999/ Stephen F. Austin University	6	7	1
Hunter, Molly	Assistant Research Professor	9 month	Fire Ecology	Ph.D./2004/Colorado State University	6	4	2
Kim, Yeon-Su	Assistant Professor	9 month	Natural Resource Economics	Ph.D./1998/ Oregon State University	15	0	0

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8 Includes 5 years as a Research Specialist.

Faculty Member	Academic Rank	12mo./9mo.	Major Field	Highest Degree Held Degree/Yr./Inst.	Experience (years)		
					Present Inst.	Other Inst.	Non-Academic
Knight, Sandra	Instructor	Part-Time	English, Technical Writing	B.B.A./2009/University of Texas at Austin; current M.A. student at NAU	1	1	2
Kolb, Tom	Professor	9 month	Forest Ecology and Tree Physiology	Ph.D./1988/ Pennsylvania State University	20	5	0
Lee, Martha	Associate Professor	9 month	Wildland Recreation	Ph.D./1991/ Oregon State University	22	0	0
Mathiasen, Robert	Associate Professor	9 month	Forest Health, Forest Pathology	Ph.D./1977/ University of Arizona	23	1	9
Moore, Margaret	Professor	9 month	Forest and Range Ecology, Landscape Ecology, GIS/Remote Sensing	Ph.D./1987/University of Minnesota	27	3	0
Sánchez Meador, Andrew	Assistant Professor	9 month, 51% FTE	Forest Biometrics and Ecosystem Modeling	Ph.D./2006/Northern Arizona University (Forestry)	1	0	9
Teclé, Aregai	Professor	9 month	Hydrology and Decision Systems Analysis	Ph.D./1988/ University of Arizona	25	13.5	0
Thode, Andrea	Assistant Professor	9 month	Fire Ecology	Ph.D./2005/University of California, Davis	8	4	4
Wagner, Michael <sup>9</sup>	Regents' Professor Emeritus	9 month	Forest Entomology	Ph.D./1980/University of Wisconsin	33	0	2

<sup>9</sup> Retired, but still teach occasional sections of FOR 441.

Faculty Member	Academic Rank	12mo./9mo.	Major Field	Highest Degree Held Degree/Yr./Inst.	Experience (years)		
					Present Inst.	Other Inst.	Non-Academic
Waring, Kristen	Assistant Professor	9 month	Silviculture, Forest Health	Ph.D./2006/University of California, Berkeley	7	2	0.5

Document D: Academic Summary for Faculty Reporting to the Forestry Program Head

Institution Name: Northern Arizona University Academic Year: 2012-2013

Official Degree Program Title: Forestry

Official Option Title: \_\_\_\_\_

Term	Faculty Member	Budgeted Time Allocation (%)				All Courses Taught					
		Teaching	Research	Service	Other	Title and Course #	Required	Credit/ Contact Hours	Total Enrollment		# of Advisees
									Undergrad	Graduate	
	<b>Allen, James</b>	5	5		90					3	
Fa 2012					FOR 697 Independent Study		3		1		
Fa 2012					FOR 799 Dissertation		1		1		
Sp 2013					FOR 360 Natural Resources Policy	Yes	3	45			
Sp 2013					FOR 799 Dissertation		9		1		
Sp 2013					FOR 697 Independent Study		3		1		
	<b>Beier, Paul</b>	40	40	20						5	
Fa 2012					FOR 313 Forest Ecology I	Yes	4	55			
Fa 2012					FOR 314 Forest Ecology II	Yes	3	55			
Fa 2012					FOR 599 Contemporary Developments		3		7		
Fa 2012					FOR 689 Professional Paper		1		1		

Fa 2012					FOR 690 Research Methods		3		7	
Fa 2012					FOR 698 Graduate Seminar		1		8	
Fa 2012					FOR 799 Dissertation		1		1	
Sp 2013					FOR 504 Applied Conservation Biology		3		11	
Sp 2013					FOR 689 Professional Paper		1		1	
Sp 2013					FOR 698 Graduate Seminar		1		5	
Sp 2013					FOR 799 Dissertation		1		4	
	<b>Bowker, Matthew</b>	50	40	10						1
Fa 2012					FOR 313 Forestry Ecology I	Yes	4	55		
Fa 2012					FOR 314 Forest Ecology II	Yes	3	55		
Fa 2012					FOR 690 Research Methods		3		7	
Sp 2013					FOR 213 Ecology & Mgt of Forest Soils	Yes	3	22		
Sp 2013					FOR 213 Ecology & Mgt of Forest Soils	Yes	3	41		
	<b>Chambers, Carol</b>	60	30	10						4
Fa 2012					FOR 599 Contemporary Developments		3		7	
Fa 2012					FOR 697 Independent Study		3		1	
Fa 2012					FOR 698 Graduate Seminar		1		8	
Fa 2012					FOR 699 Thesis		1		0	
Sp 2013					FOR 799 Dissertation		1		1	
Sp 2013					FOR 323W Forest Management I	Yes	3	49		
Sp 2013					FOR 325W Forest Management III	Yes	3	49		
Sp 2013					FOR 693 Teaching Practicum		2		3	
Sp 2013					FOR 699 Thesis		1		1	
Sp 2013					FOR 799 Dissertation		1		1	



	<b>Dewhurst, Stephen</b>					<b>On sabbatical all of 2012-2013</b>					
	<b>Fox, Bruce</b>	70	20	10							0
Fa 2012						FOR 101 Forestry Introduction	Yes	3	35		
Fa 2012						FOR 250 Arizona Forests and Wildlife		3	36		
Fa 2012						FOR 250H Arizona Forests and Wildlife		3	5		
Fa 2012						FOR 413C Forest Ecosystem Assessment I	Yes	3	34		
Fa 2012						FOR 414C Forest Ecosystem Assesment II	Yes	3	34		
Fa 2012						FOR 485 Undergraduate Research		2	2		
Fa 2012						FOR 599 Contemporary Developments		3		7	
Sp 2013						FOR 222 Environmental Conservation		3	50		
Sp 2013						FOR 222 Environmental Conservation		3	41		
Sp 2013						FOR 323W Forest Management I	Yes	3	49		
Sp 2013						FOR 485 Undergraduate Research		1	2		
	<b>Fulé, Pete</b>	40	50	10							4
Fa 2012						FOR 313 Forest Ecology I	Yes	4	55		
Fa 2012						FOR 314 Forest Ecology II	Yes	3	55		
Fa 2012						FOR 382 Ecological Restoration		3	16		
Fa 2012						FOR 382H Ecological Restoration		3	3		
Fa 2012						FOR 697 Independent Study		1		0	
Fa 2012						FOR 485 Undergraduate Research		2	1		
Fa 2012						FOR 497 Independent Study		3	2		
Fa 2012						FOR 497 Independent Study		1	1		
Fa 2012						FOR 551 Fire Ecology and Management		3		14	
Fa 2012						FOR 582 Ecological Restoration App		3		7	
Fa 2012						FOR 697 Independent Study		3		1	
Fa 2012						FOR 697 Independent Study		3		1	

Fa 2012					FOR 699 Thesis		1		0	
Fa 2012					FOR 799 Dissertation		1		2	
Sp 2013					FOR 415 Forestry Developing Countries		3	14		
Sp 2013					FOR 485 Undergraduate Research		3	1		
Sp 2013					FOR 485 Undergraduate Research		3	1		
Sp 2013					FOR 515 Forestry Developing Countries		3		8	
Sp 2013					FOR 689 Professional Paper		3		1	
Sp 2013					FOR 697 Independent Study		3		1	
Sp 2013					FOR 697 Independent Study		3		1	
Sp 2013					FOR 699 Thesis		1		0	
Sp 2013					FOR 799 Dissertation		1		2	
	<b>Gaylord, Monica</b>		95	5						0
Fa 2012					FOR 212 Trees and Forests of N. America	Yes	2	34		
Sp 2013					FOR 222 Environmental Conservation		3	40		
	<b>Hofstetter, Rich</b>	60	30	10						4
Fa 2012					FOR 485 Undergraduate Research		3	3		
Fa 2012					FOR 505 Forestry Seminars		1		10	
Fa 2012					FOR 692 Proseminar I		2		6	
Fa 2012					FOR 695 Advanced Studies in Forestry		3		1	
Fa 2012					FOR 699 Thesis		9		1	
Sp 2013					FOR 799 Dissertation		9		1	
Sp 2013					FOR 453 Forest Insects		3	17		
Sp 2013					FOR 485 Undergraduate Research		2	3		
Sp 2013					FOR 505 Forestry Seminar		1		10	
Sp 2013					FOR 553 Forest Entomology		3		8	

Sp 2013					FOR 699 Thesis		9		2	
Sp 2013					FOR 799 Dissertation		9		1	
	<b>Hospodarsky, Denver</b>	70	10	20						1
Fa 2012					FOR 211 Forest Measurements					
Fa 2012					FOR 211 Forest Measurements	Yes	3	23		
Fa 2012					FOR 211 Forest Measurements	Yes	3	24		
Fa 2012					FOR 447 Forestry and Community		3	12		
Sp 2013					FOR 101 Forestry Introduction	Yes	3	22		
Sp 2013					FOR 101 Forestry Introduction	Yes	3	22		
Sp 2013					FOR 283 Forestry in the Wui		3	15		
Sp 2013					FOR 423C Forest Ecosystem Planning I	Yes	3	32		
Sp 2013					FOR 424C Forest Ecosystem Planning II	Yes	3	32		
Sp 2013					FOR 689 Professional Paper		4		1	
	<b>Huang, Ching</b>	60	30	10						2
Fa 2012					FOR 101 Forestry Introduction	Yes	3	48		
Fa 2012					FOR 500 Ecosystem Sci & Mgt Principles		3		6	
Fa 2012					FOR 799 Dissertation		9		0	
Sp 2013					FOR 101 Forestry Introduction	Yes	3	50		
Sp 2013					FOR 324W Forest Management II	Yes	3	49		
Sp 2013					FOR 324W Forest Management II	Yes	3	49		
Sp 2013					FOR 326W Forest Management IV	Yes	4	49		
Sp 2013					FOR 326W Forest Management IV	Yes	4	49		
Sp 2013					FOR 799 Dissertation		9		1	
	<b>Hunter, Molly</b>		60	40						2
Fa 2012					FOR 310 Forest Ecol for Professionals		3	7		

Fa 2012					FOR 310 Forest Ecol for Professionals		3	7		
Sp 2013					FOR 450 Fire Ecology for Professionals		3	7		
Sp 2013					FOR 450 Fire Ecology for Professionals		3	7		
	<b>Kim, Yeon-Su</b>	60	30	10						2
Fa 2012					FOR 222 Environmental Conservation		3	60		
Fa 2012					FOR 222 Environmental Conservation		3	55		
Fa 2012					FOR 255 International Wildlife Issues		3	60		
Fa 2012					FOR 799 Dissertation		9		1	
Sp 2013					FOR 423C Forest Ecosystem Planning I	Yes	3	32		
Sp 2013					FOR 424C Forest Ecosystem Planning II	Yes	3	32		
Sp 2013					FOR 633 Ecological Economics		3		11	
Sp 2013					FOR 699 Thesis		9		0	
Sp 2013					FOR 799 Dissertation		9		1	
	<b>Knight, Sandra</b>	n/a	n/a	n/a						n/a
Fa 2012					FOR 215 Writing in Forestry	Yes	2	23		
Sp 2013					FOR 215 Writing in Forestry	Yes	2	24		
Sp 2013					FOR 215 Writing in Forestry	Yes	2	19		
	<b>Kolb, Thomas</b>	50	30	20						3
Fa 2012					FOR 313 Forestry Ecology I	Yes	4	55		
Fa 2012					FOR 313 Forestry Ecology I	Yes	4	55		
Fa 2012					FOR 314 Forest Ecology II	Yes	3	55		
Fa 2012					FOR 315 Silviculture Principles	Yes	3	53		
Fa 2012					FOR 316 Silviculture Applications	Yes	3	53		
Fa 2012					FOR 550 Forest Tree Ecophysiology		3		10	
Fa 2012					FOR 699 Thesis		9		0	
Fa 2012					FOR 799 Dissertation		9		1	

Sp 2013					FOR 212 Trees and Forests of N. America	Yes	2	93		
Sp 2013					FOR 454 Forest Health		3	13		
Sp 2013					FOR 554 Integrated Forest Health		3		9	
Sp 2013					FOR 695 Advanced Studies in Forestry		3		6	
Sp 2013					FOR 699 Thesis		9		0	
Sp 2013					FOR 799 Dissertation		9		1	
	<b>Lee, Marty</b>	70	20	10						4
Fa 2012					FOR 101 Forestry Introduction	Yes	3	28		
Fa 2012					FOR 203 Project Learning Tree		1	16		
Fa 2012					FOR 207 Project Wet		1	19		
Fa 2012					FOR 444 Wilderness Mgt Professionals		3	10		
Fa 2012					FOR 444 Wilderness Mgt Professionals		3	10		
Fa 2012					FOR 445 Wilderness Management		3	22		
Fa 2012					FOR 445H Wilderness Management H		3	1		
Fa 2012					FOR 689 Professional Paper		4		1	
Fa 2012					FOR 697 Independent Study		3		3	
Fa 2012					FOR 699 Thesis		9		0	
Sp 2013					FOR 203 Project Learning Tree		1	25		
Sp 2013					FOR 207 Project Wet		1	25		
Sp 2013					FOR 230 Multicult Prspcts Nat Res Mgt		3	32		
Sp 2013					FOR 325W Forest Management III	Yes	3	49		
Sp 2013					FOR 325W Forest Management III	Yes	3	49		
Sp 2013					FOR 326W Forest Management IV	Yes	4	49		
Sp 2013					FOR 326W Forest Management IV	Yes	4	49		
Sp 2013					FOR 689 Professional Paper		3		1	
Sp 2013					FOR 699 Thesis		9		0	

	<b>Mathiasen, Robert</b>	40	50	40							2
Fa 2012					FOR 101 Forestry Introduction	Yes	3	47			
Fa 2012					FOR 452 Forest Pathology		3	7			
Fa 2012					FOR 452 Forest Pathology		3	7			
Fa 2012					FOR 552 Forest Tree Diseases		3		1		
Fa 2012					FOR 552 Forest Tree Diseases		3		1		
Fa 2012					FOR 799 Dissertation		9		1		
Sp 2013					FOR 101 Forestry Introduction	Yes	3	90			
Sp 2013					FOR 250 Arizona Forests and Wildlife		3	27			
Sp 2013					FOR 454 Forest Health		3	13			
Sp 2013					FOR 554 Intregrated Forest Health		3		9		
Sp 2013					FOR 799 Dissertation		9		1		
	<b>Miller, Cheryl</b>	n/a	n/a	n/a							n/a
Fa 2012					FOR 204 Project Wild		1	16			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	21			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	24			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	21			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	22			
Sp 2013					FOR 204 Project Wild		1	26			
Sp 2013					FOR 423C Forest Ecosystem Planning I	Yes	3	32			
Sp 2013					FOR 424C Forest Ecosystem Planning II	Yes	3	32			
	<b>Moore, Margaret</b>	50	40	10							6
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	21			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	24			
Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	21			

Fa 2012					FOR 220 Intro to Forest/Range Plants	Yes	2	22		
Fa 2012					FOR 313 Forestry Ecology I	Yes	4	55		
Fa 2012					FOR 314 Forest Ecology II	Yes	3	55		
Fa 2012					FOR 697 Independent Study		1		1	
Fa 2012					FOR 697 Independent Study		1		1	
Fa 2012					FOR 699 Thesis		9		2	
Fa 2012					FOR 799 Dissertation		9		1	
Sp 2013					FOR 545 Rangeland Ecology & Mgmt		3		16	
Sp 2013					FOR 699 Thesis		9		1	
Fa 2012					FOR 689 Professional Paper		2		1	
Sp 2013					FOR 799 Dissertation		9		1	
	<b>Sánchez-Meador, Andrew</b>	30	15	5						1
Fa 2012					FOR 316 Silviculture Applications	Yes	3	53		
Fa 2012					FOR 485 Undergraduate Research		3	1		
	<b>Teclé, Aregai</b>	50	30	20						1
Fa 2012					FOR 222 Environmental Conservation		3	40		
Fa 2012					FOR 222 Environmental Conservation		3	23		
Fa 2012					FOR 699 Thesis		9		2	
Fa 2012					FOR 799 Dissertation		9		0	
Sp 2013					<b>On medical leave</b>					
	<b>Thode, Andrea</b>	60	30	10						8
Fa 2012					FOR 251 Introduction to Wildland Fire		3	20		
Fa 2012					FOR 699 Thesis		9		0	
Sp 2013					FOR 251 Introduction to Wildland Fire		3	26		
Sp 2013					FOR 451 Fire Ecology and Management		3	23		

Sp 2013					FOR 699 Thesis		9		0	
	<b>Wagner, Michael</b>	n/a	n/a	n/a						1
Fa 2012					FOR 689 Professional Paper		4		1	
	<b>Waring, Kristen</b>				<b>On sabbatical all of 2012-2103</b>					4
	<b>Yocom, Larissa</b>	n/a	n/a	n/a						n/a
Fa 2012					FOR 101 Forestry Introduction	Yes	3	31		
Sp 2013					FOR 317 Silviculture And Fire Apps		3	9		



## **APPENDIX G**

**School of Forestry Adjunct Faculty**

School of Forestry Adjunct Faculty

<b>Adjunct Faculty Member</b>	<b>Highest Degree</b>	<b>Employer</b>	<b>Area of Expertise</b>
Scott Abella	Ph.D., Northern Arizona University	University of Nevada Las Vegas	Ecological Restoration
Ernesto Alvarado	Ph.D., University of Washington	University of Washington	Wildland Fire Science, International Forestry
William Block	Ph.D., University of California, Berkeley	USDA Forest Service	Wildlife Ecology
Paul Bosu	Ph.D., Northern Arizona University	Ghana Forest Research Institute	Entomology
Peter Brown	Ph.D., Colorado State University	Rocky Mountain Tree-Ring Research Inc.	Forest Sciences, Watershed Management
Samuel Cushman	Ph.D., University of Massachusetts	USDA Forest Service	Landscape Ecology
Dennis Dye	Ph.D., University of Maryland	US Geological Survey	Geography (Remote Sensing and Biogeography/ Bioclimatology)
Lawrence Fisher	Ph.D., Cornell University	University of Arizona	Environmental Conflict resolution, Community Development
Paulette L. Ford	Ph.D., University of Arizona	USDA Forest Service	Disturbance/Ecosystem Ecology,
Joseph L. Ganey	Ph.D., Northern Arizona University	USDA Forest Service	Wildlife management, Zoology
Gerald J. Gottfried	Ph.D., University of Arizona	USDA Forest Service	Silviculture
Andrew Graves	Ph.D., University of Minnesota	USDA Forest Service	Entomology, Forest Management
Teryl G. Grubb	M.S., University of Washington	USDA Forest Service	Wildlife Biology
Ryan Hanavan	Ph.D., University of Idaho	USDA Forest Service	Entomology
Stephen C. Hart	Ph.D., University of California, Berkeley	University of California, Merced	Soil Science, Ecosystem Ecology
Karen Haubensak	Ph.D., University of California, Berkeley	NAU, Merriam-Powell Institute	Soil Science, Ecosystem Ecology
David W. Huffman	Ph.D., Northern Arizona University	Ecological Restoration Institute	Forest Restoration
Michael Ingraldi	Ph.D., Northern Arizona University	Arizona Game and Fish Department	Wildlife and Wetland Research, Survey, and Monitoring
Robert Keane	Ph.D., University of	USDA Forest Service	Wildland Fire Science

	Idaho		
Daniel Laughlin	Ph.D., Northern Arizona University	University of Waikato	Plant Ecology
Christopher M. McGlone	Ph.D., Northern Arizona University	US Geological Survey	Fire Ecology, Invasive Species
Joel McMillin	Ph.D., Northern Arizona University	USDA Forest Service	Forest Health, Entomology
Mario Montes-Helu	Ph.D., New Mexico State University	Northern New Mexico College	Soil Physics, Tree Ecophysiology
Daniel G. Neary	Ph.D., Michigan State University	USDA Forest Service	Riparian and Wetland Ecosystems, Forest Soils, Fire Effects
Steven T. Overby	Ph.D., Northern Arizona University	USDA Forest Service	Soil Science
Steve Rosenstock	M.S., Colorado State University	Northern Arizona University	Wildlife Management
Carolyn Sieg	Ph.D., Texas Tech University	USDA Forest Service	Range and Wildlife Management
Robert Steidl	Ph.D., Oregon State University	University of Arizona	Wildlife Conservation and Management
Ines Talamantez	Ph.D., University of California, San Diego	University of California, Santa Barbara	Indigenous Cultures and Traditional Ecological Knowledge
John VanKat	Ph.D., University of California	Miami University of Ohio (Retired)	Plant Community and Landscape Ecology
Christina Vojta (Hargis)	Ph.D., Utah State University	USDA Forest Service	Wildlife Management
Amy Waltz	Ph.D., Northern Arizona University	Ecological Restoration Institute	Fire Ecology

## APPENDIX H

### SAF Document E- Individual Faculty Information

- JAMES A. ALLEN
- PAUL BEIER
- MATT A. BOWKER
- CAROL L. CHAMBERS-SPECIALIZATIONS
- WILLIAM W. COVINGTON
- STEPHEN M. DEWHURST
- BRUCE E. FOX
- PETER Z. FULE
- MONICA L. GAYLORD
- RICHARD HOFSTETTER
- DENVER C. HOSPODARSKY
- CHING-HSUN HUANG
- MOLLY E. HUNTER
- YEON-SU KIM
- THOMAS E. KOLB
- MARTHA E. LEE
- ROBERT L. MATHIASEN
- MARGARET M. MOORE
- ANDREW J. SANCHEZ-MEADOR
- AREGAI TECLE
- ANDREA E. THODE
- KRISTEN M. WARING

## Document E: Individual Faculty Information

### JAMES A. ALLEN

Executive Director – 12 month - Tenured

Date of Appointment: 2006 - Present

Specializations: Wetland Ecology & Management

**Northern Arizona University-School of Forestry**

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### EDUCATION:

- 1994 Ph.D. Forest Ecology, Louisiana State University, Baton Rouge, LA  
Dissertation title: *Intraspecific Variation in the Response of Baldcypress (*Taxodium distichum*) Seedlings to Salinity*
- 1986 M.S. Natural Resource Policy and Planning, Cornell University, Ithaca, NY  
Thesis title: *Fuelwood Policies for Swazi Nation Land: Farm and Community Approaches for Fuelwood Production*
- 1980 B.S. Forestry and Wildlife, Virginia Polytechnic Institute, Blacksburg, VA  
A.A.S., Pre-Professional Forestry, 1978, Paul Smith's College, Paul Smiths, NY

### PROFESSIONAL AND RESEARCH EXPERIENCE:

- 2006/Present Executive Director (7/08 - present); Interim Executive Director (3/07 - 6/08); Associate Director (7/06 - 3/07) Professor (8/08 - present); Associate Professor (7/06 - 2008) School of Forestry, Northern Arizona University, Flagstaff, AZ
- 2000/2006 Dean (7/00 – 6/06) Associate Professor (7/00 - 8/05); Professor (8/05 - 7/06) Forestry, Natural Resources and Recreation Division (now the School of Forestry and Natural Resources), Paul Smith's College, Paul Smiths, NY
- 1996/2000 Research Ecologist/Forester  
Institute of Pacific Islands Forestry, U.S.D.A. Forest Service, Honolulu, HI
- 1986/1996 Research Ecologist National Wetlands Research Center,  
U.S. Fish and Wildlife Service, Slidell/Lafayette, LA
- 1984/1986 Teaching Assistant Department of Natural Resources,  
Cornell University, Ithaca, NY
- 1981/1984 Peace Corps Volunteer (Forestry) Swaziland

### TEACHING EXPERIENCE:

2000/Present Taught an average of two undergraduate courses or sections per semester from September, 2000 to May 2006 at Paul Smith's College and one undergraduate, graduate or co-convened course in 2008, 2009, 2010, 2011, 2012, and 2013 at NAU.

PSC: Dendrology Lab 131

PSC: Forest Health 221

PSC: Introduction to Wildlife Management 232

PSC: Capstone Planning 331

PSC: New Paradigms in Forestry 331

PSC: Advanced Silviculture 432

NAU: Natural Resources Policy (FOR 360)

NAU: Forestry in Developing Countries (FOR 415/515) (co-taught)

NAU: Wetland Ecology and Management (FOR 560)

### **PUBLICATIONS: (*Listed in reverse chronological order*)**

#### **PEER-REVIEWED JOURNAL ARTICLES:**

Ramstead, K.M., J.A. Allen and A.E. Springer. 2012. Have wet meadow restoration projects in the Southwestern U.S. been effective in restoring geomorphology, hydrology, soils, and plant species composition? *Environmental Evidence* 1(11): 1-16.

Krauss, K.W., D.R. Cahoon, J.A. Allen, J.C. Lynch, N.C. Cormier and K.C. Ewel. 2010. Surface elevation change and susceptibility of different mangrove zones to sea-level rise on Pacific high islands of Micronesia. *Ecosystems* 13: 129-143.

Woodcock, T, C. Evans, C. Laxson, R. Tucker, J. Allen, J. Mihuc, E. Allen and T. Mihuc. 2008. Land use designation and vegetation community structure in the Adirondack uplands (New York, USA). *Applied Vegetation Science* 11: 509-520.

K.W. Krauss, B.D. Keeland, J.A. Allen, K.C. Ewel and D.J. Johnson. 2007. Effects of season, rainfall, and hydro geomorphic setting on mangrove tree growth in Micronesia. *Biotropica* 39: 161-170.

Allen, J.A. and K.W. Krauss. 2006. The influence of propagule flotation longevity and light availability on the establishment of introduced mangrove species in Hawaii. *Pacific Science* 60: 367-376.

Allen, J.A., K.W. Krauss, K.C. Ewel, B.D. Keeland and E.E. Waguk. 2005. A tropical freshwater wetland: I. Structure, growth, and regeneration patterns. *Wetland Ecology and Management* 13: 657-669.

Allen, J.A., K.W. Krauss, and R.D. Hauff. 2003. Factors limiting the intertidal distribution of the mangrove species *Xylocarpus granatum*. *Oecologia* 135: 110-121.

Krauss, K.W. and J.A. Allen. 2003. Factors influencing the regeneration of the mangrove, Bruguiera gymnorrhiza (L.) Lamk., on a tropical Pacific island. *Forest Ecology and Management* 176: 49-60.

Krauss, K.W. and J.A. Allen. 2003. Influences of salinity and shade on seedling photosynthesis and growth of two mangrove species, Rhizophora mangle and Bruguiera sexangula, introduced in Hawaii. *Aquatic Botany* 77: 311-324.

Krauss, K.W., J.A. Allen and D.R. Cahoon. 2003. Differential rates of vertical accretion and elevation change among aerial root types in Micronesian mangrove forests. *Estuarine, Coastal and Shelf Science* 56: 251-259.

Allen, J.A., K.C. Ewel, and J. Jack. 2001. Patterns of natural and anthropogenic disturbance of the mangroves on the Pacific Island of Kosrae. *Wetland Ecology and Management* 9: 291-301.

Allen, J.A., K.C. Ewel, B.D. Keeland, T. Tara, and T.J. Smith, III. 2000. Downed wood in Micronesian mangrove forests. *Wetlands* 20: 169-176.

Allen, J.A., K.W. Krauss, N.C. Duke, O. Bjorkman, D.R. Herbst, and C. Shih. 2000. Bruguiera species in Hawaii: Systematic considerations and ecological implications. *Pacific Science* 54: 331-343.

Krauss, K.W., J.L. Chambers, J.A. Allen, D.M. Soileau, Jr., and A. DeBosier. 2000. Growth and nutrition of baldcypress families planted under varying salinity regimes in Louisiana, USA. *Journal of Coastal Research* 16: 153-163.

Cox, E.F. and J.A. Allen. 1999. Stand structure and productivity of the introduced Rhizophora mangle in Hawaii. *Estuaries* 22: 276-284.

Krauss, K.W., J.L. Chambers, J.A. Allen, B. Luse, and A. DeBosier. 1999. Root and shoot responses of Taxodium distichum seedlings subjected to saline flooding. *Environmental and Experimental Botany* 41: 15-23.

Allen, J.A. 1998. Mangroves as alien species: The case of Hawaii. *Global Ecology and Biogeography Letters* 7: 61-71.

King, S.L., J.A. Allen, and J.W. McCoy. 1998. Long-term effects of a lock and dam and greentree reservoir management on a bottomland hardwood forest. *Forest Ecology and Management* 112: 213-226.

Krauss, K.W., J.L. Chambers, and J.A. Allen. 1998. Salinity effects and differential germination of several half-sib families of baldcypress from different seed sources. *New Forests* 15: 53-68.

Allen, J.A. 1997. Reforestation of bottomland hardwoods and the issue of woody species diversity. *Restoration Ecology* 5: 125-134.

Allen, J.A., J.L. Chambers, and S.R. Pezeshki. 1997. Effects of salinity on baldcypress seedlings: Physiological responses and their relation to salinity tolerance. *Wetlands* 17: 310-320.

Allen, J.A., S.R. Pezeshki, and J.L. Chambers. 1996. Interaction of flooding and salinity stresses on baldcypress (*Taxodium distichum*). *Tree Physiology* 16: 307-313.

King, S.L. and J.A. Allen. 1996. Plant succession and greentree reservoir management: Implications for management and restoration of bottomland hardwood wetlands. *Wetlands* 16: 503-511.

Allen, J.A., J.L. Chambers, and D. McKinney. 1994. Intraspecific variation in the response of *Taxodium distichum* seedlings to salinity. *Forest Ecology and Management* 70: 203-214.

Allen, J.A., J.L. Chambers, and M. Stine. 1994. Prospects for increasing the salt tolerance of forest trees: A review. *Tree Physiology* 14: 843-853.

Allen, J.A. 1990. Establishment of bottomland oak plantations on the Yazoo National Wildlife Complex. *Southern Journal of Applied Forestry* 14(4): 206-210.

Allen, J.A. 1990. Homestead tree planting practices in two rural Swazi communities. *Agroforestry Systems* 11: 11-22.

Allen, J.A., D.P. Pimentel, and J.A. Lassoie. 1988. Fuelwood production and use in Swaziland: A case study of two rural communities. *Forest Ecology and Management* 25(3/4): 239-254.

Pimentel, D., J. Allen, A. Beers, L. Guinand, R. Linder, P. McLaughlin, B. Meer, D. Musonda, D. Perdue, S. Poisson, S. Siebert, K. Stoner, R. Salazar, and A. Hawkins. 1987. World agriculture and soil erosion. *Bioscience* 37(4): 277-283.

Bleys, J.A., W.K.M. Mazibuko, and J.A. Allen. 1982. The silviculture of indigenous and exotic trees other than pines and eucalypts in Swaziland. *South African Forestry Journal* 121: 24-28.

#### **CONFERENCE PROCEEDINGS:**

Allen, J.A. and K.M. Ramstead. 2010. High-elevation wet meadows in Arizona: Distribution, threats and biodiversity. Pages 21-25 in P.F. Ffolliott (ed.), *Hydrology and Water Resources of Arizona and the Southwest*, Volume 40, Proceedings of the 2010 Meetings of the Hydrology Section, Arizona-Nevada Academy of Science, April 10, Northern Arizona University, Flagstaff, AZ.

McCoy, J.W., B.D. Keeland, and J.A. Allen. 1999. Atlantic white cedar plantings in St. Tammany Parish, Louisiana and the Bogue Chitto National Wildlife Refuge, Mississippi. Pages 36-41 in T.H. Shear and K.O. Summerville (eds.), *Proceedings: Atlantic White-Cedar: Ecology and Management Symposium*, Newport News, VA, August 6-7, 1997. General Technical Report SRS-27, USDA Forest Service, Southern Forest Experiment Station, Asheville, NC.



Allen, J.A., J. McCoy, and B.D. Keeland. 1998. Natural establishment of woody species on abandoned agricultural fields in the Lower Mississippi Valley: First- and second-year results. Pages 263-268 in T.A. Waldrop (ed.), Proceedings of the Ninth Biennial Southern Silvicultural Research Conference, Clemson, SC, February, 1997. General Technical Report SRS-20, USDA Forest Service, Southern Forest Experiment Station, Asheville, NC.

Allen, J.A. and V. Burkett. 1997. Bottomland hardwood restoration: Overview of techniques, success, and failures. Pages 328-332 in J.A. Kusler, D.E. Willard, and H.C. Hull, Jr. (eds.), Wetlands and Watershed Management: Science Applications and Public Policy. Proceedings of the Watershed Management and Wetland Ecosystems Symposium, Tampa, FL, April 23-26, 1995. Association of State Wetland Managers, Inc., Berne, NY.

Keeland, B.D., M.A. Towson, and J.A. Allen. 1996. Effects of flooding and herbivory on baldcypress seedlings planted at Caddo Lake, TX: First-year results. Pages 44-48 in K.M. Flynn (ed.), Proceedings of the Southern Forested Wetlands Ecology and Management Conference, March 25-27, Clemson, SC. Consortium for Research on Southern Forested Wetlands, Clemson, SC.

Krauss, K., J.L. Chambers, and J.A. Allen. 1996. Intraspecific variation in the physiological response of baldcypress (Taxodium distichum (L.) Rich.) to a rapid influx of saltwater. Pages 183-189 in K.M. Flynn (ed.), Proceedings of the Southern Forested Wetlands Ecology and Management Conference, March 25-27, Clemson, SC. Consortium for Research on Southern Forested Wetlands, Clemson, SC.

Allen, J.A. 1991. The role of river corridors as fish and wildlife habitat: Implications for management and restoration. Pages 75-80 in Multi-objective river planning: Proceedings of the urban stream corridor and stormwater management workshop, Colorado Springs, CO, March 14-16, 1989 and the multi-objective management of river corridors and their restoration workshop, Knoxville, TN, March 21-23, 1989. Association of State Floodplain Managers, Inc., Madison, WI.

Allen, J.A. 1990. A modelling approach for assessing tree species composition and habitat suitability changes in forested wetlands. Pages 18-35 in Best management practices for forest wetlands: Concerns, assessment, regulation and research. National Council of the Paper Industry for Air and Stream Improvement (NCASI) Technical Bulletin No. 583. (From a paper presented at the NCASI Southern Regional Meeting, Asheville, NC, June 12-14, 1989).

Howard, R.J. and J.A. Allen. 1989. Streamside habitats in southern forested wetlands: Their role and implications for management. Pages 97-106 in Proceedings of the symposium on the forested wetlands of the southern United States. Orlando, Florida, July 12-14, 1988. U.S.D.A. Forest Service Southeastern Forest Experiment Station General Technical Report SE-50, Asheville, North Carolina.

Allen, J.A., J.T. Teaford, E.C. Pendleton, and M. Brody. 1988. Evaluation of greentree reservoir management options in Arkansas. Transactions of the 53rd North American Wildlife and Natural Resources Conference 53: 471-480.

## MISCELLANIOUS PUBLICATIONS:

Kim, Y-S, B. Fox, J. Allen and M. Wagner. 2011. Preparing foresters for a career in global forestry. *Journal of Forestry* 109: 548. (Published abstract of presentation given at the Society of American Foresters Annual Convention, Honolulu, HI, November 2-6).

Kurmes, E. and J. Allen. 2008. *School of Forestry: Celebrating a half-century of teaching, research, and innovation.* Northern Arizona University School of Forestry, Flagstaff, AZ. 33 pp.

Allen, J.A., J. Wessman, and D.J. Twedt. 2006. Restoration of understory trees on bottomland hardwood sites (Mississippi). *Ecological Restoration* 24: 111-112.

Allen, J.A. 2003. (Species summaries, see titles and page numbers below). In J.A. Vozzo (ed.), *Tropical Tree Seed Manual.* U.S.D.A. Forest Service, Agricultural Handbook 721.

<u>Acacia koa</u> A. Gray (253-255)	<u>Laguncularia racemosa</u> (L.) Gaertn. f. (537-539)
<u>Calophyllum inophyllum</u> L. (357-359)	<u>Cocos nucifera</u> L. (399-401)
<u>Metrosideros polymorpha</u> Gaud. (569-571)	<u>Cordia subcordata</u> Lam. (418-419)
<u>Rhizophora mangle</u> L. (690-692)	<u>Hibiscus tiliaceus</u> L. (508-510)
<u>Santalum freycinetianum</u> Gaud. (705-707)	

Allen, J.A., B.D. Keeland, H.E. Kennedy, Jr., and A.F. Clewell. 2001. *A guide to bottomland hardwood restoration.* U.S. Geological Survey, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0011, and USDA Forest Service, Southern Research Station General Technical Report SRS-40. 132 pp.

Krauss, K.W., R.A. Goyer, J.A. Allen, and J.L. Chambers. 2000. Tree shelters effective in coastal swamp restoration (Louisiana). *Ecological Restoration* 18: 200-201.

Allen, J.A. 1999. Research on the ecology and management of Micronesian mangroves. *Society of Wetland Scientists Bulletin* 16(2): 6-7.

Allen, J.A., W.H. Conner, R.A. Goyer, J.L. Chambers and K.W. Krauss. 1998. Freshwater forested wetlands. Pages 33-44 in G.R. Guntenspergen and B.A. Vairin (eds.), *Vulnerability of coastal wetlands in the southeastern United States: Climate change research results.* U.S. Geological Survey Science Report USGS/BRD/BSR-1998-0002.

Krauss, K.W., J.L. Chambers, J.A. Allen, B. Luse, and A. DeBosier. 1998. Intraspecific variation in the root elongation of baldcypress subjected to saline flooding. Page 309 in T.A. Waldrop (ed.), *Proceedings of the Ninth Biennial Southern Silvicultural Research Conference,* Clemson, SC, February, 1997. General Technical Report SRS-20, USDA Forest Service, Southern Forest Experiment Station, Asheville, NC. (Published abstract).

Allen, J.A. and V.R. Burkett. 1997. Salt tolerance of southern baldcypress. U.S. Geological Survey, Biological Resources Division, USGS FS-092-97. 2 pp.

Allen, J.A. 1995. Treeshelters in Louisiana coastal swamps: An update. *Restoration and Management Notes* 13(1): 123.

Allen, J.A. 1995. Treeshelters seem effective in reducing nutria damage in Louisiana coastal swamps. *National Biological Service Research Information Bulletin*, No. 7. 2 pp.

Allen, J.A. and V. Burkett. 1995. The National Biological Service: An emphasis on partnerships. *Journal of Forestry* 95(3): 15-17.

Keeland, B.D., J.A. Allen and V.V. Burkett. 1995. Southern forested wetlands. Pages 216-218 in E.T. LaRoe (ed.), *Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals and ecosystems*. National Biological Service, Washington, D.C.

Allen, J.A. 1993. From backwater to mainstream? *Journal of Forestry* 91(11): 68.

Allen, J.A. 1992. Cypress-tupelo swamp restoration in southern Louisiana. *Restoration and Management Notes* 10(2): 188-189.

Allen, J.A. and W. Norling. 1992. Nest site characteristics of the American swallow-tailed kite. *U.S. Fish and Wildlife Service Research Information Bulletin*, No. 3. 3 pp.

Allen, J.A. and W. Norling. 1992. Species profile: American swallow-tailed kite. *Louisiana Conservationist* 44(2): 29-30. March/April issue.

Allen, J.A. and J. Wessman. 1991. Understory tree planting may enhance bottomland hardwood reforestation sites. *U.S. Fish and Wildlife Service Research Information Bulletin* No. 91-31, March. 2 pp.

Allen, J.A. and R. Boykin. 1991. Tree shelters help protect seedlings from nutria (Louisiana). *Restoration and Management Notes* 9(2): 122-123.

Allen, J.A. 1990. Case study: Fuelwood consumption in Swaziland. Page 65 in *Report on the Seminar on Forestry Statistics in Africa, Blantyre, Malawi, 12-25 November, 1989*. U.N. Food and Agriculture Organization, Rome. (Published abstract).

Allen, J.A. 1990. Comparison of two planting methods for bottomland oaks. *U.S. Fish and Wildlife Service Research Information Bulletin* No. 90-48, April. 2 pp.

Allen, J.A. 1990. Design and execution of fuelwood consumption surveys. Pages 37-54 in *Report on the Seminar on Forestry Statistics in Africa, Blantyre, Malawi, 12-25 November, 1989*. U.N. Food and Agriculture Organization, Rome. (Published lecture notes).

White, T.A., J.A. Allen, S.F. Mader, D.L. Mengel, D.M. Perison, and D.T. Tew (eds.). 1990. *MiST: A methodology to classify pre-project mitigation sites and develop performance standards for construction and restoration of forested wetlands: Results of an EPA-sponsored workshop*. Hardwood Research Cooperative, NC State University, Raleigh, NC. 85 pp.

Allen, J.A. and H. Beierman. 1989. Fertilization has mixed effect on planted Nuttall oak seedlings. U.S. Fish and Wildlife Service Research Information Bulletin No. 89-115, December. 2pp.

Allen, J.A. and H.E. Kennedy, Jr. 1989. Bottomland hardwood reforestation in the Lower Mississippi Valley. U.S. Fish and Wildlife Service and U.S. Forest Service. Slidell, LA. 28 pp.

Rockwell, E.D. and J.A. Allen. 1989. Passaic River Basin Study: New Jersey and New York: Protection of forested wetlands in the Passaic River basin. U.S. Fish and Wildlife Service Planning Aid Report. Absecon, New Jersey. 46 pp.

Allen, J.A. 1988. FORFLO model used to evaluate greentree reservoir management practices. U.S. Fish and Wildlife Service Research Information Bulletin No. 88-55, July. 2 pp.

Haynes, R.J., J.A. Allen, and E.C. Pendleton. 1988. Reestablishment of bottomland hardwood forests on disturbed sites: An annotated bibliography. U.S. Fish and Wildlife Service Biological Report 88(42). 104 pp.

#### **SIGNIFICANT UNPUBLISHED PAPERS AND REPORTS:**

Chambers, J.L., K.W. Krauss, J.A. Allen, K. Velupillai, A.S. DeBosier, D.M. Soileau, and B. Luse. 1998. Restoration of baldcypress in areas subjected to saltwater intrusion along the Louisiana Gulf Coast. Final Report: Cooperative Agreement #1445-0004095-9104, U.S.G.S. Biological Resources Division, National Wetlands Research Center.

Allen, J.A., J. McCoy, and S.L. King. 1997. Felsenthal greentree reservoir monitoring study: Summary of 1995 remeasurements. U.S. Geological Survey, National Wetlands Research Center, unpubl. report. 57 pp. + appendices.

Allen, J.A. 1995. Progress report: Cooperative Bottomland Hardwood Restoration Research Project. U.S. Fish and Wildlife Service, National Wetlands Research Center. 48 pp.

Allen, J.A. 1992. Felsenthal greentree reservoir monitoring study: Summary of 1990 remeasurements. U.S. Fish and Wildlife Service, National Wetlands Research Center, unpubl. report. 70 pp. + appendices.

Allen, J.A. and T. Doyle. 1990. The FORFLO modeling program at the National Wetlands Research Center: Current status and future directions. U.S. Fish and Wildlife Service, National Wetlands Research Center, unpubl. internal report. 30 pp.

U.S. Fish and Wildlife Service. Undated. Guidelines for modifying the John Deere 7100 Max-Emerge planter to plant acorns. (This mimeographed document was prepared by J. Wessman, C. Carnathan, and myself as a handout for farmers and others interested in reforestation by direct seeding). 7 pp.

Lukhele, W.M. and J.A. Allen. 1982. Overview of forestry in Swaziland. Paper presented at the U.S.A.I.D./Peace Corps East African Forestry Workshop, Mombasa, Kenya, May 24-29, 1982.

### **BOOK CHAPTERS:**

Allen, J.A. and N.C. Duke. 2006. Bruguiera gymnorrhiza. Pages 139-152 in C.R. Elevitch (ed.), Traditional Trees of Pacific Islands: Their Culture, Environment, and Use. Permanent Agriculture Resources, Holualoa, Hawaii. Also available online at: <http://www.traditionaltree.org>.

Duke, N.C. and J.A. Allen. 2006. Rhizophora mangle. Pages 623-640 in C.R. Elevitch (ed.), Traditional Trees of Pacific Islands: Their Culture, Environment, and Use. Permanent Agriculture Resources, Holualoa, Hawaii. Also available online at: <http://www.traditionaltree.org>.

Schoenholtz, S.H., J.A. Stanturf, J.A. Allen, and C.J. Schweitzer. 2005. Afforestation of Agricultural Lands in the Lower Mississippi Alluvial Valley: The State of our Understanding. Pages 413-432. In L.H. Fredrickson, S.L. King, and R. M. Kaminski (eds.), Ecology and Management of Bottomland Hardwood Systems: The State of our Understanding. University of Missouri-Columbia. Gaylord Memorial Laboratory Special Publication No. 10. Puxico, MO.

Allen, J.A. 2001. Forest Pest Management (Insects). Pages 301-303 in D. Pimentel (ed.), Encyclopedia of Pest Management. Marcel Dekker, Inc.

Pimentel, D., J. Allen, A. Beers, L. Guinand, A. Hawkins, R. Linder, P. McLaughlin, B. Meer, D. Musonda, D. Perdue, S. Poisson, R. Salazar, S. Siebert, and K. Stoner. 1993. Soil erosion and agricultural productivity. Pages 277-292 in D. Pimentel (ed.), World Soil Erosion and Conservation. Cambridge University Press, Cambridge.

Guntenspergen, G.R., J.R. Keough, and J. Allen. 1993. Wetland systems and their response to management. Pages 383-390 in G.A. Moshiri (ed.), Constructed Wetlands for Water Quality Improvement. Lewis Publishers, Boca Raton, FL.

### **BOOK REVIEWS:**

Allen, J.A. 2009. *Journal of Forestry* 107: 330. [Review of Stuever, M. 2009. The Forester's Log: Musings from the Woods. University of New Mexico Press, Albuquerque, NM. 264 pp.]

Allen, J.A. 2007. *Natural Resources Journal* 47: 1010-1011. [Review of Niemeyer, L. and T.L. Fleischner. 2005. Desert Wetlands. University of New Mexico Press, Albuquerque, NM. 148 pp.]

Allen, J. 1994. *Wildlife Review* 243: 224. [Review of Bolen, E.G. and D. Flores. 1994. The Mississippi Kite. University of Texas Press, Austin, TX. 115 pp.]

Publications Managed Under Contract: (Served as project officer)

Golet, F.C., A.J.K. Calhoun, W.R. DeRagon, D.L. Lowry, and A.J. Gold. 1993. The ecology of red maple swamps of the glaciated Northeast: a community profile. U.S. Fish and Wildlife Service Biological Report 12. 151 pp.

Kantrud, H.A., G.L. Krapu, and G.A. Swanson. 1989. Prairie basin wetlands of the Dakotas: a community profile. U.S. Fish and Wildlife Service Biological Report 85(7.28). 111 pp.

Simons, R.W., S.W. Vince, and S.R. Humphrey. 1989. Hydric hammocks: a guide to management. U.S. Fish and Wildlife Service Biological Report 85(7.26 Supplement). 89 pp.

Vince, S.W., R.W. Simons, and S.R. Humphrey. 1989. Hydric hammocks: a community profile. U.S. Fish and Wildlife Service Biological Report 85(7.26). 81 pp.

**PRESENTATIONS:** (Listed in reverse chronological order, presented by Allen unless indicated otherwise with an asterisk)

***Invited:***

Allen, J.A. 2011. The NAUFRP Undergraduate Education Enhancement Strategy. Future of Forestry Education Workshop, Society of American Foresters Annual Convention, Honolulu, HI, November 2-6.

Allen, J.A. 2011. How can universities and research institutions jointly advocate and advance excellence in forest resource education, research and outreach? Forestry Leaders Summit, University of British Columbia, Vancouver, Canada, April 27-29.

Allen, J.A. 2009. Ecological restoration programs at Northern Arizona University. Society of American Foresters Annual Convention, Orlando, FL, September 30-October 4.

Allen, J.A. 2006. The John Dillon-International Paper Park. New York Society of American Foresters Winter Meeting, Syracuse, NY.

Allen, J.A. 2004. Mangroves on Pacific islands: Differential roles as native and alien species. SUNY Plattsburgh, Lake Champlain Research Institute Seminar.

Allen, J.A. 2004. Mangroves on Pacific islands: Differential roles as native and alien species. University of Pittsburgh, Pymatunig Ecological Field Station Seminar.

Schoenholtz\*, S.H., J.A. Stanturf, C.J. Schweitzer, and J.A. Allen. 1999. Reforestation of agricultural lands in the Mississippi Alluvial Valley: The State of Our Understanding. Ecology and Management of Bottomland Hardwood Systems: The State of Our Understanding, A Symposium, Memphis, TN, March 10-13.

Allen, J.A. 1999. Mangroves in Hawaii: Impacts and prospects for control. U.S. Forest Service/Hawaii Division of Forestry and Wildlife Seminar Series, Hilo, HI, February 23

Allen, J.A. 1998. Mangroves on Pacific islands: Differential roles as native and alien species. U.S.G.S. Biological Resources Division, Kilauea Field Station Seminar Series, Volcano, HI, November 6.

Allen, J.A. 1996. Forest Service research program on Micronesian forested wetlands. U.S.G.S. Biological Resources Division, National Wetlands Research Center Seminar Series, Lafayette, LA, November.

Allen, J.A. 1995. Introduction to bottomland hardwood wetlands. NRCS Workshop on Bottomland Hardwood Restoration, Vicksburg, MS, June 26-28.

Allen, J.A. 1995. Restoration research needs from an NBS perspective. Artificial Regeneration/Restoration of Bottomland Hardwoods Research Needs Workshop, U.S.D.A. Forest Service, Stoneville, MS, May 11-12.

Allen, J.A. 1995. Bottomland hardwood restoration: Overview of techniques, successes, and failures." Association of State Wetland Managers Symposium, Tampa, FL, April 23-26.

Allen, J.A. 1994. Initial performance of bottomland hardwood reforestation projects in the Lower Mississippi Valley. Special Symposium at the Southeastern Game and Fish Association Annual Meeting, Atlanta, GA.

Allen, J.A. 1994. Functional aspects of forested wetland restoration. Society of Wetland Scientists Southcentral Chapter, Ft. Worth, TX, November 4-5.

Allen, J.A. 1994. Intraspecific variation in salt tolerance of baldcypress. National Biological Service Southern Science Center Seminar Series, Lafayette, LA, February 22.

Allen, J.A. 1993. Greentree reservoir management. Oklahoma Cooperative Extension Service-sponsored Environmental Management for Forest Stewardship Training Workshop, Fountainhead State Park, OK, September 27-29.

Allen, J.A. 1993. Introduction to forested wetland ecology. Oklahoma Cooperative Extension Service-sponsored Environmental Management for Forest Stewardship Training Workshop, Fountainhead State Park, OK, September 27-29.

Allen, J.A. 1992. Restoration research at the National Wetlands Research Center. FWS/SCS/ACE Southern Forested Wetland Restoration Workshop, Vicksburg, MS.

Allen, J.A. 1992. Comparison of direct seeding and planting seedlings as bottomland hardwood restoration techniques. Society of Wetland Scientists Annual Meeting, New Orleans, LA, May 31-June 6.

Allen, J.A. 1992. An inventory of 'ghost forests' in southern Louisiana using aerial video photography. Federal Interagency Symposium on Forested Wetland Mapping and Inventory in the Lower Mississippi Valley, Vicksburg, MS, April 6-9.

Allen, J.A. 1991. Forested wetlands of the Gulf of Mexico coastal zone: Status, Mitigation Efforts, and Research Needs. National Ocean Pollution Policy Board Habitat Loss and Modification Working Group Meeting, San Diego, CA, January 16-18.

Haynes, R.J. and J.A. Allen. 1990. Research needs for coastal forest restoration. No Net Loss and the Role of Restoration and Creation, Association of State Floodplain Managers Symposium, Jackson, MS, April 3-7. (Haynes and Allen both presented)

Allen, J.A. 1990. Restoration of southern wooded wetlands. No Net Loss and the Role of Restoration and Creation, Association of State Floodplain Managers Symposium, Jackson, MS, April 3-7.

Allen, J.A. 1990. Site restoration as a component of landscape restoration. Nature Conservancy/Mississippi Alluvial Forest Protection and Restoration Meeting, Baton Rouge, LA.

Allen, J.A. 1989. Design and execution of fuelwood surveys. U.N. Food and Agriculture Organization Seminar on Forestry Statistics in Africa, Blantyre, Malawi, November 12-25.

Allen, J.A. 1989. Case Study: Fuelwood consumption in Swaziland. U.N. Food and Agriculture Organization Seminar on Forestry Statistics in Africa, Blantyre, Malawi, November 12-25.

Allen, J.A. 1989. A modeling approach for assessing tree species composition and habitat suitability changes in forested wetlands. National Council of the Pulp and Paper Industry for Air and Stream Improvement Southern Regional Meeting, Asheville, NC, June 12-14.

Allen, J.A. 1989. Role of river corridors as fish and wildlife habitat: Implications for management and restoration. Association of State Floodplain Managers Symposium, Knoxville, TN, March 21-23.

Howard\*, R.J. and J.A. Allen. 1988. Streamside habitats in southern forested wetlands: Their role and implications for management. Southern Forested Wetlands Symposium (sponsored by the Forest Service), Orlando, FL, July 12-14. (Allen was invited but Howard presented)

Allen, J.A. 1987. Ecology of the Pearl River Basin. Remote Sensing of Wetlands Training Workshop, U.S. Geological Survey, Stennis Space Center, MS.

***Offered:***

Kim, Y-S, J.A. Allen\*, H. Charles\*, and B. Fox. 2012. Preparing foresters for a career in global forestry. 9th Biennial Conference on University Education in Natural Resources, Colorado State University, Fort Collins, CO, March 22-24.

Allen, J.A. 2012. Student Diversity in the NAU School of Forestry: Recruitment and Retention Efforts. 9th Biennial Conference on University Education in Natural Resources, Colorado State University, Fort Collins, CO, March 22-24.

Kim, Y-S, B. Fox, J. Allen and M. Wagner. 2011. Preparing foresters for a career in global forestry. Society of American Foresters Annual Convention, Honolulu, HI, November 2-6.



Ramstead\*, K.M. and J.A. Allen. 2010. A systematic review of wet meadow restoration. Society of Wetland Scientists Annual Meeting, Salt Lake City, UT, June 27-July 2.

Ramstead\*, K.M., J.A. Allen and S. Masek Lopez. 2010. High-elevation wet meadows in Arizona: Historical distribution, threats and declining biodiversity. Arizona-Nevada Academy of Science Annual Meeting, April 10, Flagstaff, AZ.

Ramstead\*, K.M., J.A. Allen and S. Masek Lopez. 2010. High-elevation wet meadows in Arizona: Historical distribution, threats and declining biodiversity. Arizona Botany Meeting (Annual Meeting of the Arizona Native Plant Society), February 20-21, Tucson, AZ.

Ramstead\*, K.M. and J.A. Allen. 2009. Preliminary results of a systematic review of wet meadow restoration. Tenth Biennial Conference for Research on the Colorado Plateau, October 5-8, Flagstaff, AZ.

Allen, J.A., B.D. Keeland\*, J. Stanturf, A.F. Clewell, and H.E. Kennedy, Jr. 1999. A Guide to Bottomland Hardwood Restoration. Association of State Wetland Managers Annual Meeting, Annapolis, MD, October 25-27.

Allen, J.A., B.D. Keeland\*, and K.W. Krauss. 1999. Effects of Hydrogeomorphic setting on Stem Diameter Growth of Micronesian Forested Wetland Trees. Ecological Society of America 84<sup>th</sup> Annual Meeting, Spokane, WA, August 8-12.

Allen, J.A., K.W. Krauss, N.C. Duke, O. Bjorkman, and C. Shih. 1999. Morphological and Genetic Relationships Among Pacific *Bruguiera*. XVI International Botanical Congress, St. Louis, MO, August 1-7.

Allen, J.A. and K.C. Ewel. 1999. Changing Populations, Unchanging Forests? XVI International Botanical Congress, St. Louis, MO, August 1-7.

Allen, J.A., E.F. Cox, K.W. Krauss, and N.C. Duke. 1999. Factors affecting species distribution and forest structure of Hawaiian mangroves. Society of Wetland Scientists 20<sup>th</sup> Annual Meeting, Norfolk, VA, June 6-11.

Allen, J.A. 1999. Coastal baldcypress swamps: Vulnerability to sea level rise and prospects for minimizing impacts. Wetlands and Climate Change: Scientific Knowledge and Management Options; a national workshop organized by the Institute of Wetland Science and Policy, the Association of State Wetland Managers, and Wetlands International, Laurel, Maryland, February 3-4.

Ewel\*, K.C., J.A. Allen, R.L. Naylor, and W.M. Drew. 1998. Natural resources management: Islands as microcosms. Hawaii Conservation Conference, Honolulu, HI, July 30-31.

King\*, S.L., J.A. Allen, and J.W. McCoy. 1998. Long-term effects of a lock and dam and greentree reservoir management on a bottomland hardwood forest. Society of Wetland Scientists 19<sup>th</sup> Annual Meeting, Anchorage, AK, June 8-12.

Drexler\*, J.Z., V.R. Yap and J.A. Allen. 1998. Why aren't mangroves native to Hawaii? An experimental approach for determining limits for mangrove propagule dispersal. Society of Wetland Scientists 19<sup>th</sup> Annual Meeting, Anchorage, AK, June 8-12.

- Allen, J.A., K.C. Ewel, T. Tara, and B.D. Keeland. 1998. Woody debris in Micronesian mangrove forests. Society of Wetland Scientists 19<sup>th</sup> Annual Meeting, Anchorage, AK, June 8-12.
- McCoy\*, J.W., B.D. Keeland, and J.A. Allen. 1998. Natural establishment of woody species on previously farmed bottomland hardwood sites. Bottomland Hardwood Symposium at the Association of Southeastern Biologists Annual Meeting, Monroe, LA, April 15-18.
- Keeland\*, B.D., J.A. Allen, H.E. Kennedy, Jr., and A.F. Clewell. 1998. An introduction to *A Guide to Bottomland Hardwood Restoration*. Bottomland Hardwood Symposium at the Association of Southeastern Biologists Annual Meeting, Monroe, LA, April 15-18.
- McCoy\*, J.W., B.D. Keeland, and J.A. Allen. 1997. Atlantic white cedar plantings in St. Tammany Parish, Louisiana and the Bogue Chitto National Wildlife Refuge, Mississippi. Symposium: Atlantic White-Cedar: Ecology and Management, Newport News, VA. (Sponsored by the Atlantic White-Cedar Alliance).
- Krauss\*, K.W., J.L. Chambers, J.A. Allen, B. Luse, and A. DeBosier. 1997. Restoration potential of baldcypress in salt-impacted wetlands: Finding intraspecific variation in salt tolerance based on root growth. Ninth Biennial Southern Silvicultural Research Conference, Clemson, SC, February 25-27.
- Allen, J.A., J. McCoy\*, and B.D. Keeland. 1997. Patterns of natural establishment of woody species on abandoned agricultural fields in the Lower Mississippi Valley: First- and second-year results. Ninth Biennial Southern Silvicultural Research Conference, Clemson, SC, February 25-27.
- Allen, J.A. 1997. Mangroves as alien species: The case of Hawaii. Tropical Diversity: Origins, Maintenance, and Conservation. Annual Meeting of the Association for Tropical Biology and the Organization for Tropical Studies, San Jose, Costa Rica, June 15-20.
- Krauss\*, K.W., J.L. Chambers, and J.A. Allen. 1996. Salinity effects and differential germination of several half-sib families of baldcypress (*Taxodium distichum* (L.) Rich.). Effects of Forest Management on Ecosystem Processes, 14<sup>th</sup> North American Forest Biology Workshop, Université Laval, Québec City, Canada, June 16-20.
- Krauss\*, K.W., J.L. Chambers, and J.A. Allen. 1996. Intraspecific variation in the physiological response of baldcypress (*Taxodium distichum* (L.) Rich.) to a rapid influx of saltwater. Southern Forested Wetlands Ecology and Management Conference, Clemson, SC, March 25-27. Consortium for Research on Southern Forested Wetlands, Clemson, SC.
- Keeland\*, B.D., M.A. Towson, and J.A. Allen. 1996. Effects of flooding and herbivory on baldcypress seedlings planted at Caddo Lake, TX: First-year results. Southern Forested Wetlands Ecology and Management Conference, Clemson, SC, March 25-27. Consortium for Research on Southern Forested Wetlands, Clemson, SC.
- Allen, J.A., J.W. McCoy\*, and J. Teaford. 1996. Ten years of vegetational change in a greentree reservoir. Southern Forested Wetlands Ecology and Management Conference, Clemson, SC, March 25-27.

- Twedt\*, D.J., J. Portwood, and J.A. Allen. 1995. Bottomland hardwood reforestation for neotropical migratory birds: Are we missing the forest for the trees? Mississippi Chapter of the Wildlife Society, Mississippi State, MS.
- Coate\*, C.J. and J.A. Allen. 1995. An analytic hierarchy process decision model for the purchase of wetlands and other natural areas. Natural Areas Association Annual Conference, Fayetteville, AR, October 25-28.
- Allen, J.A. 1995. Bottomland hardwood forest reestablishment in the Lower Mississippi Valley. *Planted Forests: Contributions to Sustainable Societies*, 1995. Portland, OR, June 28-July 1.
- Allen, J.A. and J.W. McCoy\*. 1995. Intraspecific variation in salt tolerance of baldcypress and its implications for restoration of coastal swamps affected by saltwater intrusion. Society of Wetland Scientists Annual Meeting, Boston, MA, May 28-June 2.
- Allen, J.A., S.R. Pezeshki, and J.L. Chambers. 1995. Interactions of flooding and salinity stress on U.S. coastal forests dominated by Taxodium distichum. International Union of Forestry Research Organizations-sponsored Meeting on Interactive Environmental Effects on Forest Stands, 1995. Christchurch, New Zealand, February 5-13.
- Allen, J.A. and J.L. Chambers. 1994. A genetic approach to restoring baldcypress swamps affected by salinity. Society of American Foresters Annual Convention, Anchorage, AK, September 19-22.
- Allen, J.A. and J.L. Chambers. 1994. Intraspecific variation in the response of baldcypress seedlings to salinity. Thirteenth North American Forest Biology Workshop, sponsored by the Society of American Foresters, Baton Rouge, LA, June 14-16.
- Allen, J.A. and J. L. Chambers. 1993. Response of 15 open-pollinated families of baldcypress to salinity. Seventeenth Biennial Meeting of the Association of Southern Forest Tree Physiologists, Starkville, MS, June 22-24.
- Allen, J.A., J.L. Chambers, and M. Stine. 1993. Prospects for improving the salt tolerance of forest trees: A review. International Union of Forestry Research Organizations-sponsored Meeting on Ecophysiology and Genetics of Forests and Trees in a Changing Environment, Viterbo, Italy, May 23-30.
- Allen, J.A. 1992. Cypress-tupelo swamp restoration in southern Louisiana. Society for Ecological Restoration Annual Meeting, Waterloo, Canada, August 10-14.
- Norling\*, W. and J.A. Allen. 1992. Nest site characteristics of American Swallow-tailed Kites in Louisiana and Mississippi. Wilson Ornithological Society/Florida Ornithological Society Joint Meeting, Kissimmee, FL, August.
- Allen, J.A. 1990. Restoration of bottomland hardwood forests on the Yazoo National Wildlife Refuge Complex: An analysis of survival, growth, and species diversity. Society of Wetland Scientists Annual Meeting, Breckenridge, CO.

Hayes\*, T.D., R.E. Moss, M. Brody and J.A. Allen. 1988. Predicting the fate of an east Texas bottomland hardwood forest downstream of a proposed reservoir. Southern Forested Wetlands Symposium (sponsored by the Forest Service), Orlando, FL, July 12-14.

Allen, J.A., J.T. Teaford, E.C. Pendleton and M. Brody. 1988. Evaluation of greentree reservoir management in Arkansas. North American Wildlife and Natural Resources Conference, Louisville, KY.

Lukhele\*, W.M. and J.A. Allen. 1982. Overview of forestry in Swaziland. U.S. Agency for International Development/Peace Corps East African Forestry Workshop, Mombasa, Kenya, May 24-29.

Bleys, J.A., W.K.M. Mazibuko\*, and J.A. Allen. 1981. The silviculture of indigenous and exotic trees other than pines and eucalypts in Swaziland. Southern African Committee for the Conservation and Utilization of the Soil (SARRCUS), Louis Trichardt, South Africa, November 9-13.

**RESEARCH FUNDING:** (Note: I have almost always had my research supported by base funds and have had little need to submit proposals for external funding).

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2012-2013. Regeneration requirements and genetic variability <i>Terminalia carolinensis</i> -dominated wetlands in Micronesia.	Allen, J.A. (PI)	USDA Forest Service, Pacific Southwest Research Station	\$19,961
2009-2011. Systematic Review of Wet Meadow Restoration	Allen, J.A. (PI).	NAU Ecological Restoration Institute	\$58,300
2003-2006. Forever Wild: Adirondack Watershed Integrity	Mihuc, T. (PI); E. Allen, J. Mihuc, C. Evans and J. Allen (co-PIs)	National Science Foundation	\$320,000
2003-2005. Forest Ecology	Evans, C. and J.A. Allen (co-	USDA Forest Service,	\$35,000

Research and Demonstration Area (FERDA) Project	PIs)	Northern Research Station	
1998-2002. New Forests for a New Millennium in Hawaii	Fownes, J.P., (PI); N.S. Dudley and J.A. Allen (co-PIs)	U.S.D.A. Cooperative Research, Education and Extension Service, Fund for Rural America Program	\$250,000

## **PROFESSIONAL ACTIVITIES:**

### ***Professional Society Memberships:***

Society of American Foresters (1987-present)  
Society of Wetland Scientists (1987-present)

### ***Offices Held and Board Memberships:***

Policy Chair, Southwest Section of the Society of American Foresters (2013)  
President-Elect, National Association of University Forest Resource Programs (NAUFRP, 2013-2014)  
Congress Services Co-Chair, 2014 IUFRO Forest Congress (2012)  
Education Chair, NAUFRP (2011-2012)  
Chair, Southwest Section of the Society of American Foresters (2011)  
At-Large Member, Executive Council, NAUFRP (2008-2011)  
Board Member, American Conservation Experience (2008-present)  
Member, Arizona State Forest Stewardship Committee (2008-present)  
Chair, Northern Arizona Chapter of Society of American Foresters (2008)  
Chair, Adirondack Chapter of New York Society of American Foresters (2004-2006)  
Board Member, Northern Adirondack Chapter of the New York Forest Owners Association (2003-2006)  
Board Member, Bioregional Advisory Council, National Community Forestry Center, Northern Forest Region (2000-2004)

## **PROFESSIONAL AND ACADEMIC RECOGNITION:**

Fellow, Society of American Foresters, 2012  
Alumnus of the Year, School of Renewable Natural Resources, LSU, 2009  
USDA Forest Service, Region 3 Commendation, 2008 (for assistance in developing a training program at NAU for wildland fire managers in the GS-401 series)  
Chair's Commendation, New York Society of American Foresters, 2006  
Gilbert Foundation Fellowship, LSU, 1991, 1992, 1993  
US Fish and Wildlife Service Performance Awards, 1987, 1989, 1990, 1992, 1994  
Xi Sigma Pi (Forestry Honor Society)

Phi Sigma (Biological Sciences Honor Society)

**GRADUATE STUDENT ADVISING:** (All are NAU students unless otherwise indicated; year of graduation is listed for students who have completed their degrees)

***Committee Chair:***

1 Student, Ph.D., Forestry, current  
1 Student, M.A., Sustainable Communities, current  
1 Student, M.F., Forestry, current  
1 Student, M.F., Forestry, current  
1 Student, M.S., Forestry, 2011

***Committee Member:***

1 Student, Ph.D., Biology, current  
1 Student, M.S., Geology, 2011  
1 Student, M.S., Forestry, 2011  
1 Student, M.S., Environmental Science, 2011  
1 Student, M.S., Forestry, 2010  
1 Student, M.S., Forestry, 1997 (LSU)

***M.F. Professional Paper Reviewer:***

1 Student, 2012  
1 Student, 2012  
1 Student, 2012

**UNIVERSITY SERVICE:** (NAU only; does not include shorter-term types of service)

***College and University Level:***

Academic Chairs Council, 2006-present  
University Curriculum Committee, 2006-2008  
University Graduate Committee, 2006-2007  
Environmental Caucus (2008-present)  
Environmental Caucus Steering Committee (2012-present)  
Merriam-Powell Research Station Advisory Committee (2007-present)  
Search Committees: Dean, W.A. Franke College of Business (2011); Director, School of Earth Sciences and Environmental Sustainability (Chair, 2010-2011); Development Officer, College of Engineering, Forestry and Natural Sciences (2009-2010); Dean, College of Engineering, Forestry and Natural Sciences (2008-2009)

***School of Forestry:***

Curriculum Committee (Chair, 2006-present)  
Landscaping Committee (2008-present)  
50<sup>th</sup> Anniversary Planning/Implementation Committee (Chair, 2007-2008)

Search Committees: Assistant Professor, Wildland Fire Science (Chair, 2006-2007); Business Manager (2007 and 2010); Student Services Coordinator (Chair, 2008)

## Document E: Individual Faculty Information

### PAUL BEIER

Regents' Professor – 9 month – Tenured

Date of Appointment: May 1992 - Present

Specializations: Science-based design of wildlife corridors

**Northern Arizona University – School of Forestry**

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### EDUCATION:

- 1988 Ph.D. Wildland Resource Science, University of California, Berkeley. Major professor: Dale R. McCullough. Dissertation: *Factors influencing white-tailed deer activity patterns and habitat use.*
- 1985 M.S. Wildland Resource Science, U.C. Berkeley. Thesis: *Sex differences in quality of white-tailed deer diets.*
- 1973 B.A. Philosophy, Catholic University of America, Washington D.C.

### PROFESSIONAL EXPERIENCE:

- 2012/Present Regents Professor, Conservation Biology and Wildlife Ecology, Northern Arizona University, School of Forestry. (08/12-present)
- 2002/2012 Professor, Conservation Biology and Wildlife Ecology, Northern Arizona University, School of Forestry. (9/02-2012).
- 1992/2002 Associate Professor, (9/97-8/02); Assistant Professor, (5/92-8/97).
- 1988/1993 Project Leader. (5/88-2/93), Santa Ana Mountains Cougar Study.
- 1985 Field Crew Leader. (05/85)-(05/85), under contract from California Fish and Game. Field surveys for endangered Truckee Barberry (*Berberis sonnei*), the introduced beaver (*Castor canadensis*), and the endemic Sierra Nevada mountain beaver (*Aplodontia rufa californica*). 3 refereed publications.
- 1985/1988 Research Assistant. (5/85-5/88) (part-time, intermittent). Black-tailed deer project at University of California's Hopland Field Station, Hopland, CA. Conducted herd composition counts, necropsied deer, interviewed hunters, monitored oak mast production, determined botanical composition of rumen contents, and examined dental annuli to ascertain deer ages. 1 refereed paper.

### TEACHING EXPERIENCE:



2008/Present

BIO599 Genes to ecosystems  
FOR240 Intro to Conservation Biology Semester A  
FOR690 Research Methods  
FOR504 Systematic Conservation Planning  
FOR504 Climate-Savvy Conservation  
FOR504 Conserving connectivity

## REFERRED JOURNALS

Graves, T, R Changder, J Royle, P Beier. In review. Estimating landscape resistance to dispersal. *Methods in Ecology and Evolution*.

McRae, B, S Hall, P Beier, and D. Theobald. 2012. Where to restore connectivity? Detecting barriers and quantifying restoration benefits. *PLoS One*: 7(12): e52604.  
doi:10.1371/journal.pone.0052604.

Graves, T, J Royle, K Kendall, P Beier, J Stetz, A McLeod. 2012. Balancing precision and risk: should multiple detection methods be analyzed separately in N-mixture models? *PLoS One*:  
<http://dx.plos.org/10.1371/journal.pone.0049410>.

Schaefer, J, and P Beier. 2012. Going public: an active role for scientists in conservation. *International Journal of Environmental Studies*: accepted.

Beier, P. 2012. Conceptualizing and designing corridors for climate change. *Ecological Restoration* 30:312-319.

Rudnick, D, S Ryan, P Beier, S Cushman, F Dieffenbach, C Epps, L Gerber, J Hartter, J Jenness, J Kintsch, A Merenlender, R Perkl, D Preziosi, and S Trombulak. 2012. Emerging principles in understanding landscape connectivity: practical tools for conservation decision-making. *Issues in Ecology* 16:1-19.

Brost, BM, and P Beier. 2012. Comparing linkage designs based on land facets to linkage designs based on focal species. *PLoS ONE* 7(11): e48965. doi:10.1371/journal.pone.0048965.

Beier, P, and MF Ingraldi. 2012. There is no evidence that the Forest Service's goshawk recommendations improve goshawk nest productivity. *Wildlife Society Bulletin* 36:153-154.

Brost, BM, and P Beier. 2012. Use of land facets to design linkages for climate change. *Ecological Applications* 22:87-103. DOI: 10.1111/j.1523-1739.2011.01716.x

Beier, P, and A Gregory. 2012. Desperately seeking stable 50-year-old landscapes with patches and long, wide corridors. *PLOS Biology* 10:e1001253:4 pages.

Beier, P, WD Spencer, R Baldwin, and B McRae. 2011. Toward best practices for developing regional connectivity maps. *Conservation Biology* 25:879-892.

- Bayless, TA, and P Beier. 2011. Occurrence and habitat characteristics of burrowing owl nests in Gunnison's prairie dog colonies of northeastern Arizona. *Journal of the Arizona-Nevada Academy of Sciences* 42:65-74.
- Friggens, M, and P Beier. 2010. Anthropogenic disturbance and the risk of flea-borne disease transmission. *Oecologia* 164:809-820.
- Beier, P., and B. Brost. 2010. Use of land facets in planning for climate change: conserving the arenas not the actors. *Conservation Biology* 24:701-710.
- Bridgeland, WT, P Beier, T Kolb, and TG Whitham. 2010. A conditional trophic cascade: birds benefit faster-growing trees with strong links between predators and plants. *Ecology* 91:73-84.
- Beier, P, DR Majka, and SL Newell. 2009. Uncertainty analysis of least-cost modeling for designing wildlife linkages. *Ecological Applications* 19:2067-2077.
- Pope, TL, WM Block, and P Beier. 2009. Prescribed fire effects on wintering, bark-foraging birds in northern Arizona. *Journal of Wildlife Management*: 73:695-700.
- Trapp, JR, P Beier, C Mack, DR Parsons, and PC Paquet. 2008. Wolf, *Canis lupus*, den site selection in the Rocky Mountains. *Canadian Field-Naturalist* 122:49-56.
- Santos, MJ, and P Beier. 2008. Habitat selection by European badgers at multiple spatial scales in Portuguese Mediterranean ecosystems. *Wildlife Research* 35:835-843.
- Beier, P, D Majka, and WD Spencer. 2008. Forks in the road: choices in procedures for designing wildlife linkages. *Conservation Biology* 22:836-851.
- Beier, P, EC Rogan, MF Ingraldi, and SS Rosenstock. 2008. Does forest structure affect reproduction of northern goshawks in ponderosa pine forests? *Journal of Applied Ecology* 45:342-350.
- Rosalino, LM, MJ Santos, P. Beier, and M Santos-Reis. 2008. Eurasian badger habitat selection in Mediterranean environments: does scale really matter? *Mammalian Biology* 73:189-198.
- McRae, BH, and P Beier. 2008. Circuit theory predicts gene flow in plant and animal populations. *Proceedings National Academy of Sciences* 104:19885-19890.
- Waskiewicz, JD, PZ Fulé, and P Beier. 2007. Comparing classification systems for ponderosa pine snags in northern Arizona. *Western Journal of Applied Forestry*: 22(4):233-240.
- Wightman, CS, SS Germaine, and P Beier. 2007. Landbird community composition varies among seasons in a heterogeneous ponderosa pine forest. *Journal of Field Ornithology* 78(2):184-194.

- Dickson, BG, and P Beier. 2007. Quantifying the influence of topographic position on cougar movement in southern California USA. *Journal of Zoology (London)* 271:270-277.
- Beier, P, and AI Tungbani. 2006. Nesting with wasps increases nest success of the Red-cheeked Cordon-Bleu. *The Auk* 123:1022-1037.
- Noss, RF, P Beier, WW Covington, RE Grumbine, DB Lindenmayer, JW Prather, F Schmiegelow, TD Sisk, and DJ Vosick. 2006. Recommendations for integrating restoration ecology and conservation biology in ponderosa pine forests of the Southwestern United States. *Ecological Restoration* 14:4-10.
- Beier, P, MR Vaughan, MJ Conroy, and H Quigley. 2006. Evaluating scientific inferences about the Florida Panther. *Journal of Wildlife Management* 70:236-245.
- Conroy, MJ, P Beier, H Quigley, and MR Vaughan. 2006. Improving the use of science in conservation: lessons from the Florida panther. *Journal of Wildlife Management* 70:1-7.
- Boyce, DA, Jr, PL Kennedy, P Beier, MF Ingraldi, SR MacVean, MS Siders, JR Squires, and B Woodbridge. 2005. When are goshawks not there? Is a single visit enough to infer absence? *Journal of Raptor Research* 39:285-291.
- McRae, BH, P Beier, LE DeWald, LY Huynh, and P Keim. 2005. Habitat barriers limit gene flow and illuminate historical events in a wide-ranging carnivore. *Molecular Ecology* 14:1965-1977.
- Adjewodah, P, P Beier, MK Sam, and JJ Mason. 2005. Elephant crop damage in the Red Volta Valley, northeastern Ghana. *Pachyderm* 38:39-48.
- Griffis-Kyle, KL, and P Beier. 2005. Migratory strategy and seasonal patterns of bird diversity in relation to forest habitat. *American Midland Naturalist* 153:436-443.
- Dickson, BG, JS Jenness, and P Beier. 2005. Influence of vegetation, topography, and roads on cougar movement in southern California. *Journal of Wildlife Management* 69:264-276.
- Jenness, JS, P Beier, and JL Ganey. 2004. Associations between forest fire and Mexican spotted owls. *Forest Science* 50:765-772.
- Czech, B, E Allen, D Batker, P Beier, H Daly, J Erickson, P Garrettson, V Geist, J Gowdy, L Greenwalt, H Hands, P Krausman, P Magee, C Miller, K Novak, G Pullis, C Robinson, J Santa-Barbara, J Teer, D Trauger, and C Willer. 2003. The iron triangle: why The Wildlife Society needs to take a position on economic growth. *Wildlife Society Bulletin* 31:574-577.
- Grigione, MM, P Beier, RA Hopkins, D Neal, WD Padley, CM Schonewald and M Johnson. 2003. Ecological and allometric determinants of home-range size for mountain lions (*Puma concolor*). *Animal Conservation* 5:317-324.

- Drennan, JE, and P Beier. 2003. Winter foraging habitat of northern goshawks. *Journal of Wildlife Management* 67:177-185.
- Griffis-Kyle, KL, and P Beier. 2003. Small isolated aspen stands enrich bird communities in Southwestern ponderosa pine forests. *Biological Conservation* 110:375-385.
- Dickson, BG, and P Beier. 2002. Home range and habitat selection by adult cougars in southern California. *Journal of Wildlife Management* 66:1235-1245.
- Beier, P, M van Drielen, and BO Kankam. 2002. Avifaunal collapse in West African forest fragments. *Conservation Biology* 16:1097-1111.
- Delaney, DK, TG Grubb, P Beier, LL Pater, and MH Reiser. 1999. Effects of helicopter noise on Mexican spotted owls. *Journal of Wildlife Management* 63:60-76.
- Delaney, DK, TG Grubb, P Beier, LL Pater, and MH Reiser. 1999. Activity patterns of nesting Mexican spotted owls. *Condor* 101:42-49.
- Beier, P, and RF Noss. 1998. Do habitat corridors provide connectivity? *Conservation Biology* 12:1241-1252.
- Drennan, JE, P Beier, and N Dodd. 1998. Use of track stations to index abundance of sciurids. *Journal of Mammalogy* 79:352-359.
- Beier, P, and JE Drennan. 1997. Vegetation structure and prey abundance in foraging areas of northern goshawks. *Ecological Applications* 7:564-571.
- Beier, P, and SC Cunningham. 1996. Power of track surveys to detect changes in cougar populations. *Wildlife Society Bulletin* 24:540-546.
- Beier, P. 1995. Dispersal of juvenile cougars in fragmented habitat. *J. Wildlife Management* 59:228-237.
- Beier, P, D Choate, and RH Barrett. 1995. Activity patterns of cougars during different behaviors. *J. Mammalogy* 76:1056-1070.
- Beier, P. 1993. Determining minimum habitat areas and corridors for cougars. *Conservation Biology* 7:94-108.
- Beier, P. 1993. PUMA: A population simulator. *Wildlife Society Bulletin* 21(1):356-357.
- Beier, P, and S Loe. 1992. A checklist for evaluating impacts to wildlife movement corridors. *Wildlife Society Bulletin* 20:434-440.
- Beier, P. 1991. Cougar attacks on humans in the United States and Canada, 1890-1990. *Wildlife Society Bulletin* 19:403-412.

Beier, P, and DR McCullough. 1990. Factors influencing activity patterns and habitat use by white-tailed deer. *Wildlife Monograph* 109: 51pp.

Beier, P. 1989. Use of habitat by mountain beaver in the Sierra Nevada. *Journal of Wildlife Management* 53:649-654.

Beier, P., and R. H. Barrett. 1989. Beaver distribution in the Truckee River Basin. *California Fish and Game* 75:171-175.

Beier, P., and D. R. McCullough. 1988. Motion-sensitive radio collars for estimating white-tailed deer activity. *Journal of Wildlife Management* 52:11-13.

Beier, P. 1987. Sex differences in quality of white-tailed deer diets. *Journal of Mammalogy* 68:323-329.

Beier, P., and R. H. Barrett. 1987. Beaver habitat use and impact in the Truckee Basin, California. *Journal of Wildlife Management* 51:794-799.

McCullough, D. R., and P. Beier. 1986. Upper versus lower molars for cementum annuli age determination of deer. *Journal of Wildlife Management* 59:705-706.

**OTHER PUBLICATIONS** (§ indicates peer-reviewed book chapters)

Penrod, K, P Beier, E Garding, and C Cabañero. 2012. A Linkage Network for the California Deserts. Produced for the Bureau of Land Management and The Wildlands Conservancy. Produced by Science and Collaboration for Connected Wildlands. Available at [www.scwildlands.org](http://www.scwildlands.org).

§Cushman, S, BH McRae, F Adriaensen, K Zeller, P Beier and M Shirley. 2012. Biological corridors. Pages x-xx in DW Macdonald and K Willis, editors. Key Topics in Conservation Biology, volume 2. Wiley.

Noss, R, AP Dobson, R Baldwin, P Beier, CR Davis, DA DellaSala, J Francis, H Locke, K Nowak, R Lopez, C Reining, FA Schmiegelow, SC Trombulak, and G Tabor. 2012. Thinking and talking bigger for conservation [editorial]. *Conservation Biology* 26:1-4.

Beier, P. 2010. Regulatory Framework for Biological Corridors in Bhutan. Report submitted to WWF-Bhutan and Nature Conservation Division, Department of Forests, Royal Government of Bhutan, Thimphu.

Jones, AL. E Aumack, J Balsom, P Beier, J Belnap, J Catlin, T Fleischner, E Grumbine, D Mattson and C van Riper. 2010. Legacy and future visions of conservation biology on the Colorado Plateau. Pages 1-20 In C. van Riper, B. Wakeling, and T. D. Sisk, editors, Colorado Plateau IV shaping conservation through science and management. University of Arizona Press

Spencer, WD, P Beier, K Penrod, M Parisi, A Pettler, K Winters, J Strittholt, C Paulman, H Rustigian-Romsos. 2010. California Essential Habitat Connectivity Project: a strategy for conserving a connected California. Report prepared for California Department of Transportation and California Department of Fish & Game. <http://www.dfg.ca.gov/habcon/connectivity/>

§Beier, P, SPD Riley, and RM Sauvajot. 2010. Mountain lions. Pages 177-189 in SD Gehrt, SPD Riley, and BL Cypher, eds. Urban carnivores: ecology, conflict, and conservation. Johns Hopkins University Press, Baltimore, Maryland.

§Beier, P. 2009. Cougars and conservation planning. Pages 177-189 in M. Hornocker and S. Negri, editors, Cougar ecology and conservation. University of Chicago Press.

Beier, P. 2008. Learning like a mountain. *The Wildlife Professional* Winter: 26-29.

Beier, P, E Garding, and D Majka. 2008. Arizona Missing Linkages: Linkage designs (8 reports, namely for Bradshaw Mountains-Agua Fria River, Hualapai Mountains-Cerbat Mountains, Gila Bend Mountains-Sonoran Desert National Monument-Sierra Estrella, Granite Mountain-Black Hills, Patagonia Mountains-Santa Rita Mountains, Tucson Mountains-Tortolita Mountains-Santa Catalina Mountains, Galiuro Mountains-Pinaleno Mountains-dos Cabezas Mountains, and Mount Perkins-Warm Springs); available at [www.corridordesign.org](http://www.corridordesign.org).

Beier, P. 2007. Cougars, connectivity, & missing linkages: two decades of expanding vision & partnerships (keynote address). Transactions of the Western Section of The Wildlife Society 43:1-7.

Beier, P, D Majka, and T Bayless. 2007. Arizona Missing Linkages: Linkage designs (8 reports); available at [www.corridordesign.org](http://www.corridordesign.org).

Shaw, HG, P Beier, M Culver, and M Grigione. 2007. Puma field guide. Cougar Network. 129 pp.

Nordhaugen, SE, E Erlandsen, P Beier, BD Eilerts, R Schweinsburg, T Brennan, T Cordery, N Dodd, M Maiefsky, J Przybyl, S Thomas, K Vacariu, and S Wells. 2006. Arizona Wildlife Linkage Assessment. available at

[http://www.azdot.gov/Highways/OES/AZ\\_WildLife\\_Linkages/assessment.asp](http://www.azdot.gov/Highways/OES/AZ_WildLife_Linkages/assessment.asp)

Cougar Management Guidelines Working Group. 2005. Cougar Management Guidelines, First Edition. Wild Futures, Bainbridge Island, Washington. 137 pp. (13 authors)

§Beier, P, K Penrod, C Luke, W Spencer, and C Cabañero. 2006. South Coast Missing Linkages: restoring connectivity to wildlands in the largest metropolitan area in the United States. Pages 555-586 In KR. Crooks and MA Sanjayan, editors, Connectivity conservation, Cambridge University Press.

§Beier, P. 2006. Effects of artificial night lighting on terrestrial mammals. Pages 19-42 In C. Rich and T. Longcore, editors, Ecological consequences of artificial night lighting. Island Press, Covelo, California.

Beier, P. 2005. Being ethical as conservation biologists and as a society. (Invited Editorial). *Conservation Biology* 19:1-2.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2003-2006 (11 reports). South Coast Missing Linkages Project: Linkage Designs for 11 connections in southern California, namely San Bernardino-San Jacinto, Palomar-San Jacinto, Peninsular-Borrogo, San Bernardino-Granite, San Bernardino-Little San Bernardino, Sierra Madre-Castaic, San Gabriel-Castaic, Tehachapi, Santa Ana-Palomar (C Luke as first author), San Gabriel-San Bernardino (with S. Loe, and K. Meyer as additional coauthors), and Santa Monica-Sierra Madre (with R. Sauvajot, S. Riley, and D. Kamradt as additional coauthors). South Coast Wildlands, [www.scwildlands.org](http://www.scwildlands.org).

Adjewodah, P, and P Beier. 2004. Working with traditional authorities to conserve nature in West Africa. *African Conservation Telegraph* 1 (on-line).

§Beier, P, and J Maschinski. 2003. Threatened, endangered, and sensitive species. Pages 306-327 In P Friederici, editor. *Ecological restoration of southwestern ponderosa pine forests*. Island Press.

Beier, P., M. R. Vaughan, M. J. Conroy, and H. Quigley. 2003. An analysis of scientific literature related to the Florida panther. Report to Florida Fish and Wildlife Conservation Commission and US Fish and Wildlife Service. 211 pages, including an annotated bibliography.

Beier, P. 2001. [Book review] *Model selection and inference*, by Burnham and Anderson. *Journal of Wildlife Management* 65:.

Beier, P. 2001. Cougar (Species account in *Encyclopedia Britannica*). Invited contribution.

Despain, D. G., P. Beier, C. Tate, B. M. Durtsche, and T. Stephens. 2000. Modeling fire risk to wildlife habitat. Pages 89-118 In RN Sampson, DA Atkinson, and JW Lewis, editors, *Mapping Wildfire Hazards and Risks*. Haworth Press. 328pp.

Noss, RF, and P Beier. 2000. Arguing over little things: response to Haddad et al. *Conservation Biology* 14:1546-1648.

Beier, P. 1999. Cougar. Pages 226-228 In DE Wilson and S Ruff, editors, *Smithsonian Book of North American Mammals*. Smithsonian Institution Press, Washington. (Invited contribution). This was one of 40 books that the American Library Association voted as one of their "Best of the Best Books" for 1999-2000.

§Beier, P. 1996. Metapopulation modeling, tenacious tracking, and cougar conservation. Pages 293-323 in D. R. McCullough, ed., *Metapopulations and wildlife management*. Island Press. This book won The Wildlife Society's Award for "Best-edited Book of 1996."

## **PROFESSIONAL SOCIETIES**

2011 Associate Editor, Journal of Wildlife Management  
1990 Society for Conservation Biology (See *Related Activities* for details)  
1985 American Society of Mammalogists  
1982 The Wildlife Society (Certified Wildlife Biologist)

## **RELATED ACTIVITIES**

2010/Present Recovery Team for the northern jaguar, *Panthera onca*  
2010/Present Science Advisory Council, Freedom to Roam  
2010/Present Science Advisor to US Forest Service: Conserving marten, fisher, red fox, and wolverine in the Sierra Nevada and California Cascades  
2009/Present Ecology & Transportation Committee of the Transportation Research Board of The National Academies, October 2009-present.  
2000/Present Founding Board member & Science Advisor for SC Wildlands, 2000-present, promoting Science & Collaboration for Connected Wildlands; [www.scwildlands.org](http://www.scwildlands.org).  
2004/Present Arizona Wildlife Linkage Workgroup, 2004-present. a collaboration among Arizona Game & Fish Department, Arizona Department of Transportation, Federal Highways Administration, US Forest Service, Bureau of Land Management, and others to maintain and restore wildland connectivity in Arizona.  
2011/2014 Member at Large, US National Committee for DIVERSITAS.  
2010/2012 Core Advisor, Yale Mapping Framework for Wildlife Conservation and Climate Change Adaptation  
2010 Consultant to government of Bhutan. 2010. I developed a Framework for implementing Biological Corridors in Bhutan.  
1999/2000 Fulbright Scholar, African Regional Research Program  
2006/2007 Fulbright Scholar, African Regional Research Program  
2003/2011 Recovery Team Member for the ocelot, *Felis pardalis*  
2002/2008 Board of Governors, Society for Conservation Biology.  
2009-2015 Board of Governors, Society for Conservation Biology  
2011/2013 President 2011-2013.  
2004 Chaired committee that developed SCB's first Code of Ethics.  
2005/2010 Chaired committee that made SCB the first professional ecological society to offset its impact on greenhouse gasses.  
2001/2005 Conservation Chair of Colorado Plateau Chapter.  
2008/2010 Consultant to California Department of Transportation and California Fish & Game Department. Our team produced a map and strategic plan for conserving connectivity throughout the state of California (Spencer et al. 2010, above) on time and on budget.  
2007/2008 Science Committee, Western Governors Association's *Wildlife Corridors Initiative*, a multi-state effort to improve management for wildlife corridors and crucial habitat, Sep 2007-Sep 2008.  
2008/2010 Mentor, University Mentoring in Environmental Biology. 2008-2010.  
2005 Fellow, Aldo Leopold Leadership Program (2005). This programs trains 20 Fellows per year to become effective environmental leaders by developing skills



	in collaboration, communicating with the media, and developing relationships with members of Congress.
2008/2011	City of Flagstaff Open Space Commission, 2008-2011.
2005/2007	Scientific Review of Habitat Conservation Plan for eastern San Diego County. An independent review of the geographically most extensive Habitat Conservation Plan. I served in the same capacity for the northern San Diego County MSHCP in 2001.
1998/2008	Member, Science Advisory Board, Nature Conservation Research Centre, Ghana, This NGO specializes in community-based conservation activities in Ghana. The Wechiau Community Hippopotamus won the UNDP's <i>Equator Initiative</i> top prize for Africa in 2008.
2000/2002	Science Advisory Council, Grand Canyon Trust, 2000-2002. The GCT is the leading conservation NGO in the southwestern US.
2002/2003	Chair, Scientific Review Team, Florida Panther. Commissioned by the US Fish & Wildlife Service and the Florida Wildlife Conservation Commission to evaluate scientific issues related to the endangered Florida panther.

## GRANTS

Grants that were funded during August 2001-August 2011 (ten years). Grants are listed in chronological order starting in 2001. (Note: I started at NAU in May 1992. I did not retain records for 1992-2001; those years certainly had lower dollar amounts.)

Grant Title	Amount
Landscape model of habitat use by Mexican spotted owls. US Forest Service Rocky Mountain Research Station	\$29,000
Review of literature on the Florida Panther. Florida Fish and Wildlife Conservation Commission.	\$57,386
Evaluation of 8 landscape linkages in the South Coast Ecoregion. South Coast Wildlands Project.	\$19,685
Hippopotamus feeding ecology in northern Ghana. EarthWatch International. I authored this proposal on behalf of Nature Conservation Research Centre (Ghana), which received the award. The actual amount depended on subscriptions; \$100K is a very conservative estimate. These dollars were a main source of income for the Wechiau Community Hippopotamus Sanctuary during 2000-2005.	\$100,000
The South Coast Missing Linkages Project. The Wildlands Conservancy. I authored this proposal on behalf of South Coast Wildlands Project, which received the award.	\$310,315
Bird predation, forest insects, and growth of ponderosa pine and Gambel Oak. Mission Research (McIntire-Stennis federal dollars to NAU)	\$90,000
A survey for bare-headed rockfowl <i>Picathartes gymnocephalus</i> in Ghana. Tropenbos International.	\$600
Conservation of elephants and antelopes in Ghana's Red Volta River Valley. EarthWatch Institute. I authored this proposal on behalf of Nature Conservation	\$100,000

Research Centre (Ghana), which received the award. The estimate is precise within about 10%. These dollars were a main source of income for this conservation project during 2005-2008.	
Bird predation, forest insects, and growth of cottonwoods. National Science Foundation	\$276,000
Dynamics of plague epizootics in prairie dog communities. National Science Foundation (passed through University of New Mexico to NAU)	\$99,094
Mountain plovers and burrowing owls nesting in Gunnison's prairie dog colonies. Arizona Game and Fish Department.	\$65,000
Designing corridors for Arizona's Missing Linkages. Arizona Game and Fish Department,	\$187,000
GIS tools for wildlife corridor design. ERDENE TRIF (internal NAU dollars).	\$75,000
Ecology and conservation of bare-headed rockfowl in Ghana, Fulbright Senior Scholar Program	\$32,750
Developing a regional open space plan, Southern California Association of Governments (my share of a \$500,000 grant)	\$29,400
Evaluation tools for wildlife corridors. ERDENE TRIF (internal NAU dollars)	\$48,000
Designing corridors for a changing climate, Mission Research (McIntire-Stennis federal dollars to NAU)	\$37,000
Designing wildlife corridors for a changing climate, USDA Forest Service National Competition.	\$45,228
Rigorous estimates of landscape resistance to gene flow, National Science Foundation.	\$248,000
Impact of non-motorized recreation on wildlife. Gordon and Betty Moore Foundation.	\$430,000
Do conservation corridors work? Gordon and Betty Moore Foundation.	\$220,000
BLM Desert Connectivity project	\$240,000
<hr/> Total	<hr/> \$2,729,458

## **Document E: Individual Faculty Information**

### **MATTHEW A. BOWKER**

Associate Professor – 9 month – Tenured

Date of Appointment: 2006 – Present

Specializations: Soil Ecosystem and Community Ecologist

**Northern Arizona University – School of Forestry**

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### **EDUCATION**

2006 Northern Arizona University - Biological Sciences, Ph.D. *with distinction*

2004 Northern Arizona University - Biological Sciences

1997 University of Nevada-Las Vegas - Environmental Science 1997

### **PROFESSIONAL EXPERIENCE:**

2012/Present Assistant Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ

2010/Present Adjunct Faculty, Biological Sciences, University of Nevada, Las Vegas

2010/Present Adjunct Faculty, Biological Sciences, Northern Arizona University, Flagstaff, AZ

2010/2012 Ecologist, Southwest Biological Science Center, US Geological Survey, Flagstaff, AZ

2008/2010 Juan de la Cierva Fellow (post-doc), Universidad Rey Juan Carlos, Móstoles, Spain

2007/2008 Co-lecturer, Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ

2007/2008 Research specialist, Center for Environmental Science and Education, Northern Arizona University, Flagstaff, AZ

2002/2006 Research assistant, Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ

1997/2002 Bioscience technician & contract researcher, US Geological Survey, Moab, UT

1996/1997 Research technician, Desert FACE facility, Nevada Test Site

1996/1996 Undergraduate teaching assistant, University of Nevada-Las Vegas

1994/1996 Bioscience technician, Southern Nevada Environmental Inc., Las Vegas, NV

**TEACHING EXPERIENCE:**

2001/Present

FOR 313 Ecosystem Processes,  
FOR 314 NAU undergraduate course  
FOR 690 Research Methods, NAU graduate course (currently underway)  
Lecturer, Biological soil crusts, Desert Institute Joshua Tree course  
(Scheduled Feb 2012)  
Guest-lecturer, Ecology, NAU undergraduate course  
Guest-lecturer, Dryland restoration ecology, URJC graduate course  
Guest-lecturer, Soil and water conservation, URJC undergraduate course  
Guest-lecturer, Dryland restoration ecology, URJC grad. course  
Teaching assistant, Conservation Biology, NAU grad. & undergrad.  
course  
Guest Lecturer, Environmental Science of the San Juan River Basin NAU  
undergraduate course  
Co-lecturer, Community genetics: tools of the trade, NAU grad. course  
Co-lecturer, Environmental Science of the San Juan River Basin NAU  
undergrad. course  
Guest Lecturer, Ecology, NAU undergrad. course  
Guest Lecturer, Field Biology, CCC undergrad. course  
Guest Lecturer & teaching assistant, Environmental Science of the San  
Juan River Basin, NAU undergrad. course  
Guest lecturer, Mycology, NAU grad.-undergrad. course  
Guest Lecturer & teaching assistant, Biological soil crust training s  
seminar, Moab UT  
Lecturer, Ecology of biological soil crusts, NAU grad. seminar  
Workshop Instructor, Field identification of soil crust mosses & lichens,  
USGS training  
Teaching assistant, Biological soil crust training seminar, GSENM  
Undergraduate Teaching Assistant, Principles of Modern Biology  
Laboratory, UNLV undergraduate course

**JOURNAL PUBLICATIONS, BOOKS, & BOOK CHAPTERS**

*In review:*

Bowker, M.A., Eldridge, D.J., Val, J., Soliveres, S. 201x. Dual ecosystem engineering of hydrological functioning in patterned landscapes from micro- to macro-scale. *Soil Biology & Biochemistry* in review.

Eldridge, D.J., Soliveres, S., Bowker, M.A., Val, J. 201x Grazing moderates the positive effects of shrub encroachment on ecosystem functions in a semi-arid woodland. *Journal of Applied Ecology* in review.

- Bowker, M.A., Miller, M.E., Belote, R.T. 201x. Assessing the provisioning of multiple ecosystem services in semi-arid rangelands. *Ecosystems in review*.
- Ochoa-Hueso, R., Maestre, F.T., de los Rios, A., Valea, S., Theobald, M.R., Vivanco, M.G., Manrique, E., Bowker, M.A. 201x. Nitrogen deposition alters nitrogen cycling and reduces carbon stocks in semiarid Mediterranean ecosystems. *Environmental Pollution in review*.
- Johnson, N.C., Wilson, G.W.T., Wilson, J.A., Miller, R.M., Bowker, M.A. 201x. Law of the minimum and resource trade predict mycorrhizal function. *Ecology Letters in review*.
- Bowker, M.A., Maestre, F.T., Mau, R.L. 201x. What determines semi-arid ecosystem multifunctionality? Biodiversity and patch size distribution of biological crusts. *Ecosystems in review*.
- Bowker, M.A., Miller, M.E., Garman, S.L., Belote, T. 201x. Applying Threshold Concepts to Conservation Management of Dryland Ecosystems: Case Studies on the Colorado Plateau. Pages XXX In: Guntenspergen, G., (Ed.) Application of threshold concepts in natural resource decision making. Springer, Berlin. In review.
- Eldridge, D.J., Maestre, F.T., Maltex-Mouro, S., Bowker, M.A. 2012. A global database of shrub encroachment effects on ecosystem structure and functioning. *Ecology*: in press.
- Miller, M.E., Bowker, M.A., Reynolds, R., Goldstein, H. 2012. Post-fire land treatments and wind erosion – lessons from the Milford Flat Fire. *Aeolian Research*: in press.
- Escolar, C., Maestre, F.T., Martínez, I., Bowker, M.A. 2012. Warming reduces the growth and diversity of lichen-dominated biological soil crusts in a semi-arid environment: implications for ecosystem structure and function. *Proceedings of the Royal Society B*: in press.
- Bowker, M.A., Maestre F.T. 2012. Inferring local competition intensity from patch size distributions: a test using biological soil crusts. *Oikos* in press.
- de Vries, F.T., Liiri, M., Bjørnlund, L., Bowker, M.A., Christensen, S., Setälä, H.M., Bardgett, R.D. 2012. Agricultural land use and the stability of food webs. *Nature Climate Change* doi:10.1038/nclimate1368. (see press release: <http://news.lancs.ac.uk/web/news/pages/grasslands-soils-offer-insurance-against-climate-change.aspx>).
- Maestre, F.T., Quero, J.L., Gotelli, N.J., Ochoa, V., Delgado-Baquerizo, M., García-Gómez, Bowker, M.A. et al. (over 50 authors). 2012. Biodiversity enhances ecosystem multifunctionality in the world's drylands. *Science* 335: 214 – 217 (rated “must read” by Faculty of 1000; see press at <http://maestrelab.blogspot.com/2012/01/impacto-en-los-medios-de-nuestro.html>)
- Meneses, N, Bailey, J.K., Allan, G.J., Bangert, R.K., Bowker, M.A., Rehill, B.J., Wimp, G.W., Lindroth, R.J., Whitham, T.G. 201X. Arthropod community similarity in clonal stands of aspen: A test of the genetic similarity rule. *Ecoscience* in press.

Maestre, F.T., Castillo, A.P., Bowker, M.A., Ochoa-Hueso R. 201X. Species richness and composition are more important than spatial pattern and evenness as drivers of ecosystem multifunctionality. *Journal of Ecology* 100:317-330. (see post in *Journal of Ecology* blog at <http://jecologyblog.wordpress.com/2012/01/31/biological-soil-crusts-and-ecosystem-multifunctionality/>)

Bowker, M.A., Muñoz, A., Martínez, T., Lau, M.K. 2012. Rare drought-induced mortality of Juniper is enhanced by edaphic stressors and influenced by stand density. *Journal of Arid Environments* 76: 9 – 16.

Soliveres, S., Eldridge, D.J., Maestre, F.T., Bowker, M.A., Tighe, M., Escudero, A. 2011. Microhabitat amelioration and reduced competition among understorey plants as drivers of plant facilitation across environmental gradients: towards a unifying framework. *Perspectives in Plant Ecology, Evolution and Systematics* 13: 247 – 258.

Wu, Z., Koch, G.W., Dijkstra, P., Bowker, M.A., Hungate, B.A. 2011. Responses of ecosystem carbon cycling to climate change treatments along an elevation gradient. *Ecosystems* 14: 1066 – 1080.

García-Palacios, P., Bowker, M.A., Maestre, F.T., Soliveres, S., Valladares, F., Papadopoulos, J., Escudero, A. 2011b. Ecosystem development in roadside grasslands: biotic control, plant–soil interactions and dispersal limitations. *Ecological Applications* 21:2806 – 21.

Miller, M.E., Belote, R.T., Bowker, M.A., Garman, S.L. 2011. Alternative states of a semiarid grassland ecosystem: Implications for erosion susceptibility, ecosystem services and management. *Ecosphere* 2 Art 55.

Eldridge, D.J., Bowker, M.A., Maestre, F.T., Reynolds, J.F., Roger, E., Whitford, W.G. 2011. Impacts of shrub encroachment on ecosystem structure and functioning: toward a global synthesis. *Ecology Letters* 14: 709 - 722.

Maestre, F.T., Bowker, M.A., Cantón, Y., Castillo-Monroy, A.P., Cortina, J., Escolar, C., Escudero, A., Lázaro, R. Martínez, I. 2011. Ecology and functional roles of biological soil crusts in semi-arid ecosystems of Spain. *Journal of Arid Environments* 75:1282 - 1291.

Bowker, M.A., Mau, R.L., Maestre, F.T., Escolar, C., Castillo, A.P. 2011. Functional profiles reveal unique ecological roles of various biological soil crust organisms. *Functional Ecology* 25: 787-795.

García-Palacios, P., Bowker, M.A, Chapman, S.J., Maestre, F.T., Soliveres, S., Gallardo, A., Valladares, F., Guerrero, C., Castillo-Monroy, A.P. Escudero, A. 2011a. Early-successional vegetation changes after roadside prairie restoration modify potential soil functioning by changing microbial functional diversity. *Soil Biology and Biochemistry* 43: 1245-1253.

Castillo-Monroy, A.P., Bowker, M.A., Maestre, F.T., Rodríguez-Echeverría, S., Martínez, I., Barraza-Zepeda, C.E., Escolar, C. 2011. Relationships between biological soil crust, bacterial diversity and abundance and ecosystem functioning: Insights from a semi-arid Mediterranean environment. *Journal of Vegetation Science* 1:165-174

Lamit, L.J., Bowker, M.A., Holeski, L.M., Wooley, S.C., Zinkgraf, M., Lindroth, R.L., Whitham, T.G., and C.A. Gehring. 2011. Genetically-based trait variation within a foundation tree species influences a dominant bark lichen. *Fungal Ecology* 4:103-109.

Linares, J.C., Camarero, J.J., Bowker, M.A., Ochoa, V, and Carriera, J.A. 2010. Stand-structural effects on *Heterobasidion abietinum*-related mortality following drought events in *Abies pinsapo*. *Oecologia* 164:1107-1119.

Eldridge, D.J., Bowker, M.A., Maestre, F.T., Alonso, P., Mau, R.L., Papadopoulos, J., and Escudero, A. 2010. Interactive effects of three ecosystem engineers on infiltration in a semi-arid mediterranean grassland. *Ecosystems* 13: 499-510.

Bowker, M.A., Soliveres, S, Maestre, F.T. 2010. Competition increases with abiotic stress and regulates the diversity of biological soil crusts. *Journal of Ecology* 98: 551-560.

Maestre, F.T., Bowker, M.A., Escolar, C., Puche, M.D., Soliveres, S., Castillo, A.P., Mouro, S.P., García-Palacios, P., Martínez, I, and Escudero, A. 2010. Potential climate change impacts on competition, facilitation, and contributions to ecosystem function of Mediterranean plant and biological soil crust communities. *Philosophical Transactions of the Royal Society B* 365:2057-2070.

Johnson, N.C., Wilson, G.W.T., Bowker, M.A., Wilson, J., and R.M. Miller. 2010. Resource limitation is a driver of local adaptation in mycorrhizal symbioses. *Proceedings of the National Academy of Sciences* 107: 2093-2098.

Bowker, M.A., Maestre, F.T., Escolar, C. 2010. Biological crusts as a model system for examining the biodiversity-function relationship in soils. *Soil Biology and Biochemistry* 42: 405-417.

Bowker, M.A., Belnap, J. and D.W. Davidson. 2010. Microclimate and propagule availability are equally important for rehabilitation of dryland N-fixing lichens. *Restoration Ecology* 18: 30-33.

Owen, S., Gehring, C., Seig, C., and M.A. Bowker. 2009. Above- and belowground responses to tree thinning depend on the treatment of tree debris. *Forest Ecology and Management* 259: 71-80.

Maestre F.T., Bowker, M.A., Puche, M.D., Hinojosa, M.B., Martínez, I., García-Palacios, P., Castillo, A.P., Soliveres, S., Luzuriaga, A.L., Sánchez, A.M, Carreira, J.A., Gallardo, A. and Escudero, A. 2009. Shrub encroachment can reverse desertification in semiarid Mediterranean grasslands. *Ecology Letters* 12:930-941.

Antoninka, A.J, Wolf, J.E., Bowker, M.A., Classen, A.T., and N.C. Johnson. 2008. Linking

above- and belowground responses to global change at community and ecosystem scales. *Global Change Biology* 15:914-929.

Chaudhary, V.B., Bowker, M.A., O'Dell, T.E., Grace, J.B., Redman, A.E., Johnson, N.C., and M. Rillig. 2008. Untangling the biological controls on soil stability in semi-arid shrublands. *Ecological Applications* 40:2309-2316.

Bowker, M.A., Koch, G.W., Belnap, J., and N.C. Johnson. 2008. Nutrient availability affects pigment production but not growth in lichens of biological soil crusts. *Soil Biology and Biochemistry* 40: 2819-2826.

Bowker, M.A., Miller, M.E., Belnap, J., Sisk, T.D., and N.C. Johnson. 2008. Prioritizing conservation effort using biological soil crusts as indicators of dryland ecosystem functioning. *Conservation Biology* 22: 1533-1543.

Bowker, M.A. , Belnap, J., Chaudhary, V.B., Johnson, N.C. 2008. Revisiting classic soil erosion models in drylands: the relationship of biological soil crusts to erosion resistance. *Soil Biology and Biochemistry* 40:2309-2316.

Bowker, M.A., and J. Belnap. 2008. A simple but informative classification of biological soil crust habitat on the Colorado Plateau, USA. *Journal of Vegetation Science* 19: 831-840.

Bowker, M.A., Johnson, N.C., Belnap, J., and G.W. Koch. 2008. Short term measurement of change in aridland lichen cover using repeat photography and fatty acids. *Journal of Arid Environments* 72: 869-878.

Rosentreter, R., Bowker, M.A., and J. Belnap. 2007. A field guide to biological soil crusts of western U.S. drylands: common lichens and bryophytes. US Government Printing Office, Denver, Colorado.

Bowker, M.A. 2007. Biological soil crust rehabilitation in theory and practice: an underexploited opportunity. *Restoration Ecology* 15:13-23

Bowker, M.A., Belnap, J., and M.E. Miller. 2006. Spatial modeling of biological soil crusts to support rangeland assessment and monitoring. *Range Ecology and Management*. 59: 519-529.

Bowker, M.A., Belnap, J., Davidson, D.W., and H. Goldstein. 2006. Correlates of biological soil crust distribution across a continuum of spatial scales: support for a hierarchical conceptual model. *Journal of Applied Ecology* 43: 152-163.

Gitlin, A.R., Stulz, C.M., Bowker, M.A., Stumpf, S., Ecton, K., Kennedy, K., Munoz, A., Bailey, J.K., and T.G. Whitham. 2006. Dominant plants as "barometers" of change during record droughts: local and landscape patterns of mortality. *Conservation Biology* 20: 1477-1486.



Bowker, M.A., Belnap, J., Davidson, D.W., and S.L. Phillips. 2005. Evidence for micronutrient limitation of biological soil crusts: potential to impact aridlands restoration. *Ecological Applications* 15: 1941-1951

Bowker, M.A., Belnap, J., Rosentreter, R., and B.Graham. 2004. Wildfire-resistant biological soil crusts and fire-induced loss of soil stability in Palouse prairies, USA. *Applied Soil Ecology* 26: 41-52.

Davidson, D.W., Bowker, M.A., George, D., Phillips, S.L. and J. Belnap. 2002. Treatment effects on performance of N-fixing lichens in disturbed soil crusts on the Colorado Plateau. *Ecological Applications* 12: 1391-1405.

Bowker, M.A., Reed, S.C., Belnap, J., and S.L. Phillips. 2002. Temporal variation in community composition, pigmentation, and Fv/Fm of desert cyanobacterial crusts. *Microbial Ecology* 43: 13 - 25.

Bowker, M.A., Stark, L.R., McLetchie, D.N., and B.D. Mishler. 2000. Sex expression, skewed sex ratios, and microhabitat distribution in the dioecious desert moss *Syntrichia caninervis* (Pottiaceae). *American Journal of Botany* 87: 517-526.

## **OTHER PUBLICATIONS**

### ***In review:***

Bowker, M.A., Miller, M.E., Belote, R.T., and S.L. Garman. 201x. Ecological thresholds as a basis for defining management triggers for NPS vital signs – Case studies for dryland ecosystems. USGS OFR in review.

Bowker, M.A., Miller, M.E., and R.T. Belote. 2012. Assessment of rangeland ecosystem conditions, Salt Creek Watershed and Dugout Ranch, Southeastern Utah. USGS OFR 2012-1061.

## **PRESENTATIONS AND POSTERS**

***(presenter listed first, all are oral presentations unless otherwise indicated)***

DeCrappeo, N.M., Bowker, M.A., Chaudhary, V.B. 2012. Reducing erosion, ameliorating stress, resisting invasion: roles for soil organisms in ecological restoration. ESA Meeting, Portland (*invited*).

Bowker, M.A., Maestre, F.T., Castillo-Monroy, A.P., Escolar, C. 2012. Biological soil crusts as a model system in community and ecosystem ecology. ESA Meeting, Portland (*invited*).

Bowker, M.A., Wood, T., Spence, J., Stark, L.R. 2012. Can biological soil crust mosses be developed as restoration materials on the Colorado Plateau? Hurdles and outstanding research topics. Colorado Plateau Native Plant Program Meeting, Page, Arizona (*invited*)

Bowker, M.A., Miller, M.E., Belote, T. 2012. Assessing the provisioning of multiple ecosystem services in semi-arid rangelands. Canyon Country Science Symposium, Moab Utah (*invited*)

Bowker, M.A., Eldridge, D.J., Maestre, F.T. 2012. Runoff source or sink? Biocrust hydrological function strongly depends on the relative abundance of mosses. European Geoscience Union General Assembly, Vienna, Austria (*invited*)

Bowker, M.A., Belnap, J., Maestre, F.T., Chaudhary, V.B. 2012. What controls dryland soil stability? The surprising importance of biocrusts and their possible sensitivity to climate change. European Geoscience Union General Assembly, Vienna, Austria (*invited*)

Kenkel, J., Sesnie, S., Johnson, N.C., Bowker, M.A., Sisk, T.D. 2011. Detection of nitrogen eutrophication in Grand Canyon National Park .11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ.

Chiquoine, L., Bowker, M.A., Stark, L.R., Abella, S. 2011. Biological soil crust rehabilitation on disturbed gypsiferous soil. 11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ.

Bowker, M.A. 2011. Biological Soil Crusts: Understanding, Modeling, and Restoring their Function in the Ecosystems. Introduction to special session. 11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ.

Belnap, J., Bowker, M.A. 2011. Interactions between biocrust microtopography and ecosystem function. 11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ.

Bowker, M.A., Belnap, J., Maestre, F., Chaudhary, V.B. 2011. What controls dryland soil stability? The surprising importance of biological soil crusts at multiple spatial scales. 11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ (*invited*)

Bowker, M.A., Arundel, T. 2011. Maps of the biological soil crust potential of the Colorado Plateau: a resource prepared for the Bureau of Land Management ecoregional assessment. 11<sup>th</sup> Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ.

Bowker, M.A., Soliveres, S, Maestre, F.T. 2011. A backward stress gradient hypothesis and competition-regulated biodiversity in a biological crust model system. University of New South Wales, BEES Departmental Seminar, Sydney, Australia (*invited*).

Bowker, M.A., Roth D. 2011. Modeling the niche of an endangered gypsophile plant (*Arctomecon humilis*, papaveraceae) to aid the discovery of new populations. Washington County Rare Plants Symposium, St. George Utah.

Bowker, M.A. 2011. Rehabilitation of biological soil crusts in theory and practice: an underexploited opportunity. International Rangeland Congress, Rosario, Argentina (*invited*).

Bowker, M.A., Miller, M.E., Garman, S.L., Belote, T. 2010. Applying threshold concepts to conservation management: case studies on the Colorado Plateau. USGS Western Region post-doctoral colloquium, Menlo Park, California (Poster).

Bowker, M.A. What determines multi-function in semi-arid soils? Biodiversity and patch size distribution of biological crusts. Northern Arizona University Biology Departmental Seminar, Flagstaff, Arizona.

Maestre, F.T., Bowker, M.A., Escolar, C., Martinez, I, Escudero, A. 2010. Testing the stress-gradient hypothesis with biological soil crusts: competition dominates and modulates species richness. Biological soil crusts in ecosystems: Their diversity, ecology and management, Zellingen-Retzbach, Germany.

Castillo-Monroy, A.P., Bowker, M.A., Maestre, F.T., Rodriguez-Echeverria, S., Barraze-Zepeda, C.E., Escolar, C., Martinez, I. 2010. Are the functional effects of biological soil crusts mediated by the below-ground bacterial community? Biological soil crusts in ecosystems: Their diversity, ecology and management, Zellingen-Retzbach, Germany.

Bowker, M.A., Maestre, F.T., Mau, R.L. 2010. What determines multi-function in semi-arid soils? Biodiversity and patch size distribution of biological crusts. Biological soil crusts in ecosystems: Their diversity, ecology and management, Zellingen-Retzbach, Germany.

Bowker, M.A, Soliveres, S., Maestre, F.T. 2010. Competition prevails and influences biodiversity in biological soil crusts. ESA Meeting, Pittsburgh, PA.

Bowker, M.A., Soliveres, S, Maestre, F.T. 2010. A backward stress gradient hypothesis and competition-regulated biodiversity in a biological crust model system. Northern Arizona University Biology Special Departmental Seminar, Flagstaff, Arizona.

Bowker, M.A., Maestre, F.T., Soliveres, S. 2010. The log-normal distribution and its relation to biotic interactions: describing patch size distributions when competition prevails. Departmental seminar, Universidad Rey Juan Carlos, Area de Biodiversidad y Conservación, Móstoles, Spain.

Maestre, F.T., Bowker, M.A. Escolar, C. Soliveres, S. Garcia-Palacios, P., Castillo, A.P. Martinez, I. Escudero, A. 2009. Potential climate change impacts on competition, facilitation, and contributions to ecosystem function of Mediterranean plant and biological soil crust communities. BES meeting, Hertfordshire, UK.

Garcia-Palacios, P., Maestre, F.T., Chapman, S.J., Soliveres, S., Bowker, M.A., Escudero, A., Valladares, F., Gallardo, A., Guerrero, C., Castillo, A.P. 2009. Links between vegetation, microbial functional diversity and soil functioning during restoration of semi-arid motorway slopes. BES meeting, Hertfordshire, UK.

- Bowker, M.A., Maestre, F.T. 2009. Ecosystem function in biological soil crusts: relative importance of diversity, abundance, and patch size distributions. BES meeting, Hertfordshire, UK.
- Neal, S., Sieg, C.H., Gehring, C.A., & M.A. Bowker. 2009. Mechanical mastication showed fewer negative above-and belowground impacts than slash burning. North American Forest Ecology Workshop, Logan, Utah.
- Antoninka, A., Wolf, J, Bowker, M.A, Classen, A.T, & N.C. Johnson. 2009. Linking above and belowground responses to global change at community and ecosystem scales. Soil Ecological Society Meeting, Burlington, Vermont.
- Maestre, F.T., Bowker, M.A., Soliveres, S., Escolar, C., García-Palacios, P., Castillo, A.P., Martínez, I. & A. Escudero. 2009. Biotic interactions at multiple spatial scales: Their role in maintaining ecosystem structure along complex resource gradients. Dynamic Deserts: Resource Uncertainty in Arid Environments Conference, Tempe, Arizona.
- Bowker, M.A., Chaudhary, V.B., Belnap, J., Johnson, N.C., and F.T. Maestre. 2008. What controls dryland soil stability? The importance of biological soil crusts at three spatial scales. BES meeting, London, UK.
- Lamit, L.J., Bowker, M.A., Holeski, L.M., Wooley, S.C., Zinkgraf, M.S., Lindroth, R.L., Whitham, T.G., Gehring, C.A. 2008. Genetic variation in a foundation species influences associated primary producers: cottonwoods and lichens. ESA Meeting, Milwaukee, Wisconsin.
- Johnson, N.C., Wilson, G.W.T., Miller, R.M., Gehring, C.A., and M.A. Bowker. 2008. Testing models to generate a unified hypothesis of mycorrhizal function. ESA Meeting, Milwaukee, Wisconsin.
- Hagenauer, L.E., Ferrier, S.M., Bowker, M.A., Allen, G.J., and T.G. Whitham. 2008. The importance of genetic diversity in supporting arthropod diversity in natural stands of a foundation tree species. ESA Meeting, Milwaukee, Wisconsin.
- Chaudhary, V.B., Bowker, M.A., Johnson, N.C., Redman, A., and T. O'Dell. 2008. What can soil organisms do for GSENM? Grand Staircase-Escalante National Monument Advisory Committee Meeting, Escalante, Utah.
- Bowker, M.A., Chaudhary, V.B., Belnap, J., Koch, G.W., Miller, M.E., Johnson, N.C., Akland, K., and T.D. Sisk. 2007. Rehabilitation of biological soil crusts in theory and practice: an underexploited opportunity. Northern Arizona University Forestry Department Seminar, Flagstaff, Arizona.
- Will-Wolf, S. and M.A. Bowker. 2007. Lichens and biological soil crusts in ecological

restorations: where, when and why? ESA meeting, San Jose, CA.

Bowker, M.A., Koch, G.W., Belnap, J., and N.C. Johnson. Aug 2007. Micronutrient availability affects pigment production but not growth in biological soil crusts. ESA meeting, San Jose, CA.

Chaudhary, V.B., Bowker, M.A., Redman, A.E., Grace, J.B., and N.C. Johnson. 2007. Untangling the biological contributors to soil stability in semi-arid shrublands. ESA meeting, San Jose, CA

Bowker, M.A., Koch, G.W., Belnap, J., and N.C. Johnson. 2007. Micronutrient availability affects pigment production but not growth in biological soil crusts. SES meeting, Moab, Utah.

Chaudhary, V.B., Bowker, M.A., O'Dell, T.E., Redman, A.E., Grace, J.B., Rillig, M.C., and N.C. Johnson. 2007. How much do arbuscular mycorrhizal fungi contribute to the soil stability of semi-arid systems? SES meeting, Moab, Utah.

Bowker, M.A., Belnap J., Miller, M.E., Johnson, N.C., and T.D. Sisk. 2007. Spatial modeling of biological soil crusts to support range management and restoration. Departmental Seminar, Universidad Rey Juan Carlos, Area de Biodiversidad y Conservación, Móstoles, Spain (invited).

Chaudhary, V.B., Bowker, M.A., O'Dell, T.E., Redman, A.E., Rillig, M.C. and N.C. Johnson. 2006. How much do mycorrhizal fungal communities contribute to the soil stability of arid ecosystems? GSENM Learning from the land conference, Cedar City, UT.

Bowker, M.A., Belnap J., and M.E. Miller. 2006. Using biological soil crusts as a rangeland health indicator and to prioritize restoration efforts. GSENM Learning from the land conference, Cedar City, UT.

Bowker, M.A. 2005. Predictive modeling of biological soil crusts as a tool for better range management. GSENM special session, Kanab, UT

Bowker, M.A. 2005. Ecology and management of biological soil crusts: introduction to special session. 8th Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ

Bowker, M.A. 2005. Restoration of biological soil crusts in theory and practice: an underexploited opportunity. 8th Biennial Conference of research on the Colorado Plateau, Flagstaff, AZ

Antoninka, A., Neal, S, Rauch, E. and Bowker, M.A. 2005. ORV disturbance in a riparian habitat: negative impacts and management implications for plants and arbuscular mycorrhizal communities. 8th Biennial Conference of research on the

Colorado Plateau, Flagstaff, AZ

Bowker, M.A., Belnap J., and M.E. Miller. 2005. Predictive modeling of biological soil crusts as a tool for better range management. GSENM Science Forum, Escalante, UT.

Bowker, M.A. 2005. Structural equation modeling: a tool for better understanding linkages and interactions in soils. SES meeting, Argonne National Laboratory, IL.

Bowker, M.A. 2005. A broad overview of structural equation modeling. Presentation to Ecological Restoration Institute, Flagstaff, AZ.

Anderson, D., Ort, M., Ostregren, D., Sisk, T., Anderson, K., & M.A. Bowker. 2004. San Juan River field course at Northern Arizona University. Geological Society of America Annual Meeting, Denver, CO (Poster).

Bowker, M.A. 2004. Biological soil crust distribution across a suite of spatial scales: toward applications in restoration. Merriam-Powell Seminar Series, Flagstaff, AZ

Bowker, M.A., and J. Belnap. 2004. Predictive modeling of biological soil crusts as a tool for better range management. 89th Annual Ecological Society of America Meeting, Portland, OR.

Bowker, M.A. 2003. Can biological soil crusts be restored to reduce desertification? Experiments and distribution studies. Merriam-Powell Seminar Series, Flagstaff, AZ

Bowker, M.A., & J. Belnap. 2003. Can predictive modeling of biological soil crusts become a tool for better range management? 7th Biennial Conference on research on the Colorado Plateau, Flagstaff, AZ

Povilotis, A., Bowker, M.A., Putnam, C. Reilly, J., Roberts, J., Wynne, J., Becker, D., & A. Gaines. 2003. Increasing public understanding of regionally imperiled species: a work group of the Colorado Plateau chapter of the Society for Conservation Biology. 7th Biennial Conference on research on the Colorado Plateau, Flagstaff, AZ

Stumpf, S., Bowker, M.A., Ecton, K., Gitlin, A., Kennedy, K., Stultz, C., and T.G. Whitham. 2003. Effects of a record drought on dominant plant species across an elevational gradient in northern Arizona. 7th Biennial Conference on research on the Colorado Plateau, Flagstaff, AZ

Bowker, M.A., & J. Belnap. 2003. Predicting the occurrence, composition and function of biological soil crusts in Grand Staircase-Escalante National Monument. Arizona-Nevada Academy of Sciences Annual Meeting, Flagstaff, AZ.

Muñoz, A., Martinez, T., & M.A. Bowker. 2002. Landscape type influences juniper mortality in response to a millenium-level drought. Annual Meeting of the Southwest Association of Biologists, Portal, AZ.

Bowker, M.A., Reed, S.C., Belnap, J., & S.L. Phillips. 8 August 2002. Temporal variation in community composition and pigmentation in desert cyanobacterial soil crusts. 87th Ecological Society of America Meeting, Tucson, AZ.

Bowker, M.A., & J. Belnap. Mar 2002. Predicting the occurrence and composition of biological soil crusts in Grand Staircase-Escalante National Monument. 1st GSENM Research Conference, Provo, Utah.

Bowker, M.A., Reed, S.C., Belnap, J., & S.L. Phillips. November 2001. Temporal variation in community composition and pigmentation in desert cyanobacterial soil crusts. 6th Biennial Conference on research on the Colorado Plateau, Flagstaff, AZ

Bowker, M.A., Belnap, J., Davidson, D., & S.L. Phillips. November 1999. Factors influencing the distribution of the lichen genus *Collema* on the Colorado Plateau. Conference on research in Virginia Park, Canyonlands National Park, Moab, Utah.

### ***Additional Training Courses:***

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|------|--|
| 2010 | Learn the R statistical package by example (webcast by Paul Geissler), USGS-NPS online training course   |
| 2010 | Structural equation modeling using Bayesian methods (Taught by James B. Grace), 1 day workshop, ESA Annual Meeting, Pittsburgh, PA                             |
| 2009 | Null model analysis with ECOSIM software (Taught by Nicholas J. Gotelli), 1 day workshop, Universidad Rey Juan Carlos, Móstoles, Spain                         |
| 2007 | A brief introduction to Bayesian and hierarchical Bayesian modeling in ecology (Taught by Kiona Ogle et al.), 1 day workshop, ESA Annual meeting, San Jose, CA |
| 2006 | Model Selection and multi-model Inference (taught by David Anderson), 2 day workshop, Northern Arizona University, Flagstaff, AZ                               |
| 2005 | An Introduction to Structural Equation Modeling (taught by James B. Grace), 1 day workshop, ESA Annual Meeting, Portland, OR                                   |

## **MENTORING**

### ***Graduate student advisees:***

2012/Present      1 Student (M.S. Student, Dept. Biological Sciences, NAU)

**Graduate student committees:**

2010/Present            1 Student (M.S. Student, School of Environment & Public Affairs, UNLV)  
2010/Present            1 Student (Ph.D candidate, Dept. Biological Sciences, NAU)  
2012/Present            1 Student (Ph. D. candidate, Dept. Biological Sciences, NAU)

**Undergraduate Interns:**

1 Student                (B.S. Student, URM Scholar, School of Earth Sciences and Environmental Sustainability, NAU)  
1 Student                (B.S. Student, URM Scholar, Department of Biological Sciences, NAU)

**SERVICE, OUTREACH, & ENGAGEMENT IN SCIENTIFIC COMMUNITY**

Chair and organizer of conference sessions:

*Ecology and management of biological soil crusts* at the 8<sup>th</sup> Biennial Conference for Research on the Colorado Plateau, November 7 – 10 2005, Flagstaff, Arizona.

*Biological Soil Crusts: Understanding, Modeling, and Restoring their Function in Ecosystems* at the 11<sup>th</sup> Biennial Conference for Research on the Colorado Plateau, October 24 – 27 2011, Flagstaff, Arizona.

Manuscript reviews for the US Geological Survey in addition to the journals *American Naturalist*, *Arid Land Research and Management*, *Applied Vegetation Science*, *Earth Surface Processes and Landforms*, *Ecology*, *Journal of Ecology*, *Journal of Arid Environments*, *Journal of Applied Ecology*, *Microbial Ecology*, *Rangeland Ecology & Management*, *Soil Biology & Biochemistry*, *European Journal of Soil Biology*, *Plant and Soil*, *Restoration Ecology*, *Austral Ecology*, *Hydrological Processes*, *Pedosphere*, *Ecosphere*, *Ecosystems*, *Plant Ecology*, *Geobiology*, *Journal of Vegetation Science*, *Philosophical Transactions of the Royal Society B*, *Land Degradation & Development*, *Global Change Biology*, *Plant Ecology & Diversity*, *Ecological Monographs*.

Consulting editor for *Plant & Soil*.

Reviewer of the Bureau of Land Management's Colorado Plateau rapid ecoregional assessment.

Grant proposal reviews for the *American Chemical Society*, *Israeli-American Binational Science Foundation*, *Israeli Science Foundation*, *Biotechnology and Biosciences Research Council*

Spoke to two 7<sup>th</sup> grade classes at Flagstaff Middle School about soil ecology, desertification, and becoming a scientist.

Instruction/ design of biological soil crust course for general public at Desert Institute at Joshua Tree.

Present member of professional societies: British Ecological Society, Ecological Society of America

**GRANTS AND FELLOWSHIPS**



- To be funded 2013* Barger, N., Belnap, J., Garcia-Pichel, F., Bowker, M.A., Reed, S.C., & M.C. Duniway. Achieving dryland restoration through the deployment of enhanced biocrusts to improve soil stability, fertility and native plant recruitment.. SERDP. \$ 2,122,689.
- 2012 Wood, T., Spence, J., Bowker, M.A., & L.R. Stark, L.R. Development of dryland soil mosses as restoration materials for the Colorado Plateau: Evaluating genetic diversity and cultivation techniques. \$50,057.
- 2011 Bowker, M.A. *Are micronutrients the key to restoration of biocrust function in degraded drylands?* Competitively awarded internal USGS base funds \$18,218
- 2011 Bowker, MA. *Bandelier National Park Natural Resource Condition Assessment* Technical Assistance Agreement with NPS Inventory & Monitoring Program, \$48,000
- 2010 Bowker, M.A., & Roth, D. *Modeling the niche of an endangered gypsophile plant (Arctomecon humilis, papaveraceae) to aid the discovery of new populations.* USGS-USFWS SSP Program. \$50,181
- 2010 Johnson, NC, Sisk, TD, Sesnie, S, Dickson, B, Bowker, MA. *Detecting the Impacts of Nitrogen Pollution on Vegetation and Soils in Grand Canyon National Park* NPS Air Quality Division. \$63,999
- 2010 Bowker, MA, Eldridge, DJ. *Interactive effects of biological crusts and ecosystem engineering on arid ecosystem function.* Technical assistance agreement with University of New South Wales, Australia \$8,707
- 2009 Bowker, MA, *Maestre, FT. What controls dryland erodibility? An investigation of the role of biological soil crusts at three spatial scales conducted in Mediterranean steppes.* Small Ecological Project Grant, British Ecological Society £2500
- 2008/2010 Bowker, MA. Juan de la Cierva contract, Ministry of Science & Education, Spain 70,686€
- 2006 Bowker, M.A. : *Can enhancement of micronutrient fertility help restore biological soil crusts to desertified landscapes?* NSF Doctoral Dissertation Improvement Grant. \$11,196.
- 2005 Bowker, M.A. : *Can enhancement of micronutrient fertility help restore biological soil crusts to desertified landscapes?* Canon National Parks Scholars Honorable Mention. \$ 1,000.

- 2003/2007 Belnap, J. & M.A. Bowker. *Predicting the occurrence and species composition of biological soil crusts in the Flagstaff area National Monuments*. National Park Service. \$48,016.
- 2003/2004 Bowker, M.A. Merriam-Powell Center for Environmental Research Fellowship. \$7,000.

## **AWARDS**

- 2011 Qualified for USGS Annual Employee Performance Award  
2010 USGS Annual Employee Performance Award  
2007 Emeritus Professor Outstanding Dissertation Award  
2006 Emeritus Professor Outstanding Graduate Student Award

## Document E: Individual Faculty Information

### CAROL L. CHAMBERS

Professor – 9 month – Tenured

Date of Appointment: 2007 - Present

**Northern Arizona University – School of Forestry**

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### EDUCATION:

- 1996** Ph.D., Oregon State University, Corvallis, Wildlife Sciences (Major), Forest Sciences (Minor)  
*Dissertation Title: Response of Terrestrial Vertebrates to Three Silvicultural Treatments in the Central Oregon Coast Range*
- 1989** M.S., University of Kentucky, Lexington, Forestry  
*Thesis Title: Phenological Patterns of an East Kentucky Deciduous Forest*
- 1979** B.S., University of Kentucky, Lexington, Biology

### PROFESSIONAL EXPERIENCE:

- 2007/Present Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ  
Wildlife ecology and management instruction in the forestry undergraduate and graduate program (60%), research (30%) and service (10%).
- 2001/2007 Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ  
Wildlife ecology and management instruction in the forestry undergraduate and graduate program (65 to 70%), research (20 to 25%) and service (10%).
- 1996/2001 Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ  
Wildlife ecology and management instruction in the forestry undergraduate and graduate program (65%), research (25%) and service (10%).
- 1995/1996 Professor, Department of Forest Resources, Oregon State University, Corvallis, OR  
National Biological Service
- 1990/1995 Professor, Department of Forest Resources, Oregon State University, Corvallis, OR
- 1988/1989 Faculty Research Assistant, Department of Forest Resources, Oregon State University, Corvallis, OR

### TEACHING EXPERIENCE:

- 2006/Present Northern Arizona University  
FS 111 Ecology and Behavior of Bats Science  
FOR 204 Project WILD

FOR 250 Arizona Forests and Wildlife  
FOR 255 International Wildlife Issues  
FOR 325W Habitat Management, Forest Science B  
FOR 423 Forest Management  
FOR 506 Sustainability of Forest Ecosystems  
FOR 514 Field Identification of Birds.  
FOR 604 Wildlife Habitat Relationships.  
FOR 693 Teaching Practicum  
FOR 697 Scientific Writing and Publishing

Liberal studies course investigating global wildlife issues, 2001-2010, I developed this course. I also provide lectures on wildlife or habitat relationships for other courses.

### ***Continuing Education Courses for Professionals***

2008/2009 Wildlife Conservation and Management - Coordinator and instructor for USDA Forest Service Continuing Education short course  
Fall 2006 International Seminar on Forest Administration and Management, Northern Arizona University School of Forestry and USDA Forest Service – Biodiversity  
2001/2004 Wildlife Habitat and Plant Management - Coordinator for USDA Forest Service Continuing Education 2-week short course  
1997/2007 Wildlife Habitat Analysis, USDA Forest Service Continuing Education in Ecosystem Management Module II  
June 2001 Arizona Game and Fish Department School – Historic look at Arizona habitat, Parts I and II

### **REFERRED JOURNALS**

Chambers, C. L., B. Dickson, J. Prather, M. Herder, D. Mikesic, T. Snow, M. Siders, and K. Yasuda. A habitat model for spotted bats (*Euderma maculatum*) in the Southwestern United States. In preparation, to be submitted to *Journal of Mammalogy*.

Hagell, S., C. L. Chambers, S. Spehar, B. Davenport, and S. Otterstrom. Detection dogs as tools for primate surveys and non-invasive sampling. In preparation, to be submitted to *International Journal of Primatology*.

Mering, E.D., and C.L. Chambers. Spatial and temporal variability of bat activity in northern Arizona. In preparation for *Wildlife Society Bulletin*.

Chambers, C. L., R. R. Doucett, D. Mikesic, W. O. Noble, and T. Theimer. Diet and migration of mummified spotted bats as indicated by stable isotopes. In preparation, to be submitted to *Oecologia*.

Chambers, C. L., R. R. Doucett, D. Mikesic, W. O. Noble, and T. Theimer. Diet of spotted bats as indicated by stable isotopes. In preparation, to be submitted to *Oecologia*.

Chambers, C. L., R. R. Doucett, and T. Theimer. Evidence for migration of spotted bats as indicated by stable isotopes stable hydrogen isotope analysis of bat hair. In preparation, to be submitted to *Oecologia*.

Johnson, S. A. and C. L. Chambers. Effects of management in ponderosa pine forests on habitat for bats. In preparation for *Western North American Naturalist*.

Parker, T.J., C.L. Chambers, and R.L. Mathiasen. Effects of dwarf mistletoe on breeding bird abundance in ponderosa pine forests. In preparation for *Journal of Wildlife Management*.

Petriello, M. A., S. E. Hagell, and C. L. Chambers. Local ecological knowledge and environmental concerns in Nicaraguan tropical dry forest communities.

Chambers, C. L. and J. N. Mast. In preparation. Snag dynamics and cavity excavation following bark beetle outbreaks in southwestern ponderosa pine forests. In preparation for *Forest Science*.

Mering, E. D., and C. L. Chambers. What attracts bats to artificial bat roosts: A review. In preparation for *Acta Chiropterologica*.

Petriello, M. A., M. E. Lee, and C. L. Chambers. Public attitudes and knowledge of bats: Help or hindrance to bat conservation and management? *Wildlife Society Bulletin*. In review.

Hagell, S., A. Whipple, and C. L. Chambers. Population genetic patterns among social groups of the endangered Central American spider monkey (*Ateles geoffroyi*) in a human-dominated landscape. *Molecular Ecology*. In review.

Mering, E.D., and C.L. Chambers. 2012. Artificial roosts for tree-roosting bats in northern Arizona. *Wildlife Society Bulletin* 36(4):765-772.

Barrett, K.J., E.L. Kalies, and C.L. Chambers. 2012. Predator occupancy rates in a thinned ponderosa pine forest, Arizona: A pilot study. *Wildlife Society Bulletin* 36(2):232-239.

Kalies, E. L., B. G. Dickson, C. L. Chambers, and W. W. Covington. 2012. Small mammal community occupancy responses to restoration treatments in ponderosa pine forests, northern Arizona, USA. *Ecological Applications* 22:204–217. [doi: <http://dx.doi.org/10.1890/11-0758.1>]

Chambers, C. L., M. J. Herder, K. Yasuda, D. G. Mikesic, S. M. Dewhurst, W. M. Masters, and D. Vleck. 2011. Roosts and home ranges of spotted bats (*Euderma maculatum*) in northern Arizona. *Canadian Journal of Zoology* 89(12):1256-1267.

Ganey, J. L., and C. L. Chambers. 2011. A reconnaissance of small mammal communities in Garland and Government Prairies, Arizona. *Western North American Naturalist* 71(2):151-157.

Kalies, E. L., W. W. Covington, C. L. Chambers, and S. S. Rosenstock. 2010. Systematic Review No. 66: How do thinning and burning treatments in southwestern conifer forests in the United States affect wildlife density and population performance? Center for Evidence-Based Conservation. Published at <http://www.environmentalevidence.org/SR66.html>.

Kalies, E. L., C. L. Chambers, and W. W. Covington. 2010. Wildlife responses to thinning and burning treatments in southwestern conifer forests: A meta-analysis. *Forest Ecology and Management* 259(3):333-342. *This article was in the Top 25 (most read articles as counted by article downloads on ScienceDirect) in the first quarter of 2010 for Forest Ecology and Management.*

Painter, M. L., C. L. Chambers, M. Siders, R. R. Doucett, J. O. Whittaker, Jr. and D. L. Phillips. 2009. Diet of spotted bats (*Euderma maculatum*) in Arizona as indicated by fecal analysis and stable isotopes. *Canadian Journal of Zoology* 87(10):865-875.

Solvesky, B. G., and C. L. Chambers. 2009. Roosts of Allen's lappet-browed bat in northern Arizona. *Journal of Wildlife Management* 73(5):677-682.

Thompson, R. L., C. L. Chambers, and B. C. McComb. 2009. Home range and habitat of western red-backed voles in the Oregon Cascades. *Northwest Science* 83(1):46-56.

Corbett, R. J. M., C. L. Chambers, and M. Herder. 2008. Roosts and activity areas of *Nyctinomops macrotis* in northern Arizona. *Acta Chiropterologica* 10(2):323-329.

Sesnie, S. E., S. Hagell, S. Otterstrom, C. L. Chambers, and B. G. Dickson. 2008. SRTM-DEM and Landsat ETM+ data for mapping tropical dry forest cover and biodiversity assessment in Nicaragua. *Rev. Geográfica Acadêmica* 2(2):53-65.

Chambers, C. L. and R. R. Doucett. 2008. Diet of the Mogollon vole as indicated by stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ). *Western North American Naturalist* 68(2): 153-160.

Lynn, J. C., S. S. Rosenstock, and C. L. Chambers. 2008. Avian use of desert wildlife water developments as determined by remote videography. *Western North American Naturalist* 68(1):107-112.

McComb, B. C., L. Curtis, C. L. Chambers, M. Newton, and K. Bentson. 2008. Acute toxic hazard evaluations of glyphosate herbicide on terrestrial vertebrates of the Oregon Coast Range. *Environmental Science and Pollution Research* 15(3):266-272.

Binkley, D., T. Sisk, C. Chambers, J. Springer and W. Block. 2007. The role of old-growth forests in frequent-fire landscapes. *Ecology and Society* 12 (2): 18. [online] URL: <http://www.ecologyandsociety.org/vol12/iss2/art18/>

Yarborough, R. F. and C. L. Chambers. 2007. Using visual evidence of Mogollon voles (*Microtus mogollonensis*) to predict their presence in northern Arizona. *The Southwestern Naturalist* 52(4):511-519.

Miller, A. M., and C. L. Chambers. 2007. Birds of harvested and unharvested pine-oak forests, Chihuahua, Mexico. *The Southwestern Naturalist* 52(2):271-283.

- Lynn, J. C., C. L. Chambers, and S. S. Rosenstock. 2006. Use of wildlife water developments by birds in southwest Arizona during migration. *Wildlife Society Bulletin* 34(3):592-601.
- Tuttle, S. R., C. L. Chambers, and T. C. Theimer. 2006. Effects of modified livestock water troughs on bat use in northern Arizona. *Wildlife Society Bulletin* 34(3):602-608.
- Hedwall, S. J., C. L. Chambers, and S. S. Rosenstock. 2006. Red squirrel use of dwarf mistletoe-induced witches' brooms in Douglas-fir. *Journal of Wildlife Management* 70(4):1142-1147.
- Mast, J. N. and C. L. Chambers. 2006. Landscape Form, Process, and Function: Coalescing Geographic Frontiers: Integrated Approaches to Examine Snag Dynamics and Bird Use of Burned Versus Unburned Landscapes. *Professional Geographer* 58(4):397-405.
- Garnett, G. N., C. L. Chambers and R. L. Mathiasen. 2006. Use of witches' brooms by Abert squirrels in ponderosa pine forests. *Wildlife Society Bulletin* 34(2):467-472.
- Gatto, A. E., T. G. Grubb, and C. L. Chambers. 2005. Red-tailed hawk dietary overlap with northern goshawks on the Kaibab Plateau, Arizona. *Journal of Raptor Research* 39(4):439-444.
- Chambers, C. L. and J. N. Mast. 2005. Ponderosa pine snag dynamics and cavity excavation following wildfire in northern Arizona. *Forest Ecology and Management* 216:227-240.
- Garnett, G. N., R. L. Mathiasen, and C. L. Chambers. 2004. A comparison of wildlife use in broomed and unbroomed ponderosa pine trees in northern Arizona. *Western Journal of Applied Forestry* 19:42-46.
- Bernardos, D. A., C. L. Chambers, and M. J. Rabe. 2004. Selection of Gambel oak roosts by southwestern myotis in ponderosa pine-dominated forests, northern Arizona. *Journal of Wildlife Management* 68:595-601.
- Chambers, C. L., V. Alm, M. S. Siders, and M. J. Rabe. 2002. Use of artificial roosts by forest-dwelling bats in northern Arizona. *Wildlife Society Bulletin* 30:1085-1091.
- Chambers, C.L., W.C. McComb, J.C. Tappeiner, II, L.D. Kellogg, R.L. Johnson, G. Spycher. 1999. CFIRP: What we learned the first 10 years. *The Forestry Chronicle* 75:431-434.
- Lehmkuhl, J.F., S.D. West, C.L. Chambers, W.C. McComb, D.A. Manuwal, K.B. Aubry, J.L. Erickson, R.A. Gitzen, and M. Leu. 1999. An experiment for assessing vertebrate response to varying levels and patterns of green-tree retention. *Northwest Science* 73:45-63.
- Cazares, E., D.L. Luoma, M.P. Amaranthus, C.L. Chambers, and J. Lehmkuhl. 1999. Interaction of fungal sporocarp production with small mammal abundance and diet in Douglas-fir stands of the southern Cascade Mountains. *Northwest Science* 73:64-76.
- Chambers, C.L., W.C. McComb, and J.C. Tappeiner, II. 1999. Breeding bird responses to three silvicultural treatments in the Oregon Coast Range. *Ecological Applications* 9:171-185.

Cole, E.C., W.C. McComb, M. Newton, J.P. Leeming, and C.L. Chambers. 1998. Response of small mammals to clearcutting, burning, and glyphosate application in the Oregon Coast Range. *Journal of Wildlife Management* 62:1207-1216.

Chambers, C.L. and W.C. McComb. 1997. Effects of silvicultural treatments on wintering bird communities in the Oregon Coast Range. *Northwest Science* 71:298-304.

Chambers, C.L., T. Carrigan, T. Sabin, J. Tappeiner, and W.C. McComb. 1997. Use of artificially created Douglas-fir snags by cavity-nesting birds. *Western Journal of Applied Forestry* 12:93-97.

Boyle, J.R., J.E. Warila, R.L. Beschta, M. Reiter, C.L. Chambers, W.P. Gibson, S.V. Gregory, J. Grizzel, J.C. Hagar, J.L. Li, W.C. McComb, T. W. Parzybok, and G. Taylor. 1997. Cumulative effects of forestry practices: an example framework for evaluation from Oregon, U.S.A. *Biomass and Bioenergy* 13:223-245.

Cole, E.C., W.C. McComb, M. Newton, C.L. Chambers, and J.P. Leeming. 1997. Response of amphibians to clearcutting, burning, and glyphosate application in the Oregon Coast Range. *Journal of Wildlife Management* 61:656-664.

McComb, W. C., C. L. Chambers, and M. Newton. 1993. Small mammal and amphibian communities and habitat associations in red alder stands, Central Oregon Coast Range. *Northwest Science* 67:181-188.

Gulati, D.K., C.L. Chambers, G.A. Rosenthal, and P.S. Sabharwal. 1981. Comparative toxicity of some naturally occurring and synthetic non-protein amino acids. *Environmental and Experimental Botany* 21:225-230.

Rawls, J.M. Jr., C.L. Chambers, and W.S. Cohen. 1981. A small genetic region that controls Dihydroorotate dehydrogenase in *Drosophila melanogaster*. *Biochemical Genetics* 19:115-127.

## **REFERRED CONFERENCE PROCEEDINGS**

Chambers, C. L. 2002. Forest Management and the Dead Wood Resource in Ponderosa Pine Forests: Effects on Vertebrates. Pages 679-693 *In* Laudenslayer, William F., Jr.; Valentine, Brad; Weatherspoon, C. Philip; Lisle, Thomas E., technical coordinators. Proceedings of the symposium on the ecology and management of dead wood in western forests. 1999 November 2-4; Reno, NV. Gen. Tech. Rep. PSW-GTR-181. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

Knox, S. C., C. Chambers, and S. S. Germaine. 2001. Habitat association of the sagebrush lizard (*Sceloporus graciosus*): Potential responses of an ectotherm to ponderosa pine forest restoration



treatments. Pages 95-98 In Vance, R.K., C.B. Edminster, W.W. Covington, J.A. Blake, Comps. Ponderosa pine ecosystems restoration and conservation: steps toward stewardship; 2000 April 25-27; Flagstaff, AZ. Proceedings RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Daniel P. Mummert, David H. Ellis, and Carol L. Chambers. 2001. Fate of the survivors of the 1995 and 1996 Arizona trucking migrations of costume-reared greater sandhill cranes. Proceedings North American Crane Workshop 8:127-131. North American Crane Working Group, 11-14 January 2000, Albuquerque, New Mexico.

Daniel P. Mummert, Carol L. Chambers, and David H. Ellis. 2001. A comparison of behavior for two cohorts of captive-reared greater sandhill cranes released in northern Arizona. Proceedings North American Crane Workshop 8:145-154. North American Crane Working Group, 11-14 January 2000, Albuquerque, New Mexico.

Daniel P. Mummert, David H. Ellis, and Carol L. Chambers. 2001. A reintroduction experiment involving mated pairs of parent-reared greater sandhill cranes in northern Arizona. Proceedings North American Crane Workshop 8:155-159. North American Crane Working Group, 11-14 January 2000, Albuquerque, New Mexico.

Chambers, C.L., and B.E. Fox. 1999. Converting from even- to uneven-aged stand structure in Pacific Northwest coniferous forests – Implications for wildlife. Pages 534-541 In W. H. Emmingham, Compiler. Proceedings of the IUFRO Interdisciplinary Uneven-aged Management Symposium, September 1997. Corvallis, OR: Oregon State University.

Chambers, C.L., J. Hagar, and W.C. McComb. 1995. Linking reserve areas: animal responses to silvicultural systems as models for management. Proceedings, George Wright Society, 8th Conference on Research and Resource Management in Parks and on Public Lands, Portland, OR, 1995.

McComb, W., J. Tappeiner, L. Kellogg, R. Johnson, and C. Chambers. 1994. Alternative stand management approaches for multiple resources: Integrated management experiments. In: Huff, M.H., S.E. McDonald, and H. Gucinski, eds. Expanding Horizons of Forest Ecosystem Management: Proceedings of the Third Habitat Futures Workshop, PNW-GTR-336, pp. 71-86.

### **GRADUATE STUDENT THESES AND DISSERTATIONS COMPLETED**

Zylo, Mary T. 2012. Bald eagles (*Haliaeetus leucocephalus*) wintering in northern Arizona select perches based on food availability, visibility and cover. M.S. Thesis.

Petriello, Michael A. 2011. Where humans, bats, and wildlands converge: Socio-ecological dynamics of human-bat interactions in a Wildland-Urban Interface. M.S. Thesis.

Vizcarra, Beatriz. 2011. Evaluating use of habitat by bats along the Lower Colorado River. M.S. Thesis.

Hagell, Suzanne E. 2010. Conserving forest connectivity for the Central American spider monkey (*Ateles geoffroyi*) in southwestern Nicaragua. Ph.D. Dissertation.

- Mering, Elisabeth D. 2010. Use of artificial roosts to increase habitat for forest-roosting bats in northern Arizona. M.S. Thesis.
- Joshi, Prabin K. 2009. Night roosts of bald eagles (*Haliaeetus leucocephalus*) wintering in northern Arizona. M.S. Thesis.
- Johnson, Shelly A. 2008. Effects of ponderosa pine forest restoration on bat habitat in northern Arizona. M.S. Thesis.
- Solvesky, Ben G. 2007. Roosts of Allen's lappet-browed bat (*Idionycteris phyllotis*) in northern Arizona. M.S. Thesis.
- Yarborough, R. Fenner. 2006. Using Mogollon vole (*Microtus mogollonensis*) sign to predict Mogollon vole presence in northern Arizona. M.S. Thesis.
- Corbett, Richard Jason M. 2005. Movement patterns and roost sites of big free-tailed bats (*Nyctinomops macrotis*) in northern Arizona. M.S. Thesis.
- Lynn, Janet C. 2005. Use of wildlife water developments by birds in southwest Arizona during migration. M.S. Thesis.
- Passovoy, M. David. 2005. Snag and woody debris dynamics following severe wildfires in northern Arizona ponderosa pine forests. M.S. Thesis.
- Miller, Andrew M. 2003. Birds of a harvested pine-oak (*Pinus-Quercus*) forest, Chihuahua, Mexico: Biological and ethnoecological warning signs. M.S. Thesis.
- Painter, Mikele L. 2003. Foraging ecology of spotted bats (*Euderma maculatum*) on the Kaibab Plateau, Arizona. M.S. Thesis.
- Roberts, Ann R. 2003. Ponderosa pine restoration treatment effects on *Peromyscus truei* and *Peromyscus maniculatus* in northwestern Arizona. M.S. Thesis.
- Garnett, Gregg N. 2002. Wildlife use of witches' brooms induced by dwarf mistletoe in ponderosa pine forests of northern Arizona. M.S. Thesis.
- Gatto, Angela E. 2002. Foraging ecology and parental behavior of red-tailed hawks sympatric with northern goshawks on the Kaibab Plateau, Arizona. M.S. Thesis.
- Sieg, Matthew J. 2002. The influence of landscape-scale habitat quality on female Abert squirrel survivorship, predator-based mortality, home-range size and movement in a ponderosa pine ecosystem. M.S. Thesis.
- Bernardos, Debra A. 2001. Use of ponderosa pine-Gambel oak forests by bats in northern Arizona. M.S. Thesis.

Hall, Patricia A. 2001. Size and composition of northern goshawk (*Accipiter gentilis*) home ranges in north-central Arizona. Ph.D. Dissertation.

Parker, Thomas J. 2001. Bird communities in dwarf mistletoe infested ponderosa pine forests. M.S. Thesis.

Reading, Heather A. 2001. Response of small mammals and Sin Nombre virus to ecological restoration of ponderosa pine in northern Arizona. M.S. Thesis.

Dwyer, Jill K. 2000. Response of secondary cavity-nesting birds to wildfire in ponderosa pine forests of northern Arizona. M.S. Thesis.

Hedwall, Shaula J. 2000. Bird and mammal use of dwarf mistletoe-induced witches' brooms in Douglas-fir in the southwest. M.S. Thesis.

Kyle, Sean C. 2000. Small mammal abundance and habitat correlates following varied-severity wildfire in ponderosa pine-bunchgrass forests. M.S. Thesis.

Mummert, Daniel P. 1999. The use of sandhill cranes as a surrogate for whooping cranes in reintroduction experiments in northern Arizona. M.S. Thesis.

Rabe, Michael J. 1999. Bat habitat use in pinyon-juniper woodland and grassland habitats in northern Arizona. M.S. Thesis.

### ***Book Chapters***

Sullivan, B. K., D. R. Van Haverbeke, and C. L. Chambers. 2013. Wildlife and anthropogenic changes in the arid southwest. Pages 169 - 191 *In* R. Malloy, J. Brock, A. Floyd, M. Livingston, and R. H. Webb, editors. Design with the desert: Conservation and sustainable development. Taylor and Francis.

([http://www.crcpress.com/product/isbn/9781439881354;jsessionid=bqH6hIc-760tXOOGQygwPg\\_.37626dd5-d89a-32c1-af8-5f166039641c](http://www.crcpress.com/product/isbn/9781439881354;jsessionid=bqH6hIc-760tXOOGQygwPg_.37626dd5-d89a-32c1-af8-5f166039641c))

Chambers, C. L. and B. C. McComb. 2005. Chapter 5 Wildlife responses. Pages 63-87 *In* C. C. Maguire and C. L. Chambers, eds. College of Forestry Integrated Research Project: Ecological and socioeconomic responses to alternative silvicultural treatments. Research Contribution 46. Oregon State University, Corvallis.

Chambers, C. L., R. L. Johnson, L. D. Kellogg, J. Scott Ketchum, and W. H. Emmingham. 2005. Chapter 2 Study Area and methods. Pages 24-44 *In* C. C. Maguire and C. L. Chambers, eds. College of Forestry Integrated Research Project: Ecological and socioeconomic responses to alternative silvicultural treatments. Research Contribution 46. Oregon State University, Corvallis.

McComb, B. C. and C. L. Chambers. 2005. Chapter 1 Introduction. Pages 13-23 *In* C. C. Maguire and C. L. Chambers, eds. College of Forestry Integrated Research Project: Ecological

and socioeconomic responses to alternative silvicultural treatments. Research Contribution 46. Oregon State University, Corvallis.

Chambers, C. L., and S. S. Germaine. 2003. Chapter 16: Vertebrates. *In* P. Freiderici, ed. Ecological Restoration of Southwestern Ponderosa Pine Forests, Washington, D.C.: Island Press.

Chambers, C. L. and R. S. Holthausen. 2000. Montane ecosystems used as rangelands. Pages 213 - 280 *In* R. Jemison and C. Raish, co-editors. Livestock Management in the American Southwest: Ecology, Society, and Economics. Amsterdam, The Netherlands: Elsevier Science.

### ***Books Edited***

Maguire, C. C. and C. L. Chambers, eds. 2005. College of Forestry Integrated Research Project: Ecological and socioeconomic responses to alternative silvicultural treatments. Research Contribution 46. Oregon State University, Corvallis. 161 pp.

### ***Web Articles***

Chambers, C. L. and M. J. Herder. 2005. *Euderma maculatum*, Spotted bat species account. [http://www.wbwg.org/species\\_accounts.htm](http://www.wbwg.org/species_accounts.htm).

### ***Popular Articles***

Chambers, C. L. 2012. Nicaragua: Now the Land of 100 Bat Species. BATS Magazine. Bat Conservation International 30(3):7-9.

Mikesic, D. G. and C. L. Chambers. 2004. Return of the (bat) mummy. BATS Magazine. Bat Conservation International 22(4):8-11.

### ***Research Results – Reports, Seminars, and Reviews***

Large Forest Patches Increase Bat Species Diversity in a Fragmented Landscape in Nicaragua, Presentation for NAU Student Chapter of The Wildlife Society (35 attendees), (November 2012)

Bats and the Wildland Urban Interface II, *Draft* Final Report prepared for Arizona Game and Fish Department Arizona Bat Conservation Partnership (September 2012)

Bats, Our Nocturnal Neighbors, Presentation for Friends of Rio de Flag (25 attendees), (June 2012)

Member of 4-person peer review team commissioned by The Wildlife Society to review *Restoration of Federal Forests in the Pacific Northwest* (October 2011)

Federal Mine Safety and Health Act Training (August 2011)

Bats in our Backyard, Presentation for general public (20 attendees), The Arboretum at Flagstaff (May 2011)

Bats, Our Nocturnal Neighbors, Presentation for general public (35 attendees), Flagstaff-Coconino County Public Library (April 2011)

Bird Communities in Wildfire-burned Ponderosa Pine Landscapes 14 years Post Fire, Presentation for Arizona Bird Conservation Initiative (March 2011)

Bird Communities in Wildfire-burned Ponderosa Pine Landscapes 14 years Post Fire, Presentation for Kaibab National Forest (March 2011)

Bird Communities in Wildfire-burned Ponderosa Pine Landscapes 14 years Post Fire, Final Report prepared for Kaibab National Forest (March 2011)

Survey of bats, Rivas Isthmus, Nicaragua, Final Report prepared for Paso Pacífico (July 2010)

Use of artificial roosts to enhance bat habitat in wildland urban interface (WUI) areas, Final Report prepared for Arizona Game and Fish Department Arizona Bat Conservation Partnership (July 2010)

Bats: Meet Arizona Bats Live, Presentation for general public (50 attendees), Dairy Springs Campground (June 2010)

Roosting Habitat of Bats II, Final Report prepared for Arizona Game and Fish Department Heritage Project I08001 (June 2010)

Kalies, E.L. and C.L. Chambers. 2010. Guidelines for managing small mammals in restored ponderosa pine forests of northern Arizona. Ecological Restoration Institute Working Paper No. 23. Flagstaff, Arizona (May 2010)

Various television and newspaper articles on bats and rabies for lay audiences in northern Arizona (October-November 2009)

Wintering Bald Eagle Roosting Habitat, Final Report prepared for Arizona Department of Emergency and Military Affairs (October 2009)

Foraging and roosting ecology of sensitive bat species (spotted, Townsend's big-eared, and big free-tailed bats) in and around Canyon de Chelly, Arizona, Final Report prepared for Canyon de Chelly National Monument (August 2009)

City Bats and Country Bats, Presentation for general public (82 attendees), Pine Grove Campground (July 2009)

City Bats and Country Bats, Presentation for general public (80 attendees), Dairy Springs Campground (June 2009)

Roosting Habitat of Bats, Final Report prepared for Arizona Game and Fish Department Heritage Project I07008 (May 2009)

Ganey, J. L., S. C. Vojta, L. F. Doll, and C. L. Chambers. A preliminary reconnaissance of small mammal communities of Garland and Government Prairies, Kaibab National Forest, Arizona. Final Report to Kaibab National Forest (February 2009)

Bats, Presentation for Northern Arizona University Student Chapter of The Wildlife Society (October 2008)

Solvesky, B. and C. L. Chambers. Bat roost inventory and monitoring project for Arizona Game and Fish Department Region 2. Final Report prepared for Arizona Game and Fish Department (August 2007)

Chambers, C. L. Survey of bat species for the proposed Sunshine Wind Park, Coconino County, Arizona. Final Report prepared for Sunshine Arizona Wind Energy, LLC (<http://www.emaprogram.com/emaweb/ema/site/WindFarm.asp>) (March 2007)

Foraging and roosting ecology of 5 bat species, Presentation for Arizona Game and Fish Department, Region 2 (July 2006)

Foraging and roosting ecology of 5 bat species (spotted, Allen's lappet-browed, Townsend's big-eared, big free-tailed, and greater western mastiff bats) in northern Arizona, Final Report prepared for Arizona Game and Fish Department State Wildlife Grant (June 2006)

Charismatic Microfauna, Heritage Fund Advisory Committee (June 2006)

Bird in burns and bats in rat middens: a book in progress, School of Forestry Sabbatical Seminar (November 2005)

Use of Wildlife Water Developments by Birds in Southwest Arizona during Migration, Report prepared for Arizona Game and Fish Department (June 2005)

Importance of cover at desert wildlife water developments to migrating birds, Final report prepared for Arizona Birds Conservation Initiative (June 2005)

Using Mogollon vole (*Microtus mogollonensis*) sign to predict Mogollon vole capture rate or presence in northern Arizona, Final Report prepared for Kaibab National Forest (January 2005)

Restoration and Wildlife, Ecological Restoration Institute Seminar (April 2004)

Spotted bats (*Euderma maculatum*) in eastern Grand Canyon: mummified remains, marathon summer foraging patterns, and migration, School of Forestry Seminar (December 2003)

Snag dynamics of fire-killed trees on Pumpkin and Horseshoe Hochderffer Fires: What happens in the early years after wildfire, Ecological Restoration Institute Seminar (November 2003)

Status and Habitat Use of Oaks, Final Report prepared for Arizona Game and Fish Department Heritage Project I98012 (July 2002)

Snag Resurvey - Bridger-Knoll Fire, Final Report prepared for North Kaibab Ranger District (July 2002)

Literature Review of Select Arizona Rare Plants, and the Kit Fox in the Southwest prepared for North Kaibab Ranger District (January 2001)

Beschta, R.L., J.R. Boyle, C.L. Chambers, W.P. Gibson, S.V. Gregory, J. Grizzel, J.C. Hagar, J.L. Li, W.C. McComb, T.W. Parzybok, M.L. Reiter, G.H. Taylor, J.E. Warila. 1995. Cumulative effects of forest practices in Oregon. Prepared for Oregon Department of Forestry, Salem, Oregon.

Chambers, C., J. Erickson, J. Lehmkuhl, D. Manuwal, W. McComb, S. West and K. Aubrey. 1995. Study plan: Wildlife research in the DEMO project. Oregon State University. April 20, 1995.

Policy analysis of Northern Spotted Owl Recovery Plan salvage guidelines presented to Northern Spotted Owl Recovery Team (May 1992) and Willamette National Forest (June 1992)

Review of Oregon State University College of Forestry Integrated Research Project (CFIRP), coordinator (March 1992)

Field trips (about 30) to Oregon State University McDonald-Dunn Research Forest to display alternative silvicultural treatments for agencies (BLM, FS), OSU classes, and Continuing Education groups (1990-1996)

## **PROFESSIONAL MEETINGS – STUDENT PRESENTATIONS**

### **2011**

E. D. Mering and C. L. Chambers, *Bat use of artificial roosts in ponderosa pine forest*, Arizona/New Mexico Chapters of The Wildlife Society 44<sup>th</sup> Joint Annual Meeting (February), Presentation

M. A. Petriello, M. E. Lee, and C. L. Chambers, *There's a bat in my umbrella: Public perceptions, knowledge of and willingness to conserve bats in a Wildland-Urban Interface*, Arizona/New Mexico Chapters of The Wildlife Society 44<sup>th</sup> Joint Annual Meeting (February), Presentation

### **2010**

B. Vizcarra, V. Frary, L. Piest, T. Olson, C. L. Chambers and A. Calvert, *Monitoring of four bat species for the Lower Colorado River Multi-Species Conservation Plan*, 40<sup>th</sup> Annual Symposium of the North American Society for Bat Research (October), Presentation

E. D. Mering and C. L. Chambers, *Bat use of artificial roosts in ponderosa pine forests*, 40<sup>th</sup> Annual Symposium of the North American Society for Bat Research (October), Presentation

S. Hagell, S. Otterstrom, C. Chambers, and C. Perla Medrano, *Teak, carbon, and spider monkeys: Using a landscape perspective to conserve tropical dry forest*, Society for Conservation Biology (July), Presentation

E. L. Kalies, B.G. Dickson, C.L. Chambers, and W.W. Covington, *Small mammal community responses to ecological restoration treatments in southwestern ponderosa pine forests, northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (February), Presentation (**Won Best Student Paper Award**)

B. Vizcarra and C. L. Chambers, *Monitoring of four bat species for the Lower Colorado River Multi-Species Conservation Plan*, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (February), Presentation

Petriello, M. A., S. E. Hagell, and C. L. Chambers, *The use of local ecological knowledge to enhance conservation efforts in tropical dry forests: a case study from Nicaragua*, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (February), Presentation

T. Graves and C. L. Chambers, *More bang! Combining genetic and telemetry data can improve wildlife research*, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (February), Presentation

K. J. Barrett, E. L. Kalies, and C. L. Chambers, *Restoration treatments increase predator diversity*, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (February), Poster

## **2009**

E.D. Mering and C.L. Chambers, *Bat activity increases during summer in ponderosa pine forests in northern Arizona*, North American Symposium on Bat Research (November), Poster

E.L. Mering, C.L. Chambers, C. Vojta, and A. Chung-MacCoubrey, *Efficacy of scent detection dogs in detecting bat roosts in ponderosa pine snags*, North American Symposium on Bat Research (November), Presentation

Kalies, E.L., C.L. Chambers, and W.W. Covington, *Meta analysis indicates thinning and burning treatments have positive effects on wildlife densities in southwestern conifer forests*, 10<sup>th</sup> Biennial Conference Integrating Science and Management on the Colorado Plateau (October), Poster

E.D. Mering and C.L. Chambers, *Bat activity increases during summer in ponderosa pine forests in northern Arizona*, 10<sup>th</sup> Biennial Conference Integrating Science and Management on the Colorado Plateau (October), Presentation



E. Mering, C. Chambers, C. Vojta, and A. Chung-MacCoubrey, *Efficacy of scent detection dogs in detecting bat roosts in ponderosa pine snags*, The Wildlife Society 16<sup>th</sup> Annual Conference (September), Presentation

Kalies, E.L., C.L. Chambers, and W.W. Covington, *The impacts of ecological restoration treatments on wildlife populations in southwestern conifer forests: a meta analysis*, The Ecological Society of America 94<sup>th</sup> Annual Meeting (August), Presentation

E.D. Mering and C.L. Chambers, *Use of scent detection dogs to locate bat roosts in ponderosa pine snags*, Arizona/New Mexico Chapters of The Wildlife Society 42<sup>nd</sup> Joint Annual Meeting (February), Presentation (**Won Best Student Paper Award**)

B. Vizcarra, C.L. Chambers, L. Piest, M. Ingraldi, T. Olson, and Al. Calvert, *Monitoring of four bat species for the Lower Colorado River Multi-Species Conservation Plan*, Arizona/New Mexico Chapters of The Wildlife Society 42<sup>nd</sup> Joint Annual Meeting (February), Presentation

## **2008**

B.G. Solvesky and C.L. Chambers, *Roosts of Allen's lappet-browed bat in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 41<sup>st</sup> Joint Annual Meeting (February), Presentation (**Won Best Student Paper Award**)

S. Johnson and C.L. Chambers, *Effects of forest restoration on bats in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 41<sup>st</sup> Joint Annual Meeting (February), Presentation

P.K. Joshi and C.L. Chambers, *Night roosts of bald eagles wintering in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 41<sup>st</sup> Joint Annual Meeting (February), Presentation

## **2007**

B.G. Solvesky and C.L. Chambers, *Roosts of Allen's lappet-browed bat in northern Arizona*, 9<sup>th</sup> Biennial Conference of Research on the Colorado Plateau (October), Presentation

B.G. Solvesky and C.L. Chambers, *Roosts of Allen's lappet-browed bat in northern Arizona*, Western Bat Working Group (April), Presentation

B.G. Solvesky and C.L. Chambers, *Roosts of Allen's lappet-browed bat in northern Arizona*, The Wildlife Society 14<sup>th</sup> Annual Conference (September), Poster

S. Johnson and C.L. Chambers, *Effects of forest restoration on bats in northern Arizona*, The Wildlife Society 14<sup>th</sup> Annual Conference (September), Poster-in-Progress

## **2006**

Elizabeth L. Kalies and Carol L. Chambers, *A Review of the Impacts of Ecological Restoration of Southwestern Ponderosa Pines Forests on Wildlife Diversity*, Conserving and Restoring

Frequent Fire Landscapes in the West: Linking Science, Collaboration, and Practice (October), Presentation

R. Jason M. Corbett, Carol L. Chambers, Michael J. Herder, and Elaine F. Leslie, *Foraging Patterns and Roosting Sites for Female Big Free-tailed Bats (Nyctinomops macrotis) in Northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 39<sup>th</sup> Joint Annual Meeting (February), Presentation

## **2005**

R. Jason M. Corbett, Carol L. Chambers, Michael J. Herder, and Elaine F. Leslie, *Foraging Patterns and Roosting Sites for Female Big Free-tailed Bats (Nyctinomops macrotis) in Northern Arizona*, Eighth Biennial Conference of Research on the Colorado Plateau (November), Presentation

R. Jason M. Corbett, Carol L. Chambers, Michael J. Herder, and Elaine F. Leslie, *Foraging Patterns and Roosting Sites for Female Big Free-tailed Bats (Nyctinomops macrotis) in Northern Arizona*, North American Symposium on Bat Research (October), Presentation

Stuart R. Tuttle, Tad C. Theimer and Carol L. Chambers, *Effect of modified water troughs on bat use*, Arizona/New Mexico Chapters of The Wildlife Society 38<sup>th</sup> Joint Annual Meeting (February), Presentation

Janet C. Lynn, Steven S. Rosenstock and Carol L. Chambers, *Use of wildlife water developments by migrating songbirds in southwestern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 38<sup>th</sup> Joint Annual Meeting (February), Presentation

## **2004**

Stuart R. Tuttle, Tad C. Theimer and Carol L. Chambers, *Effect of modified water troughs on bat use*, North American Symposium on Bat Research (October), Presentation

Stuart R. Tuttle, Tad C. Theimer and Carol L. Chambers, *Effect of modified water troughs on bat use*, Wildlife Water Developments Workshop (September), Presentation

Janet C. Lynn, Steven S. Rosenstock and Carol L. Chambers, *Use of wildlife water developments by migrating songbirds in southwestern Arizona*, Wildlife Water Developments Workshop (September), Presentation

R. Fenner Yarborough and Carol L. Chambers, *Using Mogollon vole runways to measure Mogollon vole abundance in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 37<sup>th</sup> Joint Annual Meeting (February), Presentation

## **2003**

Mikele L. Painter, Carol L. Chambers, and Melissa Siders, *Foraging ecology and stable-isotope analysis of spotted bats on the Kaibab Plateau, Arizona*, The Wildlife Society 10<sup>th</sup> Annual Conference (September), Presentation

Mikele. L. Painter, Carol L. Chambers, and Melissa S. Siders, *Foraging ecology of spotted bats (Euderma maculatum) on the Kaibab Plateau, Arizona*, 2<sup>nd</sup> Four Corners Regional Bat Conference (January), Presentation

Mikele. L. Painter, Carol L. Chambers, and Melissa S. Siders, *Foraging ecology of spotted bats (Euderma maculatum) on the Kaibab Plateau, Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 36<sup>th</sup> Joint Annual Meeting (February), Presentation

B.G. Solvesky and C.L. Chambers, *A comparison of Mexican Vole (Microtus mexicanis) runway densities in dry meadow and wet meadow habitat in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 36<sup>th</sup> Joint Annual Meeting (February), Poster

## 2002

Gregg Garnett, Carol L. Chambers, and Robert Mathiasen, *Wildlife use of southwestern dwarf mistletoe witches' brooms in ponderosa pine forests in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 35<sup>th</sup> Joint Annual Meeting (February), Presentation

Ann Roberts, Carol L. Chambers, Pete Z. Fule, and W. Wallace Covington, *Importance of dead wood as habitat for mice in a restoration-treated pine forest in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 35<sup>th</sup> Joint Annual Meeting (February), Presentation

Angela Gatto, Teryl Grubb, and Carol L. Chambers, *Prey species of red-tailed hawks (Buteo jamaicensis): an indication of competition with a sensitive raptor, northern goshawks (Accipiter gentiles), on the Kaibab Plateau, Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 35<sup>th</sup> Joint Annual Meeting (February), Poster

## 2001

Debra Bernardos and Carol L. Chambers, *Use of ponderosa pine-Gambel oak forests by bats in northern Arizona*, The Wildlife Society 8<sup>th</sup> Annual Conference (September), Presentation

Heather A. Shanes, Carol L. Chambers, Ken D. Abbott, and W. Wallace Covington, *Response of small mammals and Sin Nombre virus to ecological restoration of ponderosa pine in northern Arizona*, The Wildlife Society 8<sup>th</sup> Annual Conference (September), Presentation

Thomas J. Parker, Carol L. Chambers, and Robert L. Mathiasen, *Bird communities in dwarf mistletoe-infested ponderosa pine forests*, The Wildlife Society 8<sup>th</sup> Annual Conference (September), Presentation

Heather A. Shanes, Carol L. Chambers, Ken D. Abbott, and W. Wallace Covington, *Response of small mammals and Sin Nombre virus to ecological restoration of ponderosa pine in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 34<sup>th</sup> Joint Annual Meeting (February), Presentation

Thomas J. Parker, Carol L. Chambers, and Robert L. Mathiasen, *Bird communities in dwarf mistletoe-infested ponderosa pine forests*, Arizona/New Mexico Chapters of The Wildlife Society 34<sup>th</sup> Joint Annual Meeting (February), Presentation

## **2000**

Shaula J. Hedwall, Carol L. Chambers, and Robert L. Mathiasen, *Bird and mammal use of dwarf mistletoe-induced witches' brooms in Douglas-fir in the Southwest*, The Wildlife Society 7<sup>th</sup> Annual Conference (September), Presentation

Heather A. Shanes, Carol L. Chambers, Ken D. Abbott, and W. Wallace Covington, *Hantavirus in rodent populations of ponderosa pine forest restoration sites*, Steps Toward Stewardship: Ponderosa Pine Ecosystems Restoration and Conservation Conference (April), Poster

Debra Bernardos, Carol L. Chambers, and Michael J. Rabe, *Use of ponderosa pine/Gambel oak forests by bats in Northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 33<sup>rd</sup> Joint Annual Meeting (February), Presentation

Shaula J. Hedwall, Carol L. Chambers, and Robert L. Mathiasen, *Bird and mammal use of dwarf mistletoe-induced witches' brooms in Douglas-fir in the Southwest*, Arizona/New Mexico Chapters of The Wildlife Society 33<sup>rd</sup> Joint Annual Meeting (February), Presentation

Victor Alm, Carol L. Chambers, and Michael J. Rabe, *Response of northern Arizona forest bats and bat roosting habitat to ecological restoration of ponderosa pine forests and artificial roosts*, Arizona/New Mexico Chapters of The Wildlife Society 33<sup>rd</sup> Joint Annual Meeting (February), Poster

Daniel P. Mummert and Carol L. Chambers, *A comparison of behavior for two cohorts of captive-reared greater sandhill cranes released in northern Arizona*, The Eighth North American Crane Workshop (January), Presentation

Daniel P. Mummert, David H. Ellis, and Carol L. Chambers, *Results of the 1995 and 1996 Arizona trucking migrations of costume-reared greater sandhill cranes*, The Eighth North American Crane Workshop (January), Presentation

Daniel P. Mummert, David H. Ellis, and Carol L. Chambers, *A reintroduction experiment involving mated pairs of adult parent-reared sandhill cranes in Arizona*, The Eighth North American Crane Workshop (January), Presentation

## **1999**

Heather A. Shanes, Carol L. Chambers, Ken D. Abbott, and W. Wallace Covington, *Hantavirus in rodent populations of ponderosa pine forest restoration sites*, Society for Ecological Restoration (September), Poster

Daniel P. Mummert, David H. Ellis, and Carol L. Chambers, *The use of sandhill cranes as a surrogate species to create disjunct migratory populations of whooping cranes*, Arizona/New Mexico Chapters of The Wildlife Society 32<sup>nd</sup> Joint Annual Meeting (February), Presentation

Heather A. Shanes, Carol L. Chambers, Ken D. Abbott, and W. Wallace Covington, *Hantavirus in rodent populations of ponderosa pine forest restoration sites*, Arizona/New Mexico Chapters of The Wildlife Society 32<sup>nd</sup> Joint Annual Meeting (February), Presentation

Michael J. Rabe and Carol L. Chambers, *Bat habitat use in pinyon-juniper and grassland habitats in northern Arizona*, Arizona/New Mexico Chapters of The Wildlife Society 32<sup>nd</sup> Joint Annual Meeting (February), Presentation

### **1998**

Douglas A. Koenig and Carol L. Chambers, *Bird foraging and nesting in Gambel oak in northern Arizona: characteristics of selected and non-selected oak clumps*, Arizona/New Mexico Chapters of The Wildlife Society 31<sup>st</sup> Joint Annual Meeting (February), Presentation

## **GRANTS AND AWARDS**

### **2012:**

Bats and gates: How Chiroptera respond to gating roost sites, Bat Conservation International, \$100,000 (Pending)

Bats and wind development in northern Arizona, Arizona Game and Fish Department / NextEra, \$150,000 (Pending)

Predicting viral emergence: a host shift of rabies virus from bats to carnivores in Arizona, National Science Foundation – Ecology of Emerging Infectious Diseases, \$?? (Pending) (Co-PI with Dr. Gerardo Chowell-Puente, Arizona State University; Dr. Melanie Culver, University of Arizona; Dr. Tad Theimer, NAU)

Bats in Burns: Response of Chiroptera to wildfire in high elevation forests, USDA McIntire-Stennis, (Funded)

Occurrence of small mammals (bats) in high elevation forests and meadows, USDA Forest Service, Apache-Sitgreaves National Forests, \$55,000 (Funded)

Genetic diversity and population status of bats in northern Arizona, National Park Service, \$10,000 (Funded)

Bridging the gap between renewable energy solutions and bat conservation in Arizona, FY2013 Technology and Research Initiative Fund (TRIF), Support for Post-Doctoral Associates (SPA) Program, \$100,000 (Funded)

Comparing Nicaraguan bat (Order: Chiroptera) communities in native and non-native forests, Bat Conservation International, \$9,000 (Funded)

**2011:**

Bats and the Wildland Urban Interface – Phase II, Arizona Game & Fish Department Heritage IIAPM Program, \$49,867 (Not funded)

Bats and the Wildland Urban Interface – Phase III, Arizona Game & Fish Department Heritage Urban Program, \$23,984 (Not funded)

Occurrence of small mammals in high elevation forests and meadows, USDA Forest Service, Apache-Sitgreaves National Forests, \$61,000 (Funded)

Translating forest science for global practitioners, National Institute of Food and Agriculture, \$251,500 (Funded) (Co-PI with PI Dr. Thomas E. Kolb and others)

Bats and uranium mines: How Chiroptera tolerate exposure to radiation, Bat Conservation International, \$96,000 (Funded)

**2010:**

Predicting viral emergence: a host shift of rabies virus from bats to carnivores in Arizona, National Science Foundation – Ecology of Infectious Diseases, \$2,499,813 (Not Funded) (Co-PI with Dr. Gerardo Chowell-Puente, Arizona State University; Dr. Melanie Culver, University of Arizona; Dr. Tad Theimer, NAU)

Predicting viral emergence: a host shift of rabies virus from bats to carnivores in Arizona, Arizona Biomedical Research Commission, \$171,174 (Funded) (Co-PI with Dr. Gerardo Chowell-Puente, Arizona State University and Dr. Tad C. Theimer, NAU)

Genetic analysis of small mammals, USDA Forest Service, \$30,000 (Funded)

Bat survey of Fossil Creek, USDA Forest Service, \$10,000 (Funded)

Effects of restoration treatments on small mammal communities in pinyon-juniper woodlands, USDA Forest Service, \$10,000 (Funded)

Bats in the Burns: How Chiroptera respond to wildfire in ponderosa pine forests, USDA McIntire-Stennis, (Not Funded)

Managing the carbon resource and providing forest ecosystem services through ecological forestry at Camp Navajo in Arizona, Department of Defense, \$635,274 (Not Funded) (Co-PI with Dr. Ching-Hsun Huang and Dr. Kristen Waring)

**2009:**

Predicting viral emergence: a host shift of rabies virus from bats to carnivores in Arizona, National Science Foundation – Ecology of Infectious Diseases, \$2,499,813 (Not funded) (Co-PI with Dr. Gerardo Chowell-Puente, Arizona State University; Dr. Melanie Culver, University of Arizona; Dr. Tad Theimer, NAU)

Genetic Diversity and Population Status of Bats in Northern Arizona, Arizona Game & Fish Department Heritage IIAPM Program, \$70,665 (Program cancelled due to state budget issues)

Habitat and genetic connectivity for small mammal populations in pinyon-juniper woodlands, NAU Faculty Grant Program, \$17,344 (Not funded)

Developing microsatellite markers for spotted bats: applications for monitoring and conserving populations, Arizona Bat Conservation Partnership, Arizona Game and Fish Department, \$8883 (Funded but funding withdrawn due to state budget issues)

Effects of restoration treatments on small mammal communities in pinyon-juniper woodlands, USDA Forest Service, \$35,000 (Funded)

Bird communities in wildfire-burned ponderosa pine landscapes 14 years post fire, USDA Forest Service, Kaibab National Forest, \$14,300 (Funded)

Occurrence of Small Mammals in High Elevation Forests and Meadows, USDA Forest Service, Apache-Sitgreaves National Forest, \$55,500 (Funded)

**2008:**

Bats and the Wildland Urban Interface – Phase II, Arizona Game & Fish Department Heritage Urban Program, \$44,406 (Funded)

Bats in the Wildland-Urban Interface: Understanding Resident Perceptions, Knowledge, and Support for Conservation, USDA McIntire-Stennis, (Funded) (Co-PI with Dr. Martha Lee)

Use of artificial roosts to enhance bat habitat in wildland urban interface (WUI) areas. Arizona Game & Fish Department, \$9840 (Funded)

**2007:**

Developing forest management recommendations for restoring the small mammal community in ponderosa pine forests in Arizona. Arizona Game & Fish Department, \$30,373 (Funded). Co-Principal Investigator: Elizabeth Kalies, Ph.D. Candidate.

**2006:**

Bat Roosts – Phase II, Arizona Game & Fish Department Heritage IIAPM Program, \$13,138 (Funded)

Bats and the Wildland Urban Interface, Arizona Game & Fish Department Heritage Urban Program, \$48,465 (Funded)

Wintering Bald Eagle Roosting Habitat, USDA McIntire-Stennis, \$18,000 (Funded)

RUI: Biogeographical impacts of recent bark beetle epidemics on cavity-nesting birds in Arizona, National Science Foundation, \$137,757 (Funded) (Co-PI with Dr. Joy N. Mast)

Field test of bat roost survey techniques, USDA Forest Service, \$28,000 (Funded)

Monitoring bats at a potential wind farm site, NAU and Foresight Wind, \$5000 (Funded)

Snag Resurvey – Bridger-Knoll Fire, North Kaibab Ranger District, Kaibab National Forest, \$3000 (Funded)

Wintering Bald Eagle Roosting Habitat, State of Arizona, Department of Emergency and Military Affairs, \$15,000 (Funded)

Wintering Bald Eagle Roosting Habitat – Supplemental Funding, State of Arizona, Department of Emergency and Military Affairs, \$7,035 (Funded)

Wintering Bald Eagle Roosting Habitat, Kaibab National Forest, \$3,000 (Funded)

Wintering Bald Eagle Roosting Habitat, State of Arizona, US Fish & Wildlife Service, \$3,000 (Funded)

**2005:**

Roosting habitat of bats, Arizona Game & Fish Department Heritage IIAPM Program, \$21,711 (Funded)

Effects of forest restoration treatments on bat communities in a wildland urban interface, USDA McIntire-Stennis, \$36,416 (Funded)

Effects of forest restoration treatments on bat communities in a wildland urban interface, Arizona Game & Fish Department, \$40,000 (Funded)

Effects of forest restoration treatments on bat communities in a wildland urban interface, Forest Service, \$25,000 (Funded)

**2004:**

Foraging ecology of four bat species, Arizona Game & Fish Department Heritage Program, \$33,193 (Withdrawn – funding for this project was received from Arizona Game & Fish Department)

Foraging and roosting ecology of 5 bat species (spotted, Allen's lappet-browed, and Townsend's big-eared bats, big free-tailed and western mastiff bats) in northern Arizona, Arizona Game & Fish Department, \$35,130 (Funded)

Ecology of spotted bats (*Euderma maculatum*) in the Southwestern United States as determined from living and mummified bats, National Geographic Society, Proposal, \$14,998 (Not funded)

Roosting ecology of spotted bats in northern Arizona, Bat Conservation International, \$4,951 (Not funded)

Bat Roost Inventory in Region 2, Arizona Game and Fish Department, \$35,000 (Funded)

Importance of cover at desert wildlife water developments to migrating birds, Arizona Birds Conservation Initiative, \$9,996 (Funded)

Importance of desert wildlife water developments to migrating passerine birds, Arizona Game & Fish Department, Addendum, \$10,000 (Funded)

The importance of wildlife water developments to migrating songbirds in southwestern Arizona USDA McIntire-Stennis, \$16,725 (Not funded)



Roost locations of spotted bats in northern Arizona, NAU Intramural Grant Program, \$5,500 (Funded)

Foraging and roosting habitat of spotted bats and Allen's lappet-browed bats in northern Arizona, Arizona Game and Fish Department, \$15,633 (Not funded)

**2003:**

Importance of desert wildlife water developments to migrating passerine birds, Arizona Game & Fish Department, \$60,000 (Funded)

Foraging and habitat use of spotted bats near Grand Canyon, Arizona, Arizona Game & Fish Department, \$28,071 (Not funded)

Summer movements and genetics of spotted bats in eastern Grand Canyon, Arizona, NAU Intramural Grant Program, \$7,545 (Funded)

**2002:**

Effects of ungulate grazing on Mexican voles in northern Arizona, Kaibab National Forest, \$8,000 (Funded)

Effects of ungulate grazing on Mexican voles in northern Arizona, USDA McIntire-Stennis, \$16,725 (Funded)

Modeling Diurnal Breeding Bird Use in Wildfire-Burned Ponderosa Pine Landscapes, Coconino National Forest, \$29,545 (Not funded)

Modeling Diurnal Breeding Bird Use in Wildfire-Burned Ponderosa Pine Landscapes, Kaibab National Forest, \$9,931 (Not funded)

**2001:**

Effects of prescribed fire on Mexican spotted owl prey, Prescott National Forest, \$74,000 (Not funded)

Using dead wood as monitoring indicators for wildlife, Southwest Fire Initiative, Bureau of Land Management, \$69,834 (Funded)

Effects of ungulate grazing on small mammals in cold temperate wetlands, USDA Forest Service, \$17,600 (Funded)

**2000:**

Impacts of forest management and grazing on Mexican spotted owl prey, Arizona Game and Fish Department Heritage Program, \$25,899 (Not funded)

Effects of ungulate grazing on small mammals in cold temperate wetlands, USDA Forest Service, \$5000 (Funded)

Relating Decay Rate to Cavity-Nesting Bird Use of Ponderosa Pine Snags, NAU Intramural Grant Program, \$9000 (Funded)

Wildlife habitat relationships on the North Kaibab Ranger District, Kaibab National Forest, \$20,000 (Funded)

Forest restoration in the Sierra Madre Occidental, Mexico, National Science Foundation, \$803,871 (Co-PI with Drs. Peter Z. Fulé and W. Wallace Covington) (Not funded)

Foraging ecology of red-tailed hawks sympatric with northern goshawks on the Kaibab Plateau, Arizona, USDA Forest Service, \$7000 (Funded)

Bird diversity in dwarf mistletoe-infested and uninfested ponderosa pine forests in northern Arizona, USDA Forest Service, \$25,140 (Continuation of project) (Co-PI with Dr. Robert Mathiasen) (Funded)

Characteristics of Gambel Oak Roosts Used by Reproductive Bats in Northern Arizona, USDA Forest Service, \$2,000 (Funded)

Effects of ungulate grazing on small mammals and amphibians in cold temperate wetlands, USDA Forest Service, \$2000 (Funded)

**1999:**

Snag dynamics in ponderosa pine ecosystems of northern Arizona, NRICGP, \$121,172 (Co-PI with Dr. Joy Nystrom Mast) (Not funded)

Influence of habitat quality on Abert squirrel fitness, dispersal, and habitat selection in ponderosa pine ecosystems, USDA McIntire-Stennis and USDA Forest Service, \$28,000 (Funded)

Wildlife use of dwarf mistletoe-induced witches' brooms in ponderosa pine forests in northern Arizona, USDA McIntire-Stennis and USDA Forest Service, \$28,000 (Co-PI with Dr. Robert Mathiasen) (Funded)

Snag Dynamics in Ponderosa Pine Ecosystems of Northern Arizona, Organized Research, Northern Arizona University, \$11,090 (Funded)

Influence of Habitat Quality on Abert's Squirrels in a Ponderosa Pine Ecosystem, USDA Forest Service, \$7000 (Funded)

Use of the TreeTop Peeper II to Measure Abert's Squirrel Fecundity, Christensen Designs, Co-PI on a Student Equipment Grant awarded to Matthew Sieg, Equipment loan valued at \$4000 (Funded)

Snag Dynamics, Use, and Associated Bird Communities in Wildfire-Burned Ponderosa Pine Landscapes, USDA Forest Service, \$8900 (Funded)

Bird diversity in dwarf mistletoe-infested and uninfested ponderosa pine forests in northern Arizona, USDA Forest Service, \$33,595 (Co-PI with Dr. Robert Mathiasen) (Funded)

**1998:**

Forest Restoration in the Sierra Madre Occidental, Mexico, National Science Foundation, \$362,086 (Co-PI with Drs. Peter Z. Fulé and W. Wallace Covington) (Not funded)

Characteristics of Gambel Oak Roosts Used by Reproductive Bats in Northern Arizona, Bat Conservation International, \$3,661 (Funded)

Modeling Bird Habitat Use in Wildfire-Burned Ponderosa Pine Landscapes, Organized Research, Northern Arizona University, \$11,000 (Funded)

Historic Reconstruction of Pinyon-Juniper Forests on the Colorado Plateau using GIS and Image Processing, Organized Research, Northern Arizona University, \$17,230 (Co-PI with Dr. Joy Nystrom Mast) (Funded)

Bird Diversity in Dwarf Mistletoe-Infested and Uninfested Ponderosa Pine Forests, USDA McIntire-Stennis, \$28,000 (Co-PI with Dr. Robert Mathiasen) (Funded)

Wildlife Use of Dwarf Mistletoe-Induced Witches' Brooms in Douglas-fir, USDA Forest Service, \$2500 (Co-PI with Dr. Robert Mathiasen) (Funded)

Changes in Pinyon Pine-Juniper Forests since Euro-American Settlement, Long Term Ecological Program, National Science Foundation, \$252,000 (Co-PI with Drs. Joy Nystrom Mast and others) (Not funded)

**1997:**

Modeling Snag Dynamics for Wildlife Habitat, POWRE Program, National Science Foundation, \$74,992 (Not funded)

Status and Habitat Use of Oaks, Arizona Game and Fish Department Heritage Program, \$40,250 (Funded)

Characteristics of Gambel Oak that Contribute to Use by Wildlife, Organized Research, Northern Arizona University, \$12,905 (Funded)

Snag Dynamics, Use, and Associated Bird Communities in Wildfire-Burned Ponderosa Pine Landscapes. USDA McIntire-Stennis, \$54,000 (Funded)

Ecological and Socioeconomic Aspects of Alternative Silvicultural Treatments, College of Forestry Integrated Research Project, Oregon State University, \$17,000 (Funded)

Bird and Mammal Use of Dwarf Mistletoe-Induced Witches' Brooms in the Southwest, Co-authored with Dr. Robert Mathiasen, USDA McIntire-Stennis, \$54,000 (Funded)

Bat Habitat Use in Pinyon-Juniper and Grassland Habitats in Northern Arizona, Co-PI on a Student Grant awarded to Michael J. Rabe, \$2500 (Funded)

**1996:**

Use of Artificially-Created Douglas-Fir Snags by Cavity-Nesting Birds, College of Forestry Integrated Research Project, Oregon State University, \$33,000 (Funded)

Small Mammal and Amphibian Diversity and Abundance in Cold Temperate Wetland and Riparian Habitat, Arizona Game and Fish Department Heritage Program (\$93,680) (Not funded)

**Professional Meetings, Symposia, Conferences, and Workshops** (presenter's name underlined if not Chambers)

**2012**

North American Symposium on Bat Research (October), Speaker, *Large forest patches increase bat species diversity in a fragmented landscape in Nicaragua*

**2011**

Eleventh Biennial Conference of Research on the Colorado Plateau (October), Speaker, *Bird communities in wildfire-burned ponderosa pine forest*

New Mexico Chapter of The Wildlife Society, (October), Speaker, *Bird communities in wildfire-burned ponderosa pine forest*

J. N. Mast and C. L. Chambers, *Dead Trees Falling: Bark beetle outbreaks, snag dynamics, and impacts on cavity-nesting birds in southwestern ponderosa pine forests*, National Council for Geographic Education, (August), Presentation.

J. N. Mast and C. L. Chambers, *Dead Trees Falling: Snag Dynamics and Impacts on Cavity-nesting Birds in Southwestern Ponderosa Pine Forests*, National Meeting of the Association of American Geographers, (April), invited talk for a special session sponsored by the Biogeography Specialty Group on vegetation change in the American Southwest

E. L. Kalies, C. L. Chambers, and S. R. Rosenstock, *Multi-season occupancy modeling: applications to avian-habitat relationships*. Arizona/New Mexico Chapters of The Wildlife Society 44<sup>th</sup> Joint Annual Meeting (February), Presentation

Arizona/New Mexico Chapters of The Wildlife Society 44<sup>th</sup> Joint Annual Meeting (February), Speaker, *Small mammals in pinyon-juniper woodlands and grasslands in northern Arizona*

**2009**

Association of American Geographers 2009 Annual Meeting (March), Mast, J. N. and C. L. Chambers, *Biogeographical impacts of bark beetle epidemics in the Southwest*

Arizona/New Mexico Chapters of The Wildlife Society 42<sup>nd</sup> Joint Annual Meeting (February), Invited Speaker, Telemetry Workshop, *Bat and VHF Telemetry*

**2007**

Western Bat Working Group (April), Poster, *A habitat model for the spotted bat in Arizona*

**2006**

North American Symposium on Bat Research (October), Speaker, *Movement Areas for Spotted Bats (*Euderma maculatum*), Northern Arizona*

Arizona/New Mexico Chapters of The Wildlife Society 39<sup>th</sup> Joint Annual Meeting (February), Speaker, *Foraging areas for female and male spotted bats (*Euderma maculatum*), northern Arizona*

Wakonse Teaching Retreat (May 2006); 4-day faculty retreat for outstanding teachers in higher education

## **2005**

Eighth Biennial Conference of Research on the Colorado Plateau (November), Invited Speaker, *Long-term cave roosting and diet of spotted bats (*Euderma maculatum*) in northern Arizona as indicated by stable isotopes from mummified remains and live bats*

Eighth Biennial Conference of Research on the Colorado Plateau (November), Speaker, *Foraging areas for female and male spotted bats (*Euderma maculatum*), northern Arizona*

Eighth Biennial Conference of Research on the Colorado Plateau (November), Herder, M. J., C. L. Chambers, R. J. M. Corbett, and J. W. Prather. *Roosting sites of spotted bats (*Euderma maculatum*) in northern Arizona*

Western Bat Working Group (March), Speaker, *Foraging and roosting sites for male spotted bats (*Euderma maculatum*), northern Arizona*

## **2004**

North American Symposium on Bat Research (October), Speaker, *Foraging Distances of Spotted Bats (*Euderma maculatum*) at Marble Canyon, Northern Arizona*

The Wildlife Society 11<sup>th</sup> Annual Conference (September), Speaker, *Foraging and roosting sites for male spotted bats (*Euderma maculatum*), northern Arizona*

The Wildlife Society 11<sup>th</sup> Annual Conference (September), Poster, *Diet of live and mummified spotted bats in northern Arizona as indicated by stable isotopes*

Ecological Society of America 89<sup>th</sup> Annual Meeting (August), Hayes, J. P., M. A. Stoddard, and C. L. Chambers. *Influence of alternative silvicultural practices on songbirds in western Oregon*

Ecological Society of America 89<sup>th</sup> Annual Meeting (August), Poster, *Diet of live and mummified spotted bats in northern Arizona as indicated by stable isotopes*

Arizona/New Mexico Chapters of The Wildlife Society 37<sup>th</sup> Joint Annual Meeting (February), Speaker, *Foraging Distances of Spotted Bats (*Euderma maculatum*) at Marble Canyon, Northern Arizona*

Arizona/New Mexico Chapters of The Wildlife Society 37<sup>th</sup> Joint Annual Meeting (February), Poster, *Diet of live and mummified spotted bats (*Euderma maculatum*) as indicated by stable isotopes*

Arizona/New Mexico Chapters of The Wildlife Society 37<sup>th</sup> Joint Annual Meeting (February), Poster, *Mummified remains of spotted bats (*Euderma maculatum*) indicating historic roosting habitat in eastern Grand Canyon, Arizona*

## **2003**

33rd Annual North American Symposium on Bat Research (October), Poster, *Mummified remains of spotted bats (*Euderma maculatum*) indicating historic roosting habitat in eastern Grand Canyon, Arizona*

Southwest Fire Initiative Conference (April), Speaker, *Dead wood, wildlife habitat, and forest management*

**2002**

Society for Range Management Ecological Restoration in the Southwest Ponderosa Pine Forests Symposium (August), Invited Speaker, *Effects of Restoration on Animal Species*

**2001**

Arizona/New Mexico Chapters of The Wildlife Society 34<sup>th</sup> Joint Annual Meeting (February), Speaker, *Effects of ungulate grazing on small mammals in cold temperate wetlands in northern Arizona*

**2000**

Arizona/New Mexico Chapters of The Wildlife Society 33<sup>rd</sup> Joint Annual Meeting (February), Speaker, *Forest Management and the Dead Wood Resource in Ponderosa Pine Forests: Effects on Vertebrates*

**1999**

Symposium on the Ecology and Management of Dead Wood in Western Forests (November), Speaker, *Ecological Restoration and the Dead Wood Resource in Ponderosa Pine Forests: Effects on Vertebrates*

Arizona/New Mexico Chapters of The Wildlife Society 32<sup>nd</sup> Joint Annual Meeting (February), Speaker, *Developing Forest Restoration Plans to Include Wildlife Objectives*

**1998**

Long Term Silvicultural Research Sites Workshop (October), Speaker, *CFIRP: The First 10 Years*

The Wildlife Society 5<sup>th</sup> Annual Conference (September), Invited Speaker, *Setting Restoration Objectives for Wildlife: What do we need to know?*

**1997**

Uneven-aged Management – Concepts and Applications (September), Invited Speaker, *Implications of Alternative Silvicultural Systems for Wildlife*

IUFRO Interdisciplinary Uneven-Aged Silviculture Symposium & Field Tour (September), Speaker, *Converting from Even- to Uneven-Aged Stand Structure in Pacific Northwest Coniferous Forests – Implications for Wildlife*

**1995**

Managing Forest Stands and Landscapes for Ecosystem Values (March), Invited Speaker, *Species Habitat Considerations; Responses of Wildlife to Silvicultural Systems*

Society for Northwestern Vertebrate Biology (March), Invited Speaker, *Diurnal Breeding Bird Response to Alternative Stand Management in the Central Oregon Coast Range*

**1994**

Society for Northwestern Vertebrate Biology (March), Invited Speaker, *Interpreting Bird Response to Stand-Level Alternative Silvicultural Treatments*

### **1993**

Western Forestry and Conservation Association (September), Invited Speaker, with John Tappeiner, *Stand Management Alternatives for Multiple Resource Values*

Master Woodland Manager Mini-College (September), Invited Speaker, *Practical Strategies for Ecosystem Management on Small Woodland Properties: Wildlife and Forest Management*

Uneven-Aged Methods for Ecosystem Management: Forest Health, Fire, Wildlife (June), Invited Speaker, *Wildlife, Biodiversity, Fragmentation*

### **1992**

Habitat Futures 1992, USDA Forest Service, British Columbia Ministry of Forests and Ministry of Environment, Lands, and Parks (October), Invited speaker, *Biodiversity Planning and Management: Local/Stand Scale*

Western Forest Economists 1992 Meeting (May), Speaker, with Duncan Campbell, *Economic Feasibility of the Spotted Owl Recovery Plan Salvage Guidelines: The Warner Creek Fire.*

Regional Alternative Silviculture Meeting (May), Organizer

The Wildlife Society (February), Invited speaker, *Response of Terrestrial Vertebrate Communities to Three Alternative Silvicultural Systems in the Oregon Coast Range*

### **1991**

Regional Alternative Silviculture Meeting (November), Invited Speaker, *Response of Bird Communities to Three Alternative Silvicultural Systems in the Oregon Coast Range*

### **1990**

Northwest Scientific Association (March), Speaker, *Terrestrial Vertebrate Communities of Red Alder in the Oregon Coast Range*

## **PROFESSIONAL SERVICES**

Southwest Section Representative to Council, The Wildlife Society (2009-2012, 2012-2015)

Wildlife Roundtable Discussion Chair, The Wildlife Society 20<sup>th</sup> Annual Conference, Milwaukee, WI (2013)

Wildlife Roundtable Discussion Co-Chair, 4th International Wildlife Management Congress, Durban, South Africa (2010-2011)

Arizona Chapter of The Wildlife Society, Techniques Workshop, Presentation and hands-on training for students from Arizona State University, Northern Arizona University, and University of Arizona (March 2011) *Wildlife Telemetry and Handheld GPS Techniques* (36 student attendees)

Wildlife Program and Local Arrangements Chair, Arizona/New Mexico Chapters of The Wildlife Society 43<sup>rd</sup> Joint Annual Meeting (2009-2010)

Arrangements Committee, Chair of Student Activities Committee, The Wildlife Society 14<sup>th</sup> Annual Conference, Tucson, AZ (2007)

President, Arizona Chapter of The Wildlife Society (2006-2007)

President-Elect, Arizona Chapter of The Wildlife Society (2005-2006)

Associate Editor for Journal of Wildlife Management (2004-2006)  
 Web Site Manager, Arizona Chapter of The Wildlife Society (2000-2006)  
 Wildlife Program Chair, Arizona/New Mexico Chapters of The Wildlife Society 39<sup>th</sup> Joint Annual Meeting (2005-2006)  
 Wildlife Program Chair, Arizona/New Mexico Chapters of The Wildlife Society 37<sup>th</sup> Joint Annual Meeting (2003-2004)  
 Wildlife Program Chair, Arizona/New Mexico Chapters of The Wildlife Society 33<sup>rd</sup> Joint Annual Meeting (1999-2000)  
 Board Member, Arizona Chapter of The Wildlife Society (2000-2001)  
 Review Panel and Moderator, The Wildlife Society 12<sup>th</sup> Annual Conference, Madison, WI (2005)  
 Member, Subcommittee for Symposia, The Wildlife Society 8<sup>th</sup> Annual Conference, Reno, NV (2000-2001)  
 Faculty Advisor, Northern Arizona University Student Chapter The Wildlife Society (2005-2008)  
 Co-Advisor for Northern Arizona University Student Chapter The Wildlife Society (1999)  
 Northern Arizona University Student Chapter The Wildlife Society, Invited Speaker (April 2001) *Hantavirus, Rabies, and Plague – Avoiding Death in Arizona*  
 Mexican Spotted Owl Upper Gila Mountains Recovery Unit Working Team Member (Alternate for Dr. Paul Beier 1998-1999; Team Member 1999-2001)  
 Vertebrate Monitoring Workshop, Sonoran Desert Institute, Tucson (July 2003), Panel to develop parameters for ecological monitoring  
 Consortium Member, Great Basin Biological Research Conference (1999-2000)  
 Grand Staircase-Escalante National Monument Summer Lecture Series, Invited Speaker (September 2005) *Extreme bats: Adaptations for survival*  
 Grand Canyon National Park, Presentation for Interpretive Staff (May 2003) *Small Mammals and Hantavirus and Bats of Arizona and the Grand Canyon National Park*  
 University of Arizona, Invited Speaker (March 2001) *Wildlife, Forestry, and Disturbing Events*  
 Sigma Xi, Invited Speaker (April 2000) *The Dangers of Wildlife Work in Arizona (or How to Die in the Southwest)*  
 Rotary International, Invited Speaker (December 1998) *Response of Small Mammals and Sin Nombre Virus to Ecological Restoration*  
 Sensitive Bat Species Project, Grand Staircase-Escalante National Monument, Utah (July 2003, Summer 2004)  
 Greater Western Mastiff Bat Roosting Habitat Project, Kaibab Plateau, North Kaibab Ranger District, Arizona (1999)  
 Board Member, Northern Arizona Audubon Society (2000-2001)  
 Audubon Society (1997) Assisted with program development; arranged for scheduling of several School of Forestry students to present research at Audubon meetings

### ***University***

Institutional Animal Care and Use Committee (July 2007-June 2013)  
 CEFNS Strategy Committee (2012-13)  
 Associate Vice President for Research Search Committee (2011)  
 Provost's Academic Computing Advisory Council (2005-2008)



Northern Arizona University Intramural Grant Program (formerly Organized Research Committee) (1997-2003, 2005-06, 2007-08)  
Center for Environmental Sustainability Committee (1999)

### ***School of Forestry***

Semester B Coordinator (2013)  
Faculty Status Committee (2011-2012)  
Curriculum Committee (2011-2012)  
Curriculum Review Committee (2011-2012)  
Annual Review Committee (2009-2011)  
Ecosystem Ecology Search Committee (2008)  
Forest Management Search Committee (2007)  
Information Technology (Chair) (2005-present)  
Strategic Plan (2003-2004)  
Native American Advisory Committee (2003-2004)  
Graduate Studies Committee, School of Forestry (1998-2001, 2003-2004)  
Faculty Status Committee (2001-2002)  
Mission Research Board, School of Forestry (1997, 2000-2001)  
Chair's Advisory, School of Forestry (1997-1998, 1999-2000)  
Faculty Workload Committee, School of Forestry (1999)  
School of Forestry Seminar Series on Sustainability (Fall 1998) (I organized a 12 speaker series; approximately 700 attended; two courses used this seminar series as part of their class schedule)  
School of Forestry Seminar Series (Spring 1998) (I served as student advisor for a group of 4 students who organized and conducted the 14-speaker seminar series; approximately 350 attended)  
School of Forestry Seminar Series on Ecological Restoration (Fall 1997) (I organized a 12 speaker series; approximately 1000 attended; two courses used this seminar series as part of their class schedule)

### **PROFESSIONAL SOCIETIES**

The Wildlife Society (Parent Society [1992 – present], Northwest Section [1993-1996], Oregon Chapter [1991 – 1996], Southwest Section [1996 – present], Arizona Chapter [1996 – present])  
Western North American Naturalists (2008 – present)  
Southwestern Association of Naturalists (2005 – present)  
Western Bat Working Group (2005 – present)  
Cooper Ornithological Society (1990 – 2005)  
Ecological Society of America (1997 – 2003)  
Society of American Foresters (1998 – 2003)  
Northwest Scientific Association (1997 – 2000)

### **HONORS**

The Wildlife Habitat Relationships (WILDHARE) Award, The Arizona Chapter of The Wildlife Society, 2008

Registry of Distinguished Students, College of Agriculture, Oregon State University, 1995  
 The Wildlife Society Oregon Chapter Advanced Graduate Student Scholarship, 1995  
 Gamma Sigma Delta, Honor Society of Agriculture (1983, 1993 – 1994)  
 Phi Eta Sigma, Freshman Honor Society

**ADVISING EXPERIENCE:**

***High School Student Research Projects***

2004            1 Student, Bats in northern Arizona (completed)

***Undergraduate Student Research Projects***

2011            1 Student, REU Program, Use by bats of artificial roosts in ponderosa pine forests (completed)  
 2009            1 Student, Does prey diversity enhance predator diversity in a ponderosa pine forest food web? (completed)  
 2003            1 Student, A comparison of Mexican vole (*Microtus mexicanus*) runway densities in dry meadow and wet meadow habitat in northern Arizona (completed)  
 2000            1 Student, Effect of roads on Gambel oak habitat availability (completed)  
 1999            1 Student, Bat use of artificial bark in ponderosa pine forests in northern Arizona (completed and published) Shawn Knox, Habitat association of the sagebrush lizard (*Sceloporus graciosus*): Potential responses of an ectotherm to ponderosa pine forest restoration (completed and published)  
 1998            1 Student, Hantavirus in rodent populations of ponderosa pine forest restoration (completed)

***Graduate Students***

Students for whom I have served or now serve as major professor:

	<u>Degree Completion (or projected year)</u>
1 Student, MF *	-- (2014)
1 Student, MS	-- (2013)
1 Student, PhD	-- (2013)
1 Student, MS	2012
1 Student, MS *	2011
1 Student, MS	2011
1 Student, MS	2010
1 Student, PhD	2010
1 Student, MS	2009
1 Student, MS	2008
1 Student, MS	2007
1 Student, MS	2006
1 Student, MS	2005
1 Student, MS	2005
1 Student, MS *	2005
1 Student, MS	2003
1 Student, MS	2003

1 Student, MS \* 2003  
 1 Student, MS \* 2002  
 1 Student, MS 2002  
 1 Student, MS 2002  
 1 Student, MS 2001  
 1 Student, MS \* 2001  
 1 Student, MS 2001  
 1 Student, PhD 2001  
 1 Student, MS\* 2000  
 1 Student, MS \* 2000  
 1 Student, MS\* 2000  
 1 Student, MS 1999  
 1 Student, MS 1998  
 1 Student, MS (not completed)  
 1 Student, MS (not completed)  
 \* = co-adviser

Students for whom I have served or now serve as committee member:

Degree Completion (or projected year)

1 Student, MS (Biology) -- (2015)  
 1 Student, MS (Biology) -- (2014)  
 1 Student, MS (Biology) -- (2014)  
 1 Student, MS (Biology) -- (2013)  
 1 Student, PhD -- (2013)  
 1 Student, PhD -- (2013)  
 1 Student, MS (Arizona State University) (2013)  
 1 Student, MS (Biology) 2012  
 1 Student, MS (Biology) 2012  
 1 Student, MS (Texas Tech University) 2012  
 1 Student, PhD 2012  
 1 Student, PhD (Biology) 2011  
 1 Student, PhD 2010  
 1 Student, MS 2007  
 1 Student, MS 2006  
 1 Student, MS (Biology) 2005

***1 Student, PhD (Biology) 2004***

1 Student, MS (Biology) 2003  
 1 Student, MS 2003

***1 Student, MS 2002***

***1 Student, MS (Biology) 2001***

1 Student, PhD 2000

1 Student, PhD (Biology) 2000  
1 Student, MS 1998  
1 Student, MS 1998  
1 Student, MS (not completed)

## Document E: Individual Faculty Information

### WILLIAM W. COVINGTON

Regents' Professor and Executive Director – 9 month – Tenured

Date of Appointment: 1997 – Present

**Northern Arizona University - Ecological Restoration Institute**

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### EDUCATION:

- 1976 Ph.D., Yale University, Forest Ecology Dissertation - Forest floor organic matter and nutrient content and leaf fall during secondary succession in northern hardwoods. Dissertation advisors: F.H. Bormann, D.B. Botkin, D.M. Smith, G.K. Voigt. 1981. Covington, W.W. Changes in forest floor organic matter and nutrient content following clear cutting in northern hardwoods. *Ecology* 62:41-48. 1980. Covington, W.W. and J.D. Aber. Leaf production during secondary succession. *Ecology* 61:200-204.
- 1972 M.S., University of New Mexico, Ecology Thesis - Altitudinal variation of chlorophyll concentration and reflectance of the bark of *Populus tremuloides*. Thesis advisors: James R. Gosz, L.D. Potter, D.E. Johnson. 1975. Covington, W.W. Altitudinal variation of chlorophyll concentration and reflectance of the bark of *Populus tremuloides*. *Ecology* 56:715-720.
- 1969 B.A., honors, University of North Texas. Major - Biology, Minor - Chemistry. Undergraduate research advisor: V.D. Scholes.

### PROFESSIONAL EXPERIENCE:

- 1997/Present Executive Director and Founder, The Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ
- 1995/Present Regents' Professor of Forest Ecology, Northern Arizona University
- 1987/1995 Professor of Forest Ecology, Northern Arizona University
- 1979/1987 Associate Professor of Forest Ecology, Northern Arizona University
- 1985 Land Management Planning Analyst, USDA Forest Service
- 1983/1984 Research Forester, Rocky Mountain Research Station, USDA Forest Service
- 1975/1979 Assistant Professor of Forest Ecology, Northern Arizona University
- 1972/1975 Graduate Research Specialist, Hubbard Brook Ecosystem Study, Yale University
- 1970/1972 Graduate Research Assistant, Tesuque Watershed Ecosystem Study, University of New Mexico

### **SELECT RECENT REFERRED PUBLICATIONS:**

Kalies, E.L., and W.W. Covington. 2012. Small mammal community maintains stability through compensatory dynamics after restoration of a ponderosa pine forest. *Ecosphere* 3(9):78.

<http://dx.doi.org/10.1890/ES12-00143.1>

Kalies, E. L., B. G. Dickson, C. L. Chambers, and W. W. Covington. 2012. Community occupancy responses of small mammals to restoration treatments in ponderosa pine forests, northern Arizona, USA. *Ecological Applications* 22:204–217. <http://dx.doi.org/10.1890/11-0758.1>

Abella, S.R., E.C. Engel, J.D. Springer, and W.W. Covington. 2012. Relationships of exotic plant communities with native vegetation, environmental factors, disturbance, and landscape ecosystems of *Pinus ponderosa* forests, USA. *Forest Ecology and Management*, Volume 271, 1 May 2012, pages 65-74.

McGlone, C.M., M.T. Stoddard, J.D. Springer, M.L. Daniels, P.Z. Fulé, W.W. Covington. 2012. Nonnative species influence vegetative response to ecological restoration: Two forests with divergent restoration outcomes. *Forest Ecology and Management*, 285:195-203.\*

Kalies, E.L., W.W. Covington, C.L. Chambers, and S.S. Rosenstock. 2010. Systematic Review No. 66: How do thinning and burning treatments in southwestern conifer forests in the United States affect wildlife density and population performance? Center for Evidence-Based Conservation. <http://www.environmentalevidence.org/SR66.html>

Diggins, Corinne, P.Z. Fulé, J.P. Kaye, and W.W. Covington. 2010. Future climate affects management strategies for maintaining forest restoration treatments. *International Journal of Wildland Fire*, 19, 903-913.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2010. Monitoring landscape-scale ponderosa pine restoration treatment implementation and effectiveness. *Restoration Ecology* 18(6):820-833.

Kalies, E.L., B.G. Dickson, C.L. Chambers, and W.W. Covington. 2010. Small mammal community responses to ecological restoration treatments in southwestern ponderosa pine forests, northern Arizona. The Wildlife Society's Arizona and New Mexico 43<sup>rd</sup> Joint Annual Meeting, Flagstaff, Arizona. February 4-6, 2010.

McGlone, C.M., J.D. Springer, and W.W. Covington. 2009. Cheatgrass encroachment on a ponderosa pine forest ecological restoration project in Northern Arizona, USA. *Ecological Restoration* 27(1):37-46.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2009. Assessing changes in canopy fuels and potential fire behavior following ponderosa pine restoration. *Fire Management Today* Vol. 69, No. 2, 47-50.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2008. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments. *International Journal of Wildland Fire* 17:293-303.

Abella, S.R., and W.W. Covington. 2007. Forest floor treatments in Arizona ponderosa pine restoration ecosystems: no short-term effects on plant communities. *Western North American Naturalist* 67:120-132.

Abella, S.R., J.D. Springer, and W.W. Covington. 2007. Seed banks of Arizona pinus ponderosa landscape: responses to environmental gradients and fire cues. *Canadian Journal of Forest Restoration* 37:552-567.

Abella, S.R., W.W. Covington, P.Z. Fulé, L. Lentile, A. Sanchez-Meador, P. Morgan. 2007. Past, present, and future old growth in frequent-fire conifer forests of the western United States. *Ecology and Society* Vol. 12, No. 2, Article 16.

Laughlin, D.C., M.M. Moore, J.D. Bakker, C.A. Casey, J.D. Springer, P.Z. Fulé, and W.W. Covington. 2007. Assessing targets for the restoration of herbaceous vegetation in ponderosa pine forests. *Restoration Ecology* (14)4:548-560.

Abella, S.R., P.Z. Fulé, and W.W. Covington. 2006. Diameter caps for thinning southwestern ponderosa pine forests: viewpoints, effects, and tradeoffs. *Journal of Forestry*(104) 407-414.

Fulé, P.Z., T.A. Heinlein, and W.W. Covington. 2006. Fire histories in ponderosa pine forests of Grand Canyon are well supported: reply to Baker. *International Journal of Wildland Fire* 15:439-445.

Moore, M.M., C.A. Casey, J.D. Bakker, J.D. Springer, P.Z. Fulé, W.W. Covington, and D.C. Laughlin. 2006. Herbaceous response to restoration treatments in a ponderosa pine forest, 1992-2004. *Rangeland Ecology and Management* 59:135-144.

Kaye, J.P., Hart, S.C., Fulé, P.Z., Covington, W.W., M.M. Moore, and M.W. Kaye. 2005. Initial carbon, nitrogen, and phosphorus fluxes following ponderosa pine restoration treatments. *Ecological Applications* 15(5):1581-1593.

Fulé, P.Z., D.C. Laughlin, and W.W. Covington. 2005. Pine-oak forest dynamics five years after ecological restoration treatments. *Forest Ecology and Management* 218:129-145.

Heinlein, T.A., M.M. Moore, P.Z. Fulé, and W.W. Covington. 2005. Fire history of two ponderosa pine—mixed conifer sites: San Francisco Peaks, Arizona, USA. *International Journal of Wildland Fire* 14:307-320.

Moore, M.M., D.W. Huffman, P.Z. Fulé, W. W. Covington, and J.E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50(2):162-176.

- Fulé, P.Z., A.E. Cocke, T.A. Heinlein, and W.W. Covington. 2004. Effects of an intense prescribed forest fire: is it ecological restoration? *Restoration Ecology* 12(2):220-230.
- Gildar, C.N., P.Z. Fulé, and W.W. Covington. 2004. Plant community variability in ponderosa pine forest has implications for reference conditions. *Natural Areas Journal* 24(2):101-111.
- Fulé, P.Z., J.E. Crouse, A.E. Cocke, M.M. Moore, and W.W. Covington. 2004. Changes in Canopy Fuels and Potential Fire Behavior 1880-2040: Grand Canyon, Arizona. *Ecological Modelling* 175:231-248.
- Abella, S. and W.W. Covington. 2004. Monitoring an Arizona ponderosa pine restoration: sampling efficiency and multivariate analysis of understory vegetation. *Restoration Ecology*, 12(3): 359-367.
- Fulé, P.Z., A.E. Cocke, T.A. Heinlein, and W.W. Covington. 2004. Effects of an intense prescribed forest fire: is it ecological restoration? *Restoration Ecology* 12(2):220-230.
- Fulé, P.Z., J.E. Crouse, A.E. Cocke, M.M. Moore, and W.W. Covington. 2004. Changes in canopy fuels and potential fire behavior 1880-2040: Grand Canyon, Arizona. *Ecological Modelling* 175:231-248.
- Gildar, C.N. , P.Z. Fulé, and W.W. Covington. 2004. Plant community variability in ponderosa pine forest has implications for reference conditions. *Natural Areas Journal* 24(2):101-111.
- Korb, J.E., N.C. Johnson and W.W. Covington. 2004. Slash pile burning effects on soil biotic and chemical properties and plant establishment: recommendations for amelioration. *Restoration Ecology* 12(1):52-62.
- Laughlin, D.C., J.D. Bakker, M.T. Stoddard, M.L. Daniels, J.D. Springer, C.N. Gildar, A.M. Green, and W.W. Covington. 2004. Toward reference conditions: effects of wildfire on flora of a remote old-growth ponderosa pine forest. *Forest Ecology and Management*. In press.
- Moore, M.M., D.W. Huffman, P.Z. Fulé, W.W. Covington, and J.E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50(2):162-176.
- Covington, W.W. 2003. Restoring ecosystem health in frequent-fire forests of the American West. *Ecological Restoration* 21:1: 7-11
- Covington, W.W. 2003. The Evolutionary and Historical Context. Pages 26-47, Chapter 2, in Friederici, Peter (Editor), *Ecological Restoration of Southwestern Ponderosa Pine Forests*. Society for Ecological Restoration International.
- Elseroad, A.C., P.Z. Fulé, W.W. Covington. 2003. Forest Road Revegetation: effects of seeding and soil amendments. *Ecological Restoration* 21:3: 180-185.



Fulé, P.Z., J.E. Crouse, T.A. Heinlein, M.M. Moore, W.W. Covington, and G. Verkamp. 2003. Mixed-severity fire regime in a high-elevation forest: Grand Canyon, Arizona. *Landscape Ecology* 18:465-486.

Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2003. Assessing fire regimes on Grand Canyon landscapes with fire scar and fire record data. *International Journal of Wildland Fire* 12(2):129-145.

Korb, J.E., W.W. Covington, and P.Z. Fulé. 2003. Sampling techniques influence understory plant trajectories following restoration—an example from ponderosa pine restoration. *Restoration Ecology* 11(4):504-515.

Korb, J.E., N.C. Johnson and W.W. Covington. 2003. Arbuscular mycorrhizal propagule densities respond rapidly to ponderosa pine restoration treatments. *Journal of Applied Ecology* 40(1): 101-110.

Waltz, A.E.M., P.Z. Fulé, W.W. Covington, and M.M. Moore. 2003. Diversity in ponderosa pine forest structure following ecological restoration treatments. *Forest Science* 49(6):885-900.

Waltz, A.E.M. and W.W. Covington. 2003. Ecological restoration treatments increase butterfly richness and abundance: mechanisms of response. *Restoration Ecology* 12(1):85-96.

Bailey, D.F. and W.W. Covington. 2002. Evaluating ponderosa pine regeneration rates following ecological restoration treatments in northern Arizona, USA. *Forest Ecology and Management*. 155:271-278.

Fulé, P.Z., W.W. Covington, H.B. Smith, J.D. Springer, T.A. Heinlein, K.D. Huisinga, and M.M. Moore. 2002. Comparing ecological restoration alternatives: Grand Canyon, Arizona. *Forest Ecology and Management* 170: 19-41.

Fulé, P.Z., W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. 2002. [Natural variability in forests of Grand Canyon, USA](#). *Journal of Biogeography* 29:31-47.

Covington, W.W., P.Z. Fulé, S.C. Hart, and R.P. Weaver. 2001. [Modeling ecological restoration effects on ponderosa pine forest structure](#). *Restoration Ecology* 9(4):421-431.

Fulé, P.Z., A.E.M. Waltz, W.W. Covington, and T.A. Heinlein. 2001. Measuring forest restoration effectiveness in hazardous fuels reduction. *Journal of Forestry* 99(11):24-29

Fulé, P.Z., J.D. Springer, D.W. Huffman, and W.W. Covington. 2001. Response of a Rare Endemic, *Penstemon clutei*, to Burning and Reduced Belowground Competition. Pages 139-152 in Maschinski, J., and L. Holter (technical coordinators), Southwestern Rare and Endangered Plants: Proceedings of the Third Conference. Proc. RMRS-P-23. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Fulé, P.Z., C. McHugh, T.A. Heinlein, and W.W. Covington. 2001. Potential fire behavior is reduced following forest restoration treatments. Pages 28-35 in Vance, G.K., C.B. Edminster, W.W. Covington, and J.A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Toward Stewardship*. Proc. RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Meyer, C.L., T.D. Sisk, W.W. Covington. 2001. Microclimatic changes induced by ecological restoration of ponderosa pine forests in northern Arizona. *Restoration Ecology* 9:443-452.

Covington, W.W., P.Z. Fulé, T.M. Alcoze, and R.K. Vance. 2000. Learning by doing: ecological restoration education at Northern Arizona University. *Journal of Forestry* 98(10):30-34.

Fulé, P.Z., A. García-Arévalo, and W.W. Covington. 2000. Effects of an intense wildfire in a Mexican oak-pine forest. *Forest Science* 46(1): 52-61.

Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2000. Continuing fire regimes in remote forests of Grand Canyon National Park. *Proceedings: Wilderness Science in a Time of Change*. USDA Forest Service Proceedings RMRS-P-15-VOL-5: 242-248.

## **PRESENTATIONS**

Kalies, E.L., C.L. Chambers, and W.W. Covington. 2009. The impacts of ecological restoration treatments on wildlife populations in southwestern conifer forests: a meta analysis. Presented by E.L. Kalies at The Ecological Society of America's Annual Meeting, Albuquerque, New Mexico. August 2-8, 2009.

## **Current Research Interests**

Ecological Restoration  
Fire ecology and Management  
Ecological Modeling  
Ecosystem Management  
Sustainable Forestry

## **Related Professional Activities and Recognition**

2012/Present Member representing the scientific community, USFS Planning Rule National Advisory Committee.  
2004/Present Arizona Governor's Forest Health Advisory Council.  
1994-Present Invited testimony before Congressional Committees.  
2009 Society for Ecological Restoration International (SERI), Theodore M. Sperry Award, for meritorious achievement and service.

2004/2006 New Mexico Forest and Watershed Health Committee.  
2001/2004 Arizona Governor Hull's Forest Health/Fire Plan Advisory Committee.  
2000/2003 National Commission on Science for Sustainable Forestry, NCSE, Charter  
Commission Member.  
1996/2003 Co-Chair, Science and Policy Working Group, Society for Ecological Restoration  
(SERI).  
1989-1996 Founding Chair, SERI, Science Working Group.  
1998 Lead author on interagency restoration ecology synthesis paper.  
1999 Governor's Pride in Arizona Award for Environmental Leadership.  
1994-1997 Chair, Research Working Group, Society for Ecological Restoration.  
1972-1975 Sterling Graduate Fellow, Yale University.  
1982/1989/  
1997 Outstanding Teaching Scholar Award, Northern Arizona University

## **Document E: Individual Faculty Information**

### **STEPHEN M. DEWHURST**

Associate Professor-Tenured 9 Month

Date of Appointment: 2003 - Present

**Northern Arizona University - School of Forestry**

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#### **EDUCATION:**

- 1996 Ph.D. School of Forestry, Northern Arizona University. Dissertation Title: A Decision Support Approach for Hierarchical Forest Ecosystem Management.
- 1988 M.Sc. Forest Resources, University of Minnesota. Thesis Title: A System for the Collection and Analysis of High-Resolution Spectral Data of Forest Canopies.
- 1985 B.A., Double Major: Geography and Anthropology, University of California, Santa Barbara. Graduation with Highest Honors (GPA 3.89 on 4.0 scale)
- 1982 A.A., Freshman/Sophomore-level University Preparatory Program, Santa Rosa Junior College, California

#### **PROFESSIONAL EXPERIENCE:**

- 2007/Present Associate Professor, School of Forestry, Northern Arizona University.
- 2003/2007 Assistant Professor, School of Forestry, Northern Arizona University.
- 1995/2003 Assistant Professor, Forestry Programme, University of Northern British Columbia.
- 1995/1996 Lecturer, Forestry Programme, University of Northern British Columbia.
- 1990/1995 Senior Research Specialist, School of Forestry, Northern Arizona University.
- 1988/1990 GIS Applications Specialist, TYDAC Technologies Corporation, Washington DC, USA and Ottawa Canada
- 1988 Instructor, University of Minnesota. Teaching Responsibility for FR5262, Remote Sensing of Natural Resources, a graduate-level survey course covering a range of remotes sensing and GIS topics.
- 1987 Teaching Assistant, University of Minnesota. Lab Instructor for FR5200, Air Photo Interpretation.
- 1985/1988 Research Assistant, University of Minnesota. Support for faculty and staff research activities in the Remote Sensing Laboratory, College of Forestry.

1984 Field Assistant, Environmental Studies Program, University of California, Santa Barbara. Field data collection (plant identification, measurements, field survey, etc...) for ecosystem remote sensing project conducted by NASA/Johnson Spaceflight Center near Ely, Minnesota.

### **PAPERS (PEER REVIEWED)**

Chambers, C. L., M. Herder, K. Yasuda, D.G. Mikesic, S. Dewhurst, W. M. Masters, and D. Vleck.(2011) Roosts and activity areas of spotted bats (*Euderma maculatum*) in Arizona. *Canadian Journal of Zoology*, 89(12): 1256-1267

Kim, Y.S., S.M. Dewhurst, and D.S. Hospodarsky (2007) The 2005 planning rule as a teaching tool. *Journal of Forestry*, Volume 105 (6): 320-325

Campbell, K.A., and S.M. Dewhurst (2007) A hierarchical simulation-through-optimization approach to forest disturbance modeling. *Ecological Modelling* 202:3-4, 281-296

***Sherry E.E., S.M. Dewhurst and M.K. Karjala, (2005). Aboriginal forest planning: lessons from three community pilot projects. Canadian Journal of Native Studies.25(1):51-91***

Karjala, M.K., E.E. Sherry & S.M. Dewhurst, (2004). Criteria and indicators for sustainable forest planning: A framework for recording Aboriginal resource and social values. *Forest Policy and Economics* 6(2), 95-110

Karjala, M.K., & Dewhurst, S.M. (2003). Exploring Aboriginal forestry: a case study in central interior, British Columbia, Canada. *Landscape and Urban Planning* 64.

Dewhurst, S.M. and W.B. Kessler. (1999). Using scenario planning to educate the next generation of natural resource managers. *Journal of Forestry* 97 (11). 43-47.

Wood, D.B. and Stephen M. Dewhurst (1998). A decision support system for the Menominee legacy forest. *Journal of Forestry*, 95(12): 28-32.

Dewhurst, S.M., W.W. Covington, and D.B. Wood (1995). Developing a model for adaptive ecosystem management: goshawk management on Arizona's Kaibab plateau. *Journal of Forestry*, 92(12).

### **GUIDEBOOKS (PEER REVIEWED)**

Karjala, M.E., E.E. Sherry, and S. Dewhurst (2003) The Aboriginal forest planning process: a guidebook for identifying community-level criteria and indicators. University of Northern British Columbia and Forest Renewal BC. 90pp.

Bismanis, A., M.A. MacGregor, S.M. Dewhurst, and G. Halseth. (2003). A guide for managers and researchers: Incorporating forest history into sustainable forest management. University of Northern British Columbia and Forest Renewal BC. 82pp.

### **PRESENTATIONS**

Dewhurst, S.M. (2007) Recursive Graph Optimization for Achieving Spatial Structure Goals in Estate Models. Forest Estate Modelling Conference 2007, Victoria, BC, Canada. June 12-14,

Clark, M.J. and Dewhurst, S.M. (2006) Landscape-Level Modeling For Pronghorn Habitat Restoration Planning In Central And Northern Arizona. 33<sup>rd</sup> Annual Natural Areas Conference. September 20-23, 2006 Flagstaff Arizona.

Campbell, K.A. and S.M. Dewhurst. (2006) A probabilistic simulation through optimization approach to disturbance modelling at three levels of forest planning. *Forests, Fires and Stochastic Modeling. Pacific Institute for Mathematical Sciences. Banff International Research Station Workshop.* May 14.

Dewhurst, S.M. (2005) Planning pronghorn habitat restoration on the Prescott National Forest. *Arizona Pronghorn Roundtable*, Flagstaff Arizona. June 17.

Dewhurst, S.M (2005). Planning Pronghorn Habitat Restoration on the Prescott National Forest. *Annual Meeting, the Colorado Plateau Chapter of the Society for Conservation Biology.* Prescott Arizona May 11-24.

Dewhurst, S.M. (2002). An efficient heuristic simulation approach to satisficing spatial and temporal indicators. *Annual meeting of Canadian Operations Research Society, Toronto, ON. July 12.*

Dewhurst, S.M and O Garcia. (2002) A stochastic heuristic object-oriented approach. to satisficing multiple-objective forest. management problems. *Symposium on Systems and Models in Forestry, Punta de Tralca, Chile, March 4-7.*

Dewhurst, S.M. Linking goal programming with stochastic/heuristic optimization – a hierarchical approach. (2000) *Symposium on Systems Analysis in Forest Resources*, Snowmass, CO. September 27 – 30.

Melanie Karjala, Stephen Dewhurst and S. Grainger. (2000) Cooperative Forest Planning Using Criteria, Indicators and Systems Analysis. *Symposium on Systems Analysis in Forest Resources*, Snowmass, CO. September 27 – 30, 2000

Karjala, M.K., E.E. Sherry & S.M. Dewhurst. (2000) Criteria and indicators for forest management: a method for recording aboriginal resource and community values. *Streamlining Local-Level Information for Sustainable Forest Management*, Vancouver, BC. August 28-29, 2000

Dewhurst, S.M. and W.B. Kessler. (1999) Echo and scenario planning applied for sustainable forest management. *Science and Practices: Sustaining the Boreal Forest.* Edmonton, AB. February 14-17.

Dewhurst, S.M..(1999) Strategic forest planning: why do it?. *Silviculture Institute of British Columbia, Module 5, Strategic-Level Forest Analysis.* Prince George, BC.

Dewhurst, S.M.(1997). Scenario-based analytical approaches to sustainable forest management planning. *Global Approaches – Sustainable Forest Management*, Prince George, BC. 21-26 September.

Dewhurst, S.M., D.B. Wood and D. Wilson. (1997). Using a decision support system to implement ecosystem management on the Menominee forest: from theory to application. *1997 International Symposium on Systems Analysis in Forest Resources*, Traverse City, MI, USA.

Dewhurst, S.M., D.B. Wood and D.W. Wilson. (1995). An ecological allocation model for the Menominee tribal forest. *10<sup>th</sup> Annual US National Symposium on Landscape Ecology*, Minneapolis, MN, USA.

Dewhurst, S.M.(1995) Decision support systems for land management planning. *TREES continuing forestry education workshop*. Flagstaff, AZ, March.

Dewhurst, S.M., W.W. Covington and D.B. Wood. (1993). Landscape-level habitat management using an integrated decision support approach. *8<sup>th</sup> Annual US National Symposium on Landscape Ecology*, Minneapolis, MN, USA.

Dewhurst, S.M., W.W. Covington and D.B. Wood. (1993) A flexible decision support architecture for multi-resource forest management.. *GIS '93 Conference*, Vancouver, BC, Feb. 16, 1993

## **PROFESSIONAL AFFILIATIONS**

Society for Range Management

## **FELLOWSHIPS**

1986/1988 NASA Graduate Student Researcher, Earth Resources Branch, Goddard Spaceflight Center, Greenbelt, MD, USA.

## **GRANTS RECEIVED**

(2007) USDA Managed Ecosystems (Kolb et al.). “Carbon and Water Balance Implications of Forest Restoration Thinning”. \$399,000. Status: *Funded, Project Underway*

(2006) NAU/TRIF. Making a more viable business of land stewardship contracting through improved information and analysis. \$25,000. Status: *Not Funded*

(2005) Arizona Game and Fish Department.. Tactical Planning in Support of Pronghorn Habitat Enhancement. \$25,000. Status: *Funded, Project Complete.*

(2004) Prescott National Forest: GIS and Remote Sensing in Support of Upper Verde River Watershed Analysis. \$10,000. Status: *Funded, Project Complete*

(2004) Arizona Board of Regents – Enhanced Tools for Learner-Centered Education. \$25,000. Status: *Not Funded*.

(2003) Research Proposal to NAU Forestry Mission Research – Zoning to Support Ecological Restoration of Forests in Northern Arizona

- Amount Requested: \$15,000 per year for 4 years (\$60,000 total)

- Status: *Approved, Project in Progress*.

(2001) Research Proposal to Forest Renewal BC – Use of Historical Information to Support Ecological Restoration of Managed Forests

- Amount Requested: \$181,000 over 2 years

- Status: *Approved, project completed*

(2001) Research Proposal to Forest Renewal BC – An Approach to Representing Aboriginal Values in Forest Management Planning

- Amount Requested: \$192,000 over 2 years

- Status: *Approved, project completed*

(2000) Research Proposal to BC Ministry of Forests. Scenario Planning for the Upper Goat Landscape Unit.

- Amount Requested: \$10,000

- Status: *Approved, project completed*

(1998) Infrastructure Proposal to Canada Foundation for Innovation (High Performance Computing)

- Amount Requested: \$541,000 (total value \$1,200,000 with partnership/matching funds)

- Status: *Funded*

(1998) Research Proposal to Sustainable Forest Management Network – Evaluation of the EchoSystem and Scenario Planning for Sustainable forest Management

- Amount Requested: \$262,000

- Status: *Approved, project completed*

(1997) Letter of Intent to Forest Renewal BC – Endowed Chair in Landscape Ecology

- Amount Requested: endowment to return \$161,000 per annum



- Status: *Revised Proposal Funded*

(1997) Letter of Intent to Forest Renewal BC – Endowed Chair in Forest Growth and Yield

- Amount Requested: endowment to return \$161,000 per annum

- Status: *Funded, Position Filled*

(1996) Research Proposal to Forest Renewal BC – Accessible Forest Planning Tools

-Amount requested: \$201,884

-Status: *Approved, Project Completed*

## **Document E: Individual Faculty Information**

### **BRUCE E. FOX**

Professor of Forest Management – 9 month – Tenured

Date of Appointment: 1998 – Present

**Northern Arizona University – School of Forestry**

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### **EDUCATION AND CERTIFICATION:**

- 1980            Ph.D., Natural Resources. Forest Economics and Policy. University of Michigan. Ann Arbor, MI. Dissertation Topic: “A Long Term Timber Sale Policy for Michigan's State Forests”
- 1976            Master of Forestry. University of California, Berkeley.
- 1975            Bachelor of Science, Forestry (with honors). University of California, Berkeley.
- 1996/Present   Registered Professional Forester, California.

### **PROFESSIONAL EXPERIENCE:**

- 2009/Present   Field Operations Manager. KGA. Berkeley, CA. Technical and logistics support for vegetation mapping of Grand Canyon National Park.
- 2008/2009      Director, Master of Administration Program. Northern Arizona University. Flagstaff, AZ. Leadership and administrative responsibility for Master of Administration Program. Master of Administration Program faculty member.
- 2002/Present   Director, University Honors Program. May 2002-December 2008. Northern Arizona University. Flagstaff, AZ. Leadership and administrative responsibility for the University honors Program. Honors faculty member.
- 2001/2002      Chair, School of Forestry. Northern Arizona University.
- 1999/2001      Interim Chair. Leadership and administrative responsibility for School of Forestry.
- 1998/Present   Professor, Forest Management, July 1998 to present; Associate Professor, August 1991 to present.
- 1991/1998      Assistant Professor, July 1985 to August 1991. Undergraduate and graduate teaching and research responsibilities in forest management and economics. Northern Arizona University. Flagstaff, AZ.
- 1986/Present   Consultant. 1986 to present. Forestry and corporate management consultant, forest products and aerospace industries.

**TEACHING EXPERIENCE:**

2008/Present Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ  
FOR 215 WRITING IN FORESTRY  
FOR 101 FORESTRY INTRODUCTION  
FOR 215 WRITING IN FORESTRY  
FOR 222 ENVIRONMENTAL CONSERVATION  
FOR 324W FOREST MANAGEMENT II (Biometrics Module)  
FOR 423C FOREST ECOSYSTEM PLANNING I (Team taught)  
FOR 424C FOREST ECOSYSTEM PLANNING II (Team taught)  
FOR 250 ARIZONA FORESTS AND WILDLIFE  
FOR 250H AZ FORESTS & WILDLIFE-HONORS  
FOR 413C FOREST ECOSYSTEM ASSESSMENT I (Team taught)  
FOR 414C FOREST ECOSYSTEM ASSESSMENT II (Team taught)  
FOR 485 UNDERGRADUATE RESEARCH (Team taught)  
FOR 599 CONTEMPORARY DEVELOPMENTS (Team taught)  
FOR 485 UNDERGRADUATE RESEARCH (Team taught)

**REFEREED PUBLICATION:**

Fox, Bruce E. and John J. Doherty. 2011. "Design to Learn". *Communications in Information Literacy*. Vol 5. No. 2. (electronic journal).

**SERVICE (selected list):**

***School/Department of Forestry***

2011/Present Curriculum Committee.  
2011/2012 Chair, Forest Biostatistics Faculty Search Committee.  
2009/2013 Faculty Status Committee.  
2009/2010 Teaching Evaluation Committee.  
2001/2013 Curriculum Review Committee.  
1999 Chair, Coordinator of Recruitment, Retention, and Placement Search Committee.  
1997/2002 Member, Curriculum Review Committee.  
1996 Co-chair, Silvicultural Operations Faculty Search Committee.  
1995/1996 Member, Environmental Management Planning Committee.  
1994/1999 Coordinator of Academic Programs.  
1994 Chair, Departmental Chair Search Committee.  
1993/1999 Coordinator of Graduate Studies.

***University***

2013 Acting Chair  
2012 Vice Chair  
2012 Chair, Director of Liberal Studies Search Committee.  
2011/2013 Faculty Status Committee, CFENS.

2010/Present Liberal Studies Committee.  
 2010/2011 Chair, Liberal Studies Program Review Task Force.  
 2010/Present Chair, Assessment Committee.  
 2010 Summer Assessment Committee  
 2010 Summer Subcommittee.  
 2009/Present University Assessment Committee.  
 2008/2011 Faculty Senate  
 2008/2009 Graduate Committee.  
 Faculty Development Advisory Committee

**COMMUNITY AND PROFESSIONAL SERVICE (selected):**

2010/Present Member, Flagstaff Open Space Commission.  
 2012-2013 Chair  
 2011/Present Publisher's Reviewer. Environmental Sciences. 2011-present. Pearson Press.  
 2011 Publisher's Reviewer. 2011. Introduction to Forestry. Elsevier Press.  
 2004/Present Consultant-Evaluator, Higher Learning Commission of the North Central.  
 2004/Present AQIP Evaluator. Higher Learning Commission of the North Central.  
 2005/Present Editorial Board Member (Founding). *Honors in Practice*  
 1988/Present Referee for manuscripts submitted for publication to *Environmental Management*,  
 1988/Present *Southern Journal of Applied Forestry*, 1983 to present; *Journal of Forestry*,  
 2009/Present *Western Journal of Applied Forestry*, 2009-present; USDA Forest Service  
 Intermountain Forest and Range Experiment Station, 1994 to present; National  
 Biological Survey, 1996 to present; *Forest Science* 2009-present

## Document E: Individual Faculty Information

### PETER Z. FULE

Professor – 9 month – Tenured

Date of Appointment: 1996 – Present

Northern Arizona University – School of Forestry

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### EDUCATION:

- 1996 Ph.D. Forest Ecology Northern Arizona University, Flagstaff AZ (with distinction). Dissertation: *Fire Disturbance Regimes and Forest Structure in Pine Ecosystems of Arizona, U.S.A., and Durango, Mexico.*
- 1990 M.S. Forestry Northern Arizona University, Flagstaff AZ (with distinction). Thesis: *Predicting forest floor fuel loading under ponderosa pine at Grand Canyon National Park, Arizona.*
- 1986 B.A. Chemistry Vassar College, Poughkeepsie NY (with honors). Thesis: *Crystal and molecular structure of rotenone.*

### PROFESSIONAL EXPERIENCE:

- 2010/Present Professor, School of Forestry, Northern Arizona University P.O. Box 15018, Flagstaff AZ.
- 2004/2010 Associate Professor, School of Forestry and Director of Research and Development, Ecological Restoration Institute (Associate Director 2004-2008), Northern Arizona University, P.O. Box 15018, Flagstaff AZ.
- 2005/2006 Senior Fulbright Scholar, Departament d'Ecologia, Facultat de Biologia, Universitat de Barcelona. Avenida Diagonal 645, 08028 Barcelona, Catalunya, Spain.
- 2000/2004 Assistant Professor, School of Forestry and Associate Director for Ecological Research (2002-2004), Ecological Restoration Institute, Northern Arizona University, P.O. Box 15018, Flagstaff AZ.
- 1998/2000 Assistant Research Professor, School of Forestry and Staff Director, Ecological Restoration Institute, Northern Arizona University, P.O. Box 15018, Flagstaff AZ.
- 1992/1998 Sr. Research Specialist, School of Forestry, Northern Arizona University, P.O. Box 15018, Flagstaff AZ.
- 1991/1992 Forester/Fire Planning, Bureau of Indian Affairs, Albuquerque Area Office, P.O. Box 26567, Albuquerque NM.

- 1990/1991 Peace Corps Volunteer Forester/Agroforestry & Extension, U.S. Peace Corps, Casilla 1522, La Paz, Bolivia, South America.
- 1990 Forester, Southern Ute Agency, Bureau of Indian Affairs, Ignacio CO.
- 1988/1990 Graduate Research Assistant, Forestry, Northern Arizona University, Flagstaff AZ.
- 1989 Firefighter/Prescribed Fire, Grand Canyon National Park, AZ.
- 1983/1988 Construction Foreman/Carpenter, Sierra Vista Construction, Chama NM.

**TEACHING EXPERIENCE:**

- 1997/Present **Economic and Ecological Impacts of Non-Native Forest Pests and Pathogens (Distributed Graduate Seminar, National Center for Ecological Analysis and Synthesis)**

FOR 282  
 FOR 380  
 FOR 380H  
 FOR 398  
 FOR 506  
 FOR 580

**Ecological Restoration  
 FOR 382, 382H, and 582**

FOR 298/506  
 FOR 299/399/506  
 FOR 298/506

**Fire Ecology and Management**

FOR 451 and 551  
 FOR 451 and 551  
 FOR 497  
 FOR 499/506

**Fire Monitoring & Modeling**

FOR 351  
 FOR 506

**Ecosystem Science and Management**

FOR 500

**Forest Science (Semester A)**

FOR 313-316

**Forestry in Developing Countries**  
FOR 415/515

**Dendroecology**  
FOR 506  
FOR 517  
FOR 599  
GGR 599

**REFERRED JOURNALS:**

Christopoulou, A., P.Z. Fulé, P. Andriopoulos, D. Sarris, and M. Arianoutsou. 2013. Dendrochronology-based fire history of *Pinus nigra* forests in Mount Taygetos, Southern Greece. *Forest Ecology and Management* <http://dx.doi.org/10.1016/j.foreco.2012.12.048>.

Shive, K.L., A.M. Kuenzi, C.H. Sieg, and P.Z. Fulé. In press. Pre-fire fuel reduction treatments influence plant communities and exotic species nine years after a large wildfire. *Applied Vegetation Science*.

Cortés Montaña, C., P. Z. Fulé, D. A. Falk, J. Villanueva-Díaz, and L. L. Yocom. 2012. Linking old-growth forest composition, structure, fire history, climate and land-use in the mountains of northern México. *Ecosphere* 3(11):106. <http://dx.doi.org/10.1890/ES12-00161.1>

Springer, J.D., P.Z. Fulé, and D.W. Huffman. 2012. Long-term responses of *Penstemon clutei* (Sunset Crater beardtongue) to root trenching and prescribed fire: Clues for population persistence. *Calochortiana* 1:164-171.

Laughlin, D., J. Chaitanya, P. M. van Bodegom, Z. A. Bastow, and P.Z. Fulé. 2012. A predictive model of community assembly that incorporates intraspecific trait variation. *Ecology Letters* 15: 1291–1299, doi:0.1111/j.1461-0248.2012.01852.x.

Yocom, L.L., and P.Z. Fulé. 2012. Human and climate influences on frequent fire in a high-elevation tropical forest. *Journal of Applied Ecology* doi: 10.1111/j.1365-2664.2012.02216.x.

McGlone, C.M., M.T. Stoddard, J.D. Springer, M.L. Daniels, P.Z. Fulé, and W.W. Covington. 2012. Nonnative species influence vegetative response to ecological restoration: two forests with divergent restoration outcomes. *Forest Ecology and Management* 285:195–203. <http://dx.doi.org/10.1016/j.foreco.2012.08.022>.

Ross, C.S., J. P. Kaye, M.W. Kaye, V.J. Kurth, R. Brimmer, S.C. Hart, and P.Z. Fulé. 2012. Ecosystem carbon remains low for three decades following fire and constrains soil CO<sub>2</sub> responses to precipitation in southwestern ponderosa pine forests. *Ecosystems* 15: 725–740. doi: 10.1007/s10021-012-9541-3.

Fulé, P.Z., L.L. Yocom, C. Cortés Montaña, D.A. Falk, J. Cerano Paredes, and J. Villanueva D. 2012. Testing a pyroclimatic hypothesis on the México-U.S. border. *Ecology* 93(8):1830-1840.

Zegler, T.J., M.M. Moore, M.L. Fairweather, K.B. Ireland, and P.Z. Fulé. 2012. *Populus tremuloides* mortality near the southwestern edge of its range. *Forest Ecology and Management* 282:196–207. <http://dx.doi.org/10.1016/j.foreco.2012.07.004>.

Honig, K.A., and P.Z. Fulé. 2012. Simulating effects of climate change and ecological restoration on fire behavior in a southwestern USA ponderosa pine forest. *International Journal of Wildland Fire*. <http://dx.doi.org/10.1071/WF11082>.

Ireland, K. B., A. B. Stan, and P. Z. Fulé. 2012. Bottom-up control of a northern Arizona ponderosa pine forest fire regime in a fragmented landscape. *Landscape Ecology* 27(7):983–997. DOI 10.1007/s10980-012-9753-0.

Huffman, D.W., J.E. Crouse, W.W. Chancellor, and P.Z. Fulé. 2012. Influence of time since fire on pinyon-juniper woodland structure. *Forest Ecology and Management* 274:29–37, doi:10.1016/j.foreco.2012.02.014.

Roccaforte, J.P., P.Z. Fulé, W.W. Chancellor, and D.C. Laughlin. 2012. Woody debris and tree regeneration dynamics following severe wildfires in Arizona ponderosa pine forests. *Canadian Journal of Forest Research* 42:593-604.

Korb, J.E., P.Z. Fulé, and M.T. Stoddard. 2012. Forest restoration in a surface fire-dependent ecosystem: an example from a mixed conifer forest, southwestern Colorado, USA. *Forest Ecology and Management* 269:10–18, doi:10.1016/j.foreco.2012.01.002

Fulé, P.Z., J.E. Crouse, J.P. Roccaforte, and E.L. Kalies. 2012. Do thinning and/or burning treatments in western USA ponderosa or Jeffrey pine-dominated forests help restore natural fire behavior? *Forest Ecology and Management* 269: 68–81, doi:10.1016/j.foreco.2011.12.025.

Hoffman, C.M., C.H. Sieg, J.D. McMillan, and P.Z. Fulé. 2011. Fuel loadings five years after a bark beetle outbreak in Southwestern USA ponderosa pine forests. *International Journal of Wildland Fire* 21:306–312. <http://dx.doi.org/10.1071/WF11019>.

Bickford, I.N., P.Z. Fulé, and T.E. Kolb. 2011. Growth sensitivity to drought of co-occurring *Pinus* spp. along an elevation gradient in northern Mexico. *Western North American Naturalist* 71(3):338–348.

Falk, D.A., E.K. Heyerdahl, P.M. Brown, C. Farris, P.Z. Fulé, D. McKenzie, T.W. Swetnam, A.H. Taylor, and M.L. Van Horne. 2011. Multiscale controls of historical forest fire regimes: New insights from fire-scar networks. *Frontiers in Ecology and the Environment* 9(8):446-454.

Laughlin, D.C., P.Z. Fulé, D.W. Huffman, J.E. Crouse, and E. Laliberté. 2011. Climatic constraints on trait-based forest assembly. *Journal of Ecology* 99: 1489–1499. doi: 10.1111/j.1365-2745.2011.01885.x.



- Stoddard, M.T., C.M. McGlone, P.Z. Fulé, D.C. Laughlin, and M.L. Daniels. 2011. Native plants dominate understory vegetation following ponderosa pine forest restoration treatments. *Western North American Naturalist* 71(2):206-214.
- Peppin, D.L., P.Z. Fulé, C. Hull Sieg, J.L. Beyers, M.E. Hunter, and P.R. Robichaud. 2011. Recent trends in post-wildfire seeding in western U.S. forests: costs and seed mixes. *International Journal of Wildland Fire* 20:702-708.
- Fulé, P.Z., M. Ramos-Gómez, C. Cortés-Montaña, and A.M. Miller. 2011. Fire regime in a Mexican forest under indigenous resource management. *Ecological Applications* 21(3):764-775.
- Laughlin, D.C., M.M. Moore, and P.Z. Fulé. 2011. A century of increasing pine density and associated shifts in understory plant strategies. *Ecology* 92(3):556-561.
- Hurteau, M.D., M.T. Stoddard, P.Z. Fulé. 2011. The carbon costs of mitigating high-severity wildfire in southwestern ponderosa pine. *Global Change Biology* 17:1516–1521. doi: 10.1111/j.1365-2486.2010.02295.x.
- Diggins, C., P.Z. Fulé, J.P. Kaye, and W.W. Covington. 2010. Future climate affects management strategies for maintaining forest restoration treatments. *International Journal of Wildland Fire* 19: 903–913.
- Cerano Paredes, J., J. Villanueva D., P.Z. Fulé. 2010. Reconstrucción de incendios y su relación con el clima para la reserva Cerro El Mohinora, Chihuahua. *Revista Mexicana de Ciencias Forestales* 1(1): 63-74.
- Stella, K.A., C.H. Sieg, and P.Z. Fulé. 2010. Minimal effectiveness of native and non-native seeding following three high-severity wildfires. *International Journal of Wildland Fire* 19:746–758.
- Peppin, D., P.Z. Fulé, C.H. Sieg, J.L. Beyers, and M.E. Hunter. 2010. Post-wildfire seeding in forests of the western United States: An evidence-based review. *Forest Ecology and Management* 260:573–586.
- Peppin, D.P., P.Z. Fulé, J.C. Lynn, A.L. Mottek-Lucas, and C.H. Sieg. 2010. Market perceptions and opportunities for native plant production on the southern Colorado Plateau. *Restoration Ecology* Vol. 18 (No. S1):113–124, doi: 10.1111/j.1526-100X.2010.00656.x.
- Yocom, L.L., Fulé, P.Z., Brown, P.M., Cerano, J., Villanueva-Díaz, J., Falk, D.A., Cornejo-Oviedo, E. 2010. El Niño-Southern Oscillation effect on a fire regime in northeastern Mexico has changed over time. *Ecology* 91(6):1660-1671.
- Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2010. Monitoring landscape-scale ponderosa pine restoration treatment implementation and effectiveness. *Restoration Ecology* 18(6): 820–833, doi: 10.1111/j.1526-100X.2008.00508.x.

- Villanueva, D.J., P. Z. Fulé, J. Cerano Paredes, J. Estrada Avalos, I. Sánchez C. 2009. Reconstrucción de precipitación estacional para el barlovento de la Sierra Madre Occidental con anillos de crecimiento de *Pseudotsuga menziesii* (Mirb.) Franco. *Ciencia Forestal en México* 34 (105): 37-69.
- Villanueva D., J., J. Cerano P., V. Constante G., P. Z. Fulé, E. Cornejo O. (2009). Variabilidad hidroclimática histórica de la Sierra de Zapalinamé y disponibilidad de recursos hídricos para Saltillo, Coahuila. *Madera y Bosques* 15(3):45-64.
- Fulé, P.Z., J.E. Korb, and R.Wu. 2009. Changes in forest structure of a dry mixed conifer forest, southwestern Colorado USA. *Forest Ecology and Management* 258:1200–1210. DOI:10.1016/j.foreco.2009.06.015.
- Cerano Paredes, J., J. Villanueva Díaz, P.Z. Fulé, J.G. Arreola Ávila, I. Sánchez Cohen, and R. D. Valdez Cepeda. 2009. Reconstrucción de 350 años de precipitación para el suroeste de Chihuahua, México. *Madera y Bosques* 15(2):27-44.
- Waring, K.M., D. M. Reboletti, L. A. Mork, M. Li, C.-H. Huang, R. W. Hofstetter, A. M. Garcia, P. Z. Fulé, and T. S. Davis. 2009. Modeling the impacts of two bark beetle species under warming climate in the southwestern U.S.A.: ecological and economic consequences. *Environmental Management*. DOI 10.1007/s00267-009-9342-4.
- van Mantgem, P.J., N. L. Stephenson, J. C. Byrne, L. D. Daniels, J. F. Franklin, P. Z. Fulé, M. E. Harmon, A. J. Larson, J. M. Smith, A. H. Taylor, and T. T. Veblen. 2009. Widespread increase of tree mortality rates in the western United States. *Science* 323:521-524. DOI: 10.1126/science.1165000.
- Huffman, D.W., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. 2009. A comparison of fire hazard mitigation alternatives in pinyon-juniper woodlands of Arizona. *Forest Ecology and Management* 257:628–635.
- Keane, R.E., J.K. Agee, P.Z. Fulé, J.E. Keeley, C. Key, S.G. Kitchen, R. Miller, and L.A. Schulte. 2008. Ecological effects of large fires on US landscapes: benefit or catastrophe? *International Journal of Wildland Fire* 17(6):696-712.
- Fulé, P.Z. 2008. Does it make sense to restore wildland fire in changing climate? *Restoration Ecology* 16(4):526-531.
- Stoddard, M.T., D.W. Huffman, T. Alcoze, and P.Z. Fulé. 2008. Effects of slash on herbaceous communities in pinyon-juniper woodlands of northern Arizona. *Rangeland Ecology and Management* 61:485-495.
- Huffman, D.W., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. 2008. Fire history of pinyon-juniper woodlands at upper ecotones with ponderosa pine forests in Arizona and New Mexico. *Canadian Journal of Forest Research* 38( 8):2097-2108.

- Dodge, R.S., P.Z. Fulé, and C.H. Sieg. 2008. Dalmatian toadflax (*Linaria dalmatica*) response to wildfire in a southwestern forest. *Ecoscience* 15(2):213-222.
- Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2008. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments. *International Journal of Wildland Fire* 17: 293–303.
- Laughlin, D.C., and P.Z. Fulé. 2008. Wildland fire effects on understory plant communities in two fire-prone forests. *Canadian Journal of Forest Research* 38:133-142.
- Korb, J.E., and P.Z. Fulé. 2008. Intra and inter-annual vegetation change: implications for long-term research. *Restoration Ecology* 16(1):5-11.
- Fulé, P.Z., M. Ribas, E. Gutiérrez, R. Vallejo, and M.W. Kaye. 2008. Forest structure and fire history in an old *Pinus nigra* forest, eastern Spain. *Forest Ecology and Management* 255:1234-1242.
- Kuenzi, A.M., P.Z. Fulé, and C.H. Sieg. 2008. Effects of fire severity and prefire stand treatment on plant community recovery after a large wildfire. *Forest Ecology and Management* 255:855-865.
- Abella, S. R., W. W. Covington, P. Z. Fulé, L. B. Lentile, A. J. Sánchez Meador and P. Morgan. 2007. Past, present, and future old growth in frequent-fire conifer forests of the western United States. *Ecology and Society* 12 (2): 16. [online] URL: <http://www.ecologyandsociety.org/vol12/iss2/art16/>.
- Kaufmann, M. R., D. Binkley, P. Z. Fulé, M. Johnson, S. L. Stephens and T. W. Swetnam. 2007. Defining old growth for fire-adapted forests of the western United States. *Ecology and Society* 12 (2): 15. [online] URL: <http://www.ecologyandsociety.org/vol12/iss2/art15/>
- Kolb, T.E., J.K. Agee, P.Z. Fulé, N.G. McDowell, K. Pearson, A. Sala, R.H. Waring. 2007. Perpetuating old ponderosa pine. *Forest Ecology and Management* 249:141-157.
- Fulé, P.Z., J.P. Roccaforte, and W.W. Covington. 2007. Posttreatment tree mortality after forest ecological restoration, Arizona, United States. *Environmental Management* 40:623-634.
- Waskiewicz, J.D., P.Z. Fulé, and P. Beier. 2007. Quantifying the deterioration of ponderosa pine snags in northern Arizona. *Western Journal of Applied Forestry* 22(4):233-240.
- Strom, B.A., and P.Z. Fulé. 2007. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. *International Journal of Wildland Fire* 16:128-138.
- Baumgartner, K.H., and P.Z. Fulé. 2007. Survival and sprouting responses of Chihuahua pine after the Rodeo-Chediski fire on the Mogollon Rim, Arizona. *Western North American Naturalist* 67(1):51-56.

- Korb, J.E., M.L. Daniels, D.C. Laughlin, and P.Z. Fulé. 2007. Understory communities of warm/dry mixed conifer in southwestern Colorado. *Southwestern Naturalist* 52(4):493-503.
- Fulé, P.Z., and D.C. Laughlin. 2007. Wildland fire effects on forest structure over an altitudinal gradient, Grand Canyon National Park, USA. *Journal of Applied Ecology* 44:136-146.
- Abella, S.R., P.Z. Fulé, and W.W. Covington. 2006. Diameter caps for thinning southwestern ponderosa pine forests: viewpoints, effects, and tradeoffs. *Journal of Forestry* 104(8):407-414.
- Laughlin, D.C., M.M. Moore, J.D. Bakker, C.A. Casey, J.D. Springer, P.Z. Fulé, and W.W. Covington. 2006. Assessing targets for the restoration of herbaceous vegetation in ponderosa pine forests. *Restoration Ecology* 14(4):548-560.
- Fulé, P.Z., T.A. Heinlein, and W.W. Covington. 2006. Fire histories in ponderosa pine forests of Grand Canyon are well supported: reply to Baker. *International Journal of Wildland Fire* 15:439-445.
- Fulé, P.Z., W.W. Covington, M.T. Stoddard, and D. Bertolette. 2006. "Minimal-impact" restoration treatments have limited effects on forest structure and fuels at Grand Canyon, USA. *Restoration Ecology* 14(3):357-368.
- Passovoy, M.D., and P.Z. Fulé. 2006. Snag and woody debris dynamics following severe wildfires in northern Arizona ponderosa pine forests. *Forest Ecology and Management* 223:237-246. [doi:10.1016/j.foreco.2005.11.016](https://doi.org/10.1016/j.foreco.2005.11.016)
- Van Horne, M.L., and P.Z. Fulé. 2006. Comparing methods of reconstructing fire history using fire scars in a southwestern USA ponderosa pine forest. *Canadian Journal of Forest Research* 36(4):855-867.
- Moore, M.M., C.A. Casey, J.D. Bakker, J.D. Springer, P.Z. Fulé, W.W. Covington, and D.C. Laughlin. 2006. Herbaceous response to restoration treatments in a ponderosa pine forest, 1992-2004. *Rangeland Ecology and Management* 59:135-144.
- Martin, S.L., T.C. Theimer, and P.Z. Fulé. 2005. Ponderosa pine restoration does not affect turkey roost site use in northern Arizona. *The Wildlife Society Bulletin* 33(3):859-864.
- Huisinga, K.D., D.C. Laughlin, P.Z. Fulé, J.D. Springer, and C.M. McGlone. 2005. Effects of an intense prescribed fire on ground-flora in a mixed conifer forest. *Journal of the Torrey Botanical Society* 132(4):590-601.
- Stephens, S.L., and P.Z. Fulé. 2005. Western pine forests with continuing frequent fire regimes: possible reference sites for management. *Journal of Forestry* 103(7):357-362.
- Laughlin, D.C., J.D. Bakker, and P.Z. Fulé. 2005. Understorey plant community structure in lower montane and subalpine forests, Grand Canyon National Park, USA. *Journal of Biogeography* 32:2083-2102.

- Kaye, J.P., Hart, S.C., Fulé, P.Z., Covington, W.W., M.M Moore, and M.W. Kaye. 2005. Initial carbon, nitrogen, and phosphorus fluxes following ponderosa pine restoration treatments. *Ecological Applications* 15(5):1581-1593.
- Fulé, P.Z., D.C. Laughlin, and W.W. Covington. 2005. Pine-oak forest dynamics five years after ecological restoration treatments. *Forest Ecology and Management* 218:129-145.
- Cocke, A.E, P.Z. Fulé, and J.E. Crouse. 2005. Forest change on a steep mountain gradient after extended fire exclusion: San Francisco Peaks, Arizona, USA. *Journal of Applied Ecology* 42:814-823.
- Heinlein, T.A., M.M. Moore, P.Z. Fulé, and W.W. Covington. 2005. Fire history of two ponderosa pine—mixed conifer sites: San Francisco Peaks, Arizona, USA. *International Journal of Wildland Fire* 14:307-320.
- Cocke, A.E, P.Z. Fulé, and J.E. Crouse. 2005. Comparison of burn severity assessments using differenced normalized burn ratio ( $\Delta$ NBR) and ground data. *International Journal of Wildland Fire* 14(2):189-198.
- Fulé, P.Z., J. Villanueva-Díaz, and M. Ramos-Gómez. 2005. Fire regime in a conservation reserve, Chihuahua, México. *Canadian Journal of Forest Research* 35:320-330.
- Fisher, M.A., and P.Z. Fulé. 2004. Changes in forest vegetation and arbuscular mycorrhizae along a steep elevation gradient in Arizona. *Forest Ecology and Management* 200:293-311.
- Jerman, J.L., P.J. Gould, and P.Z. Fulé. 2004. Slash compression treatments reduced tree mortality from prescribed fire in southwestern ponderosa pine. *Western Journal of Applied Forestry* 19(3):149-153.
- Moore, M.M., D.W. Huffman, P.Z. Fulé, W. W. Covington, and J.E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50(2):162-176.
- Fulé, P.Z., A.E. Cocke, T.A. Heinlein, and W.W. Covington. 2004. Effects of an intense prescribed forest fire: is it ecological restoration? *Restoration Ecology* 12(2):220-230.
- Gildar, C.N., P.Z. Fulé, and W.W. Covington. 2004. Plant community variability in ponderosa pine forest has implications for reference conditions. *Natural Areas Journal* 24(2):101-111.
- Fulé, P.Z., J.E. Crouse, A.E. Cocke, M.M. Moore, and W.W. Covington. 2004. Changes in Canopy Fuels and Potential Fire Behavior 1880-2040: Grand Canyon, Arizona. *Ecological Modelling* 175:231-248.
- Waltz, A.E.M., P.Z. Fulé, W.W. Covington, and M.M. Moore. 2003. Diversity in ponderosa pine forest structure following ecological restoration treatments. *Forest Science* 49(6):885-900.

- Korb, J.E., W.W. Covington, and P.Z. Fulé. 2003. Sampling techniques influence understory plant trajectories following restoration—an example from ponderosa pine restoration. *Restoration Ecology* 11(4):504-515.
- Fulé, P.Z., J.E. Crouse, T.A. Heinlein, M.M. Moore, W.W. Covington, and G. Verkamp. 2003. Mixed-severity fire regime in a high-elevation forest: Grand Canyon, Arizona. *Landscape Ecology* 18:465-486.
- Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2003. Assessing fire regimes on Grand Canyon landscapes with fire scar and fire record data. *International Journal of Wildland Fire* 12(2):129-145.
- Rodríguez-Trejo, D.A., and P.Z. Fulé. 2003. Fire ecology of Mexican pines and a fire management proposal. *International Journal of Wildland Fire* 12(1):23-37.
- Fulé, P.Z., W.W. Covington, H.B. Smith, J.D. Springer, T.A. Heinlein, K.D. Huisinga, and M.M. Moore. 2002. Comparing ecological restoration alternatives: Grand Canyon, Arizona. *Forest Ecology and Management* 170:19-41.
- Fulé, P.Z., W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. 2002. Natural variability in forests of Grand Canyon, USA. *Journal of Biogeography* 29:31-47.
- Covington, W.W., P.Z. Fulé, S.C. Hart, and R.P. Weaver. 2001. Modeling ecological restoration effects on ponderosa pine forest structure. *Restoration Ecology* 9(4):421-431.
- Fulé, P.Z., A.E.M. Waltz, W.W. Covington, and T.A. Heinlein. 2001. Measuring forest restoration effectiveness in hazardous fuels reduction. *Journal of Forestry* 99(11):24-29.
- Covington, W.W., P.Z. Fulé, T.M. Alcoze, and R.K. Vance. 2000. Learning by doing: ecological restoration education at Northern Arizona University. *Journal of Forestry* 98(10):30-34.
- Fulé, P.Z., A. García-Arévalo, and W.W. Covington. 2000. Effects of an intense wildfire in a Mexican oak-pine forest. *Forest Science* 46(1):52-61.
- Moore, M.M., W.W. Covington, and P.Z. Fulé. 1999. Reference conditions and ecological restoration: A southwestern ponderosa pine perspective. *Ecological Applications* 9(4):1266-1277.
- Fulé, P.Z., and W.W. Covington. 1999. Fire regime changes in La Michilía Biosphere Reserve, Durango, Mexico. *Conservation Biology* 13(3):640-652.
- Mast, J.N., P.Z. Fulé, M.M. Moore, W.W. Covington, and A. Waltz. 1999. Restoration of presettlement age structure of an Arizona ponderosa pine forest. *Ecological Applications* 9(1):228-239.

Fulé, P.Z., and W.W. Covington. 1998. Spatial patterns of Mexican pine-oak forests under different recent fire regimes. *Plant Ecology* 134:197-209.

Fulé, P.Z., and W.W. Covington. 1997. Fire regimes and forest structure in the Sierra Madre Occidental, Durango, Mexico. *Acta Botanica Mexicana* 41:43-79.

Fulé, P.Z., M.M. Moore, and W.W. Covington. 1997. Determining reference conditions for ecosystem management in southwestern ponderosa pine forests. *Ecological Applications* 7(3):895-908.

Covington, W.W., P.Z. Fulé, M.M. Moore, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, and M.R. Wagner. 1997. Restoration of ecosystem health in southwestern ponderosa pine forests. *Journal of Forestry* 95(4):23-29.

Fulé, P.Z., and W.W. Covington. 1996. Changing fire regimes in Mexican pine forests: ecological and management implications. *Journal of Forestry* 94(10):33-38.

Fulé, P.Z., and W.W. Covington. 1994. Fire regime disruption and pine-oak forest structure in the Sierra Madre Occidental, Durango, Mexico. *Restoration Ecology* 2(4):261-272.

Fulé, P.Z., and W.W. Covington. 1994. Double sampling increases the efficiency of forest floor inventories for Arizona ponderosa pine forests. *International Journal of Wildland Fire* 4(1):3-10.

Rossi, M., P.Z. Fulé, and M.R. Taylor. 1988. Conformational flexibility in the molecular structure of rotenone, a naturally occurring insecticide. *Bioorganic Chemistry* 16:376-387.

#### **PEER-REVIEWED GOVT PUBLICATIONS AND CONFERENCE PROCEEDINGS:**

Hoffman, C.M., J.D. McMillin, C.H. Sieg, and P.Z. Fulé. 2012. Chapter 19. Influence of bark beetle-caused mortality on fuel loadings and crown fire hazard in southwestern ponderosa pine stands. Pp. 241-246 in Potter, Kevin M.; Conkling, Barbara L. Forest health monitoring: 2009 national technical report. Gen. Tech. Rep. SRS-167. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 252 p.

Huffman, D.W., M. T. Stoddard, P. Z. Fulé, W. W. Covington, and H.B. Smith. 2008. A Demonstration Project to Test Ecological Restoration of a Pinyon-Juniper Ecosystem. Proceedings RMRS-P-51. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Abella, S.R., and P.Z. Fulé. 2008. Changes in Gambel Oak densities in southwestern ponderosa pine forests since Euro-American settlement. Research Note RMRS-RN-36. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Bakker, J.D., A.J. Sánchez Meador, P.Z. Fulé, D.W. Huffman, and M.M. Moore. 2008. "Growing trees backwards": Description of a stand reconstruction model. Pp. 136-147 in:

Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Crouse, J.E., M.M. Moore, and P.Z. Fulé. 2008. Revisiting Pearson's climate and forest type studies on the Fort Valley Experimental Forest. Pp. 176-187 in: Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Crouse, J.E., and P.Z. Fulé. 2008. A visual progression of the Fort Valley Restoration Project treatments using remotely sensed imagery. Pp. 188-196 in: Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Moore, M.M., W.W. Covington, P.Z. Fulé, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, and M.R. Wagner. 2008. Ecological restoration experiments (1992-2007) at the G.A. Pearson Natural Area, Fort Valley Experimental Forest. Pp. 290-304 in: Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Stoddard, M.T., C.M. McGlone, and P.Z. Fulé. 2008. Effects of ecological restoration alternative treatments on nonnative plant species establishment. Pp. 353-362 in: Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Abella, S.R., and P.Z. Fulé. 2008. Fire effects on Gambel oak in southwestern ponderosa pine forests. Research Note RMRS-RN-34. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Fulé, P.Z., J.D. Springer, D.W. Huffman, and W.W. Covington. 2001. Response of a Rare Endemic, *Penstemon clutei*, to Burning and Reduced Belowground Competition. Pages 139-152 in Maschinski, J., and L. Holter (technical coordinators), Southwestern Rare and Endangered Plants: Proceedings of the Third Conference. Proc. RMRS-P-23. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Fulé, P.Z., C. McHugh, T.A. Heinlein, and W.W. Covington. 2001. Potential fire behavior is reduced following forest restoration treatments (peer-reviewed). Pages 28-35 in Vance, G.K., C.B. Edminster, W.W. Covington, and J.A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Toward Stewardship*. Proc. RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



Kolb, T.E., P.Z. Fulé, M.R. Wagner, and W.W. Covington. 2001. Six-year changes in mortality and crown condition of old-growth ponderosa pines in different ecological restoration treatments at the G.A. Pearson Natural Area (peer-reviewed). Pages 61-66 in Vance, G.K., C.B. Edminster, W.W. Covington, and J.A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Toward Stewardship*. Proc. RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Huffman, D.W., M.M. Moore, W.W. Covington, J.E. Crouse, and P.Z. Fulé. 2001. Ponderosa pine forest reconstruction: comparisons with historical data (peer-reviewed). Pages 3-8 in Vance, G.K., C.B. Edminster, W.W. Covington, and J.A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Toward Stewardship*. Proc. RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Springer, J.D., A.E.M. Waltz, P.Z. Fulé, M.M. Moore, and W.W. Covington. 2001. Seeding versus natural regeneration: a comparison of vegetation change following thinning and burning in ponderosa pine (peer-reviewed). Pages 67-73 in Vance, G.K., C.B. Edminster, W.W. Covington, and J.A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Toward Stewardship*. Proc. RMRS-P-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2000. Continuing fire regimes in remote forests of Grand Canyon National Park (peer-reviewed). *Proceedings: Wilderness Science in a Time of Change*. USDA Forest Service Proceedings RMRS-P-15-VOL-5: 242-248.

Heinlein, T.A., W.W. Covington, P.Z. Fulé, M.M. Moore, and H.B. Smith. 2000. Development of ecological restoration experiments in fire adapted forests at Grand Canyon National Park (peer-reviewed). *Proceedings: Wilderness Science in a Time of Change*. USDA Forest Service Proceedings RMRS-P-15-VOL-5: 249-254.

#### **OTHER PUBLICATIONS:**

Peppin, D., Fulé, P., Beyers, J., Sieg, C., Hunter, M. 2011. Does seeding after severe forest fires in western USA mitigate negative impacts on soils and plant communities? CEE review 08-023 (SR60). Collaboration for Environmental Evidence: [www.environmentalevidence.org/SR60.html](http://www.environmentalevidence.org/SR60.html).

Fulé, P.Z. 2011. Studying forest fires in Greece: a global link to Arizona. NAU Global magazine, Fall 2011.

Fulé, P.Z. 2010. A global conversation about ecological restoration (book review). *Ecology* 91(12):3746.

Cerano Paredes, J., J. Villanueva Díaz, P.Z. Fulé, P.M. Brown, L.L. Yocom, V. Constante Garcia, and J. Estrada Ávalos. 2009. Interpretación del historial de incendios en bosques mixtos de coníferas. Folleto Técnico 15, Instituto Nacional de Investigaciones Forestales, Agrícolas, y Pecuarias, CENID-RASPA, Gómez Palacio, Durango. México. Serie MX-0-310601-13-10-00-09-15. ISBN: 978-607-425-246-0.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. 2009. Assessing changes in canopy fuels and potential fire behavior following ponderosa pine restoration. *Fire Management Today* 69(2):47-50.

Fulé, P.Z., L. Yocom, and C. Cortés Montaña. 2008. Interaction of fire, climate, and forest structure in northern Mexico. *NAU Global magazine*, Fall 2008.

Fulé, P.Z., C. Denton, J.D. Springer, M. Schumann, and D. Egan. 2007. Working Paper 18: Prescribed and Wildland Use Fires in the Southwest: Do Frequency and Timing Matter? Ecological Restoration Institute Working Papers (series), Northern Arizona University, Flagstaff, AZ. Available at <https://library.eri.nau.edu:8443/handle/2019/362>.

Fulé, P.Z., J. Villanueva-Díaz, E. Cornejo-Oviedo, P. Brown, and D. Falk. 2007. Incendios forestales y clima en el norte de México. Proceedings (Electronic): VIII Congreso Mexicano de Recursos Forestales, October 28-31, 2007, Morelia, Michoacán, Mexico.

Fulé, P.Z. 2007. Book review: The Longleaf Pine Ecosystem. Ecology, Silviculture, and Restoration. *Restoration Ecology* 15(4):745-746.

Korb, J.E., P.Z. Fulé, and B. Gideon. 2007. Different restoration thinning treatments affect level of soil disturbance in ponderosa pine forests of northern Arizona, USA. *Ecological Restoration* 25(1):43-49.

Fulé, P.Z. 2006. Arizona, Europe can learn from common fire threats. Op-ed essay, *Arizona Daily Sun*, April 14, 2006.

Laughlin, D.C., and P.Z. Fulé. 2006. Meeting forest ecosystem objectives with wildland fire use. *Fire Management Today* 66(4):21-24.

Fulé, P.Z. 2005. Book Review: *In Fire's Way: A Practical Guide To Life In The Wildfire Danger Zone and Smokechasing*. *New Mexico Historical Review* 79(4):544-546.

Crouse, J.E., and P.Z. Fulé. 2003. Species and canopy cover map development using Landsat 7 Enhanced Thematic Mapper Imagery for Grand Canyon National Park. Proceedings: Ninth Forest Service Remote Sensing Applications Conference. USDA Forest Service/American Society for Photogrammetry and Remote Sensing (electronic publication).

Fulé, P.Z. 2003. Book Review: *Flames in our Forest: Disaster or Renewal?* *Ecological Restoration* 21(1):66-67.

Elseroad, A., P.Z. Fulé, and W.W. Covington. 2003. Forest road revegetation: effects of seeding and soil amendments. *Ecological Restoration* 21(3):194-199.

Fulé, P.Z., G. Verkamp, A.E.M. Waltz, and W. W. Covington. 2002. Burning under old-growth ponderosa pines on lava soils. *Fire Management Today* 62(3):47-49.

Crouse, J.E., and P.Z. Fulé. 2001. Species and canopy cover map development using Landsat 7 Enhanced Thematic Mapper Imagery for Grand Canyon National Park. Putting the Pieces

Together: Practicing Forest Ecosystem Restoration Conference, April 25 - 28, 2001, Flagstaff, AZ.

Alcoze, T.A., W.W. Covington, P.Z. Fulé, and Ecological Restoration Principles class. "Restoration Ecology" – Letter to the Editor, *Science* 287:2159 (24 March 2000).

Covington, W.W., M.M. Moore, and P.Z. Fulé. 2000. Restoration of ponderosa pine ecosystems: concepts and principles. Page 103 in *Proceedings of the 21st Fire Ecology Conference*. Tall Timbers Research Station, Tallahassee, FL.

Fulé, P.Z., and W.W. Covington. 1997. Fire regimes on an environmental gradient in a dry Sierra Madre forest (abstract). *Bulletin of the Ecological Society of America* 78(4):92.

Covington, W.W., P.Z. Fulé, M.M. Moore, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, and M.R. Wagner. 1997. Restoration of ecosystem health in southwestern ponderosa pine forests (abstract). *Bulletin of the Ecological Society of America* 78(4):73.

Fulé, P.Z., and W.W. Covington. 1995. Changes in fire regimes and stand structures of unharvested Petran and Madrean pine forests. Pages 408-415 in DeBano, L.F., and others (technical coordinators), *Biodiversity and Management of the Madrean Archipelago: the Sky Islands of Southwestern United States and Northwestern Mexico*. September 19-23, 1994, Tucson, AZ. USDA Forest Service General Technical report RM-GTR-264.

Fulé, P.Z., and W.W. Covington. 1995. Conservation of pine-oak forests in northern Mexico. Pages 80-88 in Covington, W.W., and P.K. Wagner (tech. coord.), *Conference on Adaptive Ecosystem Restoration and Management: restoration of Cordilleran Conifer Landscapes of North America*. June 6-8, 1995, Flagstaff, AZ.

Fulé, P.Z., and W.W. Covington. 1994. Fire regimes and forest structure in the Sierra Madre Occidental, Durango, Mexico. Page 89 in Aguirre-Bravo, C., and others (tech. eds.), *Partnerships for Sustainable Forest Ecosystem Management. Fifth Mexico/United States Biennial Symposium*, October 17-20, 1994, Guadalajara, Jalisco, Mexico. USDA Forest Service General Technical Report RM-GTR-266.

Moore, M.M., W.W. Covington, and P.Z. Fulé. 1993. Spatial changes in ponderosa pine since settlement. *Bulletin of the Ecological Society of America* 74:365.

Covington, W.W., M.M. Moore, and P. Fulé. 1993. Ecological restoration of southwestern ponderosa pine. Poster paper presented at *Fourth International Mexico/US Symposium on Sustainability*, April 19-23, 1993, Santa Fe, New Mexico. USDA Forest Service General Technical Report RM-240, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Fulé, P., and S. Bradshaw. 1992. Wildfire management planning for New Mexico's Native American lands. *GeoInfo Systems* 2(6):34-43.

## **BOOK CHAPTERS:**

Villanueva Díaz, J., J. Cerano P., D.W. Stahle, B.H. Luckman, M.D. Therrell, M.K. Cleaveland, P.Z. Fulé. 2011. La dendrocronología y reconstrucciones paleoclimáticas en el norte-centro de México. Chapter III (pp. 47-72) in Caballero, M., and B. Ortega Guerrero (compilers), Escenarios de cambio climático: Registros del Cuaternario en América Latina I. Universidad Nacional Autónoma de México.

Fulé, P.Z. 2010. Wildfire Ecology and Management at Grand Canyon, USA: Tree-ring applications in forest fire history and modeling. Pages 365-381 in Stoffel, M., M. Bollschweiler, D. R. Butler, B. H. Luckman (editors), *Tree-Ring Reconstructions in Natural Hazards Research*, Springer Science + Business Media B.V., Dordrecht.

Kaufmann, M.R., K. Ryan, P.Z. Fulé, and W.R. Romme. 2004. Restoration of ponderosa pine forests in the interior western United States after logging, grazing, and fire suppression. Pp. 481-500 in: Stanturf, J.A., and P. Madsen (eds.), *Restoration of Boreal and Temperate Forests*. CRC Press.

Fulé, P.Z. Monitoring. 2003. In: Friederici, P. G. (ed.), *Ecological Restoration of Southwestern Ponderosa Pine Forests: A Sourcebook for Research and Application*. Island Press, Washington, D.C.

Fulé, P.Z. 2001. *Why Forests Need to Burn*. Science Year Special Report 2002 (pages 42-55), World Book Publishing, Chicago, IL.

Stahle, D.W., J. Villanueva, M.K. Cleaveland, M.D. Therrell, G.J. Paull, B.T. Burns, W. Salinas, H. Suzan, and P.Z. Fulé. 2000. Recent Tree-Ring Research in Mexico. In: *Dendrocronología en América Latina*, F.A. Roig (compiler), EDIUNC, Mendoza, Argentina.

#### **THESES:**

Fulé, P.Z. 1996. *Fire Regimes and Forest Structure in Pine Ecosystems of Arizona, U.S.A., and Durango, Mexico*. Ph.D. dissertation, Northern Arizona University, Flagstaff, AZ.

Fulé, P.Z. 1990. *Predicting Forest Floor Fuel Loading Under Ponderosa Pine at Grand Canyon National Park, Arizona*. Master's thesis, Northern Arizona University, Flagstaff, AZ.

Fulé, P.Z. 1985. *Crystal and Molecular Structure of Rotenone*. Senior thesis, Vassar College, Poughkeepsie, NY

#### **REPORTS:**

Yocom, L.L., P.Z. Fulé, and M.R. Wagner. Final report for the 2011 Summer Institute on Environmental Stewardship, U.S. State Department Sponsor Award Number S-ECAAE-11-CA-111(DS). April 30, 2012.

Peppin, D., P.Z. Fulé, C.H. Sieg, J. Beyers, and M. Hunter. Post-wildfire Seeding in Forests of the West: Trends, Costs, Effectiveness, and Use of Native Seed. Final Report to the Joint Fire Sciences Program, Project ID 08-2-1-11. March 31, 2010.

Diggins, C., P.Z. Fulé, W.W. Covington, and J.P. Kaye. Modeling Forest Change and Management Alternatives on a Restored Landscape: Future Climate Affects Management Strategies for Maintaining Forest Restoration Treatments. Final Report to the Joint Fire Sciences Program, Project ID Number 06-3-3-05. August 31, 2009.

Hoffman, C.M. J. D. McMillin, C. Hull Sieg, and P. Z. Fulé. Influence of bark beetle-caused mortality on fuel loadings and crown fire hazard in southwestern ponderosa pine stands. Forest Health Monitoring National Technical Report, USDA Forest Service Southern Research Station. June 5, 2009.

Fulé, P.Z. Stand Structure and Fire Behavior, Rodeo-Chediski Fire. Final Report to the USDA Forest Service, Rocky Mountain Research Station, Research Joint Venture Agreement no. 03-JV-11221615-153. December 19, 2007.

Fulé, P.Z. Understory Response Following Two Southwestern Fires. Final Report to the USDA Forest Service, Rocky Mountain Research Station, Research Joint Venture Agreement no. 02-JV-11221615-139. January 22, 2007.

Stoddard, M., J. Springer, M. Daniels, D. Laughlin, P.Z. Fulé, W.W. Covington, and J.E. Korb. Flagstaff Urban Wildland Interface (FUWI) Fort Valley experimental blocks: plant community response five years after tree thinning and burning. Final Report to the USDA Forest Service, 05-CR-11031600-079. December 31, 2006.

Huffman, D.W., P.Z. Fulé, K.M. Pearson, J.E. Crouse, and W.W. Covington. 2006. Pinyon-Juniper Fire Regime: Natural Range of Variability. Final report to Rocky Mountain Research Station, 04-JV-11221615-271, August 2006.

Fulé, P.Z., and D.C. Laughlin. 2006. Fire Use Over a Southwestern Elevational Gradient: Effects of 2003 Fires. Final Report to the Joint Fire Science Program, H1200040002, March 24, 2006.

Huffman, D.W., M.T. Stoddard, C.M. McGlone, P.Z. Fulé, and W.W. Covington. 2006. Ecosystem Restoration (Mt. Trumbull), Assistance Agreement No. PAA 017002, Task Order No. AAW040001, Final Report, February 5, 2006.

Laughlin, D.C., J.E. Korb, M.L. Daniels, P.Z. Fulé, and W.W. Covington. 2005. Diversity in plant communities at forest restoration treatment sites: short-term responses and methods to detect change. Final report to USDA Forest Service (05-CR-11031600-079), Goal 1, Item 1.

Laughlin, D.C., and P.Z. Fulé. 2005. Plant community stability after wildland fire use in fire-adapted forests. Final report to USDA Forest Service (05-CR-11031600-079), Goal 1, Item 2.

Fulé, P.Z., and W.W. Covington. 2004. Comprehensive report on forest health restoration effects: experimental sites remeasured one, five, and ten years after treatments. Final report to the USDA Forest Service under #03-DG-11031600-088.

Fulé, P.Z., M. Fisher, A.E. Cocke, J.E. Crouse, M.M. Moore, and W.W. Covington. 2004. Fire in the urban/wildland interface: a landscape modeling approach. Final report, Research Joint Venture Agreement No. RMRS-99158-RJVA. USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Fulé, P.Z., J.E. Crouse, A.E. Cocke, M.M. Moore, and W.W. Covington. 2003. Changes in canopy fuels and potential fire behavior 1880-2040: Grand Canyon, Arizona. Final Report to the Joint Fire Science Program, CA-1200-99-009-NAU 04 (Part 2).

Fulé, P.Z., J.E. Crouse, M. Daniels, J. Springer, T.A. Heinlein, M.M. Moore, W.W. Covington, and G. Verkamp. 2002. Mixed-Severity Fire Regime in a High-Elevation Forest: Grand Canyon, Arizona. Final Report to the Joint Fire Science Program, CA-1200-99-009-NAU 04 (Part 1). [www.nifc.gov/joint\\_fire\\_sci/deliverables.htm](http://www.nifc.gov/joint_fire_sci/deliverables.htm)

Fulé, P.Z., J.D. Waskiewicz, and C.C. Avery. 2001. Periodic remeasurement of the Gus Pearson Natural Area. Final report, Research Joint Venture Agreement 01-JV-11221615-075, USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Waltz, A., P. Fulé, and J. Springer. 2001. Mt. Trumbull Experimental Blocks: One Year Following Treatment. Report to Bureau of Land Management, Arizona Strip District, St. George, UT.

Fulé, P.Z., G. Verkamp, and A. Waltz. 2001. Tree Mortality Associated with Prescribed Burning at Mt. Trumbull, Arizona. Report to Bureau of Land Management, Arizona Strip District, St. George, UT.

Heinlein, T.A., J.D. Springer, and P.Z. Fulé. 2001. Southwestern forests ecological restoration project. Final Report to USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Springer, J.D., P.Z. Fulé, K.D. Huisinga, M.M. Moore, and W.W. Covington. 2000. Herbaceous and shrub communities in Grand Canyon forests. *In* Covington, W.W., M.M. Moore, P.Z. Fulé, and H.B. Smith, Final Report on Grand Canyon Forest Ecosystem Restoration project, Grand Canyon National Park, Arizona.

Fulé, P.Z., W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. 2000. Natural variability in Grand Canyon Forests. *In* Covington, W.W., M.M. Moore, P.Z. Fulé, and H.B. Smith, Final Report on Grand Canyon Forest Ecosystem Restoration project, Grand Canyon National Park, Arizona.

Moore, M.M., D.W. Huffman, W.W. Covington, J.E. Crouse, P.Z. Fulé, and W.H. Moir. 2000. Southwestern ponderosa pine forest structure and fire regime disruption date: re-measurement of historical permanent forest plots. Final report to USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Waltz, A., P.Z. Fulé, and G. Verkamp (compilers). 2000. Restoration of Ecosystem Health in Southwestern Forests. Comprehensive Report 1995-2000 to Bureau of Land Management, Arizona Strip District, St. George, UT.

Heinlein, T.A., P.Z. Fulé, A.E.M. Waltz, and J.D. Springer. 1999. Changes in ponderosa pine forests of the Mt. Trumbull wilderness. Report to Bureau of Land Management, Arizona Strip District.

Waltz, A.E.M, and P.Z. Fulé. 1998. Changes in ponderosa pine forests of the Mt. Logan wilderness. Report to Bureau of Land Management, Arizona Strip District.

Fulé, P.Z., M.M. Moore, and W.W. Covington. 1995. Changes in Ponderosa Pine--Gambel Oak Forest Structure Following Fire Regime Disruption in Northern Arizona: Camp Navajo Old-Growth Forest Study. Final Report to Arizona Army National Guard, September 30, 1995.

Fulé, P.Z., and W.W. Covington. 1995. Fire Regimes and Forest Structure in the Sierra Madre Occidental, Durango, Mexico. Final Report to USDA Forest Service Pacific Northwest Experiment Station, Portland, OR. Cooperative Agreement PNW 93-0456. December 31, 1995.

#### **PRESENTATIONS, LECTURES, POSTERS:**

Shive, K.L., A.M. Kuenzi, C.H. Sieg, and P.Z. Fulé. Pre-fire fuel reduction treatments influence plant communities and exotic species nine years after wildfire. 5<sup>th</sup> International Fire Ecology and Management Congress, December 3-7, 2012, Portland, Oregon.

Fulé, P.Z. Systematic reviews: “studies of studies” to integrate scientific information. Invited plenary presentation. 5<sup>th</sup> International Fire Ecology and Management Congress, December 3-7, 2012, Portland, Oregon.

Fulé, P.Z. Restoring ecosystems in changing climates. Invited plenary presentation. 3rd FUME Project Meeting, November 13-16, 2012, Parador Nacional de Cuenca, Cuenca, Spain.

Fulé, P.Z. Yellow Belly Ponderosa. Presentation on forest restoration to Flagstaff Arts & Leadership Academy high school creative writing class developing a restoration-based theatrical production. October 10, 2012.

Zegler, T. J., M. M. Moore, M. L. Fairweather, K.B. Ireland, and P. Z. Fulé. 2012. Aspen mortality near the southwestern edge of its range. FHM poster presentation, Forest Health Monitoring Workgroup Meeting, April 2012, Tucson, AZ. Student Award.  
<http://www.fs.fed.us/foresthealth/fhm/posters/posters12/posters12.shtml>

Chaitanya, J., D.C. Laughlin, P.M. Van Bodegom, Z.A. Bastow, and P.Z. Fulé. Modeling trait based ecological community assembly (abstract only), Proceedings of the 27th International Workshop on Statistical Modelling, Volume I, 177-178, July 2012. Publisher: Tribune EU.

Fulé, P.Z. (interview/quotes): Waldo Canyon is latest super fire; get used to them, expert says. Los Angeles Times, June 27, 2012. <http://www.latimes.com/news/nation/nationnow/la-na-nn-super-fires-20120627,0,2411143.story>.

Fulé, P.Z. (interview/quotes): Super Fires In America: The Creation Of Bad Choices And Natural Forces. The Inquisitr, June 26, 2012. <http://www.inquisitr.com/263178/super-fires-in-america-the-creation-of-bad-choices-and-natural-forces/#7cBZG3ekvOHbQuSL.99>.

Klaas, D., and P.Z. Fulé. Climate-fire relationships in a rare high elevation forest. UGRaDS Undergraduate Research and Design Symposium, April 27, 2012, Northern Arizona University, Flagstaff, AZ.

Fulé, P.Z. Fuego en bosques del suroeste de EEUU y noroeste de México. Presentation to CONAFOR staff, Delegación Tlaxcala, March 20, 2012, Tlaxcala, México.

Fulé, P.Z., J. Crouse, J. Roccaforte, and E. Kalies. Do thinning and/or burning treatments in western USA ponderosa or Jeffrey pine-dominated forests help restore natural fire behavior? Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Fulé, P.Z., L. Yocom, C. Cortés-Montaña, and D. Falk. Testing a pyroclimatic hypothesis on the México-U.S. border. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Cortés, C., P.Z. Fulé, J.L. Kellerman, and D.A. Falk. Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*: Psittacidae) habitat in northwestern México is associated to fire regimes of old-growth forests. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Korb, J., P. Fulé, and R. Wu. High variability of mixed conifer forests in southwestern Colorado, USA: implications for ecological restoration. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Ireland, K., A. Stan, and P. Fulé. Bottom-up control of a northern Arizona ponderosa pine forest fire regime in a fragmented landscape. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Peppin, D., P. Fulé, J. Beyers, C. Sieg, and M. Hunter. Post-wildfire seeding in forests in the western US: An evidence-based review. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Roccaforte, J.P., P.Z. Fulé, W.W. Chancellor, and D.C. Laughlin. Woody debris and tree regeneration dynamics following severe wildfires in Arizona ponderosa pine forests. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Shive, K.L., P.Z. Fulé, and C.H. Sieg. Successional trends in forest recovery on the 2002 Rodeo-Chediski fire of northeastern Arizona. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.



Stan, A., P.Z. Fulé, and K.B. Ireland. Fire history of a ponderosa pine forest on the Hualapai tribal lands, northwestern Arizona. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Yocom, L., P. Fulé, D. Falk, and P. Brown. Climate and land-use drivers of historical fires in northern Mexico. Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.

Fulé, P.Z. Forest fires and climate from local to global scales. Science on Tap seminar series, Flagstaff, AZ, February 16, 2012.

Fulé, P.Z. Climate and fire in northern Mexico. Invited presentation to the Geography Department Colloquium Series, University of Nevada, Reno, NV, February 8, 2012.

Fulé, P.Z. Forest and fire ecology. Presentation to two A.P. Environmental Science classes, Northland Preparatory Academy, Flagstaff, AZ, January 30, 2012.

Yocom, L.L., P.Z. Fulé, M.R. Wagner, and R.A.S. Sheridan. Summer institute on environmental stewardship for European student leaders. 11<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, October 25, 2011.

Fulé, P.Z. Field course in ecological restoration applications. 11<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, October 25, 2011.

Fulé, P.Z. Invited speaker, New Horizons in Science Briefing, Lunch with a Scientist. ScienceWriters2011 Conference, Flagstaff, AZ, October 16, 2011.

Fulé, P.Z. Interview (video): With Deaths of Forests, a Loss of Key Climate Protectors. October 1, 2011.

[http://www.nytimes.com/2011/10/01/science/earth/01forest.html?\\_r=2&pagewanted=1&hp](http://www.nytimes.com/2011/10/01/science/earth/01forest.html?_r=2&pagewanted=1&hp).

Fulé, P.Z. Land-based resources: Issues and Opportunities. Presentation to the Southwest Tribal Climate Change Workshop, Flagstaff, AZ. September 14, 2011.

Fulé, P.Z. Fire in Mediterranean forests: examples from Spain and Greece. Northern Arizona Chapter, Society of American Foresters. September 8, 2011.

Fulé, P.Z. Testing a pyroclimatic hypothesis on the México-U.S. border. Presentation to Dendroecology Summer Course, University of Arizona, Merriam-Powell Research Station. May 19, 2011.

Peppin, D.L., A.E. Thode, M.E. Hunter, P.Z. Fulé, A. Evans, J.M. Iniguez, and D.A. Falk. The Southwest Fire Consortium: a new opportunity in fire science and management. Poster presentation, National Workshop on Climate & Forests, Northern Arizona University, May 16-18, 2011.

Fulé, P.Z. Ponderosa pine forest restoration. Field trip presenter, National Workshop on Climate & Forests, Northern Arizona University, May 16-18, 2011.

Fulé, P.Z. Fire and forest ecology in México: Unique opportunities for international research and management. Seminar presentation, School of Forestry, Northern Arizona University, April 13, 2011.

Ireland, K.B., A.B. Stan, and P.Z. Fulé. Spatial variability of a pine forest fire regime in a fragmented landscape. Sustainability in Dynamic Landscapes: 2011 US-International Association for Landscape Ecology Symposium, Portland, Oregon, April 3-7, 2011.

Reid, D., and P.Z. Fulé. Manejo de fuego como herramienta para la conservación. 3er. Taller “Mejores Prácticas en el Estudio y Conservación de la Biodiversidad”, March 30-April 2, 2011, Amealco, Querétaro, México.

Fulé, P.Z. What is research telling us about future fire regimes in southwestern forests? Ponderosa Pine Vegetation Session, Southwest Interagency Fuels Workshop, Flagstaff AZ. Two presentations, March 8 & 9, 2011.

Fulé, P.Z. Forest careers. Career Day, Northland Preparatory Academy, Flagstaff AZ. February 18, 2011.

Hampton, H.M., and P.Z. Fulé. Predicted effects of climate change on optimal forest restoration treatment configurations. Poster presentation, Society of American Foresters Annual Convention, Albuquerque, NM. October 27-31, 2010.

Thode, A.E., M. E. Hunter, P. Z. Fulé, A. Evans, J. M. Iniguez, and D. A. Falk. The Southwest Fire Science Consortium: A new opportunity in fire science and management. Poster presentation, Society of American Foresters Annual Convention, Albuquerque, NM. October 27-31, 2010.

Zegler, T.J., M. M. Moore, K.B. Ireland, M. L. Fairweather, and P. Z. Fulé. Rapid aspen decline on the southwestern edge of its range. Poster presentation, Society of American Foresters Annual Convention, Albuquerque, NM. October 27-31, 2010.

Fulé, P.Z., L.L. Yocom, and C. Cortés-Montaña. Mexican fire regimes: unique opportunities for international research and management. Society of American Foresters Annual Convention, Albuquerque, NM. October 30, 2010.

Fulé, P.Z. Presentation on forest restoration to Flagstaff Arts & Leadership Academy high school creative writing class developing a restoration-based theatrical production. October 15, 2010.

Fulé, P.Z. Ecological context of the Shultz fire, San Francisco Peaks. Presentation to the Arizona Forest Health Council, July 8, 2010, Flagstaff, AZ.

Cerano, J., Yocom, L., and P.Z. Fulé. Climate, fire, and forests of Citlaltépetl/Pico de Orizaba. Public presentation to citizens and journalists. Ciudad Serdán, Puebla, México. April 20, 2010.

Fulé, P.Z. Interactions of climate changes, fire regimes, and hydrological regimes. Climate Change Adaptation Workshop for Natural Resource Managers in the Four Forests Restoration Initiative Area, sponsored by The Nature Conservancy. Flagstaff, AZ, April 7, 2010.

Fulé, P.Z. Early Vegetation of the Southwest: Ponderosa Pine and Mixed Conifer Forests. Southwest Tri-Regional Fire Meeting, Bureau of Indian Affairs, Branch of Fire Management, Navajo Region. Window Rock, AZ, February 24, 2010.

Fulé, P.Z. Applying historical ecology to developing ecological restoration treatments. Annual Meeting of The Wildlife Society, Arizona and New Mexico. Flagstaff, Arizona, February 6, 2010. 120 attendees.

Yocom, L.L., P.Z. Fulé, P.M. Brown, J. Cerano, J. Villanueva-Díaz, and E. Cornejo-Oviedo. Effects of El Niño-southern oscillation on fire regime changed over time in northeastern Mexico. The Association for Fire Ecology, 4th International Fire Ecology and Management Congress: Fire as a Global Process. Savannah, GA, 30 November-4 December, 2009.

Ireland, K.B., P.Z. Fulé, and R.E. Keane. A process-based approach to modeling the response of vegetation communities and fire regimes to climatic change in northern Arizona (poster presentation). The Association for Fire Ecology, 4th International Fire Ecology and Management Congress: Fire as a Global Process. Savannah, GA, 30 November-4 December, 2009.

Peppin, D.L., P.Z. Fulé, J.L. Beyers, C.H. Sieg, and M. Hunter. Does seeding after severe fires mitigate negative impacts on soils and plant communities in forested ecosystems of the western USA? The Association for Fire Ecology, 4th International Fire Ecology and Management Congress: Fire as a Global Process. Savannah, GA, 30 November-4 December, 2009.

Roccaforte, J.P., P.Z. Fulé, and W.W. Chancellor. Woody debris and tree regeneration dynamics following severe wildfires in Arizona (poster presentation). The Association for Fire Ecology, 4th International Fire Ecology and Management Congress: Fire as a Global Process. Savannah, GA, 30 November-4 December, 2009.

Fulé, P.Z. Fuego en Bosques del Suroeste de EEUU y Noroeste de México. Special Ecological Research Seminar, Universidad de Guadalajara, Centro Universitario de la Costa Sur, Autlán, Jalisco, México. November 17, 2009.

Korb, J.E., P.Z. Fulé, M. Daniels, M. Stoddard, and R. Wu. Changes in forest structure and the understory plant community of a dry mixed conifer forest, southwestern Colorado USA. Mixed conifer forest restoration workshop, San Juan National Forest, Pagosa Springs, CO. October 23, 2009.

Kurth, V.J., S.C. Hart, P.Z. Fulé, and J.P. Kaye. Nitrogen dynamics along a 33-year stand-replacing wildfire chronosequence in southwestern ponderosa pine forests. 10th Biennial Conference of Research on the Colorado Plateau, October 5-8, 2009, Flagstaff AZ.

Laughlin, D.C., M.M. Moore, and P.Z. Fulé. 2009. Long-term changes in forest structure and functional strategies in ponderosa pine forests. 10th Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, October 6, 2009.

Fulé, P., J. Korb, and R. Wu. Changes in forest structure of a dry mixed conifer forest in Southwestern Colorado, USA. 10th Biennial Conference of Research on the Colorado Plateau, October 5-8, 2009, Flagstaff AZ.

McGlone, C.M., T.E. Kolb, C.H. Sieg, P.Z. Fulé, and J. Belnap. The persistence of native and cheatgrass dominated communities in a recently invaded ponderosa pine forest. 10th Biennial Conference of Research on the Colorado Plateau, October 5-8, 2009, Flagstaff AZ.

Stella, K.A., C.H. Sieg, P.Z. Fulé. Minimal effectiveness of seeding following three high-severity wildfires. Poster presentation, 10th Biennial Conference of Research on the Colorado Plateau, October 5-8, 2009, Flagstaff AZ.

Huffman, D.W., W.W. Covington, and P.Z. Fulé. Integrating restoration education with practice in the American Southwest. Annual Meeting, Society for Ecological Restoration, August 23-28, 2009, Perth, Australia.

Fulé, P.Z., M. Ramos-Gómez, C. Cortés-Montaña, and A. Miller. Fire regime in a Mexican forest under indigenous resource management. 94<sup>th</sup> Annual Meeting, Ecological Society of America, August 2-7, 2009, Albuquerque, NM.

Kaye, J.P., J. Romanyà, M.W. Kaye, R. Vallejo, S.C. Hart, P.Z. Fulé, V. Kurth, and C. Ross. Resilience of carbon storage to fire-regime change: Contrasting examples from woodlands in Arizona and Spain. 94<sup>th</sup> Annual Meeting, Ecological Society of America, August 2-7, 2009, Albuquerque, NM.

Yocom, L.L., P.Z. Fulé, P.M. Brown, J. Cerano, J. Villanueva-Díaz, and E. Cornejo-Oviedo. Effects of El Niño-southern oscillation on fire regime changed over time in northeastern Mexico. 94<sup>th</sup> Annual Meeting, Ecological Society of America, August 2-7, 2009, Albuquerque, NM.

Duguy, B., J.A. Alloza, R. Vallejo, P.Z. Fulé, and T. Sisk. Parameterization of a spatial decision support system for forest management and restoration in Mediterranean fire-prone landscapes (poster presentation). 94<sup>th</sup> Annual Meeting, Ecological Society of America, August 2-7, 2009, Albuquerque, NM.

Kurth, V.J., S.C. Hart, P.Z. Fulé, and J.P. Kaye. Nitrogen dynamics along a 33-year stand-replacing wildfire chronosequence in southwestern ponderosa pine forests. 94<sup>th</sup> Annual Meeting, Ecological Society of America, August 2-7, 2009, Albuquerque, NM.

Musta, E., P.Z. Fulé, D. Huffman, J. Crouse, L. Kalies, K. Barrett, K. Ireland, and T. Zegler. A current look at ecological restoration and conservation studies in northern Arizona forests (poster presentation). AZ START (Arizona Science Teacher Advancement and Research Training Program) Teacher Conference, August 2009.

Fulé, P.Z. Régimenes de fuego en bosques del suroeste de los Estados Unidos y noroeste de México: una comparación. Presentation to the División de Ciencias Forestales, Universidad Autónoma Chapingo, Chapingo, México. April 21, 2009 (75 participants).

Fulé, P.Z. Fire and restoration ecology. Field trip to Fort Valley Experimental Forest, Wildlife Short Course (Continuing Education), 17 participants, April 16, 2009.

Fulé, P.Z. Living and working in Spain. Presentation to Spanish 202, April 14, 2009.

Waring, K.M., D.M. Reboletti, L.A. Mork, C.-H. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, T.S. Davis. 2009. Modeling the impacts of two bark beetle species under warming climate in the southwestern U.S.A.: ecological and economic consequences. Western Forest Insect Work Conference, Spokane, WA. March 23-26, 2009. (Poster Presentation).

Springer, Judith D., David W. Huffman and Peter Z. Fulé. Long-term responses of *Penstemon clutei* (Sunset Crater beardtongue) to root trenching and prescribed fire: clues for population persistence. Changing Landscapes in the Southwest: Fifth Southwest Rare Plant Conference. March 16-20, 2009, Salt Lake City, UT.

Peppin, D., P. Z. Fulé, C. H. Sieg, M. Hunter, and J. Beyers. 2008. Post-wildfire seeding in forests on federal lands: trends, costs, effectiveness, and use of native seed. Wildfires and Invasive Plants in American Deserts Conference, December 9-11, 2008, Reno, Nevada.

Youtz, J., M. Johnson, D. Allen-Reid, A. Bradley, B. Bird, C. Bada, Z. Evans, P. Fulé, K. Smith. 2008. Climate Change and Mixed Conifer/Aspen Systems in New Mexico: Considerations for Managers (panel presentation). New Mexico Forestry and Climate Change Workshop, November 20, 2008, Albuquerque, NM.

Peppin, D., P.Z. Fulé, and J. Lynn. 2008. Northern Arizona Native Plant Materials Market Feasibility Study. Poster presentation, Society of American Foresters, 2008 National Convention. Nov 5-9, 2008, Reno-Tahoe, NV.

Fulé, P.Z. 2008. Monitoring large-scale forest restoration treatments: integrating multi-disciplinary science and management. Moving Toward Tomorrow: Developing a Framework for Monitoring the Forested Ecosystems of the Southwest. October 15-17, 2008, Northern Arizona University, Flagstaff AZ.

Waring, K.M., D.M. Reboletti, L.A. Mork, C.-H. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T. S. Davis. 2008. Southern and Mexican pine beetles and climate change: An assessment of potential ecological and economic effects of a range shift. 93rd Ecological Society of America Annual Meeting, Aug 3-8, 2008, Milwaukee WI.

Fulé, P.Z. 2008. Field trip presentation for the Society of Range Management. July 31, 2008. Grandview, AZ.

Van Mantgem, P.J., N.L. Stephenson, J.C. Byrne, L.D. Daniels, J.F. Franklin, P.Z. Fulé, M.E. Harmon, J.M. Smith, A.H. Taylor, and T.T. Veblen. 2008. Widespread increase of tree mortality rates in the western United States. MTNCLIM 2008 Mountain Climate Research Conference, 9-12 June 2008, Silverton, Colorado.

Fulé, P.Z. 2008. Field trip presentation for Joint Fire Science Program “Roadshow” tour of fuel treatment sites. May 6, 2008. Fort Valley, AZ.

McMillin, J. D., C. Hoffman, C. H. Sieg & P. Z. Fulé. 2008. Contribution of bark beetle outbreaks to fuel loading and fire behavior in pine forests of the Southwest. 2008 Forest Health Monitoring Working Group Meeting. 12 – 14 February 2008, in San Antonio, TX.

McMillin, J. D., C. Hoffman, C. H. Sieg & P. Z. Fulé. 2008. Contribution of bark beetle outbreaks to fuel loading and fire behavior in pine forests of the Southwest. 2008 Western Forest Insect Work Conference. 8 – 10 April 2008, in Boulder, CO.

Fulé, P.Z. What does the Rodeo-Chediski fire tell us about future fires and future forests? Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Fulé, P.Z. Fire and forests in the American Southwest. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Hoffman, C., J.D. McMillin, C.H. Sieg, and P.Z. Fulé. Contribution of landscape level bark beetle outbreaks to fuel loading and fire behavior in pine forests of the Southwest. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Huffman, D., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. Fire regimes and restoration of southwestern pinyon-juniper ecosystems. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Yocom, L., P.Z. Fulé, P.M. Brown, D.A. Falk, J. Villanueva-Díaz, and E.H. Cornejo-Oviedo. Fire and climate interactions in northern Mexico. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Kurth, V.J., P.Z. Fulé, and C.A. Gehring. Community structure of wood-decay fungi following wildfire in ponderosa pine forests. Fire in the Southwest: Integrating Fire into the Management

of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Peppin, D, P.Z. Fulé, and J.C. Lynn. Northern Arizona native plant materials market feasibility study. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Stella, K.A., C.H. Sieg, and P.Z. Fulé. Effects of post-wildfire seeding in northern Arizona: aboveground biomass one year post-fire. Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ.

Fulé, P.Z. Interview with independent filmmakers Jeff Hyland and Mike Tryon, Positive Social Change Documentaries. January 16, 2008, Ashfork, AZ.

Fulé, P.Z., J. Villanueva-Díaz, E. Cornejo-Oviedo, P. Brown, and D. Falk. Incendios forestales y clima en el norte de México. VIII Congreso Mexicano de Recursos Forestales, October 28-31, 2007, Morelia, Michoacán, Mexico.

Villanueva-Díaz, J., J. Cerano-Paredes, D.W. Stahle, M.D. Therrell, B.H. Luckman, and P.Z. Fulé. Precipitación reconstruida invierno-primavera del noroeste de México para los últimos 500 años. VIII Congreso Mexicano de Recursos Forestales, October 28-31, 2007, Morelia, Michoacán, Mexico.

Waring, Kristen M., Danielle M. Reboletti, Lauren A. Mork, Richard Hofstetter, Amanda M. Garcia, Peter Z. Fulé, T.S. Davis. Potential spread of a non-native bark beetle: ecological and economic consequences. Ninth Biennial Conference of Research on the Colorado Plateau, October 29-November 1, 2007, Northern Arizona University, Flagstaff, AZ.

Fulé, P.Z. Field tour of Flagstaff restoration sites for World Presidents Organization, Arizona chapter. October 6, 2007.

Fulé, P.Z. Reference ecosystems and characteristic assemblages and disturbance regimes - is there a right answer? Annual Meeting, Ecological Society of America and Society for Ecological Restoration, San José, CA, August 6, 2007.

Fulé, P.Z. Interview with KNAU, National Public Radio, Flagstaff, AZ, broadcast July 20, 2007. [http://www.publicbroadcasting.net/knau/news.newsmain?action=article&ARTICLE\\_ID=1116411](http://www.publicbroadcasting.net/knau/news.newsmain?action=article&ARTICLE_ID=1116411).

Fulé, P.Z. Interview with La Vanguardia newspaper, Saltillo, Coahuila, Mexico, published July 22, 2007. [http://www.vanguardia.com.mx/diario/noticia/saltillo/coahuila/de\\_portada:\\_cambio\\_climatico\\_en\\_coahuila\\_¿que\\_nos\\_espera?/15997](http://www.vanguardia.com.mx/diario/noticia/saltillo/coahuila/de_portada:_cambio_climatico_en_coahuila_¿que_nos_espera?/15997)

Fulé, P.Z. Field tour of Flagstaff restoration and fire sites for Professor Joe Feller and law school class, Arizona State University. May 21, 2007. Flagstaff, AZ.

Fulé, P.Z., B. Strom, A. Kuenzi, K. Baumgartner, and C.H. Sieg. Rodeo-Chediski fire: Effects of pre-fire treatment and post-fire response. Presentation to White Mountain Apache Tribe and Bureau of Indian Affairs staff. April 25, 2007. Whiteriver, AZ.

Van Horne, M., and P.Z. Fulé. How accurate are fire-scar sampling methods at multiple scales? US-International Association of Landscape Ecology 22<sup>nd</sup> Conference. April 10, 2007. Tucson, AZ.

Fulé, P.Z. Ecological restoration overview. Community Forum, Greater Flagstaff Forests Partnership. April 3, 2007. Flagstaff, AZ.

Fulé, P.Z. Ecological restoration research update. USDA Forest Service Annual Timber/Silviculture Staff Meeting, Region 3. March 12, 2007. Albuquerque, NM.

Fulé, P.Z. Restauración ecológica en bosques adaptados a regimenes de incendios frecuentes. Seminar Series on Forest Restoration: Applications and quantitative tools for evaluation. February 6, 2007. Universidad de La Laguna, Tenerife, Canary Islands, Spain.

Fulé, P.Z., and D.C. Laughlin. Variable fire severity affects forest structure over an elevational gradient, Grand Canyon National Park, USA. International Meeting of Fire Effects on Soil Properties, February 3, 2007, Barcelona, Spain.

Fulé, P.Z. Incendios forestales de España: changing fire regimes and implications for Mediterranean ecosystems. School of Forestry Seminar Series, December 6, 2006, Flagstaff, AZ.

Farris, C., P.Z. Fulé, M.L. Van Horne, T.W. Swetnam, C.H. Baisan, and D.A. Falk. A multi-scale assessment of targeted and systematic fire scar sampling at three sites across the Southwest. 3<sup>rd</sup> International Fire Ecology & Management Congress, November 13-17, 2006, San Diego, CA.

Fulé, P.Z. Fire regime changes in pine-oak ecosystems, Durango and Chihuahua. 3<sup>rd</sup> International Fire Ecology & Management Congress, November 13-17, 2006, San Diego, CA.

Fulé, P.Z. Do never-logged forests differ from logged forests in their response to fire exclusion, Arizona and Durango? 3<sup>rd</sup> International Fire Ecology & Management Congress, November 13-17, 2006, San Diego, CA.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments at Mt Trumbull, Arizona. 3<sup>rd</sup> International Fire Ecology & Management Congress, November 13-17, 2006, San Diego, CA.



Fulé, P.Z. Fire, Climate, and People in the Pine Forests of Northern Mexico. Prescott College Fall 2006 Environmental Sciences Colloquium Series, "From Fire Ecology to Global Warming: Hot Topics in the Environmental Sciences." Prescott, AZ. November 9, 2006.

Kaye, J., M. Kaye, S. Eckert, P. Fulé, S. Hart, K. Prewitt, and S. Haase. Accumulation of carbon and nutrients in ponderosa pine trees during 120 years of fire exclusion. Managed Ecosystems: Results from Research, Education, and Extension USDA CSREES National Research Initiative projects; 2006 USDA/CSREES NRI Managed Ecosystem Project Investigators Reports; Agronomy, Crop, and Soil Science Societies Meeting; Indianapolis, Indiana; November 14, 2006.

Moore, M.M., A.J. Sánchez Meador, D.W. Huffman, J.D. Bakker, D.M. Bell, P.F. Parysow, P.Z. Fulé. Long-term and anticipated changes in southwestern conifer forests: Analysis and modeling of historical USDA permanent plot data. Managed Ecosystems: Results from Research, Education, and Extension USDA CSREES National Research Initiative projects; 2006 USDA/CSREES NRI Managed Ecosystem Project Investigators Reports; Agronomy, Crop, and Soil Science Societies Meeting; Indianapolis, Indiana; November 14, 2006.

Fulé, P.Z. Field trip leader, Fort Valley Forest Restoration. October 25, 2006, Flagstaff, AZ.

Fulé, P.Z. Panelist, Setting Ecological Goals and Determining Restoration Success. Conserving and Restoring Frequent Fire Landscapes of the West: Linking Science, Collaboration and Practice. October 24-26, 2006, Flagstaff, AZ.

Fulé, P.Z., J.P. Roccaforte, and W.W. Covington. Post-treatment mortality affects forest structure after ecological restoration treatments, Mt. Trumbull, Arizona. Poster presentation, Conserving and Restoring Frequent Fire Landscapes of the West: Linking Science, Collaboration and Practice. October 24-26, 2006, Flagstaff, AZ.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments at Mt Trumbull, Arizona. September 21, 2006 33<sup>rd</sup> Annual Natural Areas Conference, Flagstaff, AZ. Poster presentation.

Laughlin, D.C., and P.Z. Fulé. Plant community stability following wildfires in old-growth fire-adapted forests in Grand Canyon National Park. September 21, 2006. 33<sup>rd</sup> Annual Natural Areas Conference, Flagstaff, AZ. 38 attendees.

Fulé, P.Z., and D.C. Laughlin. Wildland fire use effects on forest structure over an elevational gradient, Grand Canyon National Park. September 21, 2006. 33<sup>rd</sup> Annual Natural Areas Conference, Flagstaff, AZ. 38 attendees.

Fulé, P.Z. Restoration of fire-adapted forests in the American Southwest. May 29, 2006, Swiss Federale Institute WSL [Forest, Snow, Landscape], Birmensdorf, Switzerland. 19 attendees.

Fulé, P.Z. Historia de incendios forestales en bosques mediterraneos: un ejemplo del Pinus nigra. Seminar, departament d'ecologia, Universitat de Barcelona. May 3, 2006, Barcelona, Spain. 18 attendees.

Fulé, P.Z. Restauración de bosques adaptados a incendios frecuentes. Seminar presentation, CREAM (Centre de Recerca Ecologica i Aplicacions Forestals), Universitat Autònoma de Barcelona, Bellaterra (Barcelona). March 8, 2006, Catalunya, Spain. 25 attendees.

Fulé, P.Z. Gestión de fuego y restauración de bosques: Norteamérica, México, España. Guest lecture, course in wildland fire management, Universitat de Lleida. February 6, 2006, Lleida, Spain. 35 attendees.

Fulé, P.Z. Gestión y usos de bosques en norteamérica. Guest lecture, class in forest management, Universitat de Barcelona. November 23, 2005, Barcelona, Spain. 18 attendees.

Fulé, P.Z. Incendios en ecosistemas de Norteamérica. Guest lecture, class in wildland fire ecology, Universitat de Barcelona. November 9, 2005, Barcelona, Spain. 17 attendees.

Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments. Oral presentation at 8<sup>th</sup> Biennial Conference, Integrating Science and Management on the Colorado Plateau. November 8-10, 2005, Flagstaff AZ.

Fulé, P.Z., D.C. Laughlin, and C. Crocker-Bedford. Wildland Fire Use Effects Across an Elevation Gradient. Poster presentation at 2005 JFSP Principal Investigator Workshop, November 1-3, San Diego, CA.

Strom, B.A., and P.Z. Fulé. Pre-fire treatment effects and post-fire forest dynamics on White Mountain Apache Tribe lands within the Rodeo-Chediski burn area, Arizona. Oral presentation at 8<sup>th</sup> Biennial Conference, Integrating Science and Management on the Colorado Plateau. November 8-10, 2005, Flagstaff AZ.

Kuenzi, A.M., P.Z. Fulé, and C.H. Sieg. Analysis of understory vegetation recovery on the Rodeo-Chediski fire. Poster presentation at 8<sup>th</sup> Biennial Conference, Integrating Science and Management on the Colorado Plateau. November 8-10, 2005, Flagstaff AZ.

Korb, J.E., M.L. Daniels, D.C. Laughlin, and P.Z. Fulé. Warm dry mixed conifer plant community in southwestern Colorado. Poster presentation at 8<sup>th</sup> Biennial Conference, Integrating Science and Management on the Colorado Plateau. November 8-10, 2005, Flagstaff AZ.

Fulé, P.Z., J. Villanueva-Díaz, and M. Ramos-Gómez. Fire regime in a conservation reserve, Chihuahua, México. The World Conference on Ecological Restoration, Society for Ecological Restoration International, September 12-18, 2005, Zaragoza, Spain. 25 attendees.

Fulé, P.Z. (moderator). Fulbright grantees location (Barcelona) and discipline (scientific research). September 6-7, 2005, Madrid, Spain.

Fulé, P.Z. Field tour of Mt Trumbull restoration project for law school students from Arizona State University, Professor J. Feller, May 19, 2005 (12 participants).

Roccaforte, J.P., and P.Z. Fulé. Changes in canopy fuels and fire behavior after ponderosa pine restoration treatments: a landscape perspective. Ecological Restoration of Southwest Ponderosa Pine and Pinyon-Juniper Ecosystems, Society of American Foresters, St. George, UT, May 11-13, 2005.

Huffman, D., M. Stoddard, P.Z. Fulé, W.W. Covington, and H.B. Smith. A demonstration project to test ecological restoration of a pinyon-juniper ecosystem. Ecological Restoration of Southwest Ponderosa Pine and Pinyon-Juniper Ecosystems, Society of American Foresters, St. George, UT, May 11-13, 2005.

Van Horne, M.L., and P.Z. Fulé. Do fire scar sampling methods affect estimates of fire frequency? Fire History and Climate Synthesis in Western North America, Flagstaff, AZ. April 30-May 3, 2005.

Garcia, P., P.Z. Fulé, and J. Reed. NAU Hybrid Students—Perceptions of Online Learning with highlights from FORESTRY 380, Ecological Restoration Principles, and SOCIOLOGY 101. Faculty showcase: focus on hybrid courses. March 30, 2005.

McGlone, C.M., J.D. Springer, P.Z. Fulé, and W.W. Covington “Changes in understory vegetation on a large-scale ponderosa pine restoration.” Society of Range Management, February 10, 2005. Ft. Worth, TX.

Fulé, P.Z. Forest restoration field trip—Gus Pearson Natural Area. Project CENTRL (Arizona Dept. of Agriculture), October 15, 2004.

Fulé, P.Z. After severe forest fires—what’s next? Flagstaff Festival of Science in-school presentation, Cromer Elementary School (Mr. Zanone), October 11, 2004, Sechrist Elementary School (Mr. Smith), September 28, 2004, Sechrist Elementary School (Ms. Wright), September 22, 2004.

Fulé, P.Z., J.D. Springer, W.W. Covington, and J.E. Korb. Changes in tree structure, forest floor, and plant communities following restoration treatments in Arizona. Ecological Society of America annual meeting, Portland, OR, August 1-7, 2004.

Fulé, P.Z. Fire and forest restoration. Forest Restoration Workshop, Jobs and Biodiversity Coalition, April 21, 2004, Silver City, NM.

Long, R., and P. Fulé. An uncommon undergraduate experience: conducting research and fieldwork in ecological restoration. Natural Resource Education for a Culturally Diverse

Audience: Fifth Biennial Conference on University Education in Natural Resources, March 14-17, 2004, Flagstaff, AZ.

Fulé, P.Z. Fire and restoration in the greater Grand Canyon region. Colloquium in the Life Sciences, Colorado State University, Fort Collins, CO, March 1, 2004.

Martin, S., Theimer, T., Fulé, P.Z. Effects of ponderosa pine forest restoration on Merriam's turkey use of historical roost sites in Northern Arizona. 35th Joint Annual Meeting of the Arizona and New Mexico Chapters of the American Fisheries Society and The Wildlife Society, Safford, Arizona. February 6, 2004.

Restoration science and prescriptions. P.Z. Fulé. Presentation to Building Trust for Forest Restoration Through Collaborative Partnerships Symposium, Showlow, AZ, December 5, 2003.

Fire, forest change, and ecological restoration. P.Z. Fulé. Presentation to the R1-R4 Joint Forest Management Meeting, Phoenix, AZ, December 3, 2003.

Fulé, P.Z., J.E. Crouse, T.A. Heinlein, and W.W. Covington. Fire, forest change, and restoration at Grand Canyon. Second International Wildland Fire Ecology and Fire Management Congress. November 17, 2003, Orlando, FL.

Van Horne, M.L., and P.Z. Fulé. Testing fire history methods: preliminary results addressing sampling uncertainty. Second International Wildland Fire Ecology and Fire Management Congress. November 17, 2003, Orlando, FL.

Fisher, M., P.Z. Fulé, and N.C. Johnson. 2003. Competition between native grasses in the presence of arbuscular mycorrhizal communities from different elevations. Seventh Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, November 5, 2003.

Van Horne, M.L., and P.Z. Fulé. Testing fire history methods: preliminary results addressing sampling uncertainty. Seventh Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, November 5, 2003.

Natural disturbance regimes in mixed conifer. P.Z. Fulé. Presentation to Goshawk guidelines field trip, North Kaibab Ranger District, October 24, 2003.

Stand Structure and Fire Behavior, Rodeo-Chediski Fire. P.Z. Fulé. Presentation to Wildland Fire Leadership Council (Interagency), Field trip to Rodeo-Chediski fire, White Mountain Apache tribal lands, AZ, October 15, 2003.

Grand Canyon forest fires: past, present, and future. P.Z. Fulé. School of Forestry seminar, Northern Arizona University, Flagstaff, October 1, 2003.

Effects of ponderosa pine forest restoration on Merriam's turkey use of historical roost sites in northern Arizona. S.L. Martin, T. Theimer, P.Z. Fulé. The Wildlife Society annual conference, Burlington, VT, September 6-10, 2003.

Altered fire regimes and forest thinning in major biomes. T.E. Kolb and P.Z. Fulé. 2003 Southwest Drought Summit, Flagstaff, AZ, May 12, 2003.

Multiple studies on an elevational gradient, San Francisco Peaks. A.E. Cocke, M.A. Fisher, J.E. Crouse, and P.Z. Fulé. Southwest Fire Initiative Conference, Flagstaff, AZ, April 29, 2003.

Fire history and landscape dynamics within Mexican Spotted Owl habitat at Walnut Canyon National Monument, AZ. S. Knox, W. Romme, P. Fulé, and P. Whitefield. Southwest Fire Initiative Conference, Flagstaff, AZ, April 29, 2003.

Quantifying forest reference conditions for ecological restoration: the Woolsey plots. A. Meador, M. Moore, W. Covington, P. Fulé, P. Parysow, D. Huffman, J. Bakker. Southwest Fire Initiative Conference, Flagstaff, AZ, April 29, 2003.

Multi-Century Fire Modeling on Landscape Gradients. P.Z. Fulé. Joint Fire Science Program Investigators' Meeting, Phoenix, AZ, March 11, 2003.

Vegetation Gradients on the San Francisco Peaks. M. Fisher, A. Cocke, J. Crouse, and P.Z. Fulé. NAU Environmental Research on National Forests and Adjacent Lands Meeting, February 3, 2003.

Fire-dominated landscapes at Grand Canyon. P.Z. Fulé. NAU Environmental Research on National Forests and Adjacent Lands Meeting, February 3, 2003.

Fire regimes and natural variability in Grand Canyon forests. P.Z. Fulé. Presentation to Forest Ecosystem Landscape Analysis team, Grand Canyon National Park, January 13, 2003.

Science and practice. P.Z. Fulé. Restoration and Fuel Management Symposium: Moving Forward Together. Flagstaff, AZ, November 13, 2002.

Ecological issues in forest restoration. P.Z. Fulé and L.E. DeWald. Forest Management Seminar Series, Environmental Law Society, College of Law, Arizona State University, Tempe, October 30, 2002.

Fire ecology and forest restoration at Grand Canyon. P.Z. Fulé. Merriam-Powell Seminar Series, Northern Arizona University, Flagstaff, October 25, 2002.

Diversity in forest restoration. P.Z. Fulé. Invited presentation to the workshop, "Seeking Common Ground in Fire, Wildlife and Forest Restoration." Arizona Chapter of The Wildlife Society, Flagstaff, AZ, October 24, 2002.

School presentation on wildfire. P.Z. Fulé. Sechrist School, Flagstaff, AZ, October 8, 2002.

School presentation on wildfire. P.Z. Fulé. Knoles School, Flagstaff, AZ, October 3, 2002.

Wildfire's dangerous new role. P.Z. Fulé. Presentation for Flagstaff Festival of Science, Lowell Observatory, Flagstaff, AZ, October 2, 2002.

Forest restoration field tour, Taos and Los Alamos, NM, September 26-28, 2002.

Grand Canyon fire ecology. P.Z. Fulé. Training session for Northern Arizona Conservation Corps, Fort Tuthill, AZ, August 28, 2002.

USFS Gus Pearson Research Plots. P.Z. Fulé. Field presentation to the international meeting of the Society of Range Management, Flagstaff, AZ, August 13, 2002.

Restoration at Gus Pearson Natural Area. P.Z. Fulé. Field presentation to the international meeting of the Ecological Society of America, Flagstaff, AZ, August 2, 2002.

Fire ecology and forest restoration at Grand Canyon, with a detour to Mexico. P.Z. Fulé. Tree Ring Talk (seminar series), Laboratory of Tree-Ring Research, University of Arizona, Tucson, May 8, 2002.

Species and Canopy Cover Map Development Using Landsat 7 Enhanced Thematic Imagery For Grand Canyon National Park. Crouse, J.E. and P.Z. Fulé. Paper presented at the Forest Service RS2002 Conference. April 8-12, 2002. San Diego, CA.

Water, nutrient, and carbon fluxes following ecological restoration of southwestern ponderosa pine forests. Hart, S.C., J.P. Kaye, W.W. Covington, P.Z. Fulé, and M.M. Moore. Ecological Society of America, 87<sup>th</sup> annual meeting, August 4-9, 2002, Tucson, AZ.

When is understory herbaceous biomass and diversity restored? A seven-year case study from southwestern ponderosa pine. M.M. Moore, C.A. Casey, J.D. Springer, P.Z. Fulé, and W.W. Covington. Ecological Society of America, 87<sup>th</sup> annual meeting, August 4-9, 2002, Tucson, AZ.

Variability among plant communities in neighboring pine forests has implications for determining reference conditions. C.N. Gildar, P.Z. Fulé, and W.W. Covington. Ecological Society of America, 87<sup>th</sup> annual meeting, August 4-9, 2002, Tucson, AZ.

Monitoring understory response to ecological restoration treatments in southwestern forests: the need to collect multiple years of data. M.L. Daniels, J.D. Springer, J.E. Korb, P.Z. Fulé, and W.W. Covington. Ecological Society of America, 87<sup>th</sup> annual meeting, August 4-9, 2002, Tucson, AZ.

Importance of dead wood as habitat for mice in a restoration-treated pine forest in northern Arizona. A.R. Roberts, C.L. Chambers, and P.Z. Fulé. Southwest Chapter of The Wildlife Society meeting, February 8, 2002, Safford, AZ.

Effects of an intense prescribed fire: is it ecological restoration? P. Fulé, T. Heinlein, K. Huisinga, and W. Covington. Sixth Biennial Conference of Research on the Colorado Plateau, November 7, 2001.

Changes in snag and log characteristics after a wildland use fire. A. Green and P. Fulé. Sixth Biennial Conference of Research on the Colorado Plateau, November 7, 2001.

Choosing the appropriate sampling technique to detect plant community change—an example from ponderosa pine restoration. J. Korb, J. Springer, W. Covington, and P. Fulé. Sixth Biennial Conference of Research on the Colorado Plateau, November 7, 2001.

Understory plant response after a high-intensity fire. K. Huisinga, P. Fulé, and J. Springer. Sixth Biennial Conference of Research on the Colorado Plateau, November 7, 2001.

Ecological restoration in a pinyon/juniper—ponderosa pine ecotone. D. Huffman, P. Fulé, and A. Waltz. Sixth Biennial Conference of Research on the Colorado Plateau, November 6, 2001.

Fire and Restoration. Montessori School of Flagstaff, Switzer Mesa (grades 1-3), Flagstaff, AZ, October 12, 2001.

Xtreme Fire. Presentation for Flagstaff Festival of Science, Lowell Observatory, Flagstaff, AZ, October 1, 2001.

Festival of Science In-School Talk, South Beaver School (4<sup>th</sup> grade), Flagstaff, AZ, September 25, 2001.

Reducing Fire Hazards. Presentation to American Association of Botanical Gardens and Arboreta, Interior West Regional Meeting, September 13-15, 2001, Flagstaff, AZ.

White Mountain Apache Tribal Council field trip leader, Fort Valley, May 4, 2001.

Gus Pearson restoration site, field trip leader, Forests Festival, April 28, 2001.

Contemporary Reference Conditions in Southwestern Ponderosa Pine Forests. C. Gildar, P.Z. Fulé, and W.W. Covington. Annual Meeting, Rocky Mountain Chapter, Society for Ecological Restoration, Keystone, CO. April 2001.

Applied Restoration Research on the Campus. T.A. Heinlein, J.P. Roccaforte, P.Z. Fulé, and W.W. Covington. Annual Meeting, Rocky Mountain Chapter, Society for Ecological Restoration, Keystone, CO. April 2001.

The Recovery of Forest Roads after Closure. A. Elseroad, P.Z. Fulé, and W.W. Covington. Annual Meeting, Rocky Mountain Chapter, Society for Ecological Restoration, Keystone, CO. April 2001.

Ecological Restoration and Fire Behavior. National Fire Roundtable, The Nature Conservancy and USDA Forest Service. March 14, 2001, Flagstaff, AZ.

Forest Conditions at Mt. Trumbull and Mt. Logan Wilderness Areas. Wilderness Task Force, Bureau of Land Management. March 13, 2001, Flagstaff AZ.

Reducing Fire Behavior. Ponderosa Fire Advisory Council, November 6, 2000, Flagstaff AZ.

Forest Restoration. Presentation to Arizona Project CENTRL, October 20, 2000, Flagstaff AZ.

Joint Fire Science Program, Principal Investigators Workshop, October 3-5, 2000, Reno, NV.

Catastrophic Fire Field Trip (leader). Flagstaff Festival of Science, September 23, 2000.

The Role of the Soil Seed Bank in Understory Ponderosa Pine Restoration. J.E. Korb, W.W. Covington and P.Z. Fulé. Ecological Society of America annual meeting, Snowbird, UT, August 2000.

Forest Science Panel, Steps Toward Stewardship conference, Flagstaff, AZ, April 25, 2000.

Forty years of land use/land cover change in the urban-wildland interface, Flagstaff, Arizona. J.E. Crouse, M.M. Moore, and P.Z. Fulé. April 4-6, 2000, RS-2000 USDA Forest Service Remote Sensing Conference, Albuquerque, NM.

Restoring Flagstaff's Forests. P.Z. Fulé. Presentation to the Flagstaff Leadership Program, January 20, 2000.

Simposium Sobre Incendios Forestales. P.Z. Fulé. Presentation to the IV Congreso Mexicano Sobre Recursos Forestales, Durango, Mexico, November 26, 1999.

Fire in the Ecosystem. P.Z. Fulé. Public presentation at forest meeting, Lakeside, AZ, November 13, 1999.

Differences in Grand Canyon forest structures over environmental and disturbance gradients. P.Z. Fulé, W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. Fifth Biennial Conference on Colorado Plateau Research, October 27, 1999, Flagstaff, AZ.

Fire, climate, and tree demography on the Colorado Plateau: long-term perspectives from tree rings. T.W. Swetnam, P.Z. Fulé, J.L. Betancourt, and G.J. Gottfried. Fifth Biennial Conference on Colorado Plateau Research, October 27, 1999, Flagstaff, AZ.

Buried propagule bank of thinned and unthinned ponderosa pine stands in northern Arizona. (Poster) J.E. Korb, W.W. Covington, and P.Z. Fulé. Fifth Biennial Conference on Colorado Plateau Research, October 27, 1999, Flagstaff, AZ.

Ecología de Incendios en la Sierra Madre Occidental. P.Z. Fulé. Presentation to the Instituto de Ecología, SEMARNAP, CIDIIR-IPN, and UAJD, Durango, Mexico, July 6, 1999.



Evaluation of Ponderosa Pine Forest Reconstruction Techniques Using Historical Data. D.W. Huffman, M.M. Moore, W.W. Covington, P.Z. Fulé, and J.C. Crouse. Ecological Society of America annual meeting, Spokane, WA, August 1999.

Ponderosa Pine Ecosystem Restoration within the Greater Grand Canyon Ecosystem. W.W. Covington, M.M. Moore, and P.Z. Fulé. Ecological Society of America annual meeting, Spokane, WA, August 1999.

Southwestern Forests: Restoring our Natural Legacy. Presentation to Laird Norton Foundation. Poco Diablo, Sedona, AZ. June 22, 1999.

Historical Reconstruction of Structure and Function in a Ponderosa Pine – Bunchgrass Ecosystem. S.C. Hart, W.W. Covington, M.M. Moore, P.Z. Fulé, and J. Kaye.

Grand Canyon Forest Restoration Research. Seminar Series, Grand Canyon National Park, January 6, 1999.

Ecological Reference Conditions in Forest Ecosystems Case Study: La Michilía Biosphere Reserve, Durango, Mexico. Presented at the Society for Ecological Restoration annual meeting, Austin, TX, September 30, 1998.

Fire regimes on an environmental gradient in a dry Sierra Madre forest. Presented to the annual meeting of the Southwestern Association of Biologists, Camp Tontozona, AZ, October 11, 1997.

Ecological restoration experiments at the Gus Pearson Natural Area. Flagstaff Festival of Science, Flagstaff, AZ, September 28, 1997.

Fire and Forests in Northern Mexico. School of Forestry seminar series, Flagstaff, AZ, September 24, 1997.

Restoration of presettlement age structure of an Arizona ponderosa pine forest. Co-author with J.N. Mast. American Association of Geographers, Annual Meeting, Fort Worth, TX, April 3, 1997.

Socio-Political Factors in Prescribed Fire Management. Panel discussion for RX 340 Fire Effects course, Flagstaff, AZ, March 24, 1997.

Adaptive Ecosystem Restoration in Ponderosa Pine. Presented at the Genetics/Silviculture session at the SAF National Convention held at Albuquerque, NM, on November 12, 1996.

Restoration of Southwestern Ponderosa Pine Ecosystems. Presented to the Arizona Native Plant Society, annual meeting, August 24, 1996, Flagstaff, AZ.

Ecological Restoration of the Gus Pearson Natural Area. Presented to the Arizona Agricultural Extension Agents, annual meeting, July 18, 1996, Flagstaff, AZ.

Changing Fire Regimes in Mexican Forests. Presented to the Ecosystem Management short course CEEM II, February 16, 1996, Flagstaff, AZ.

Geonauts Program (Educational television programming for elementary school students):  
 Filmed segments on fire ecology of *Penstemon clutei* (July 10, 1995) and restoration ecology (March 26, 1996).

Forest Ecosystem Restoration. Presented to the Western Legislative Council, Annual Meeting, October 10, 1995, Salt Lake City, UT.

Restoring Western Forest Health. Presented to the Western Legislative Council, June 24, 1995, Lake Tahoe, NV.

Fulé, P.Z., W.W. Covington, and M.M. Moore. 1994. Patterns of fire occurrence and forest structure in an unharvested pine-oak forest of the Sierra Madre Occidental, Durango, Mexico. Paper presented at Ninth Annual Landscape Ecology Symposium, March 23-26, 1994, Tucson, AZ.

Fulé, P.Z., and W.F. Stansfield. 1994. Double sampling in fuel inventory. Paper presented at the Southwest Section meeting, Society of American Foresters, April 21, 1994, Flagstaff, AZ.

Fire Ecology of Southwestern Forests. Presented to the Prescott Area Wildland-Urban Interface Council, November 16, 1994, Prescott, AZ.

Fire Management Planning with Geographic Information Systems. Presented to the Southwest Region Fuel Managers Meeting, March 11, 1993, Flagstaff, AZ.

Fulé, P.Z., M.M. Moore, and W.W. Covington. 1993. Scaling sample plots to estimate patch characteristics in southwestern ponderosa pine. Poster presentation at Eighth Annual U.S. Landscape Ecology Symposium, March 24-27, 1993, Oak Ridge, TN.

Moore, M.M., W.W. Covington, and P.Z. Fulé. 1993. Changes in spatial pattern of presettlement and postsettlement ponderosa pine structure using geostatistical techniques. Paper presented at Eighth Annual U.S. Landscape Ecology Symposium, March 24-27, 1993, Oak Ridge, TN.

**RESEARCH FUNDING:**

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2012/2013 Ecological Monitoring for Ponderosa Forest Restoration within the Centennial Forest at Rogers Lake,	Fulé, P.Z., and C. Miller	The APS Leadership Fund	\$4,988

Coconino County			
2012/2014 Comparing modern and historical high-elevation fire regimes at Grand Canyon	Fulé, P.Z., and L.L. Yocom	National Park Service, Research Reserve Fund	\$98,400
2012/2013 Forest Inventory, Camp Navajo, AZ	Fulé, P.Z.	Arizona Department of Emergency and Military Affairs	\$32,635
2012/2014 Post-fire fuel loading and predicted fire behavior on two 2000 wildfires	Hunter, M.E., and P.Z. Fulé	USDA Forest Service	\$50,000
2011/2012 Peace Corps Strategy Recruiter	Fulé, P.Z.	U.S. Peace Corps	\$16,800
Translating forest science for global practitioners	Kolb, T.E., P.Z. Fulé, P. Friederici, P. Beier, C. Chambers, C. Hsun Huang, A. McGiveny, K. Waring	USDA NIFA NFF	\$251,500
2011/2013 Evaluating post-fire successional trajectories after a large high-severity wildfire	Fulé, P.Z., C. Hull Sieg, and K.L. Shive	Joint Fire Science Program	\$88,834
2011/2013 Adapting Forest Ecosystems on Southwestern Tribal Lands to Variations in Climate and Fire with Integrated Research, Education, and Extension	Stan, A.B. (P.Z. Fulé, postdoctoral mentor)	National Institute of Food and Agriculture/USDA	\$130,000
2011/2012 Summer Institute on Environmental Stewardship. Bureau of Educational and Cultural Affairs	Fulé, P.Z., M.R. Wagner, and L.L. Yocom	U.S. State Department	\$161,983
2011/2015 Southwestern Forest Dynamics: Interactions of Climate and Other	Fulé, P.Z., and M.M. Moore	USDA Forest Service Rocky Mountain Research Station	\$29,930

Disturbances			
2010 INRMP Required Species Monitoring: Floristic Survey of Camp Navajo, Bellemont, AZ (PHASE I)	Springer, J., and P.Z. Fulé		\$12,332
2010/2013 Post-fire fuel loading and predicted fire behavior on two 2000 wildfires	Hunter, M.E., and P.Z. Fulé	USDA Forest Service	\$44,613.88
Developing a Southwest Fire Science Consortium	Thode, A., M. Hunter, J. Iniguez, A. Evans, P. Fulé, and D. Falk	Joint Fire Science Program	\$419,335.
Exploring climatic and human drivers of fire regime in a high-elevation Mexican forest	Yocom, L.L., and P.Z. Fulé	National Science Foundation	\$11,283
2010/2012 Rapid aspen decline on the southwestern edge of its range	Moore, M.M., P.Z. Fulé, M. Fairweather, and C.H. Sieg	USDA Forest Service	\$22,353
2010/2011 Interaction of Fire, Climate, and Forest Structure in Northern Mexico: Supplemental funding, Research Experience for Undergraduates	Fulé, P.Z., P.M. Brown, D.A. Falk, J. Villanueva-Díaz, E. Cornejo-Oviedo, and T. Ayers.	Research Experience for Undergraduates	\$7,500
2010/2014 Forest fires under climate, social and economic changes in Europe, the Mediterranean and other fire-affected areas of the world (FUME). Collaborative Project: (ii). Large-scale integrating project. Work programme topics: Activity 6.1 Climate Change,	Moreno, J.M., and 31 partners (P.Z. Fulé is partner 29)		

<p>pollution and risks;  Sub-Activity 6.1.3  Natural Hazards; Area  6.1.3.1 Hazard  assessment, triggering  factors and  forecasting;  ENV.1.3.1.1 Forest  fires in the context of  climate and social  changes. Seventh  Framework  Programme for  Research and  Technological  Development,  European Union.</p>			
<p>2009/2011 Post-  Wildfire Revegetation  in Southwestern  Ponderosa Pine Forest  (Modification 3)</p>	<p>Fulé, P.Z., and C.H.  Sieg</p>	<p>Rocky Mountain  Research Station</p>	<p>\$34,000</p>
<p>8/15/2009-  12/15/2010.  Demographics, spatial  structure, and genetic  variability of Sunset  Crater Beardtongue</p>	<p>Fulé, P.Z., and  Springer</p>	<p>National Park Service</p>	<p>\$3,760</p>
<p>10/1/08-3/31/10.  What is driving aspen  decline on the Kaibab  National Forest?</p>	<p>Moore, M.M., C.H.  Sieg, P.Z. Fulé, and  M. Fairweather</p>	<p>USDA Forest Service  Rocky Mountain  Research Station</p>	<p>\$86,002</p>
<p>6/8/2008-1/31/2009.  Supplemental  funding, Research  Experience for  Undergraduates</p>	<p>Fulé, P.Z., P.M.  Brown, D.A. Falk, J.  Villanueva-Díaz, E.  Cornejo-Oviedo, and  T.E. Kolb</p>	<p>National Science  Foundation</p>	<p>\$14,000</p>
<p>6/11/08-3/31/10.  Post-wildfire seeding  in forests of the  Intermountain West:  trends, costs,  effectiveness, use of  native seed</p>	<p>Fulé, P.Z., C.H. Sieg,  and M.E. Hunter</p>	<p>Joint Fire Sciences  AFP</p>	<p>\$132,009</p>

7/1/2008-6/30/2012. Climate, fire, and forest structure interactions in northern Arizona.	Fulé, P.Z.	Mission Research program, School of Forestry, Northern Arizona University	\$94,376
8/16/2007-12/15/2008. Develop software applications for vegetation mapping field data collection using handheld electronic devices	Curran, S.C., and P.Z. Fulé	National Park Service, Grand Canyon National Park, Arizona, cooperative agreement H1200040002	\$5,342
2/1/2007-1/31/2012. Interaction of Fire, Climate, and Forest Structure in Northern Mexico	Fulé, P.Z., P.M. Brown, D.A. Falk, J. Villanueva-Díaz, E. Cornejo-Oviedo	National Science Foundation, DEB-Ecosystem Science Cluster, #DEB-0640351	\$703,000
2006-2007. Conserving rare plants in Nevada and Arizona: a survey of monitoring and management activities	Springer, J.D., and P.Z. Fulé	Public Lands Institute, University of Nevada, Las Vegas	\$28,000

### **PENDING (PROPOSALS NOT FUNDED)**

Laughlin, D.C., and P.Z. Fulé. Merging plant strategy theory with trait-based models of community assembly. National Science Foundation DEB. \$299,983.

Moore, M.M., J. Bakker, P.Z. Fulé, and D.C. Laughlin. LTREB: Linking plant traits to demography and community dynamics. National Science Foundation DEB-LTREB. \$449,998.

Fulé, P.Z., A.B. Stan, S.E. Sesnie, A.E. Thode, and M.K. Carroll. Fire-Climate-Human Interactions: Past, Present, and Future Forest Distributions and Disturbance Regimes on Tribal Lands in the Southwest. NASA ROSES 2010 A.30 Climate and Biological Response: Research and Applications. \$1,994,720.

Sieg, C.H., P.Z. Fulé, S.T. Overby, and K.A. Stella. Re-measurement on three seeded high-severity wildfires: Effects on vegetation succession, fuel loading, soil stability and belowground fungi. Joint Fire Science Program, RFA 1, Task 1, \$224,181.

Fulé, P.Z., S.E. Sesnie, J.E. Crouse, M.J. Falkowski, N.M. Vaillant, and A.E. Thode. Assessing Tradeoffs of WUI vs. non-WUI Fuel Treatments. Joint Fire Science Program, RFA 1, Task 9, \$474,550.

Fulé, P.Z., L.L. Yocom, P.M. Brown, and D.A. Falk. Fire-Climate Network in High-Elevation Tropical Forest Ecosystems. National Science Foundation, DEB-Ecosystem Science. \$774,692.

Huffman, D., B. Greco, and P. Fulé. Building capacity for restoration & adaptive management of southwestern mixed-conifer forests. USDA Forest Service Resource Advisory Committee, Secure Rural Schools. \$127,503.

Fulé, P.Z., A. Stan, E. Schiefer, L. Yocom, S. Sesnie, N. Vaillant. Climate and Fuel Controls on Severe Forest Fire Thresholds at Landscape Scales. USDA AFRI Foundational Grant, \$499,999.

Fulé, P.Z., L.L. Yocom, J. Villanueva, D. Rodríguez-Trejo, D.A. Falk. Fire, Climate, and Carbon Dynamics in High-Elevation Tropical Forests. DOE Office of Biological & Environmental Research, DE-FOA-0000536. \$914,163.

Fulé, P.Z., L.L. Yocom, D.W. Huffman, and E.L. Kalies. Effectiveness of fuel treatments in ponderosa pine and pinyon-juniper ecosystems. Joint Fire Science Program RFA-2012-1, Task 3. \$177,825.

Fulé, P.Z. Wildfire Research in Mexico with U.S. Peace Corps. Lucking Family Faculty Award Endowed Fund, Northern Arizona University. \$6,550.

Fulé, P.Z., and J.A. Allen. Peace Corps Campus Recruiter. U.S. Peace Corps, \$22,144.

Fulé, P.Z. Adapting Wildfire Management for Climate Change at Grand Canyon National Park. FY2013 Technology and Research Initiative Fund (TRIF), Support for Post-Doctoral Associates (SPA) Program, Northern Arizona University. \$150,000.

Fulé, P.Z., L.L. Yocom, P.M. Brown, and D.A. Falk. Fire-Climate Network in High-Elevation Tropical Ecosystems. National Science Foundation, DEB-Ecosystem Science. \$714,783.

Fulé, P.Z. Wildfire and climate interactions in French forests: implications for climate change adaptation. Fulbright Senior Scholar proposal.

### **University Lectures:**

Dendrochronology. November 29, 2012. Arizona Forests and Wildlife FOR 250.

Gifford Pinchot, John Muir, Aldo Leopold, and the Foundations of Forest Conservation in the U.S.A. November 1, 2012, FS 111/BIO 299, Global Sustainability.

Dendroecology. October 9, 2012. Quaternary Paleoecology QS/ENV 671

Selecting appropriate research methods: strength of inference, October 4, 2012, FOR 690 Research Methods

Fire, Forests, and Water (lecture and field trip), February 20, 2012, ENV 399 Environmental Science of the Verde River.

Ecosystem processes (lecture and field trip), November 7-8, 2011, FOR 350 Forest Ecology for Professionals.

Selecting appropriate research methods: strength of inference, October 6, 2011, FOR 690 Research Methods

Fire and Forests in the American Southwest. April 11, 2011. ENV 181

Dendroecology. March 3, 2011. Quaternary Paleoecology QS/ENV 671

Crown Fire Behavior, February 14, 2011, FOR 351 Fire Monitoring and Modeling

Fuels and Fuel Moisture, February 3 & 8, 2011, FOR 251 Introduction to Wildland Fire

Selecting appropriate research methods: strength of inference, October 19, 2010, FOR 690 Research Methods

Overview of Dendrochronology. Quaternary Paleoecology QS/ENV 671

Fire and Forests in the American Southwest. October 12, 2009. ENV 181

Southwestern Forests. November 13, 2008. ENV 230.

Canopy fuels. November 13, 2008, FOR 351 Fire Monitoring and Modeling.

Selecting appropriate research methods: strength of inference, October 21, 2008, FOR 690 Research Methods

Ecological Restoration, guest lecture FOR 250 AZ Forests & Wildlife, April 1, 2008

Selecting appropriate research methods: strength of inference, October 10, 2007, FOR 690 Research Methods

Fire Management, Semester D, February 8 and March 2, 2005.

Ecological Restoration, February 5, 2005, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University.

Fire & Forest Health, FOR 454/554, February 2, 2005.

Fire Ecology, October 5, 2004, Continuing Education Applied Workshop: Ecological Restoration Principles, for Apache-Sitgreaves National Forests, Northern Arizona University.



Fire Ecology, October 28, 2003, Workshop for Southwestern Region National Forest Supervisors, Northern Arizona University.

Fire Ecology & Range of Natural Variability, October 21, 2003, Continuing Education Applied Workshop: Ecological Restoration Principles, Northern Arizona University.

Ponderosa pine fire ecology. National Park Service, Integrated Fire & Resource Management Planning Course, April 28, 2003, Grand Canyon, AZ.

Fire Ecology & Range of Natural Variability, April 21-23, 2003, Continuing Education Applied Workshop: Ecological Restoration Principles, Northern Arizona University.

Ecological Restoration, February 1, 2003, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University.

Fire and sustainability, October 21, 2002, FOR 298, Northern Arizona University.

Ecological Restoration, February 8, 2002, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University.

(1) Range of Natural Variability, (2) Restoration Silviculture, and (3) Field Tour, October 17-19, 2001, Continuing Education in Wildlife Habitat and Plant Management, professional shortcourse, Northern Arizona University.

Restoration & Wildlife, October 12, 2001, BIO 478 Wildlife Management class.

Ecological Restoration, February 9, 2001, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University.

Fire Ecology & Management, April 11, 2001, October 3, 2000, FOR 101 Introduction to Forestry

Landscape Fire Modeling, March 14, 2000, ENV 544 Landscape Ecology

Ecological Restoration, February 11, 2000, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University

Ecological Restoration, November 2, 1999, FOR 398 Indigenous Conservation Knowledge

Restoration Treatments, October 26, 1999, FOR 421 Forest Science

Ecological Restoration and Dendrochronology, 2003, 2002, 2001, 1999, FOR 250 Arizona Forests and Wildlife

Ecological Restoration, February 12, 1999, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University

Ecological Restoration, February 13, 1998, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University

Selecting appropriate research methods: strength of inference, October 2004, September 2003, February 2003, 2002, 2001, 2000, 1999, January 1998, 1997, FOR 690 Research Methods

Ecological Restoration, February 12, 1998, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University

Ecological Restoration, February 14, 1997, Continuing Education in Ecosystem Management, professional shortcourse, Northern Arizona University

Ecological Restoration, October 15-17, 1996, FOR 695 Conservation Biology

Fire and Ecosystem Management, October 14-16, 1996, FOR 500

Fire Ecology and Management, April 24-26, 1995, FOR 102 Introduction to Forestry

**Outside Courses:**

Summer Institute on Environmental Stewardship for European Student Leaders, July 17-August 20, 2011, Flagstaff AZ.

Restauración Forestal, May 14-24, 2012, Universidades de Valencia, Barcelona, y Alicante, Spain.

Restauración Forestal, June 6-15, 2011, Universidades de Valencia, Barcelona, y Alicante, Spain.

Restauración Forestal, June 14-21, 2010, Universidades de Valencia, Barcelona, y Alicante, Spain.

Restauración Ecológica Basada en Procesos Naturales, February 4-8, 2008. Universidad de Alicante, Spain.

Restauración Ecológica Basada en Procesos Naturales, June 11-15, 2007. Universidad de Alicante, Spain.

Ecological Restoration Application, October 13, 2006, International Seminar on Forest Administration and Management, Flagstaff, AZ. 22 attendees.

Fire effects on flora, February 15, 2000, RX340 Introduction to Fire Effects (Interagency training course), Whiteriver AZ.

Fire effects on flora, March 30, 1999, RX340 Introduction to Fire Effects (Interagency training course), Prescott Fire Center, Prescott AZ.

### **PROFESSIONAL SERVICE:**

Mission Research Board, School of Forestry, 2012-2013.  
Annual Review Committee, School of Forestry, 2012-2013.  
Invited presenter, Yellow Belly Ponderosa project (high school student play on fire ecology), Flagstaff Arts and Leadership Academy, October 10, 2012.  
Member, Undergraduate Research Advisory Council (URAC), 2012-13.  
Invited reviewer for tenure and promotion, Texas Tech University, August, 2012.  
Coordinator of International Forestry Programs, School of Forestry, 2011-present.  
Program Committee member and Session Moderator, Southwest Fire Ecology Conference, February 27-March 1, 2012, Santa Fe, NM.  
Review panel member, Joint Fire Science Program, panel meeting Boise, ID, January 26, 2012.  
Mission Research Board, School of Forestry, 2011-2012.  
Faculty Status Committee, School of Forestry, 2011-2012.  
Member, Coconino Parks and Open Space Science Advisory Committee, Coconino County Parks and Recreation Department. 2011-2012.  
Proposal review panel member, Task 3, Evaluating the effectiveness of mitigation activities in the wildland urban interface (WUI), Joint Fire Science Program, Boise ID. January 26, 2011.  
Session moderator, Restoration and Resilience session, Society of American Foresters Annual Convention, Albuquerque, NM. October 28, 2010.  
Track organizer, Restoration and Resilience Track, Society of American Foresters Annual Convention, Albuquerque, NM. October 27-31, 2010.  
Invited orientation for creative writing students developing a play on forest restoration. Flagstaff Arts & Leadership Academy, Greater Flagstaff Forests Partnership. October 15, 2010.  
Invited reviewer for tenure and promotion, Colorado State University, October, 2010.  
Co-chair, Science and Monitoring Working Group, Four Forests Restoration Initiative, Flagstaff AZ, 2010.  
Mission Research Board, School of Forestry, 2010-2011.  
Faculty Status Committee, School of Forestry, 2009-2010.  
Chair, Mission Research Board, School of Forestry, 2009-2010.  
Kaibab Forest Health Focus, collaborative group assisting the Kaibab National Forest in prioritizing forest treatments, 2009.  
Curriculum committee, School of Forestry, 2008-2009.  
Curriculum development committee (ad hoc committee), School of Forestry, 2008-2009.  
Faculty Status Committee, School of Forestry, 2008-2009.  
Soil science/ecosystem ecology faculty search committee, School of Forestry, 2008-2009.  
Invited coordinating editor for special issue on fire and climate, *Fire Ecology*, 2008-2009.  
Member of Review Council, *Revista Ciencia Forestal en México* ("Forest Science in Mexico Journal"), 2008-2010.  
National Science Foundation review panel, Ecosystem Science, Washington, D.C. April 8-11, 2008.

Global Education Task Force and Faculty Subcommittee, Northern Arizona University, 2008-2009.

Peace Corps recruitment presentation, December 5, 2007.

Fulbright Southern Europe Review Committee, Council for International Exchange of Scholars, Washington, D.C., September-October 2007.

Invited reviewer for tenure and promotion, Case Western Reserve University, September, 2007.

Curriculum committee, School of Forestry, 2007-2008.

Curriculum development committee (ad hoc committee), School of Forestry, 2007-2008.

Faculty Status Committee, School of Forestry, 2007-2008.

Session chair for "Fire and Restoration" session, Fire in the Southwest conference (January 2008), Association for Fire Ecology.

Technical team member, Wetland Reserve Program, Coconino County (Arizona) Parks and Recreation, 2007-2008.

Associate Editor, *Canadian Journal of Forest Research*, 2007-2010.

Fire/distance learning faculty search committee, School of Forestry, 2006-2007.

Curriculum committee, School of Forestry, 2006-2007.

Scholarship committee, School of Forestry, 2006-2007.

Fulbright Southern Europe Review Committee, Council for International Exchange of Scholars, Washington, D.C., September-October 2006.

Invited reviewer for tenure and promotion, The Ohio State University, September 2006.

Mission Research committee, School of Forestry, 2006-2007.

American Representative to Fulbright Commission for candidate interviews, Fulbright/Generalitat de Catalunya Visiting Scholars Program, June 1, 2006.

Technical advisor, White Mountains Stewardship Contract Multi-Party Monitoring Board, 2006.

Chair, Fire science faculty search committee, School of Forestry 2004-2005.

Strategic planning committee, School of Forestry 2004-2005.

Organizing committee, Southwestern/Intermountain Section Meeting, Society of American Foresters, Spring 2005.

Chair, Society of American Foresters, Northern Arizona Chapter, 2004.

Symposium organizer, Historical Ecology Applied to Forest Conservation and Restoration, 7th Biennial Conference "Integrating science and management on the Colorado Plateau," Nov. 4-6, 2003.

Field trip presentation on fire ecology, interdisciplinary goshawk management team, North Kaibab Ranger District, October 24, 2003.

Southwestern forest tour leader, Vassar College, Biology class, October 22-23, 2003.

Field trip leader, Fire & Stone Guided Hike, Flagstaff Festival of Science, October 3, 2003.

Peer panel reviewer for Forest Service research scientist, September 16, 2003.

Technical Representative, Coconino County (AZ) Parks & Open Space - Science Advisory Committee, 2003-2004.

Mission Research Board, School of Forestry, 2003-2004.

Summer reading group leader, NAU freshmen, August 22, 2003, August 27, 2004.

Technical Assistance Visit participant for Rocky Mountain Research Station (RWU-RMRS-4152), USDA Forest Service, April 15-16, 2003.

Faculty advisor, Student Association for Fire Ecology, 2003-2004.

Chair-elect, Society of American Foresters, Northern Arizona Chapter, 2003.

Coordinating editor, *Restoration Ecology*, Blackwell Science Publishing. 2003-2007.

Ecological monitoring participant, Collaborative Forest Restoration Program, USDA Forest Service, Region 3, New Mexico (workshop 11/13-15, 2002).  
 Summer reading group leader, NAU freshmen, August 23, 2002.  
 Treasurer, Arizona Natural History Association, 2002-2003.  
 Judge, Braun/Buell awards, Ecological Society of America annual meeting, August 4-9, 2002.  
 Leader, Forest Restoration Field Trip, combined meetings of the Ecological Society of America/Society for Ecological Restoration, August 1-4, 2002.  
 Symposium coordinator, Forest Restoration Symposium, combined meetings of the Ecological Society of America/Society for Ecological Restoration, August 4-9, 2002, Tucson, AZ.  
 Habitat for Humanity workday, Society of American Foresters, October 20, 2001.  
 Chair, search committee for research specialist, 2001.  
 University Commission on the Status of Women, 2001-2003.  
 Graduate Studies Committee, School of Forestry, 2001-2004.  
 Instructor, International Dendroecology Field Week, August 12-17, 2001, Saltillo, Coahuila, Mexico.  
 Research Permit Committee, Merriam Powell Center, 2001-2002.  
 Co-chair, review panel for \$1.4 million funding program, ERI, January-May, 2001.  
 Latin America/CESM committee, 2001-2002  
 Mentorship 101 (Tuba City High School), March 1, 2001, November 8, 2000.  
 Mission Research Board, School of Forestry, 2000-2001.  
 Centennial Forest (NAU) technical advisory committee, 2000-2003.  
 Board of Directors, Arizona Natural History Association, 2000-2002.  
 Coordinator, Forest Science Panel, Steps Toward Stewardship conference, April 2000  
 Chair, College of Ecosystem Science and Management enrollment/distance learning committee, 2000.  
 Member, Faculty Council on Planning & Budget (2000-01).  
 Consultation: advice on forest management, Kachina Village Improvement District (Coconino County) and the Arboretum at Flagstaff, 2000.  
 Search committee for administrative assistant, 2000.  
 Search committee for program representative, 2000.  
 Search committee for marketing specialist, 2000.  
 Search committee for research technician, 1999.  
 Chair, search committee for School of Forestry technical support position, 1999.  
 Search committee for administrative assistant, 1999.  
 Science Planning and Integration Team, Grand Canyon Forests Partnership, 1999-2000.  
 Flagstaff Festival of Science, Ecological Restoration field trip, September 27, 1997.  
 Organizing committee, joint meeting of the Society of American Foresters, Southwestern Section, and the Asociación Mexicana de Profesionales Forestales, September 17-20, 1997.

**PROFESSIONAL DEVELOPMENT WORKSHOP:**

Inclusive Design/Inclusive Pedagogy Community of Practice, Spring semester, 2011.  
 Summer reading group leader, NAU freshmen, August 24, 2004.  
 Classroom Civility, November 14, 2001, Northern Arizona University, Flagstaff  
 The Art and Craft of Teaching, January 10, 1996, Northern Arizona University, Flagstaff

## **PROFESSIONAL SOCIETIES**

Society of American Foresters  
Society for Ecological Restoration International  
Association for Fire Ecology

## **RECOGNITION**

Recognized as influential faculty member by Melvin Hunter, NAU Golden Axe Award recipient, 2010. Outstanding Contribution to Forestry award, Southwest Section, Society of American Foresters, 2007.

Researcher of the Year, School of Forestry, Northern Arizona University, 2007-2008

Teaching Scholar Award, Northern Arizona University, 2005

Xi Sigma Pi, Forestry Honor Society, 2005

Recognized as influential faculty member by Aaron Green, NAU Golden Axe Award recipient, 2002

Phi Beta Kappa, Vassar College, 1986

DeGolier Prize, Vassar College, 1986

## **ADVISING EXPERIENCE:**

### **Undergraduate Research (FOR 485)**

2012 Fall:	1 Student
2011 Spring:	1 Student
2010 Fall:	1 Student
2010Spring:	1 Student
2009 Fall:	1 Student
2009 Spring:	1 Student
2008 Spring:	1 Student
2007 Fall:	1 Student
2007 Spring:	1 Student
2006 Fall:	4 Students
2005 Fall:	2 Students
2005 Spring:	1 Student
2004 Fall:	5 Students
2003 Fall:	1 Student
2002 Fall:	2 Students
2002 Spring:	3 Students
2001 Fall:	3 Students
2000 Fall:	2 Students
2000 Spring:	4 Students

### **Undergraduate Internship/Practicum (FOR 408)**

2011 Fall: 4 Students  
 2010 Fall: 5 Students  
 2010 Spring: 1 Student  
 2009 Fall: 2 Students  
 2009 Spring: 1 Student  
 2008 Fall: 5 Students  
 2007 Fall: 1 Student  
 2007 Spring: 1 Student  
 2006 Fall: 5 Students  
 2006 Spring: 1 Student  
 2005 Fall: 1 Student  
 2005 Spring: 1 Student  
 2004 Fall: 3 Students  
 2004 Spring: 1 Student  
 2003 Fall: 7 Students  
 2003 Spring: 3 Students

**Independent Study (FOR 697 or 497)**

2012 Fall (Mainpat India): 1 Student;  
 2012 Fall (Peace Corps Technical Training): 1 Student  
 2011 Fall (International Development Seminar): 2 Students  
 2002 Fall: 1 Student  
 2002 Spring: 1 Student  
 2002 Spring (Fire Ecology): 4 Students

**Independent Study (FOR 299)**

2007 Spring: 1 Student

**Special skills:**

Fluent in Spanish and native (but rusty) speaker of Hungarian, learning French.  
 Cross-cultural experience: living and working in Hispanic, Native American, and European communities in North and South America and Europe.

**Graduate Students Advised**

1 Student, M.F., PCMI (chair)  
 1 Student, Ph. D. (co-chair with Bruce Hungate)  
 1 Student, Ph.D. (chair)  
 1 Student, M.S., PCMI (chair)  
 1 Student, M.F. (co-chair with Andi Thode)  
 1 Student, M.F. (co-chair with Andi Thode)

**Graduate committee member**

1 Student, Ph.D.  
 1 Student, M.S. (U. Arizona)  
 1 Student, M.S. (Environmental Science and Policy)

1 Student, M.S. (Environmental Science and Policy)  
1 Student, M.S.

**Graduated:**

1 Student, Ph.D. (graduated 1999)  
1 Student, M.S. (2000)  
1 Student, M.S. (2000)  
1 Student, M.S. (2001)  
1 Student, M.S. (2001)  
1 Student, M.S. (co-chair w/ Wally Covington, 2001). *Forest roads in northern Arizona: recovery after closure and revegetation techniques.*  
1 Student, M.S. (2001)  
1 Student, Ph.D. (2001)  
1 Student, M.S. (co-chair w/ Wally Covington, 2002). *Plant community and arbuscular mycorrhizal dynamics have implications for determining ponderosa pine reference conditions.*  
1 Student, M.S. (2002)  
1 Student, M.S. (co-chair w/ Carol Chambers, 2003) *Ponderosa pine restoration treatment effects on pinyon mice and deer mice in northwestern Arizona.*  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (Environmental Science and Policy) (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (2003)  
1 Student, M.S. (chair, 2004). *Plant and plant-mycorrhizal interactions across an elevation gradient on the San Francisco Peaks.*  
1 Student, M.S. (chair, 2004). *Fire exclusion and burn severity on the San Francisco Peaks, Arizona.*  
1 Student, M.S. (2004)  
1 Student, M.S. (2004)  
1 Student, M.S. (co-chair with Carolyn Sieg, 2004). *Dalmation toadflax (Linaria damatica) response to wildfire and native species regeneration in ponderosa pine forest.*  
1 Student, M.A. (Liberal Studies) (2004)  
1 Student, M.S. (2004)  
1 Student, M.S. (2004, Colorado State University)  
1 Student, M.S. (chair, 2005). *Comparing methods of reconstructing fire history using fire scars in a southwestern ponderosa pine forest.*  
1 Student, Ph.D. (2005)  
1 Student, M.S. (2005)  
1 Student, M.S. (2005)  
1 Student, M.S. (co-chair with Margaret Moore, 2005). *Fuels and fire behavior modeling using remotely sensed data on the San Francisco Peaks, Arizona.*



1 Student, M.F. (chair, 2005). Professional paper: *Assessment of various methods of canopy cover estimation that yield accurate results with field repeatability.*

1 Student, M.S. (co-chair w/ David Ostergren, Environmental Science and Policy, 2005).

1 Student, M.S. (chair, 2005). *Pre-fire treatment effects and post-fire forest dynamics on the Rodeo-Chediski burn area, Arizona.*

1 Student, M.S. (co-chair with P.J. Daugherty, 2005). *Smoke, risk, and intergenerational equity in Flagstaff, Arizona's wildland-urban interface.*

1 Student, M.S. (co-chair with Carol Chambers, 2005). *Snag and woody debris dynamics following severe wildfires in northern Arizona ponderosa pine forests.*

1 Student, M.S. (chair, 2005). *Monitoring landscape-scale forest structure and fire behavior changes following ponderosa pine restoration treatments.*

1 Student, M.S. (2006).

1 Student, M.S. (2006)

1 Student, Ph.D. (2006)

1 Student, M.S. (co-chair with Carolyn Sieg, 2006). *Pre-fire treatment effects and understory plant community response on the Rodeo-Chediski fire, Arizona.*

1 Student, M.S., Colorado State University (2007)

1 Student, M.S. (2008)

1 Student (co-chair w/ Tina Kennedy, Geography, 2008). *Comparing ecological restoration and northern goshawk management guidelines treatments in a southwestern ponderosa pine forest.*

1 Student, M.S. (Biology) (2009)

1 Student, M.S. (Biology) (2009)

1 Student, M.S. (co-chair w/ Carolyn Sieg, 2009). *Effects and effectiveness of seeding following high-severity wildfire in northern Arizona ponderosa pine forests.*

1 Student, M.S. (chair, 2009). *Evidence-based review of seeding in post-fire rehabilitation and native plant market feasibility.*

1 Student, M.S. (2010)

1 Student, M.S. (chair, 2010). *Modeling forest change, bird communities, and management alternatives on a restored ponderosa pine ecosystem.*

1 Student, M.S. (co-chair with Alan Lew, Geography, 2010). *Simulating the effects of climate change and ecological restoration on wildfire behavior in southwestern ponderosa pine forests.*

1 Student, Ph.D. (co-chair w/ Steve Hart, 2011). *Long-term effects of stand-replacing wildfires on nutrient cycling and decomposition in southwestern ponderosa pine forests.*

1 Student, M.S. (2011)

1 Student, M.S. (2011)

1 Student, M.S. (2011)

1 Student, M.S. (2011)

1 Student, M.F. (2011)

1 Student, M.S. (2011)

1 Student, Ph.D. (chair, 2011). *Influence of climate and local factors on fire in high-elevation forests of Mexico.* (NAU 2011 Most Promising Graduate Student Researcher)

1 Student, Ph.D. (chair, 2011). *The treasure of the Sierra Madre: ecology of old-growth forests in Chihuahua, México.*

1 Student, M.S. (2012)

1 Student, M.S. (co-chair w/ Carolyn Sieg, 2012). *Pre-fire treatments have persistent effects on post-fire plant communities.*

1 Student, Máster en Gestión y Restauración del Medio Natural, Universidad de Alicante, Spain (co-tutor w/ Jordi Cortina, 2012). *Simulando trayectorias de sucesión post-incendio bajo alternativas de clima y gestión: caso de estudio Bosque Nacional de Apache-Sitgreaves, Arizona.*

## **Document E: Individual Faculty Information**

### **MONICA L. GAYLORD**

Assistant Research Professor – 9 month

Date of Appointment: 2001 - Present

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

- 2009            Ph.D. Forestry: Northern Arizona University, Flagstaff, AZ 86011
- 2004            M.S. Forestry: Northern Arizona University, Flagstaff, AZ 86011
- 1992            B.A. in Biology, Minor in Chemistry: Lewis and Clark College, Portland, OR  
97219

### **PROFESSIONAL EXPERIENCE:**

- 2010/Present    Assistant Research Professor, Northern Arizona University, School of Forestry
- 2009/2010      Post-doctoral research associate, Northern Arizona University, School of Forestry
- 2006/2008      Forest Entomology Teaching Assistant, Northern Arizona University, School of  
Forestry
- 2001/2008      Graduate Research Student, Northern Arizona University, School of Forestry
- 2000            Research Assistant, University of Minnesota, Department of Forestry, St. Paul,  
MN
- 1993/1998      Forestry Technician/Supervisory Forestry Technician, Flathead National Forest,  
Kalispell, MT

### **TEACHING EXPERIENCE:**

FOR212 Trees and Forests of North America  
FOR222 Environmental Conservation

### **PUBLICATIONS:**

M.L. Gaylord, T.E. Kolb, W.T. Pockman, J.A. Plaut, E.A. Yopez, A.K. Macaladay, R.E. Pangle, and N.G. McDowell. 2013. Drought causes insect attacks and decline of piñon-juniper woodlands, *New Phytologist*; In revision.

R.W. Hofstetter, M.L. Gaylord, S. Martinson, and M.R. Wagner. Attraction to monoterpenes and beetle-produced compounds by syntopic *Ips* and *Dendroctonus* bark beetles and their predators

Agriculture and Forest Entomology, 14: 207-215..

M.L. Gaylord, R.W. Hofstetter, T.E. Kolb, M.R. Wagner. 2011. Limited response of ponderosa pine bole defenses to wounding and fungi. Tree Physiology, 31: 428-437.

M.L. Gaylord, R.W. Hofstetter, M.R. Wagner. 2010. Impacts of silvicultural thinning treatments on beetle trap captures and tree attacks during low bark beetle populations in ponderosa pine forests of northern Arizona. Journal of Economic Entomology. 103: 1693-1703.

R. Hofstetter, Z. Chen, M. Gaylord, J. McMillin & M. Wagner. 2008. Synergistic effects of the attractants  $\alpha$ -pinene and *exo*-brevicommin on the southern and western pine beetle and associated predators in Arizona. J. Appl. Entomology 132: 387-397.

M. L. Gaylord, K. K. Williams, R. W. Hofstetter, J. D. McMillin, T. E. DeGomez and M. R. Wagner. 2008. Influence of temperature on spring flight initiation for southwestern ponderosa pine bark beetles (Coleoptera: Curculionidae, Scolytinae) Environmental Entomology 37: 57-69.

M. L. Gaylord, T. E. Kolb, K. F. Wallin, and M. R. Wagner. 2007. Seasonal dynamics of tree growth, physiology and resin defenses in a northern Arizona ponderosa pine forest. Canadian Journal of Forest Research 37: 1173-1183.

M. L. Gaylord, T. E. Kolb, K. F. Wallin, and M. R. Wagner. 2006. Seasonality and lure preference of bark beetles (Curculionidae: Scolytinae) and associates in a northern Arizona ponderosa pine forest. Environmental Entomology 35:37-47.

## **PRESENTATIONS:**

### ***Invited presentations:***

*May 2011: North American Forest Insect Work Conference, Portland, OR*

The carbon starvation hypothesis: relationship to host defense theory

Monica L. Gaylord, Thomas E. Kolb, Nate G. McDowell, William T. Pockman

*March 2008: Western Forest Insect Work Conference, Boulder, CO*

Impacts of thinning ponderosa pine on pine bark beetles in northern Arizona

Monica L. Gaylord, Richard W. Hofstetter and Michael R. Wagner

*January 2008, Association for Fire Ecology, Tucson, AZ*

Impacts of thinning ponderosa pine on pine bark beetles in northern Arizona

Monica L. Gaylord, Richard W. Hofstetter and Michael R. Wagner

### ***Other presentations:***

*August 2012: Ecological Society of America, Portland, OR*

Talk: Drought and insect attacks cause decline of piñon-juniper woodlands.

Monica L. Gaylord, Thomas E. Kolb, Alison K. Macalady, Robert E. Pangle, Jennifer A. Plaut, William T. Pockman, Enrico A. Yezzer, and Nate G. McDowell

*April 2010, Western Forest Insect Work Conference, Flagstaff, Arizona*

Talk: Does drought predispose piñon pine trees to insect attack?

Monica L. Gaylord, Thomas E. Kolb, Nate McDowell, Will Pockman, Enrico Yezzer, and Jen Plaut

*August 2009, Ecological Society of America, Albuquerque, New Mexico*

Poster: Does drought predispose piñon pine trees to insect attack?

Monica L. Gaylord, Thomas E. Kolb, Nate McDowell, Will Pockman

*July 2008, International Union of Forest Research Organization, Pretoria, South Africa*

Talk: Relationship between monoterpenes, silvicultural treatments, and bark beetles in ponderosa pine in northern Arizona

Monica L. Gaylord, Richard W. Hofstetter and Michael R. Wagner

*July 2008, International Congress of Entomology, Durban, South Africa*

Talk: Impacts of thinning ponderosa pine forests on pine bark beetles: implications for mitigating climate change

Monica L. Gaylord, Richard W. Hofstetter and Michael R. Wagner

*March 2007: Western Forest Insect Work Conference, Boise ID.*

Talk: Impacts of thinning ponderosa pine on pine bark beetles in northern Arizona

Monica L. Gaylord, Richard W. Hofstetter and Michael R. Wagner

*May 2006. North American Forest Insect Work Conference, Asheville, NC*

Poster presentation: Flight temperature thresholds for southwestern ponderosa pine bark beetles

Monica L. Gaylord, Kelly Williams, Richard W. Hofstetter, Joel D. McMillin, Tom DeGomez and Michael R. Wagner

*October 2005, Western Bark Beetle Initiative, Midland, UT*

Poster presentations: Flight temperature thresholds for Southwestern ponderosa pine bark beetles

Monica L. Gaylord, Richard Hofstetter, Michael R. Wagner, and Joel D. McMillin

And Thinning guidelines to prevent ponderosa pine bark beetle outbreaks in the Southwest

Monica L. Gaylord, Richard Hofstetter, Michael R. Wagner, and Joel D. McMillin

And Influence of host volatiles as pheromone synergists for the southern and western pine beetle in Arizona.

Richard W. Hofstetter, Zhong Chen, Monica L. Gaylord, and Michael R. Wagner

*March 2005, Western Forest Insect Work Conference, Victoria, BC Canada*

Talk: Mechanistic understanding of the impacts of thinning ponderosa pine on pine bark beetles

Monica L. Gaylord and Michael R. Wagner

*April 2004, Western Forest Insect Work Conference, San Diego, CA*

Poster: Seasonality of Bark Beetles (Coleoptera: Scolytidae) and associated predators in a ponderosa pine forest in northern Arizona.

Monica L. Gaylord, Thomas E. Kolb, Eric L. Smith, Michael R. Wagner, and Kimberly F. Wallin

*November 2003, Western Forest Insect Work Conference, Guadalajara, Mexico*

**Talk: Seasonal dynamics of bark beetle flight and tree growth and resin defenses in a northern Arizona ponderosa pine forest; 2002-2003.**

**Monica L. Gaylord, Thomas E. Kolb, Eric L. Smith, Michael R. Wagner and Kimberly F. Wallin**

*October 2003, International Union of Forest Research Organization bark beetle working group, Blodgett, CA.*

Poster: Seasonal dynamics of bark beetle flight and tree growth and resin defenses in a northern Arizona ponderosa pine forest; 2002-2003.

Monica L. Gaylord, Michael R. Wagner, Thomas E. Kolb and Kimberly F. Wallin

*November 2002, Entomological Society of America, Ft. Lauderdale, FL*

Poster: Seasonal dynamics of bark beetle flight and tree growth and physiology in a northern Arizona ponderosa pine forest.

Monica L. Gaylord, Michael R. Wagner, Thomas E. Kolb and Kimberly F. Wallin

*June 2002, International Union of Forest Research Organization, Flagstaff, Arizona*

Talk: Preliminary findings on bark beetle flight and ponderosa pine physiology and growth near Flagstaff, Arizona.

Monica L. Gaylord, Michael R. Wagner, Thomas E. Kolb and Kimberly F. Wallin

*March 2002, Western Forest Insect Work Conference, Whitefish, MT.*

Talk: Preliminary findings on bark beetle flight and ponderosa pine physiology and growth near Flagstaff, Arizona.

Monica L. Gaylord, Michael R. Wagner, Thomas E. Kolb and Kimberly F. Wallin

## **PROFESSIONAL AND VOLUNTEER ACTIVITIES:**

*March 2012, October 2012, Volunteer guest lecturer for Master Gardner Class, University of Arizona Extension Agency*

*February 2012, National Science Foundation Grant Review Panel*

*May 2011, Volunteer judge for Graduate Student Poster Competition at North American Forest Insect Work Conference*

*April 2011 & 2012, Volunteer judge for Undergraduate Research Poster Competition at Northern Arizona University*

*June 2010 – present: Member of Raymond Foundation, a philanthropic organization dedicated to providing scholarships to students in Coconino County.*

*April 2010-present:* Chair for the Western Forest Insect Workshop Conference, Scholarship Fundraising Committee

*June 2003 – present:* Member of the Arizona bark beetle task force.

*January 2003- May 2009:* Active member of the Forestry Seminar Coordination Committee and Forestry Graduate Student Association.

*August 2005 – December 2008:* Graduate student liaison to the faculty for the Forestry Graduate Student Association.

*August 2005,* Volunteer guest lecturer for BIO 109 at Coconino Community College

*June 2005,* Volunteer guest lecturer at the Junior Forester Academy, Northern Arizona University

*January 1999 – May 2000:* Volunteer with the Nature Conservancy, Minnesota Chapter, Minneapolis, MN

### **AWARDS:**

2008 Entomological Society of America Travel Award to attend the International Conference of Entomology in South Africa

2007 Western Forest Insect Work Conference Memorial Scholarship award winner

2007 NAU, School of Forestry, General Scholarship

2002 Entomological Society of America Student Poster Competition, Honorable Mention.

### **AWARDED GRANTS:**

9/15/2011 – 8/31/2013. PI. National Science Foundation. Challenging a Mutualism Paradigm: Do Bark Beetles Need Fungi? Total funding: \$150,000.

### **PEER REVIEWER FOR:**

Agricultural and Forest Entomology, eXtension Community of Practice on Climate, Forests and Woodlands, Forest Ecology and Management, National Science Foundation, Oikos, PLoS ONE, Physiological Entomology, Tree physiology and Western Journal of Forestry.

## Document E: Individual Faculty Information

### **RICHARD HOFSTETTER**

Associate Professor – 9 month – Tenured

Date of Appointment: 2005 – Present

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

- 2004            Ph.D. Ecology and Evolution  
Dartmouth College Hanover, New Hampshire
- 1996            M.S, Entomology  
University of Wisconsin-Madison Madison, Wisconsin
- 1992            B.S., Population Biology  
University of Wisconsin-Madison Madison, Wisconsin

### **PROFESSIONAL AND RESEARCH EXPERIENCE:**

- 2011/Present   Associate Professor of Forest Entomology, School of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2008/2011      Assistant Professor of Forest Entomology. School of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2005/2008      Assistant Professor-Research. School of Forestry, Northern Arizona University, Flagstaff, Arizona

### **RESEARCH**

- 2005/2008      Assistant Professor - Research. School of Forestry, NAU Population dynamics, community associations, and plant-insect interaction involving bark beetles in western North America.
- 2004            NSF Post-Doctoral Fellowship. Dept. of Biol. Sciences, Dartmouth College  
Community interactions and population dynamics of the Mexican and southern pine beetle.
- 1998/2003      Dartmouth Doctoral Fellowship, Dept. of Biol. Sciences, Dartmouth College.  
*Ph.D. Research.* Studying the role of antagonism, commensalism and mutualism in the southern pine beetle community.
- 1996/1998      Research Specialist, U.S.D.A., Agricultural Research Station, Yakima, WA.  
Provided technical assistance in chemical ecology research. Studies included codling moth orientation to apple volatiles, electro-antennogram responses of



codling moth to food odorants, developing yellow jackets lures, repellents for codling moths, Colorado potato beetle foraging behavior, and effects of methyl jasmonate on plant defenses and herbivore attraction.

- 1996 Research Specialist, Department of Forestry, University of Wisconsin. Studied the distribution of spring ephemerals in old growth forests of northern Wisconsin and upper Michigan.
- 1993/1996 Research Assistantship, Department of Entomology, University of Wisconsin. *M.S. Research*. Studied the effects of gypsy moth diet on the behavior, performance and fecundity of the egg parasitoid *Ooencyrtus kuvanae*.
- 1991/1993 Research Technician, Department of Entomology, University of Wisconsin. Studied tritrophic interactions involving bark beetles, Red pine and associated fungi, specifically 'Red Pine Pocket Decline', and population dynamics of pine sawflies, thrips, root weevils, and Jack pine budworm. Wetland Field Research Assistant, Hydrologic Associates, Miami, FL. Summer 1990. On subcontract from the Department of Biology, University of Miami, Coral Gables, FL. Studied the effects of exotic species on native grasses of the Everglades.
- 1988/1989 Wetland Field Research Assistant, University of Miami, FL. Surveyed dispersion and growth of *Melaleuca quinquenervia*, an exotic invasive, throughout the Everglades National Park and surrounding areas.

### **TEACHING EXPERIENCE:**

- 2005/Present Associate and Assistant Professor, School of Forestry,  
Northern Arizona University, Flagstaff, AZ  
BIO 599 Genes to Environment  
BIO 698 Mutualism Theory  
ENV 698 Mutualism Theory  
FOR 443/553 Forest Entomology  
FOR 698 Mutualism Theory

### **Other Courses:**

Semester A: Forestry Ecology (Ent. and Path. Section)  
Proseminar (Graduate course in presenting research)  
Undergraduate Research Studies  
Freshman Seminar Series: Sex, bugs and rock-n-roll (creator of course, new)  
Tropical Forest Insect Ecology, International course in Nicaragua (creator of course, new)  
(FOR441/BIO499/599)  
Mutualism Theory (FOR698/BIO698/ENV698)  
Distributed Grad. Sem.: Econ./Ecol. Impacts of Non-natives (new course)  
Forest Health

Courses in San Ramon, Costa Rica with USAC Visiting Faculty

Forest Entomology BIOL/ENV300  
Tropical Forest Ecology: Insects and People BIOL/ENV300

Courses in Rocky Mountain Research Station and School of Forestry, NAU  
Bark Beetle Workshop, 5 day course for students and professionals

## **REFERRED JOURNALS**

Acta Zoologica  
Agriculture and Forest Entomology  
Biological Journal of the Linnean Society  
Canadian Entomologist  
Canadian Journal of Forest Research Ecology  
Ecological Entomology  
Ecological Monographs  
Ecology  
Ecology and Forest Management  
Ekologija  
Entomologica Fennica  
Entomological News  
Environmental Entomology  
European Journal of Entomology Forest Science  
Florida Entomologist  
Industry Crops and Products  
Journal of Applied Entomology  
Journal of Applied Forestry  
Journal of Chemical Ecology  
Journal of Insect Science  
Kuwait Journal of Science and Engineering  
Microbial Ecology  
Naturwissenschaften  
Mycology  
Oecologia  
Oikos  
Western North America Naturalist  
Zoologischer Anzeiger

*Reviewed from August 2012-2013: Environmental Entomology (3), Ecological Monographs (1)*

## **REFEREED ARTICLES:**

Hofstetter, R.W. Ecology and management of tree-killing bark beetles: International perspectives. ISRN Forestry – Spot Light Article (*to submit June 2013*)

Hofstetter, R.W., D.D. Dunn, and R. McGuire. Changing insect behavior using biologically relevant sounds integrated with chaos. *Science (to resubmit)*

Six, D.L., R.W. Hofstetter, and K.D. Klepzig. Geographic variation in the symbiont community of a bark beetle: Implications for understanding population dynamics and symbiont community composition in widely-distributed hosts. *Environmental Entomology*

Hofstetter, R.W., M.J. Lombardero, K.D. Klepzig, and M.P. Ayres. Effects of pine oleoresin on bark beetle attack behavior and population dynamics. *Oikos*.

Garcia, A., S. Smith, and R.W. Hofstetter. Effects of crown scorch on bark beetle attraction to ponderosa pine xylem resin. *Environmental Entomology*.

Garcia, A., S. Smith, and R.W. Hofstetter. Effects of fire seasonality and fire-caused tree injury on the susceptibility and resistance of *Pinus ponderosa* var. *ponderosa* to bark beetles. *Agriculture and Forest Entomology*.

Hofstetter, R.W., M. Halevy & K.F. Raffa. Oviposition behavior of a quasi-gregarious parasitoid, *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae). *Ecol. Entomology*.

Reboletti, D., R. Hofstetter, E. Aldan & J.C. Moser. Phoretic mites and fungi associated with the Western Balsam Bark Beetle, *Dryocoetes confusus* in Arizona. *Western Naturalist*.

Reboletti, D., R. Hofstetter & J.C. Moser. Phoretic mites associated with the mountain pine beetle, *Dendroctonus ponderosae* in the Black Hills, South Dakota. *Agricultural and Forest Entomology*.

## **REFERRED JOURNALS:**

Smith, L., R. Hofstetter, and R. Mathiasen. 2013. Insect communities associated with Douglas-fir dwarf mistletoe witches' brooms in Northern Arizona. *The Southwestern Naturalist (in press)*.

Yturralde, K.M. and R.W. Hofstetter. 2012. Efficacy of commercially available ultrasonic pest repellent devices to affect behavior of bed bugs, *Cimex lectularius*. *Journal of Economic Entomology* 105(6): 2107-2114.

Davis, T.S. and R.W. Hofstetter. 2012. Plant secondary chemistry mediates the performance of a nutritional symbiont associated with a tree-killing herbivore. *Ecology* 93(2): 421-429.

Hofstetter, R.W., M.L. Gaylord, S. Martinson and M. Wagner. 2012. Attraction to monoterpenes and beetle-produced compounds by syntopic *Ips* and *Dendroctonus* bark beetles and their predators. *Agriculture and Forest Entomology* 14: 207-215.

Davis, T., K. Jarvis, K. Parise and R. Hofstetter. 2011. Oleoresin exudation rate increases and viscosity declines following a fire event in a ponderosa pine ecosystem. *Journal of the Arizona-Nevada Academy of Science* 43(1): 6-11.

- Davis, T.S. and R.W. Hofstetter. 2011. Oleoresin chemistry mediates oviposition behavior and fecundity of a tree-killing bark beetle. *Journal of Chemical Ecology* 37: 1177-1183.
- Smith, L., R. Mathiasen and R. Hofstetter. 2011. Biomass of witches' brooms caused by Douglas-fir mistletoe in northern Arizona. *Journal of the Arizona-Nevada Academy of Science* 43(1): 40-47.
- Evans, L.M., R.W. Hofstetter, M.P. Ayres and K.D. Klepzig. 2011. Temperature changes a community: *Dendroctonus frontalis* and its symbionts. *Environmental Entomology* 40(4): 824-834.
- Davis, T.S. and R.W. Hofstetter. 2011. Reciprocal interactions between the bark-beetle associated yeast *Ogataea pini* and host plant phytochemistry. *Mycologia* 103(6): 1201-1207.
- Hofstetter, R.W. and M.R. Wagner. 2011. Carbon, bark beetles and biofuel. *Journal of Forestry* 109: 245-246.
- Gaylord, M.L., R.W. Hofstetter, T.E. Kolb and M.R. Wagner. 2011. Limited response of ponderosa pine bole defenses to wounding and fungi. *Tree Physiology* 31: 428-437.
- Davis, T.S., R.W. Hofstetter, J.T. Foster, N.E. Foote and P. Keim. 2011. Interactions between the yeast *Ogataea pini* and filamentous fungi associated with the western pine beetle. *Microbial Ecology* 61: 626-634
- Hulcr, J., A.S. Adams, K.F. Raffa, R.W. Hofstetter, K.D. Klepzig, and C.R. Currie. 2011. Presence and diversity of *Streptomyces* in *Dendroctonus* and sympatric bark beetle galleries across North America. *Microbial Ecology* 61: 759-768
- Davis, T.S., R.W. Hofstetter, K.D. Klepzig, J.T. Foster, and P. Keim. 2010. Interactions between multiple fungi isolated from two bark beetles, *Dendroctonus brevicomis* and *D. frontalis* (Coleoptera: Curculionidae). *Journal of Yeast and Fungal Research* 1: 118-126.
- Gaylord, M. L., R.W. Hofstetter, and M.R. Wagner. 2010. Impacts of silvicultural thinning treatments on bark beetle trap captures and tree attacks during low bark beetle populations in ponderosa pine forests of northern Arizona. *Journal of Economic Entomology* 103(5): 1693-1703.
- Fischer, M., K. Waring, R. Hofstetter & T. Kolb. 2010. Ponderosa Pine Characteristics Associated with Attack by the Roundheaded Pine Beetle. *Forest Science* 56: 473-483.
- Waring, K.M., D.M. Reboletti, L.A. Mork, C.H. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fule, and T.S. Davis. 2009. Modeling the impacts of two bark beetle species under a warming climate in the southwestern USA: Ecological and economic consequences. *Environmental Management* 44: 824-835.
- Davis, T.S. and R.W. Hofstetter. 2009. The effects of gallery density and ratio on the fitness and fecundity of two sympatric bark beetles. *Environmental Entomology* 38(3): 639-650.

- Hofstetter, R.W., J.C. Moser, and R. McGuire. 2009. Observations of the mite *Schizosthetus lyriformis* (Acari: Parasitidae) preying on bark beetle eggs and larvae. *Entomological News* 120(4): 397-400.
- Raffa, K.F., B. Aukema, B.J. Bentz, A. Carroll, N. Erbilgin, D.A. Herms, J.A. Hicke, R.W. Hofstetter, S. Katovich, B.S. Lindgren, J. Logan, W. Mattson, A.S. Munson, D.J. Robinson, D.L. Six, P.C. Tobin, P.A. Thowsend and K.F. Wallin. 2009. A literal use of "Forest Health" safeguards against misuse and misapplication. *J. Forestry* 107: 276-277.
- Hayes, C.J., R.W. Hofstetter, T.E. DeGomez, and M. Wagner. 2009. Effects of sunlight exposure and log size on pine engraver (Coleoptera: Scolytidae) reproduction in ponderosa pine slash in Northern Arizona. *Agriculture and Forest Entomology* 11: 341-350.
- Hofstetter, R.W., Z. Chen, M. Gaylord, J. McMillin & M. Wagner. 2008. Synergistic effects of the attractants  $\alpha$ -pinene and *exo*-brevicommin on the southern and western pine beetle and associated predators in Arizona. *J. Appl. Entomology* 132(5): 387-397.
- Hayes, C.J., T.E. DeGomez, J.D. McMillin, J.A. Anhold and R.W. Hofstetter. 2008. Factors influencing pine engraver (*Ips pini* Say) colonization of ponderosa pine (*Pinus ponderosa* Dougl. ex. Laws.) slash in Northern Arizona. *Forest Ecology and Management* 255: 3541-3548.
- Gaylord, M.L., K.B. Williams, R.W. Hofstetter, J.D. McMillin, T.E. DeGomez, & M.R. Wagner. 2008. Influence of temperature on spring flight initiation for southwestern ponderosa pine bark beetles (Coleoptera: Curculionidae, Scolytidae). *Environmental Entomology* 37:57-69.
- Pureswaran, D.S., R.W. Hofstetter, & B. Sullivan. 2008. Attraction of the southern pine beetle, *Dendroctonus frontalis* to pheromone components of the western pine beetle, *Dendroctonus brevicomis* (Coleoptera: Curculionidae: Scolytinae) in an allopatric zone. *Environmental Entomology* 37: 70-78.
- Martinson, S., M.P. Ayres & R.W. Hofstetter. 2007. Why does longleaf pine have low susceptibility to southern pine beetle? *Can. J. For. Research* 37: 1966-1977.
- Hofstetter, R.W., T.D. Dempsey, K.D. Klepzig & M.P. Ayres. 2007. Temperature-dependent effects on mutualistic and phoretic associations. *Community Ecology* 8(1): 47-56.
- Hofstetter, R.W., K. D. Klepzig, J.C. Moser & M.P. Ayres. 2006. Seasonal dynamics of mites and fungi and interactions with southern pine beetle. *Environmental Entomology* 35: 22-30.
- Kolb, T.E., N. Guerard, M.R. Wagner, and R.W. Hofstetter. 2006. Attack preference of *Ips pini* in northern Arizona: tree size and bole position. *Agriculture and Forest Entomology* 8:295-303.
- Hofstetter, R.W., J. Cronin, K. D. Klepzig, J.C. Moser & M.P. Ayres. 2006. Antagonisms, mutualisms and commensalisms affect outbreak dynamics of the southern pine beetle. *Oecologia* 147(4): 679-691.

- Hofstetter, R. W., J. Mahfous, K. D. Klepzig, & M.P. Ayres. 2005. Effects of tree phytochemistry on the interactions between endophloedic fungi associated with the southern pine beetle. *Journal of Chemical Ecology* 31(3): 551-572.
- Klepzig, K.D., J. Flores-Otero, R.W. Hofstetter & M.P. Ayres. 2004. Effects of available water on growth and competition of southern pine beetle associated fungi. *Mycological Research* 108: 183-188.
- Lombardero, M.J., R.W. Hofstetter, M.P. Ayres, K. Klepzig & J. Moser. 2003. Strong indirect interactions among *Tarsonemus* mites (Acarina: Tarsonemidae) and *Dendroctonus frontalis* (Coleoptera: Scolytidae). *Oikos* 102: 342-352.
- Veysey, J.S., M.P. Ayres, M.J. Lombardero, R.W. Hofstetter & K. Klepzig. 2003. The effect of host species on reproductive success of *Dendroctonus frontalis* (Coleoptera: Scolytidae). *Environmental Entomology* 32(2): 668-679.
- Klepzig, K.D., J.C. Moser, F.J. Lombardero, R.W. Hofstetter & M.P. Ayres. 2001. Symbiosis & Competition: Complex interactions among beetles, fungi, and mites. *Symbiosis* 30:83-96.
- Landolt, P.J., J.A. Brumley, C.L. Smithhisler, L.L. Biddick & R.W. Hofstetter. 2000. Apple fruit infested with codling moth are more attractive to neonate codling moth larvae and possess increased amounts of (E,E)- $\alpha$ -Farnesene. *Journal of Chemical Ecology* 26(7):1685-1699.
- Landolt, P.J., R.W. Hofstetter & L.L. Biddick. 1999. Plant essential oils as arrestants and repellents for neonate larvae of the codling moth (Lepidoptera: Tortricidae). *Environmental Entomology* 28(6): 954-960.
- Landolt, P.J., R.W. Hofstetter & P.S. Chapman. 1998. Neonate codling moth larvae (Lep.: Tortricidae) orient anemotactically to odor of immature apple fruit. *Pan-Pacific Entomologist* 74(3): 140-149.
- Hofstetter, R.W. & K.F. Raffa. 1998. Endogenous and external factors affecting parasitism of gypsy moth egg masses by *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae). *Ent. Exp. Appl.* 88: 123-135.
- Hofstetter, R.W. & K.F. Raffa. 1997. Effects of host's diet on the orientation, development, and subsequent generations of the egg parasitoid, *Ooencyrtus kuvanae*. *Environmental Entomology* 26(6): 1276-1282.
- Hofstetter, R.W. & K.F. Raffa. 1997. New host record for *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae). *Ent. News* 108(1): 63-65.

#### **REFERRED ARTICLES AND BOOK CHAPTERS:**

***In review***

Davis, T.S. and R.W. Hofstetter. Allometry of phloem thickness and resin flow and their relation to tree chemotype in southwestern ponderosa pine. *Journal of Forest Science* (*submitted Nov. 2012*)

Foelker, C.J. and R.W. Hofstetter. Bark beetles exhibit sexual size dimorphism and variable size heritability patterns. *Environmental Entomology* (*submitted December 2012*)

Yturralde, K.M. and R.W. Hofstetter. Acoustic sounds and structures associated with *Dendroctonus approximatus*. *Journal of Insect Behavior* (*submitted January 2013*)

Mercado, J. and R.W. Hofstetter. Ectobionts (external fauna) associated with the mountain pine beetle. *Journal of Forest Science* (*to submit January 2013*)

Daniel R. Miller, Kevin J. Dodds, Andy Eglitis, Christopher J. Fettig, Richard W. Hofstetter, David W. Langor, Albert E. Mayfield III, A. Steven Munson, Therese M. Poland, and Kenneth F. Raffa. 2013. Trap Lure Blend of Pine Volatiles and Bark Beetle Pheromones for *Monochamus* spp. (Coleoptera: Cerambycidae) in Pine Forests of Canada and the United States. *Journal of Economic Entomology* (*submitted February 2013*)

Pureswaran, D.S., R.W. Hofstetter, B.T. Sullivan and A. Grady. Cooperative mass attack behaviour favours pheromone signal overlap between sympatric sibling species of tree-killing bark beetles. *Proceedings of the Royal Society B* (*to submit March 2013*)

Hofstetter, R.W. and J.C. Moser. 2013. Role of mites in insect-fungus associations. *Annual Review of Entomology* (*to submit March 2013*)

Davis, T.S., R.W. Hofstetter et al. 2013. Effects of microbial volatiles on arthropod behavioral ecology. (review article) *Journal of Chemical Ecology* (*to submit April 2013*).

**BOOK CHAPTERS:**

Cardoza, Y.J., R.W. Hofstetter and F.E. Vega. 2012. Chapter 8: Insect-associated microorganisms and their possible role in Outbreaks. *In Insect Outbreaks Revisited* (eds. P. Barbosa, D.K. Letourneau, A.A. Agrawal). Pages 155-174.

Hofstetter, R.W., J.C. Moser, and S. Blomquist. 2012. Chapter 14: Mites associated with bark beetles and their hypophoretic Ophiostomatoid fungi. *In The Ophiostomatoid Fungi: Expanding Frontiers* (Wingfield & Seifert, eds.).

Klepzig, K.D. & R.W. Hofstetter. 2012. From Attack to Emergence: Interactions between southern pine beetle, mites, microbes and trees. *In The Ophiostomatoid Fungi: Expanding Frontiers* (Wingfield & Seifert, eds.).

Fierke, M.K., D. Nowak, and R.W. Hofstetter. 2011. Chapter 9: Forest Health Monitoring. *In Using the Baseline Mortality Concept in Forest Health* (eds. John Castello and Steve Teale). SUNY College of Environmental Science and Forestry. Cambridge University Press.

Klepzig, K.D. & R.W. Hofstetter. 2011. Chapter 9: From Attack to Emergence: Interactions between southern pine beetle, mites, microbes and trees. *In* Southern Pine Beetle II (K.D.

Klepzig & R. Coulson, eds.). United States Dept. of Agriculture Forest Service, Southern Research Station General Technical Report SRS-140. Pages 141-152.

[http://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs140/gtr\\_srs140.pdf](http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs140/gtr_srs140.pdf)

Hofstetter, R.W. 2011. Chapter 11: Mutualists and Phoronts of the Southern Pine Beetle. *In* Southern Pine Beetle II (K.D. Klepzig & R. Coulson, eds.). United States Dept. of Agriculture Forest Service, Southern Research Station General Technical Report SRS-140. Pages 161-181.

[http://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs140/gtr\\_srs140.pdf](http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs140/gtr_srs140.pdf)

Klepzig, K.D., J.C. Moser, F.J. Lombardero, M.P. Ayres, R.W. Hofstetter & C.J. Walkinshaw. 2001. Mutualism and antagonism: Ecological interactions among bark beetles, mites and fungi. Pp. 237-267. *In*: Biotic Interactions in Plant-Pathogen Associations (eds. M.J. Jeger & N.J. Spence). CAB International.

#### **OTHER PUBLICATIONS:**

Hofstetter, R.W. 2012. Conserving and contrasting urban biodiversity across the globe. 2<sup>nd</sup> International Indonesian Conference on Biodiversity. Meeting Proceedings.

McMillin, J., R.W. Hofstetter, and N. Aflitto. 2012. Bark beetle activity associated with Hart Prairie fuels reduction and forest health restoration project. USDA Forest Service Southwestern Region Forest Health Report. File Code 3420. 13 pages.

Hofstetter, R.W. and K.B. London. 2012. Unexpected insect outbreaks. Arizona Daily Sun. 18 June 2012.

Hofstetter, R.W. and K.B. London. 2011. Scabies from mites: a primer. Arizona Daily Sun. 18 November 2011.

Davis, T.S. 2011. Response of a beetle-microbe complex to variation in host tree phytochemistry. Ph.D. Dissertation. Northern Arizona University, Flagstaff, AZ.

Hofstetter, R.W. and K.B. London. 2011. Students learn science and culture in Nicaragua. Four Seasons Newsletter. Spring publication. Published by School of Forestry, NAU.

Hofstetter, R.W. Driving beetles crazy. OnEarth Magazine. Summer 2010.

Hofstetter, R.W., M.P. Ayres, K.D. Klepzig, P.A. Marino, and M.J. Lombardero. 2010. Symbiosis in forest pestilence. Abstract page 361 *in* The International Forestry Review. Proceedings of the XXII IUFRO World Congress, Seoul, Republic of Korea.



Hofstetter, R.W., C. Hayes, J. McMillin, C. Fettig, and M.P. Ayres. 2010. Relating bark beetle trap catch with beetle populations within trees across stands. Abstract page 367 in *The International Forestry Review*. Proceedings of the XXII IUFRO World Congress, Seoul, Republic of Korea.

Davis, T.S. and R.W. Hofstetter. 2010. Host-tree phytochemistry has non-additive effects on mycangial fungi isolated from *Dendroctonus brevicomis*. Abstract page 354 in *The International Forestry Review*. Proceedings of the XXII IUFRO World Congress, Seoul, Republic of Korea.

Fischer, M.J., K.M. Waring, R.W. Hofstetter, T.E. Kolb. 2008. The resin composition of ponderosa pine (*Pinus ponderosa*) attacked by the roundheaded pine beetle (*Dendroctonus adjunctus*) (Coleoptera: Curculionidae, Scolytinae). Pages 245-251 in: S.D. Olberding, M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Yeager, A. 2008. The ultrasonic din of dying trees inspires a new kind of research to save forests from beetle attack – and battle climate change. *Science News*. August 30. Pages 26-27. (description of my beetle-acoustic research performed at NAU)

Hofstetter, R.W. 2006. Pine hosts and beetle pheromones. In *The IPM Practitioner Volume XXVIII No. 9* September/October 2006. Bio-Integral Resource Center, Berkeley CA.

Hofstetter, R. W. 2004. Population dynamics and community ecology of the southern pine beetle. Ph.D. Thesis, Dartmouth College. Hanover, NH.

Hofstetter, R.W., J.C. Moser, K.D. Klepzig & M.P. Ayres. 2002. Can mites impact the fungal communities of bark beetles? 53<sup>rd</sup> Western Forest Insect Work Conference Proceedings. Whitefish, MT. Pages 111-112.

Hofstetter, R. W., K. D. Klepzig, M. P. Ayres and J. C. Moser. 2001. Symbiotic associations and the ecology of the southern pine beetle. *Ecological Society of America Annual Meeting Proceedings* 86: 114-115.

Hofstetter, R.W. 1996. Factors affecting the biology and population dynamics of the gypsy moth egg parasitoid, *Ooencyrtus kuvanae* (Howard). M.S. Thesis, University of Wisconsin, Madison.

## **GENERAL PRESENTATIONS, INTERVIEWS, & PUBLICATIONS**

NPR Blog. Buzz Off: Bedbugs Unfazed By Ultrasonic Devices.

<http://www.npr.org/blogs/health/2012/12/10/166754450/ultrasonic-devices-may-be-cheap-but-they-don-t-repel-bed-bugs> December 2012.

Knolls Elementary School Science Night November 2012.

Willow Bend Science Education Program – Bark beetles and Ponderosa pine forests, Willow Bend Education Center October 2012.

Science & Engineering Day at NAU – Bark beetle biology and acoustics, High Country Conference Center 2012.

Arizona Game and Fish Department Regional Meeting – Bark Beetle Research, March 2012.

Science & Engineering Day at NAU – Bark beetle biology and control, High Country Conference Center 2011.

Description of beetle research in Grow Magazine – Wisconsin’s Magazine for the Life Sciences 2011.

Blasting bark beetles. Museum of Northern Arizona, Science Week. Sept 28, 2011.

Controlling beetles with sound. Flagstaff Exchange Club. April 20, 2011.

Bark beetle acoustics. Flagstaff Leadership Program, Science Education day. May 20, 2010.

Use of acoustics to affect bark beetles. News Interviews: Channel 12 Phoenix Feb. 8, 2010; Channel 4 Flagstaff Nov 23. 2010, Channel 13 Tucson. Radio station interviews on acoustic bark beetle research: NPR-KNAU (Nov. 23, 2010), KJAZZ (Nov. 2010), KYFI Phoenix; ‘Living on Earth’ and ‘Market Place’ NPR. Newspaper articles: USA Today, Arizona Republic, Daily Sun, Front Page, Inside NAU, Newswise, KTAR.com. OnEarth Magazine. The Atlantic Journal ‘Beetle Mania’ Jan/Feb 2010 edition. Science News ‘The ultrasonic din of dying trees inspires a new kind of research to save forests from beetle attack – and battle climate change. Aug 30, 2008.

Impact of sawfly outbreak near Kendrick Mountain. KNAU TV station, Sept 10, 2009.

Interactions between bark beetles, fire, drought affecting ponderosa pine mortality in the west. KNAU TV station February 2009.

Organizer, developer and teacher of Bark Beetle Workshop. Five day workshop/course during summer offered to professionals, entomologists, foresters and students. Started August 2010.

### **PRESENTATIONS (\*- Invited)**

\*Hofstetter, R.W. Contrasting and comparing urban biodiversity across the globe. International conference of biodiversity. KEYNOTE SPEAKER. Lombok Indonesia. November 2012.  
Hofstetter, R.W., D.D. Dunn and R. McGuire. Use of acoustics to protect trees and control bark beetles. North America Forest Insect Work Conference. Portland, OR May 2011.

Hofstetter, R.W., D.D. Dunn, R. McGuire and K. Yturralde. Controlling pest insects with acoustics. North America Forest Insect Work Conference. Portland, OR May 2011.

Hofstetter, R.W., R. McGuire, D.D. Dunn, and D.S. Pureswaran. Role of inter- and intraspecific acoustic communication in bark beetles and acoustic control of insects. Entom. Society of America National Meeting. San Diego, CA Dec. 2010.

\*Hofstetter, R.W., M.P. Ayres, K.D. Klepzig, P.A. Marino, and M.J. Lombardero. Symbiosis in forest pestilence. The International Forestry Review. XXII IUFRO World Congress, Seoul, Republic of Korea. August 2010.

\*Hofstetter, R.W., C. Hayes, J. McMillin, C. Fettig, and M.P. Ayres. Relating bark beetle trap catch with beetle populations within trees across stands. The International Forestry Review. XXII IUFRO World Congress, Seoul, Republic of Korea. August 2010

Hofstetter, R.W., D. Pureswaran, and K. Weber. Relationship between insect outbreaks, funding, and publications. Western Forest Insect Work Conference. Flagstaff, AZ. April 2010.

Hofstetter, R.W., R. McGuire, and D. Dunn. Controlling bark beetles with sound. Western Forest Insect Work Conference. Flagstaff, AZ. April 2010.

\*Hofstetter, R.W., R. McGuire, and D. Dunn. Bark beetle acoustics and novel control methods. Entomology Society of America National Meeting. Indianapolis, IN. December 2009.

Hofstetter, R.W., T.S. Davis, K. Yturralde, W. Greer, C. Foelker. Bark beetle research in the southwest. Bark Beetle Technical Working Group. Tucson, AZ. October 2009.

\*Hofstetter, R.W. The rhythm is going to get you: The acoustics of water and insects in trees. Western Chapter of International Society of Arboriculture Meeting. Flagstaff, AZ June 2009.

Hofstetter, R.W., D.D. Dunn, D.S. Pureswaran, and B. Sullivan. Acoustic signals and aggression among bark beetles. Western Forest Insect Work Conference, Spokane, WA. March 2009.

Hofstetter, R.W. Bark beetles research in the southwest U.S. Western Forest Insect Work Conference, Spokane, WA. March 2009.

Hofstetter, R.W., D. Dunn, D. Pureswaran, and B. Sullivan. Reproductive isolation mechanisms in two sympatric bark beetles: Acoustic signals. Ent. Soc. Amer. Reno, NV. November 2008.

\*Hofstetter, R.W. Ecological role of fungi and mites in beetle population dynamics and evolution. Canadian Forest Service, Fredericton Canada. October 30, 2008.

\*Hofstetter, R.W., J.C. Moser, D.M. Reboletti, E.A. Alden, and T.S. Davis. Have phoretic mites influenced the evolution of insect-microbial symbiosis in bark beetle systems? Western Forest Insect Pest Workshop. Boulder, Colorado. April 2008.

\*Hofstetter, R.W., A. Garcia, J. Moan, J. Mafouz, S. Smith, C. Edminster. *Pinus ponderosa* resistance to bark beetles in the southwest: Effects of fire and resin composition. Pacific ESA Branch Meeting, Portland OR April 2007.

\*Hofstetter, R.W., D. Wakarchuk, M. Gaylord, J. McMillin, & M. Wagner. Differential responses of predators and bark beetles to terpene and pheromone combinations in Arizona. Western Forest Insect Work Conf. Boise, Idaho. March 5-9, 2007.

Hofstetter, R.W. M.L. Gaylord, S. Martinson & M.R. Wagner. Influence of tree volatiles on cross attraction of *Ips* and *Dendroctonus* and their predators in Arizona. Western Forest Insect Work Conf. Poster presentation. Boise, Idaho. March 5-9, 2007.

\*Hofstetter, R.W., J.C. Moser, K.D. Klepzig, and M.P. Ayres. The role of mites in beetle-fungal interactions. *Ceratocystis* and *Ophiostoma* Meeting. North Stradbroke Island, Brisbane Australia. August 16-18, 2006

\*Hofstetter, R.W. Effects of fire and thinning management on tree susceptibility and resistance to insect-vectored pathogens. TPTC FABI Annual Meeting, May 2006. Pretoria, South Africa

Hofstetter, R.W., E. Aldan, J.C. Moser, B.D. Ayres and B.E. Steed. Regional differences in phoretic mites associated with the bark beetle *Ips pini*. Poster. NAFIWC Asheville, NC May 2006.

Hofstetter, R.W., J. Mahfouz, J. Moan, and C. Edminster. Can high phenotypic and genotypic diversity of *Pinus ponderosae* regulate bark beetle populations? Poster. NAFIWC Asheville, NC May 2006.

\*Hofstetter, R.W. The mysterious world of bark beetles, mites and fungi. Forestry Seminar Series, Northern Arizona University. Flagstaff, Arizona. April 2006.

Hofstetter, R.W., Z. Chen, M. Gaylord, & M. Wagner. Influence of host volatiles as pheromone synergists for southern and western pine beetle in Arizona. Ent. Soc. Am. National Meeting. Ft Lauderdale 2005

Hofstetter, R.W., E. Aldan, J.C. Moser, & K. Clancy. Phoretic mites associated with bark beetles and their predators in ponderosa pine. Ent. Soc. Am. National Meeting. Ft Lauderdale 2005

Hofstetter, R.W., L. Evans, T. Dempsey, & M.P. Ayres. Temperature-dependent interactions among beetles, mites and fungi. Western Forest Insect Work Conference, Victoria, British Columbia. 2005.

Hofstetter, R.W., M.R. Wagner, T.E. DeGomez & J.D. McMillin. Pine bark beetle situation in Arizona. Western Forest Insect Work Conference, Victoria, British Columbia. 2005.

\*Hofstetter, R.W. Complex interactions among beetles, mites and fungi. International Congress of Entomology. Brisbane, Australia. 2004. (also Session moderator).

\*Hofstetter, R.W. Linking ecology and evolution: Mite-fungal-beetle interactions in the southern and Mexican pine beetle communities. Western Forest Insect Work Conference. San Diego, CA 2004

Hofstetter, R., M. Ayres, K. Klepzig & J. Moser. Evaluating the importance of multiple drivers in outbreak population dynamics. Ecological Society of America Nat. Meeting, Savannah, GA. August 2003.

\*Hofstetter, R.W., J. Moser, K. Klepzig & M. Ayres. Community ecology of the Mexican pine beetle (*D. mexicanus*) in Arizona. Entom. Society of America Annual Meeting. Fort Lauderdale, Fl. Nov. 2002.

\*Hofstetter, R.W., K. Klepzig, J. Moser & M.P. Ayres. Epidemiology of Southern Pine Beetle-Fungal Interactions. International Congress of Mycology. Oslo, Norway. August 2002

Hofstetter, R.W., M.P. Ayres, J. Moser & K. Klepzig. Hitchhikers and their baggage: Consequences of phoretic mites on bark beetles. Entomological Society of America. Student Competition. Fort Lauderdale, Fl. November 2002.

\*Hofstetter, R.W., M.P. Ayres & K. Klepzig. Can mites impact the fungal composition in bark beetle communities? Western Forest Insect Work Conference. Whitefish, Montana. April 2002

\*Hofstetter, R.W., K. Klepzig, M.P. Ayres & J. Moser. Symbiotic associations and the ecology of the southern pine beetle. Ecological Society of America Annual Meeting. Madison, WI. August 2001.

\*Hofstetter, R.W., K. Klepzig, M.P. Ayres & J. Moser. The Population dynamics and ecology of the southern pine beetle. North American Forest Insect Pest Workshop. Edmonton, Alberta. 2001.

Hofstetter, R.W., M.P. Ayres & P. Lorio. Interactions between beetle attack rate and pine tree defenses produce positive density dependence in *D. frontalis*. International Congress of Entomology. Iguassu, Brazil. August 2000. (NSF Travel Award)

Hofstetter, R.W., K. Klepzig, M.P. Ayres & J. Moser. Fungus-mite associations and the population dynamics of *Dendroctonus frontalis*. Entom. Soc. of America Annual Meeting. Montreal, Canada. Dec. 2000.

Hofstetter, R.W., M.P. Ayres, P. Lorio, K. Klepzig. Impact of plant defenses on the population dynamics of *D. frontalis*. Ecological Society of America, Snowbird, Utah. August 2000.

Hofstetter, R.W., M. Lombardero, M.P. Ayres & P.L. Lorio. Impact of resin flow on the population dynamics of the Southern Pine Beetle. Entomological Society of America National Meeting. Atlanta, GA. 1999.

Hofstetter, R.W., M. Lombardero, M.P. Ayres, K. Klepzig & J. Moser. Population dynamics of the Southern Pine Beetle. North Central Pest Council Meeting. Plymouth meetings. March 1999.

Hofstetter, R.W., M.P. Ayres & K.D. Klepzig. Nutritional value of loblolly pine phloem for symbiotic fungi of the southern pine beetle, as related to tree growth status. Entomology Society of America National Meeting. Las Vegas, NV. 1998.

Hofstetter, R.W. & P.J. Landolt. Induced defensives in potato plants: Colorado Potato foraging behavior. Annual Potato Commission Meeting. Pullman, WA. 1998.

Hofstetter, R.W. & Landolt, P.J. Codling moth larval attractants and repellants. Washington State Tree Fruit Commission: Apple Review. Yakima, WA. 1998.

Hofstetter, R.W. & K. F. Raffa. Biological control of the gypsy moth in the great lakes region. Annual Gypsy Moth Review. Traver City, MI. 1995.

Hofstetter, R.W. & K. F. Raffa. Ecology and impact of the gypsy moth. NC-212 meetings. Representative for the State of Wisconsin. Columbus, OH 1994, & Madison, WI. 1995.

Hofstetter, R.W. & K. F. Raffa. Physical effects and internal cues influencing oviposition behavior by the gypsy moth egg parasitoid *Ooencyrtus kuvanae*. Entomological Society of America National Meeting, Dallas, TX. 1994.

***Author, not presenter***

Stevens, B., P. Rees and R. Hofstetter. Does *Erwinia tracheiphila* cause bacterial wilt in Canada thistle (*Cirsium arvense*)? National Conference on Undergraduate Research. La Crosse, WI April 2013.

Yturralde, K and R. W. Hofstetter. Acoustic structures and signals in the larger Mexican pine beetle, *Dendroctonus approximatus*. Entomological Society of America; 2<sup>ND</sup> PLACE PRESIDENTS AWARDED – Graduate Student competition. Knoxville TN November 2012.

Aflitto, N and R. W. Hofstetter. Use of acoustic technology to control wood infesting insects. Entomological Society of America; 2<sup>ND</sup> PLACE PRESIDENTS AWARDED - Undergraduate student competition. Knoxville TN November 2012.

Hoffman, C., R. Hofstetter, R.P. Hanavan, A. Grady, and J. Anhold. Development of a monitoring program to better understand the ecological impacts of wildfire under warmer, dryer conditions on a potentially major forest defoliator. Forest Health Monitoring meeting. Tucson, AZ. April 2012.

McMillin, J., R. Hofstetter and J. Anhold. Bark beetle activity associated with tornado-damaged ponderosa pine in northern Arizona. Western Forest Insect Work Conference, Penticton BC Canada. March 2012.

Hoffman, C. R. Hofstetter, R. Hanavan, A. Garcia-Grady, and J. Anhold. Pandora moth monitoring. Western Forest Insect Work Conference, Penticton, BC Canada. March 2012.

Davis, T.S. and R.W. Hofstetter. Reciprocal interactions between the bark beetle associated yeast *Ogataea pini* and host plant phytochemistry. Entomological Society of America, Reno. November 2011.

Pureswaran, D., R.W. Hofstetter, and B. Sullivan. Evolutionary transitions in bark beetle pheromone systems. International Society of Chemical Ecology Meeting, Vancouver BC, July 2011.

Hanavan, R.P., C. Hoffman, and R.W. Hofstetter. Development of a monitoring program to better understand the ecological impacts of wildfire under warmer, dryer conditions on a major forest defoliator. North America Forest Insect Work Conference. Student Poster Competition. Portland, OR. May 2011.

Yturralde, K. and R.W. Hofstetter. The sound and the scurry: the influence of sound on a hemipteran pest, *Cimex lectularius*. North America Forest Insect Work Conference. Student Poster Competition. Portland, OR. May 2011.

Davis, T.S. and R.W. Hofstetter. Reciprocal interactions between a bark-beetle associated yeast and host pine phytochemistry. North America Forest Insect Work Conference. Portland, OR. May 2011.

Foelker, C. and R.W. Hofstetter. Size heritability and the effects of size on fecundity in *Ips pini*. North America Forest Insect Work Conference. Portland, OR. May 2011.

Hanavan, R.P., C. Hoffman, and R.W. Hofstetter. Development of a monitoring program to better understand the ecological impacts of wildfire under warmer, dryer conditions on a major forest defoliator, Pandora moth. Forest Health Protection on-line meeting. Feb. 2011.

Pureswaran, D., R.W. Hofstetter, and B. Sullivan. Does host location in endemic conditions favor convergence of olfactory signals in sympatric bark beetles? Entom. Society of America National Meeting. San Diego, CA Dec. 2010.

Davis, T.S., R.W. Hofstetter, J.T. Foster, N.E. Foote and P. Keim. Interactions between *Ogataea pini* and filamentous fungi associated with the western pine beetle. Entom. Society of America National Meeting. San Diego, CA Dec. 2010.

Foelker, C., R.W. Hofstetter, and T.S. Davis. The heritability of size and its effect on fecundity in two bark beetle species, *Dendroctonus brevicornis* and *Ips pini* (Coleoptera: Curculionidae). Entom. Society of America National Meeting. San Diego, CA Dec. 2010.

Yturralde, K. and R.W. Hofstetter. The acoustic ecology of bark beetles. Entom. Society of America National Meeting. San Diego, CA Dec. 2010.

Davis, T.S. and R.W. Hofstetter. Host-tree phytochemistry has non-additive effects on mycangial fungi isolated from *Dendroctonus brevicomis*. The International Forestry Review. XXII IUFRO World Congress, Seoul, Republic of Korea. August 2010.

Davis, T.S., R.W. Hofstetter, J.F. Foster, N.E. Foote, and P. Keim. Characterizing the ecology of a yeast associated with the western pine beetle, *D. brevicomis*. Western Forest Insect Work Conference. Flagstaff, AZ. April 2010.

Yturralde, K. and R.W. Hofstetter. The secret acoustic life of bark beetles. Western Forest Insect Work Conference. Flagstaff, AZ. April 2010.

Foelker, C., R.W. Hofstetter, and T.S. Davis. Relationship between bark beetle size and fitness. Western Forest Insect Work Conference. Flagstaff, AZ. April 2010.

Davis, T.S. and R.W. Hofstetter. Response of the western pine beetle to variation in host phytochemistry. 1<sup>st</sup> PLACE PRESIDENT'S AWARD in Student Oral Competition. Entomological Society of America National Meeting. Indianapolis, IN. December 2009

Anulewicz, A.C., D.G. McCullough, S. Tanis, C.K. Limback, R. Hofstetter, A. Mayfield, and S. Munson. Coast to coast ash mortality? The potential susceptibility of selected western and southern ash species to EAB. Ent. Soc. America National Meeting. Indianapolis, IN. Dec. 2009

Anulewicz, A.C., D.G. McCullough, S. Tanis, C. Limback, R. Hofstetter, A. Mayfield, and S. Munson. The potential susceptibility of selected western and southern ash species to EAB. EAB Research and Development Meeting. Pittsburgh, PA. October 2009.

Harvey, A.J., R.W. Hofstetter and T.S. Davis. Impact of forest density on abundance of the small pine engraver, *Ips latidens*. NAU Flagstaff, REU presentation. July 31, 2009.

Davis, T.S. and R.W. Hofstetter. Do eruptive beetle-microbe complexes locally adapt to host phytochemistry? Phoenix, AZ. April 2009.

Foote, N., T.S. Davis, and R.W. Hofstetter. Ecological role of bacteria in the *Dendroctonus* bark beetle community complex. 16<sup>th</sup> Annual Celebration of Undergraduate Research and Design. Flagstaff, AZ. April 2009.

Hancock, G., D. Reboletti, and R.W. Hofstetter. Phoretic mites and lure preference of *Dendroctonus adjunctus* in Arizona. Western Forest Insect Work Conference, Spokane WA. March 2009.

Waring, Kristen M., Danielle M. Reboletti, Lauren A. Mork, Ching-Hsun, Huang, Richard W. Hofstetter, Amanda M. Garcia, Peter Z. Fulé, T. Seth Davis. 2009. Modeling the impacts of two bark beetle species under warming climate in the southwestern U.S.A.: ecological and economic consequences. Western Forest Insect Work Conference, Spokane, WA. March 23-26, 2009.



Foote, N., T.S. Davis, and R.W. Hofstetter. Bacteria associated with *Dendroctonus brevicomis* and *D. frontalis* in Arizona. Western Forest Insect Work Conference, Spokane WA. March 2009.

Davis, T.S., R.W. Hofstetter, and K.D. Klepzig. Fungal interactions among sympatric and allopatric bark beetle species. Western Forest Insect Work Conf., Spokane WA. March 2009.

Pureswaran, D., B. Sullivan, R. Hofstetter, and D. Dunn. Reproductive isolation mechanisms in two sympatric bark beetles: Chemical signals. Ent. Soc. of America. Reno, NV. November 2008.

Davis, S.T. and R.H. Hofstetter. Interspecific interactions among two primary bark beetles. Entomological Society of America National Meeting. Reno, NV November 2008.

Garcia, A.M., R.W. Hofstetter, S. Smith, B. Strom and D. Cluck. Effects of fire seasonality and severity on the susceptibility and resistance of *Pinus ponderosa* to bark beetles. 1<sup>ST</sup> PLACE POSTER COMPETITION. Society of American Foresters Annual Meeting, Reno NV November 2008.

Taerum, S., M.P. Ayres, R.W. Hofstetter, K.D. Klepzig, and D. Six. High bluestain fungus (*Ophiostoma minus*) abundance negatively affects outbreaks of the southern pine beetle, *Dendroctonus frontalis*. International Congress of Entomology, Durban, S. Africa. July 2008.

Taerum, S., M.P. Ayres, R.W. Hofstetter, K.D. Klepzig, and D. Six. Causes and consequences of variation in the growth rates of blue stain fungi (*Ophiostoma minus*) associated with the southern pine beetle (*Dendroctonus frontalis*). IURFO. Pretoria, S. Africa. July 2008.

Gaylord, M.L., R.W. Hofstetter, S. Sky Stephens, and M.R. Wagner. Global change, vegetation management and pine bark beetles: elevational gradients as a surrogate predictor of forest and bark beetle response. International Congress of Entomology, Durban, S. Africa. July 2008.

\*Hofstetter, R.W., T.S. Davis (presenter), and K.D. Klepzig. Indirect interactions: competition among fungal mutualists from sympatric and allopatric bark beetle populations. International Congress of Entomology, Durban, S. Africa. July 2008.

Hayes, C., R.W. Hofstetter, and T. DeGomez. Effects of light intensity on pine engraver reproduction in ponderosa pine slash in northern Arizona. Invited presentation at: International Congress of Entomology, Durban, South Africa, July 2008.

Waring, K.M., D.M. Reboletti, L.A. Mork, C-H Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T.S. Davis. Southern and Mexican pine beetle and climate change: An assessment of potential ecological and economic effects of a range shift. ESA Annual Meeting. Milwaukee WI. Aug.2008.

Fischer, M.J., K.M. Waring, R.W. Hofstetter, and T.E. Kolb. Resin composition and growth characteristics of ponderosa pine associated with attack by the roundheaded pine beetle (Coleoptera: Scolytidae). Fort Valley Experimental Station Conference. Flagstaff, AZ. May 2008

- Garcia, A.M., R.W. Hofstetter, and S.L. Smith. Effects of burn season and fire injury on the quantity and quality of ponderosa pine resin. WFIWC. Boulder Colorado. April 2008.
- Reboletti, D., R.W. Hofstetter, D.L. Six, and J.C. Moser. Mite Associates of the Mountain Pine Beetle. WFIWC, Boulder Colorado. April 2008.
- Davis, T.S. and R.W. Hofstetter. Fitness, fecundity, and competition: interactions among sympatric primary bark beetles. WFIWC. Boulder Colorado. April 2008.
- Six, D.L., K.D. Klepzig, and R.W. Hofstetter. Geographic variation in the fungal symbiont community of the southern pine beetle. WFIWC. Boulder Colorado. April 2008.
- Gaylord, M.L., R.W. Hofstetter, and M.R. Wagner. Impacts of thinning ponderosa pine on pine bark beetles in northern Arizona. Memorial Scholarship Presentation. WFIWC. Boulder Colorado. April 2008.
- Waring, K.M., D.M. Reboletti, L.A. Mork, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, T.S. Davis. Inconvenient Pest: Evaluating the ecological and economic consequences of range shift of *Dendroctonus mexicanus* (Coleoptera: Scolytidae). NCEAS meeting. Santa Barbara. Feb 2008.
- Garcia, A.M., R.W. Hofstetter, and S.L. Smith. Effects of seasonal fires on the susceptibility and resistance of *Pinus ponderosa* to bark beetles. Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems. Tucson, AZ. Jan. 2008.
- Gaylord, M.L., R.W. Hofstetter, and M.R. Wagner. Effects of thinning on bark beetle movement. Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems. Tucson, AZ. Jan. 2008.
- Waring, K.M., D.M. Reboletti, L.A. Mork, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, T.S. Davis. An Inconvenient Pest: Potential spread of a non-native bark beetle: ecological and economic consequences. Poster presentation. 9<sup>th</sup> Biennial Colorado Plateau Meeting. Flagstaff October 30, 2007.
- Six, D.L., K.D. Klepzig, and R.W. Hofstetter. Geographic variation in fungi associated with the southern pine beetle, *Dendroctonus frontalis*. IUFRO meeting, Vienna Austria, Sept. 2007.
- Gaylord M.L., R.W. Hofstetter & M.R. Wagner. Mechanistic understanding of the impacts of thinning ponderosa pine on pine bark beetles. Student presentation. Western Forest Insect Work Conference. March 5-9, 2007.
- Hayes, C.J., R.W. Hofstetter, and T.E. DeGomez. Factors influencing pine engraver colonization and development in ponderosa pine slash in northern Arizona. Student presentation. Western Forest Insect Work Conference. March 5-9, 2007.
- Reboletti, D. & R.W. Hofstetter. Multiple associations: Mountain pine beetle, mites and fungi. Student presentation. Western Forest Insect Work Conference. March 5-9, 2007.

Davis, T.S., R.W. Hofstetter & K.D. Klepzig. Battle of the beetles: Interspecific interactions between primary *Dendroctonus* species. Student presentation. Western Forest Insect Work Conference. March 5-9, 2007.

Alden, E., R.W. Hofstetter, J. Moser, D. Six, & C. Edminster. Identifying the mites and fungal community members of *Dryocoetes confusus* in northern Arizona. Poster. Western Forest Insect Work Conference. March 5-9, 2007.

Klepzig, K.D., R.W. Hofstetter, et al. Ecology of microbial and arthropod associates of southern pine beetles. N.A.U. Forestry Seminar Series. Nov. 29, 2006.

Ayres, M.P., R.W. Hofstetter, et al. When 'isms collide: mutualisms, commensalisms and antagonisms among plant enemies. N.A.U. Forestry Seminar Series. September 30, 2006.

Ayres, M.P., N.A. Friedenber, R.W. Hofstetter, M.J. Lombardero, K.D. Klepzig, & J.C. Moser. Phoretic mites and the population dynamics of bark beetles. International Congress of Acarology, Amsterdam, The Netherlands. 21-26 August 2006.

Taerum, S.J., K.D. Klepzig, R.W. Hofstetter, D.L. Six, J.C. Moser & M.P. Ayres. Interspecific interactions among symbionts associated with two populations of southern pine beetles. Poster. NAFIWC. Asheville, NC, 2006.

Gaylord, M.L., K. Williams, R.W. Hofstetter, J.D. McMillin, T. DeGomez, and M.R. Wagner. Flight temperature thresholds for southwestern ponderosa pine bark beetles. Poster. NAFIWC. Asheville, NC, 2006.

Klepzig, K.D., M.P. Ayres, R.W. Hofstetter, M.J. Lombardero, J.C. Moser. 2005. Pestis Symbiotica: Symbiosis red in tooth and claw. Western Forest Insect Work Conference. San Diego, CA.

Klepzig, K.D., R.W. Hofstetter, J.C. Moser, & M.P. Ayres. 2004. Mutualism and antagonism in bark beetle-fungal-mite interactions International Congress of Entomology. Brisbane, Australia.

Ayres, M.P., R.W. Hofstetter, M.F. Lombardero, K. Klepzig & J.C. Moser. When 'isms collide: Mutualism, commensalism and antagonism among plant enemies. Gordon Conference: Plant-Insect Interactions California 2004.

Ayres, M., R. Hofstetter, K. Klepzig & J. Moser. Consequences of symbioses for populations and communities: The case of bark beetles and their fungal mutualists. 4<sup>th</sup> International Symbiosis Society Congress. Halifax, Nova Scotia. August 2003.

Klepzig, K.D., J.C. Moser, M.J. Lombardero, M.P. Ayres & R.W. Hofstetter. Mutualism and Antagonism: Ecological interactions among bark beetles, mites and fungi. British Society of Plant Pathology Meeting. London, England 1999.

Ayres, M.P., J. Veysey, M. Lombardero, R. Hofstetter, K. Klepzig & J. Moser. Community interactions and the population ecology of *D. frontalis*. Entomological Society of America. National Meeting, Atlanta, GA. 1999.

Ayres, M.P., R.W. Hofstetter, M.J. Lombardero, B. Smith & J.M. Pye. Regional patterns in forest epidemiology of the southern pine beetle. Entomology Society of America National Meeting. Las Vegas, NV. 1998.

Raffa, K.F., S.C. Kruse, R.W. Hofstetter, J.J. Kruse, A. Chenot, & J. Powell. The ecology and impact of gypsy moth invasion. NC-212. 1998.

Kruse, S.C., K.F. Raffa, R.W. Hofstetter, J.J. Kruse, & A. Chenot. USDA Interagency Gypsy Moth Research. Integrating natural enemy performance and forest type to enhance biological control of gypsy moth. 1997.

## **PROFESSIONAL AFFILIATIONS AND INVOLVEMENT**

1993/Present Ecological Society of America (ESA)  
1992/Present Society of American Foresters (SAF)  
1992/Present Entomological Society of America (ESA)  
2001/Present Mycological Society of America (MSA)  
2005/Present America Institute of Biological Sciences (AIBS)  
2005/Present American Association for the Advancement of Science (AAAS)  
2008/Present Arizona-Nevada Academy of Science (ANAS)  
2005/Present Member of Bark Beetle Task Force Committee  
2012/Present Member of the RMRS Lab Coordinating Committee (LLCC)  
2012/Present Organizer and Moderator for Forest Entomology Symposium at Entomological Society of America National Meeting  
2012 Applicant reviewer for Stellenbosch University, South Africa  
2010/2013 President (Chair) of Western Forest Insect Work Conference  
2011 Judge of Student Competition Presentations at NAFIWC  
2006/2011 Session coordinator at professional meetings (WFIWC, NAFIWC)  
2006/2011 Moderator at professional meetings (WFIWC, NAFIWC)  
2010 Grant reviewer for Czech Science Foundation  
2010 Committee and proceedings organizer for WFIWC meeting (Flagstaff, AZ)  
2009 Committee and local organizer for BBTWG meeting (October, Tucson, AZ)  
2009 Grant reviewer for National Research Foundation of South Africa  
2007 Judge of Student Competition Presentations at E.S.A. Pacific Branch Meeting  
2006 External reviewer for Full professor appointment at Univ. of Montana

## **PROFESSIONAL DEVELOPMENT**

2012 Workshop: Innovation Bootcamp; specialized NAU workshop for faculty innovators  
2008 Course: Promoting Critical Thinking in the Classroom

2007 Course: Essentials of Good Grantsmanship

***School of Forestry Service***

2012/Present Scholarship Committee

2011/Present Graduate Coordinator

2011/Present Curriculum Review Committee

2011/Present Curriculum Review Subgroup

2010/Present Faculty advisor for Forestry Sigma Xi Honors Society

2008/Present Library Representative

2012 Administrative Assistant Search Committee

2008/2009 Mission Research Committee

2008/2011 Adjunct Faculty Status Review Committee

2008 Asst. Professor Search Committee (replacement for S. Hart)

2007 Student Enrollment Improvement Grant Submitted to SRR Grant Committee

***Nau University Service***

2011/Present University Graduate Committee

2008/Present Ad Hoc Dissertation/Defense Subcommittee within UGC

2008/Present Member of the IGERT oversight Committee

2010/2012 Faculty Senator

2007/2011 Imaging and Histology Core Facility Committee (IHCF)

2010/2011 Task Force for Indirect Policies and Centers

2010/2011 NAU Athletic Strategic Planning Committee

2008/2009 Chair of Governance and Compliance Committee Subcommittee of the Intercollegiate Athletics Committee (IAC)

2006/2009 Member of Intercollegiate Athletics Committee (IAC)

2009/2011 Judge for CEFNS Celebration of Undergraduate Research and Design

2008 SFAz Review Committee

2008 Reviewer for Tenure promotion (Biology Department)

2007/2008 Faculty Representative on Governance and Compliance Committee Subcommittee of the Intercollegiate Athletics Committee (IAC)

2007/2008 Faculty Representative on Equity and Student Well-being Committee Subcommittee of the Intercollegiate Athletics Committee (IAC) NAU-NCAA Recertification Self-Study

Committee appointed by J.D. Haeger

2007/2008 Governance and Commitment to Rules Compliance Subcommittee

**RECOGNITION AND REWARDS**

2013 *Exemplary Faculty* in School of Forestry Northern Arizona University

2012 *Teacher of the Year*; Xi Sigma Pi Chapter Northern Arizona University

2011/2012 *Researcher of the Year*: School of Forestry Northern Arizona University

2010 Bark beetle recordings used by Olympic Museum in Lausanne, Switzerland for display in Olympic winter games (Vancouver Canada Feb. 2010)

2008/2012 Multiple radio, newspaper and TV interviews relating to acoustic research

2009/2010 Nominated for 2009 and 2010 Research and Creative Activity Award for ‘Most Promising New Scholar’ at Northern Arizona University  
 2008/2009 *Researcher of the Year*: School of Forestry Northern Arizona University  
 2008 New mite species named in my honor: *Petalomium hofstetteri* (Moser)

## OTHER TEACHING EXPERIENCE AND ADVISING

### *Guest Lectures*

Forest Health (FOR554): Insects and Forests	2007
Landscape Ecology (Professional Program): Insect patterns	2011
Sechrist Elementary School – Entomology to 1 <sup>st</sup> graders	2011
Sechrist Elementary School – Earth Day Science Fair	2011
Mt. Elden Middle School – 3 biology courses	2011
Sedona High School – Biology field course	2010
Bark Beetle Workshop – Student and Professional 5-day course	2010
Mutualism with Insects (Univ. of New Brunswick, Canada)	2008
Disturbance Ecology: Role of Insects and Pathogens (FOR399)	2008
Fire Ecology and Mgmt (FOR551): Fire-Insect-Pathogen Interactions	2007
CEEM (Continuing Education in Ecosystem Management)	
Topic: Forest Health & Interactions with Insects and Pathogens	2007
ISFAM (International Seminar on Forest Administration and Management)	
Forest Health	2006/2008
Invasive Species	2006
Field Studies Program in Costa Rica (Dartmouth College)	
BioStatistics	2002
Entomology	2002
Coevolution	2002
Social Insects	2002
Field Studies Program in Jamaica (Dartmouth College)	
Coral Reef Geology	2002
Algal Induced Resistance	2002
Introduction to Environmental Studies (Dartmouth College)	
Bark Beetle Ecology	1999, 2001
Symbioses among Insects (University of Wisconsin-Madison)	
Role of Phoretic Mites and Fungi in Bark Beetle Dynamics	1995
Teaching Assistant, Dartmouth College, Hanover, NH.	1998/2003
Vertebrate Anatomy, Tropical Field Ecology <i>in</i> Costa Rica & Jamaica	
Introduction to Environmental Studies, Ecosystem Ecology, Introductory Ecology	
Teaching Assistant, University of Wisconsin, Madison, WI.	1995/1996
Evolution, Genetics and Ecology (Biocore Dept.), Ornithology Field Course	

### *Undergraduate Supervisor*

NAU undergraduate research projects in School of Forestry (13), Biology (3), and Engineering (1)	2005/Present
2 students, Undergraduate student Hooper Award Recipients:	2011/2013
1 student, NAU Interns-to-Scholars (I2S) intern:	2012
1 student, Undergraduate Research Mentoring (URM) Scholars:	2011/2012
1 student, Senior Thesis, University of New Brunswick	2009/2010
3 students Supervisor for REU undergraduate; Native American students	2008/2010
4 students in Women in Science Program at Dartmouth College	1999/2004
3 seniors honors theses at Dartmouth College	2000/2004
1 senior thesis at University of Wisconsin	1995

***Graduate Student Advisor***

2 students, School of Forestry, NAU	2012/Present
1 student, School of Forestry, NAU	2010/Present
2 students, School of Forestry, NAU	2009/Present
1 student, School of Forestry, NAU	2009/2011
1 student, School of Forestry, NAU	2008/2011
1 student, School of Forestry, NAU	2010
1 student, School of Forestry, NAU	2008-2010
1 student, School of Forestry, NAU	2008-2009
1 student, School of Forestry, NAU	2006/2009
3 students, School of Forestry, NAU	2006/2008
1 student, School of Forestry, NAU	2006/2007

***Graduate Student Committee Member***

1 student, Univ. of Stellenbosch	2013
1 student, School of Forestry, NAU	2012
2 students, School of Forestry, NAU	2012
1 student, Biology, NAU	2011/Present
1 student, Biology, NAU	2010/Present
1 student, Biology, NAU	2010/2012
2 students, School of Forestry, NAU	2008/2012
1 student, University of New Brunswick	2010/2011
1 student, School of Forestry, NAU	2009/2011
1 student, School of Forestry, NAU	2009/2010
2 students, School of Forestry, NAU	2008/2010
2 students, School of Forestry, NAU	2009
1 student, School of Forestry, NAU	2007/2009
1 student, School of Forestry, NAU	2005/2009
1 student, School of Forestry, NAU	2005/2008
1 student, Geology, NAU	2006/2008

***SERVICE***

SUBJECT EDITOR	
Subject Editor for Symbioses Section in <i>Environmental Entomology</i>	2009/2013

This is extremely time-consuming, approximately 25 hours a month

**FUNDED GRANTS (LAST FIVE YEARS)**

<u>PROJECT</u>	<u>INVESTIGATORS</u>	<u>SPONSOR</u>	<u>AMOUNT</u>
2013/2015 Mission Research Grant	Soil-insect food webs (PI)	MS funding	\$42,860
2013/2015 RIF-NAU Postdoctoral Grant	Insect Acoustics (PI)	NORTHERN ARIZONA UNIVERSITY	\$100,000
2012/2013 Hooper Undergraduate Research Award (HURA)	1 Student, R. Hofstetter	NORTHERN ARIZONA UNIVERSITY	\$3180
2012/2013 Hooper Undergraduate Research Award (HURA)	1 STUDENT, R. HOFSTETTER	NORTHERN ARIZONA UNIVERSITY	\$2968
2010/2013 USDA-EM Development of early warning system for Pandora Moth	Co-PI, R. Hofstetter		\$78,000
2010/2015 Mission Research Grant; Bark beetle-tree-genetics	PI	PhD funding	\$93,000
2011/2012NSF Do bark beetles need fungi to be successful	co-PI	NATIONAL SCIENCE FOUNDATION	\$150,000
2011/2012Hooper Undergraduate Research Award (HURA)	1 Student	NORTHERN ARIZONA UNIVERSITY	\$3486
2011/2012Hooper Undergraduate Research Award (HURA)	1 Student	NORTHERN ARIZONA UNIVERSITY	\$3394
2011/2012USDA Coop Agreement Experiential Outreach Program for Forestry Students	PI	Southern Research Station Asheville	\$8,400
2011 TRIF grant: Using acoustic technology to control bedbugs	PI	TRIF grant	\$28,491



2010/2011 TRIF grant: Using acoustic technology to control wood infesting insects	PI	TRIF GRANT	\$62,175
2009/2011 USDA JV Agreement; Management, climate change, bark beetles	PI	USDA	\$141,990
2009/2010 Hooper Undergraduate Research Award (HURA)	1 Student	NORTHERN ARIZONA UNIVERSITY	\$1,990
2009/2010 USDA Emerald Ash Borer Study with Deb McCullough	Co-PI	Michigan State University	no funds allocated to NAU
2009 IGP-NAU Sound perception and production by bark beetles	PI		\$6,500
2009 IGERT Undergraduate Program: Role of bacteria associated with bark beetles 2009	1 Student	IGERT	\$4917
2007/2008 ERDENE-SEED Grant Acoustic emissions to control bark beetles	PI		\$20,767
2006/2008 USDA Coop Agreement-Pineville; Pheromone project	PI	USDA	\$62,362

#### **PENDING GRANTS**

2013/2014 USDA-EM Seed and cone predators of Ponderosa pine in Arizona \$45,892  
2013/2015 USDA-EM Seed and cone predators of southwestern white pine \$78,180  
2013/2015 USDA-STDP Improved Western Pine Beetle Pheromone Technologies \$26,224

#### **NON FUNDED GRANTS**

2013/2016 USAID/Indonesia: Annual Program Statement (APS) Number Indonesia APS-497-11-000001 "Supporting Universities to Partner Across the Pacific; CO-PI \$999,639  
2013/2016 USDA-EM Natural enemies and climate effects on Pandora moth \$62,831

2012/2013Lindbergh Foundation: Balancing technology and the Environment. Using acoustics to protect trees from insect attack. (PI) \$10,186.

## **PATENTS AND IPD's**

International Patent Application WO2012/078814 A2	2012
Full Patent: No. PCT/US2011/063838. Use of Acoustics to Disrupt and Deter Wood-Infesting Insects and Other Invertebrates from and within trees and wood products. NAU10-002 PCT	2011
Provisional Patent: Use of acoustics to disrupt and deter wood-infesting insects from and within trees #26814.008	2010
Intellectual Property Disclosure (IPD # NAU 10-002): Acoustic methods to control insects in trees	2009
Intellectual Property Disclosure (IPD # NAU 8-008): Bark Beetle Trap Technological Enhancement	2007

## **Document E: Individual Faculty Information**

### **DENVER C. HOSPODARSKY**

Associate Professor

Date of Appointment: 1993 – Present

Specializations: Certified Forester #3142

**Northern Arizona University – School of Forestry**

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#### **EDUCATION:**

- 1993            Ph.D., College of Forestry, Oregon State University; Resource and Community Development (emphasis area)
- 1982            M.S., College of Forest Resources, University of Washington; Natural Resources Policy and Planning (emphasis area)
- 1978            B.S., School of Forestry, Mississippi State University; Forest Management (emphasis area)
- 2002/2011      Certified Forester, certification 2002 and re-certification 2005, 2008 and 2011. Each re-certification requires a minimum of 60-hours continuing forestry education credits.

#### **PROFESSIONAL EXPERIENCE:**

- 1999/2001      Coordinator, Environmental Management Emphasis Area, College of Ecosystem Science and Management, Northern Arizona University
- 1998/Present   Associate Professor, School of Forestry, Northern Arizona University; Human dimensions in forest management specialization; 9-month appointment
- 1992/1998      Assistant Professor, School of Forestry, Northern Arizona University
- 1993/1997      Director, Parks and Recreation Management Program, Northern Arizona University

#### **TEACHING EXPERIENCE:**

- 1990/Present      RLS (PRM) 447: Research and Evaluation Methods  
                         RLS (PRM) 374: Program Planning and Marketing  
                         RLS 308: Practicum in Recreation and Leisure Services  
                         PRM 208: Practicum in Parks and Recreation  
                         FOR 311: Forest Science - A (team-taught)  
                         RLS (PRM) 360: Interpretation for Recreation  
                         RLS (PRM) 220: Leisure and Society  
                         PRM 408: Senior Internship

FOR 430: Environmental Leadership  
PRM 460: Advanced Interpretation  
PRM 498: Senior Seminar  
FOR 101: Introduction To Forestry  
FOR 211: Forest Mapping and Measurements  
FOR 283: Forestry in the Wildland-Urban Interface  
FOR 423C/424C: Forest Ecosystem Planning I & II (team taught and as Coordinator)  
FOR 325W/326W: Forest Management III & IV (team taught)  
FOR 447: Forestry and Community  
FOR 499: Regional Planning for Natural Resources and Recreation (team taught)  
FOR 590: Economic and Social Issues in Forest Recreation Development (co-taught)  
FOR 690: Graduate Research Methods (team taught)

### **ADMINISTRATION**

2008/Present    Coordinator, Human Dimensions certificate area, School of Forestry, Northern Arizona University  
1999/2001      Coordinator, Environmental Management Emphasis Area, College of Ecosystem Science and Management  
1993/1997      Director, Parks and Recreation Management Program (formerly, Recreation and Leisure Services Program), School of Forestry  
1990/1992      Coordinator, Contracted Research for the Arizona Office of Tourism

### **PUBLICATIONS, ARCHIVAL, & EQUIVALENT (since 2004):**

Kim, Y-S., S. Dewhurst, and D. Hospodarsky. 2007. Teaching Based on the 2005 Planning Rule, J. Forestry, September.

Perez-Verdin, G., Y-S. Kim, D. Hospodarsky and A. Teclé. 2008. Factors Driving Deforestation in Common-pool Resources in Northern Mexico. J. Environmental Management.

### **RESEARCH REPORTS:**

Lee, M., Hospodarsky, D., and McBride, K. 2010. Petrified Forest National park Wood Theft Study. School of Forestry, Northern Arizona University.

Lee, M. and D. Hospodarsky. 2003. Public Attitudes and Intentions Toward Forest Health Restoration and Fire Risk reduction in the Coconino National Forest, Northern Arizona University.

Hospodarsky, D., M. Lee, and T. Combrink. 2004. Identification and Evaluation of Approaches to Public-Private Partnerships in Ecological Restoration. Final Report to Ecological restoration Institute, Northern Arizona University.

**PRESENTATIONS (since 2004):**

Hospodarsky, D. 2010. Where Has all the SPNM Gone?: A Case Study of regional ROS Planning. ROS/BEIG Workshop, October 26, duBois Center, Flagstaff, AZ.

Hospodarsky, D. (presenter) and Lee, M. 2009. A Social marketing approach to Managing Resource Theft at Petrified Forest National Park, Arizona. 10<sup>th</sup> Biennial Conference Integrating Science and Management on the Colorado Plateau, Oct. 5-8, 2009, Flagstaff, AZ.

Hospodarsky, D. 2003. Toward Indicators and Standards for the Integration of Biophysical and Social Variables in NPS Backcountry Management. Invited paper at the National Park service, Backcountry impacts Research Symposium, Doubletree Hotel, September 16-19, Seattle, WA.

Hospodarsky, D. (presenter), M. Lee, T. Combrink. 2003. An Evaluation of Approaches to Public-private Partnerships in Ecological Restoration: Some Intermediate Results and Implications. Paper presented at the 7<sup>th</sup> Biennial Conference of Research on the Colorado Plateau; duBois Center, November 3-6, Northern Arizona University.

Hospodarsky, D. (presenter) and M. Lee. 2003. Public-Private Partnerships as an Approach to Community Fire Risk Reduction. Paper presented at the Southwest Fire Initiative Conference, April 29, duBois Conference Center, Northern Arizona University.

Hospodarsky, D. 2005. Ethics Across the Curriculum: Moral Education for a Changing Profession. 2005. Poster presented at the Society of American Foresters National Convention, Ft. Worth Convention Center, October 19-23, Ft. Worth, TX.

Hospodarsky, D. (presenter), M. Lee, and K. McBride. 2005. Stealing or “Just Looking:” Studies of Resource Incidence at Petrified Forest National park, Arizona. Paper presented at the 8<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, duBois Conference Center, November 7-10, Northern Arizona University.

Hospodarsky, D. Fostering Professionalism in Student Foresters – We Can Do Better! Poster presented at the Society of American Foresters National Convention, Pittsburgh Convention Center, October 18-22, Pittsburgh, PA.

Hospodarsky, D. and M. Lee. 2007. Conclusions About Visitor and Resource Incidence at Petrified Forest National Park, Arizona. Paper accepted for presentation at the 9<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, duBois Conference Center, October 29-November 1, Northern Arizona University. (Note: A scheduling error on the part of conference organizers precluded the opportunity for the authors to make the oral presentation of this paper.)

## **PROFESSIONAL SERVICE:**

Member, Society of American Foresters, Science Fund (National) Committee.  
2003 - 2004.

Secretary, Society of American Foresters, Land Use Planning Organization and Management (E2) National Working Group.  
2002 - 2005.

Chair, Northern Arizona Chapter, Society of American Foresters. 2004.

School of Forestry Faculty Representative to the Society of American Foresters.  
(2003-present)

Member, Society of American Foresters Certification Review Board (national).  
2004-2006; 2009-present.

National Forester (CEO) Xi Sigma Pi (forestry national honorary scholastic fraternity).  
2004-2006

Advisory Board Member, Greater Flagstaff Forest Partnership.  
2005-2006

Member, Board of Directors and Vice President, Arizona Natural History Association.  
2003-2005.

Chair, Membership Committee, Society of American Foresters Southwestern Section.  
2005-2010.

National Co-chair, Certification Review Board, Society of American Foresters.  
2006-2007

Author, organizer and co-presenter of professional roundtable at Portland, Reno and Orlando National SAF Conventions (2007-09) on fostering student leadership.

Chair, Southwestern Society (New Mexico and Arizona), Society of American Foresters.  
2012 calendar year.

Peer reviewer to several professional journals

## **MEMBERSHIPS:**

Society of American Foresters  
Xi Sigma Pi  
Gamma Sigma Delta

## **RESEARCH ACTIVITIES:**

Note: In 2004 my teaching and service assignments increase substantially, while my research appointment was reduced to 10%. These appointment levels, maintained since 2004, effectively put my research productivity on a four-year evaluation basis regarding publications, presentations, and grants categories (viz., 0.25/year or 1/four-years, minimum).

***Recent Unfunded Research Activity: (Principal Investigator)***

- 2011/Present Certification Review Board. Surveys of forestry undergraduate students, recent graduates, and forestry faculty advisors and administrators to identify and overcome barriers to participation in the SAF Candidate Certified Forester Program. Society of American Foresters. Pro Bono. (SAF has committed approximately \$6,000 as in-kind contributions to the project.)
- 2011 Hospodarsky, D. The Identification and Diminishment of Barriers to Participation in the SAF Candidate Certified Forester Program. Submitted to the Certification Review Board, SAF. Proposal accepted and research has been implemented Pro Bono.
- 2004 Grants and Contracts Funded: (Principal Investigator unless otherwise indicated)
- 2003/2004. Petrified Forest National Park Wood Theft Monitoring Project, Phase I. National Park Service. \$43,000. (Co-principal investigator).
- 2002/2005. Identification and Evaluation of Approaches to Public-Private Partnerships in Ecological Restoration. Ecological Restoration Institute, Northern Arizona University. \$27,597.

Petrified Forest National Park Wood Theft Monitoring Project, Phase II and III. National Park Service. \$58,000. (Co-principal investigator).

***Proposals Submitted - unfunded (since 2004)***

Combrink, T. and D. Hospodarsky. 2004. The Impact of Forest Management Interest Groups on Forest Health Restoration in the Southwest. Submitted to the Community Forestry Research Fellowships Program, USDA.

Hospodarsky, D. 2004. Social Impacts on Communities from Exposure to Various Levels of Wildfire Risk as a Result of Forest Restoration. Submitted to the NAU School of Forestry Mission Research Board.

Hospodarsky, D., M. Lee, Y. Kim. 2004. The Role of Forest Health restoration in Relationships Between Community Socioeconomic Conditions and Wildfire Management in the Southwest. Submitted to the USDA-Cooperative State Research, Education, and Extension Service; CSREES proposal number 2004-04115.

**ADVISING:**

Faculty advisor to the NAU Society of American Foresters Student Chapter and NAU Forestry Club, 2002-present. The NAU Student Chapter SAF was recognized as the “Outstanding Student Chapter in North America – First Place in both 2008-09 and 2011-12, and Third Place in 2010-11 (among 74 SAF Student Chapters throughout North America).

Faculty advisor to the NAU Logging Sports Team, 2006-present. Revived the team after a 20-year hiatus and since have lead the team to five annual competitions (conclaves) of the Association of Western Forestry Clubs (AWFC).

Currently mentor about 90 Forestry student members of the Forestry Club, NAU Student Chapter SAF, and NAU Logging Sports Team.

Recognized as an Educator of Influence by NAU Gold Axe recipient Erin Saunders, 2008-09.

During the 2000-01, 2001-02, and 2002-03 AYs, I advised and mentored 70, 62, and 28 students, respectively, in the PRM, Forestry, and Environmental Management programs.

Attended yearly Summer Previews training and served as Previews Advisor fall semester and summers 1994, 1995, 1996, 1997, and 1999.

Faculty advisor to the R.E.A.L. Association, the Parks and Recreation Management student club, 1994 – 1997



## **Document E: Individual Faculty Information**

### **CHING-HSUN HUANG, Ph.D.**

Associate Professor – 9 month – Tenured

Date of Appointment: 2007 - Present

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

- 1999            Ph.D. Forest Economics, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, Texas  
Dissertation Topic: Economic Analysis of Carbon Storage in Loblolly Pine Plantations  
Minors in Business, Mathematics and Statistics
- 1993            M.S. Environmental Management, University of Houston-Clear Lake, Houston, Texas
- 1990            B.S. Forestry, Chinese Culture University, Taipei, Taiwan.

### **PROFESSIONAL AND RESEARCH EXPERIENCE:**

- 2012/Present   Associate Professor in Forest Economics and Forest Management, School of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2007/2012      Assistant Professor in Forest Economics and Forest Management, School of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2006/2007      Assistant Professor in Natural Resources Economics, Department of Agronomy and Resource Sciences, College of Agriculture and Human Sciences, Texas A&M University-Kingsville, Texas
- 2003/2006      Research Scientist in Forest Economics and Management, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, Texas
- 2000/2002      Post Doctorate Research Associate in Forest Economics and Management, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, Texas
- 1996/1999      Research Assistant, Forest Economics, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, Texas
- 1993/1994      Taiwan EPA Research Assistant, Department of Public Health, Taipei Medical College/Taiwan Environmental Protection Administration (EPA).

### **TEACHING EXPERIENCE:**

2008/Present

FOR 101 Forestry Introduction

FOR 324W Forest Economics (lectures and labs)

FOR 326W Forest Management (lectures and labs)

FOR 493 Natural Resource Economics (online)

FOR 500 Ecosystem Science and Management Principles

FOR 593 Natural Resource Economics (online)

FOR 505 Forestry Seminar Series

***Courses Taught at Texas A&M University-Kingsville***

AGBU 2317 Agricultural Economics (3 credits)

AGBU 3380 Environmental Economics (3 credits)

AGBU 4325/5390 Range Economics (undergraduate and graduate) (3 credits)

AGECON 2223 International Agribusiness Marketing (3 credits)

***New Courses Developed:***

AGBU 2317 Agricultural Economics

AGBU 3380 Environmental Economics

AGBU 4325/5390 Range Economics

**REFERRED JOURNALS:** (with Impact Factors and Google Scholar Citations)

Vegh<sup>1</sup>, T., Huang, C., and Finkral, A.J. 2012. Carbon Credit Possibilities and Economic Implications of Fuel Reduction Treatments. *Western Journal of Applied Forestry*. In print. (Impact Factor: 0.696)

Huang, C., and Sorensen<sup>1</sup>, C. 2011. The Economic Value of Selling Carbon Credits from Restored Forests: A Case Study from the Navajo Nation's Tribal Forests. *Western Journal of Applied Forestry*. 26(1):37-45. (Impact Factor: 0.696)

Sorensen<sup>1</sup>, C., Finkral, A.J., Kolb, T.E., and Huang, C. 2011. Short- and Long-Term Effects of Thinning and Prescribed Fire on Carbon Stocks in Ponderosa Pine Stands in Northern Arizona. *Forest Ecology and Management*. 261:460-472. (Impact Factor: 1.992; 2 citations)

Huang, C., and Sorensen<sup>1</sup>, C. September 2010. Exploring the Potential of Obtaining Carbon Credits for Restoration Activities on Navajo Tribal Forest Lands. *Ecological Restoration Institute*.

Huang, C. 2009. Economics of Northern Bobwhite and Timber Management in the Southeastern United States. *Journal of Wildlife Management*. 73(8):1355-1361. (Impact Factor: 1.555; 1 citation)

Waring, K.M., D.M. Reboletti<sup>1</sup>, L.A.. Mork<sup>1</sup>, C. Huang, R.W. Hofstetter, A.M. Garcia<sup>1</sup>, P.Z. Fulé, and T.S. Davis<sup>1</sup>. 2009. Modeling the Impacts of Two Bark Beetle Species under a

Warming Climate in the Southwestern USA: Ecological and Economic Consequences. *Environmental Management*. 44(4):824-835. DOI 10.1007/s00267-009-9342-4. (Impact Factor: 1.503; 10 citations)

Huang, C. and Kronrad, G.D. 2006. The Effect of Carbon Revenues on the Rotation and Profitability of Loblolly Pine Plantations in East Texas. *Southern Journal of Applied Forestry*. 30(1):1-9. (Impact Factor: 0.838; 13 citations)

Huang, C., G.D. Kronrad and J. Morton<sup>1</sup>. 2005. The Financially Optimal Loblolly Pine Planting Density and Management Regime for Nonindustrial Private Forestland in East Texas. *Southern Journal of Applied Forestry*. 29(1):16-21. (Impact Factor: 0.838; 7 citations)

Huang, C. and Kronrad, G.D. 2004. Economic Analysis of Carbon Sequestration in Northern Red Oak in the United States. *World Resource Review*. 16(2):147-156. (1 citation)

Huang, C., and G.D. Kronrad. 2004. Economic Analysis of Pruning and Low Density Management Compared to Traditional Management of Loblolly Pine Plantations in East Texas. *Southern Journal of Applied Forestry*. 28(1):12-20. (Impact Factor: 0.838; 6 citations)

Huang, C., Bates<sup>1</sup>, R., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2004. Economic Analyses of Sequestering Carbon in Loblolly Pine, Cherrybark Oak and Northern Red Oak in the United States. *Environmental Management*. Vol. 33 Supplement 1, pp. S187–S199. DOI: 10.1007/s00267-003-9129-y. (Impact Factor: 1.503; 11 citations)

Huang, C., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2003. Economic Analysis of Sequestering Carbon in Green Ash Forests in the Lower Mississippi River Valley. *TheScientificWorldJOURNAL*. 3:731-740. (1 citation)

Kronrad, G.D., S. Cheng<sup>1</sup>, and C. Huang. 2003. Sequestering Carbon in Forests in the Lower Mississippi River Valley in the United States: An Economic Analysis. *World Resource Review*. 15(3):319-335. (1 citation)

Huang, C., and G.D. Kronrad. February 2002. Financially Optimal Thinning and Final Harvest Schedules for Loblolly Pine Plantations on Nonindustrial Private Forestland. *Southern Journal of Applied Forestry*. 26(1):13-17. (Impact Factor: 0.838; 7 citations)

Huang, C., and G.D. Kronrad. 2002. The Cost of Sequestering Carbon in Forests of the Southern United States. *World Resource Review*. Vol. 14, No. 3, P. 385-397.

Huang, C., and G.D. Kronrad. 2001. The Cost of Sequestering Carbon on Private Forest Lands. *Forest Policy and Economics*. P. 133-142. (Impact Factor: 0.895; 52 citations)

#### **NON-REFERRED JOURNAL ARTICLES:**

Huang, C., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2003. Economic Analysis of Sequestering Carbon in Forests Planted in the U.S. The Proceedings of the 12<sup>th</sup> International Conference on Coal Science. November 2-6, 2003. Cairns, Queensland, Australia.

Huang, C., and G.D. Kronrad. 2003. The Effects of a Carbon Credit Market and Sequestration Policies on Private Forestry in the Southern United States. Forest Policy Center Conference Proceedings. March 25-27, 2001. Atlanta, Georgia. P. 28-37.

Kronrad, G.D., R. Bates<sup>1</sup>, and C. Huang. 2002. Enhancement of Terrestrial Carbon Sinks through Reclamation of Abandoned Mine Land in the Appalachian Region. The Proceedings of Market Based Approaches to Mined Land Reclamation & Reforestation: A Technical Interactive Forum. May 15-16, 2002. Fort Mitchell, KY.

Huang, C., and G.D. Kronrad. 2002. Economic Analysis of Carbon Sequestration in Cherrybark Oak in the United States. The Proceedings of the Sixth International Conference on Greenhouse Gas Control Technologies. September 30-October 4, 2002. Kyoto, Japan.

Kronrad, G.D., C. Huang, and R. Bates<sup>1</sup>. 2002. The Cost of Sequestering Carbon on Private Forest Land in the Southern and Northern United States. The Proceedings of Future Energy Systems and Technology for CO<sub>2</sub> abatement. November 18-19, 2002. Antwerpen, Belgium. P. 277-289.

Bates<sup>1</sup>, R., G.D. Kronrad, C. Huang, and D. Vandendriesche. 2002. Use of the Forest Vegetation Simulator in Determining Optimal Rotation Settings for Abandoned Mined Lands in Appalachia. The Proceedings of the Second Forest Vegetations Simulator Conference. February 12-14, 2002. Fort Collins, Colorado. P. 196-199. (1 citation)

Huang, C., and G.D. Kronrad. 2001. Economic Analysis of Carbon Sequestration on Reclaimed Mined Lands. Eighteenth Annual International Pittsburgh Coal Conference. December 4-7, 2001. Newcastle, Australia.

Huang, C., and G.D. Kronrad. 2000. Optimal Financial Returns of Loblolly Pine in East Texas. Proceedings of Southern Forest Economics Working Group (SOFEW) 1999 Conference. April 18-20, 1999. Biloxi, MS. P. 9-12.

#### **REFERRED ARTICLES IN PREP:**

Huang, C., Sorensen<sup>1</sup>, C., Finkral, A.J., and Kolb, T.E. 2012. Economic Value of Carbon Storage in Wood Products from Ponderosa Pine Fire-Risk Reduction Treatments in Arizona, USA. *Journal of Environmental Management*. (Impact Factor: 2.760)

Huang, C., Finkral, A.J., and Kolb, T.E. 2011. Economic analysis of carbon sequestration arising from fuel reduction treatments in ponderosa pine forests from 2006-2010. *Journal of Forestry*. (Impact Factor: 1.764)

Huang, C., and Kester<sup>1</sup>, J. 2011. Economic Impacts of Fire Hazard Reduction Treatments on the Navajo Nation. *Western Journal of Applied Forestry*. (Impact Factor: 0.696)

**<sup>1</sup>Graduate student**

**SCIENTIFIC PRESENTATIONS:** Principle Presenter and Lead Author

Huang, C., and Sorensen<sup>1</sup>, C. 2011. The economic value of selling carbon credits from restored forests: a case study from the Navajo Nation's tribal forests. The 11<sup>th</sup> Biennial Cultural and Natural Resource Management on the Colorado Plateau: Science and Management at the Landscape Scale, Flagstaff, AZ, October 26, 2011

Huang, C., and Sorensen<sup>1</sup>, C. 2011. Economic Analysis of Tradable Carbon Credits from the Navajo Nation's Tribal Forests. The Northern Arizona Chapter of the Society of American Foresters, Flagstaff, AZ, October 20, 2011.

Huang, C. 2010. Economics of Northern Bobwhite and Timber Management in the Southeast. The Economics of Forest Management Track at the 2010 SAF National Convention, Albuquerque, NM, .October 27-31.

Huang, C. 2010. Carbon credits & international trade: Implications for forest management. 61st Western Forest Insect Work Conference, Flagstaff, AZ April 5-8, 2010.

Huang, C. and Kronrad, G.D. 2006. Evaluating Planning Alternatives Concerning Financial Revenues, Carbon Sequestration and Potential Biofuel Production for Loblolly Pine Plantations in East Texas. 2006 Southern Forest Economics Workshop. March 23-24. Knoxville, Tennessee.

Huang, C. and Kronrad, G.D. 2005. The Effect of Carbon Revenues on the Rotation and Profitability of Loblolly Pine Plantations in East Texas. International Symposium: Faustmann and Optimal Stopping Times in Forestry and Beyond. April 20-22. Baton Rouge, Louisiana.

Huang, C., Kronrad, G.D, Bates<sup>1</sup> R. and M. Nentwich<sup>1</sup>. 2005. A Comparison of Sequestering Carbon in Forests in the U.S. The 8<sup>th</sup> Electric Utilities Environmental Conference. January 24-26, 2005. Tucson, Arizona.

Huang, C. and Kronrad, G.D. 2004. Economic Analysis of Carbon Sequestration in Northern Red Oak in the United States. The 15th Global Warming International Conference. April 20-22. San Francisco, California.

Huang, C. and Kronrad, G.D. 2004. The Effects of Carbon Credit Payment Methods on a Carbon Trading Market. The 7<sup>th</sup> Electric Utilities Environmental Conference January 19-22, 2004. Tucson, Arizona.

Huang, C. and Kronrad, G.D. 2003. Economic Analysis of Sequestering Carbon in Forests Planted on Reclaimed Mined Land in the U.S. The 12<sup>th</sup> International Conference on Coal Science. November 2-6, 2003. Cairns, Queensland, Australia.

Huang, C., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2003. Sequestering Carbon in Forests in the Lower Mississippi River Valley in the United States: An Economic Analysis. The XIVth Global Warming International Conference. May 27-30, 2003. Boston, Massachusetts.

Huang, C., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2002. Carbon Sequestration in Cherrybark Oak Stands in the Lower Mississippi River Valley. USDA Carbon Symposium on Natural Resource Management to Offset Greenhouse Gas Emissions, November 19-21, Raleigh, NC.

Huang, C., G.D. Kronrad, and S. Cheng<sup>1</sup>. 2002. Economic analysis of carbon sequestration in cherrybark oak in the United States. The Sixth International Conference on Greenhouse Gas Control Technologies, October 1-5, Kyoto, Japan.

Huang, C. and G. D. Kronrad. 2001. Carbon Sequestration can Benefit Forest Landowners and the Economy. Southern Forest Science Conference. November 26-28, Atlanta, Georgia.

Huang, C. and G. D. Kronrad. 2001. Economic Analysis of Carbon Sequestration on Reclaimed Mined Lands. Eighteenth Annual International Pittsburgh Coal Conference. December 4-7. Newcastle Australia.

Huang, C. and G.D. Kronrad. 1999. Carbon Sequestration in Loblolly Pine Plantations in Texas: Financial Compensation and Management Implication. International Union of Forestry Research Organizations, October, Darmstadt, Germany.

*Author (Not Presenter)*

Waring, K.M., D.M. Reboletti<sup>1</sup>, L.A.. Mork<sup>1</sup>, C. Huang, R.W. Hofstetter, A.M. Garcia<sup>1</sup>, P.Z. Fule, T.S. Davis<sup>1</sup>. 2009. Modeling the impacts of two bark beetle species under warming climate in the southwestern U.S.A.: ecological and economic consequences. Western Forest Insect Work Conference, Spokane, WA. March 23-26, 2009. (Poster Presentation).

Waring, K.M., D.M. Reboletti<sup>1</sup>, L.A.. Mork<sup>1</sup>, M. Li, C. Huang, R.W. Hofstetter, A.M. Garcia<sup>1</sup>, P.Z. Fule, T.S. Davis<sup>1</sup>. 2008. Southern and Mexican pine beetles and climate change: An assessment of potential ecological and economic effects of a range shift. Ecological Society of America 93<sup>rd</sup> Annual Meeting. August 3-8, 2008, Milwaukee, WI.

Waring, K.M., D.M. Reboletti<sup>1</sup>, L.A.. Mork<sup>1</sup>, C. Huang, R.W. Hofstetter, A.M. Garcia<sup>1</sup>, P.Z. Fule, T.S. Davis<sup>1</sup>. 2008. An Inconvenient Pest! Assessing the spread of a non-native bark beetle. National Center for Ecological Analysis and Synthesis Distributed Graduate Seminar Synthesis Meeting, February 4-8 2008, Santa Barbara, CA.

Kronrad, G.D and C. Huang. 2005. Economic Analyses of Sequestering Carbon in Forests in the United States. The Chapman Conference on Science and Technology of Carbon Sequestration. January 16-20, 2005. San Diego, California.

Kronrad, G.D., C. Huang and R. Bates<sup>1</sup>. 2003. Enhancement of Terrestrial Carbon Sinks through Reclamation of Abandoned Mine Land in the Appalachian Region. June 2-5, 2003. Pittsburgh, Pennsylvania.

Kronrad, G.D., C. Huang and S. Cheng<sup>1</sup>. 2003. Economic Analysis of Sequestering Carbon in Green Ash Forests in the Lower Mississippi River Valley. The 6<sup>th</sup> Electric Utilities Environmental Conference. January 27-30, 2003. Tucson, Arizona.

Bates<sup>1</sup>, R., G.D. Kronrad and C. Huang. 2002. The Cost of Sequestering Carbon in Northern Red Oak Plantations on Abandoned Mined land in West Virginia. USDA Carbon Symposium on Natural Resource Management to Offset Greenhouse Gas Emissions, November 19-21, Raleigh, NC.

Kronrad, G.D., and C. Huang. 2002. Enhancement of Terrestrial Carbon Sinks through Reclamation of Abandoned Mine Lands in the Appalachian Region. Presentation to National Energy Technology Laboratory, United States Department of Energy. October 22-24, Morgantown, WV.

Kronrad, G.D., and C. Huang. 2002. Carbon Sequestration on Mined Lands. Texas Mining Conference. October 4, College Station, TX.

Kronrad, G.D., and C. Huang. 2002. Economic Analysis of Sequestering Carbon in Forest Plantation on Mined Lands. The Fifth Electric Utilities Environmental Conference, January 21-28, Tucson, Arizona.

Kronrad, G.D., S. Cheng<sup>1</sup> and C. Huang. 2002. Carbon Sequestration and the Carbon Credit Market. Surface Mine Reclamation Workshop, October, College Station, TX.

Kronrad, G. D. and C. Huang. 2002. Forestry and the Carbon Credit Market. Texas Forestry Association Annual Meeting. Grapevine, TX.

Bates<sup>1</sup>, R., G.D. Kronrad, C. Huang, and Don Vandendriesche. 2002. Use of the Forest Vegetation Simulator in Determining Optimal Rotation Settings for Abandoned Mined Lands in Appalachia. Second Forest Vegetations Simulator Conference. Fort Collins, CO.

Kronrad, G.D., and C. Huang. 2002. Profitability of Loblolly Pine Management. Texas-Louisiana Longleaf Pine Project Development Workshop. Nacogdoches, TX.

Kronrad, G.D., and C. Huang. 2001. The Cost of Sequestering Carbon in Forests of the Southern United States. The XIIIth Global Warming International Conference & Expo, The Year 2001 Conference, April 8-11, Cambridge, UK

Kronrad, G.D., and C. Huang. 2001. Intensive Pine Plantation Management: Profitability of Timber Management and Carbon Sequestration. Florida Society of American Foresters Annual Meeting, Pensacola, FL.

Morton<sup>1</sup>, J., and G.D. Kronrad, C. Huang. 2001. Carbon Sequestration- The Answer to a Global Problem. Texas Mining Conference. Dallas, TX.

Kronrad, G.D., and C. Huang. 2001. Integrating Carbon into Forest Management Planning. Society of American Foresters Spring Symposium. April 24-25, Gainesville, FL.

Kronrad, G.D., and C. Huang. 2001. Intensive Pine Plantation Management: Profitability of Timber Management and Carbon Sequestration. DuPont Pharmaceuticals Company. August 22-24, Pensacola, FL.

Kronrad, G.D., and C. Huang. 2001. The Cost of Sequestering Carbon on Private Forest Lands. 4th Iberian Forest Congress. November 30, Evora, Portugal

Kronrad, G.D., and C. Huang. 2001. The Effects of a Carbon Credit Market and Sequestration Policies on Private Forestry in the Southern United States. Global Initiatives and Public Policies: First International Conference on Private Forestry in the 21st Century, March, Atlanta, Georgia.

Kronrad, G.D., and C. Huang. 2000. Sequestering Carbon in Forests: Results from Texas and Future Research. Los Alamos National Laboratory Conference on Carbon Sequestration, February, Santa Fe, NM.

Kronrad, G.D., and C. Huang. 2000. Recent Developments and Proposals for Carbon Sequestration Research. Department of Energy & Department of the Interior Joint Conference, March, Shepherdstown, WV.

Kronrad, G.D., and C. Huang. 2000. Financially Optimal Thinning and Final Harvest Schedules for Timber Production and Carbon Sequestration. 2000 Symposium on Systems Analysis in Forest Resources, September, Aspen, CO.

Kronrad, G.D., and C. Huang. 2000. Carbon Sequestration: Economic Analysis of Carbon Storage in Loblolly Pine Plantations in East Texas. Surface Mine Reclamation Workshop, October, College Station, TX.

Kronrad, G.D., and C. Huang. 2000. Nonindustrial Private Forest Landowners can Profit from a Carbon Credit Market. Society of American Foresters National Convention, November, Washington, DC.

Kronrad, G.D., and C. Huang. 2000. The Profitability of Loblolly Pine Management. National Landowner Association Meeting, March, San Antonio, TX.

Kronrad, G.D., and C. Huang. 2000. Profitability of Forest Management in East Texas. Forest Profitability Workshop, September, Nacogdoches, TX.



Kronrad, G.D., and C. Huang. 2000. Optimizing Profitability in Pine Plantation Management. Texas Forestry Association Annual Conference: Who Leads the Change? October, Nacogdoches, TX.

Kronrad, G.D., and C. Huang. 1999. Sequestering Carbon in Loblolly Pine Plantations. Forest Resource Institute Research Conference, August, Nacogdoches, TX.

Kronrad, G.D., and C. Huang. 1999. Carbon Sequestration on Forestland. Department of the Interior Conference on Carbon Sequestration, December, Washington D.C.

Kronrad, G.D., and C. Huang. 1999. Optimal Financial Returns of Loblolly Pine in East Texas. Southern Forest Economics Working Group Conference, March, Biloxi, MS.

### <sup>1</sup>Graduate student

#### **ADVISING**

##### *Undergraduate Student Advisor*

1 student, School of Forestry, Northern Arizona University 2011-2012

##### *Graduate Student Advisor*

1 student, Environmental Science and Policy,  
Northern Arizona University 2012-present

2 students, School of Forestry, Northern Arizona University 2011-present

1 student, School of Forestry, Northern Arizona University 2008-2011

2 students, School of Forestry, Northern Arizona University 2009-2010

College of Agriculture and Human Sciences,  
Texas A&M University-Kingsville 2006-2007

##### *Graduate Student Committee Member*

1 student, School of Forestry, Northern Arizona University 2011-2012

1 student, School of Forestry, Northern Arizona University 2010-2011

1 student, College of Social and Behavioral Sciences,  
Northern Arizona University 2010-2011

1 student School of Forestry, Northern Arizona University 2009-2011

1 student, School of Forestry, Northern Arizona University 2009-2010

1 student, School of Forestry, Northern Arizona University 2008-2010

1 student, School of Forestry, Northern Arizona University 2008-2009

1 student, School of Forestry, Northern Arizona University 2007-2009

2 students, College of Forestry and Agriculture  
Stephen F. Austin State University 2004-2006

1 student, College of Forestry and Agriculture,  
Stephen F. Austin State University 2003-2005

2 students, College of Forestry and Agriculture,  
Stephen F. Austin State University 2002-2004

1 student, College of Forestry and Agriculture,

Stephen F. Austin State University 1 student, College of Forestry and Agriculture, Stephen F. Austin State University College of Forestry and Agriculture, Stephen F. Austin State University	2002-2003  2001-2003  2000-2005
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**PROFESSIONAL SERVICE ACTIVITIES:**

Reviewer of professional papers submitted to: *Forest Science, Southern Journal of Applied Forestry (SJAF), Ecological Modeling, and Carbon Balance and Management, the Canadian Journal of Forest Research, the Journal of Forest Economics, Agroforestry Systems, Forest Policy and Economics, Forest Ecology and Management.*

As a full panelist serving on the FY 2012 Food and Agricultural Sciences National Needs Graduate and Postgraduate Fellowship (NNF) Grants Program Review Panel for the USDA National Institute of Food and Agriculture (NIFA)

Selected to review proposals submitted to the 2011 NASA Applied Science RFP titled “Wildland Fires”

2011 As a full panelist serving on the FY 2011 Higher Education Challenge Grants Program Review Panel for the USDA National Institute of Food and Agriculture (NIFA)

2011 Nominee for serving on an EPA Science Advisory Board (SAB) Panel on Accounting for Carbon Dioxide (CO<sub>2</sub>) Emissions from Biogenic Sources

Reviewer of a textbook, “Managing the Environment” by Barlowe

2006 External project proposal reviewer for Forest and Wildlife Research Center at Mississippi State University

Member of Society of American Foresters (SAF)

1999-present Member of Southern Forest Economics Workers (SOFEW)

**NAU, COLLEGE, AND UNIVERSITY SERVICE:**

2012-present Member of the CEFNS Curriculum Committee

2012-present Forestry Library Liaison Member of the Search Committee for Instructors of Mathematics, Mathematics and Statistics Department

2011-present Member of the Information Technology Committee

2010-present Member of the Annual Review Committee

2011-2012 Presented scholarships at Honors Convocation

2011-2012 Judge for College of Engineering, Forestry & Natural Sciences (CEFNS)

***Undergraduate Research and Design Symposium (UGRADS)***

2009-2012 Member of the Faculty Grants Committee

2009-present Member of the SWFSC Landscape Committee

Member of the Mission Research Board

Member of the Ad Hoc Adjunct Faculty Status Review Committee

Forestry Graduate Student Association faculty advisor

Presented scholarships at Honors Convocation

**COMMUNITY SERVICE:**

Attended Landscape Restoration Working group for the Four Forest Restoration Initiative (4FRI) as a forest economics/utilization advisor and provided comments regarding the outline of 4FRI Utilization, Economics and Ecosystem Services in 2010.

Provided assistance in the calculation of herbage production for range management to the 4FRI team in January 2012.

Gave a talk to the Boy Scouts of America in their badges series on citizenship in the world, teaching the boy scouts about different world organizations and the role government plays globally on February 29, 2012.

Provided forest economics and forest management advice to KOMAZA, “a non-profit social enterprise committed to reducing rural poverty by connecting smallholder farmers with high-value markets”, on April 9, 2012

**SPECIALIZED TRAINING:**

USDA Forest Service (Region 3) Project Level Economic Training for Range, April 24-25, 2012

## **Document E: Individual Faculty Information**

### **MOLLY E. HUNTER**

Professor – 9 month – Tenured

Date of Appointment: 2007 – Present

Specializations: Fire Science

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

2000/2004 Colorado State University, Fort Collins, CO, Ph.D. in Forest Science, 2004.

1994/1998 University of California at Davis, Davis, CA, B.S. in Plant Biology 1998.

### **PROFESSIONAL EXPERIENCE:**

2011/Present Assistant Research Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ. Courses taught: Fire Ecology; Forest Ecology; Fire Monitoring and Modeling; Fuel Treatments and Modeling.

2007/2010 Assistant Clinical Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ. Courses developed and taught: Introduction to Wildland Fire; Fire Ecology; Forest Ecology; Fire Monitoring and Modeling; Fuel Treatments and Modeling; Graduate Seminar.

2007 Instructor, School of Life Sciences, University of Nevada at Las Vegas. Courses developed and taught: Ecosystem Management; Biogeography.

2005/2007 Research Associate, Dept. of Forest, Rangeland and Watershed Stewardship, Colorado State University, Fort Collins, CO.

2004/2005 Instructor, Dept. of Forest, Rangeland and Watershed Stewardship, Colorado State University. Courses taught: Fire Behavior.

### **PEER-REVIEWED PUBLICATIONS:**

Stevens-Rumann, Camille, Carolyn H. Sieg, and Molly E. Hunter. 2012. Ten years after wildfires: how does varying tree mortality impact fire hazard and forest sustainability? *Forest Ecology and Management* 267: 199-208.

Hunter, M.E., Lentile, L.B. and Iniquez, J.M. 2011. Comparing effects of prescribed fires and wildland fire use in central New Mexico, USA. *Fire Ecology* 7(3): 108-121.

Peppin, D.L., Fulé, P.Z., Sieg, C.H., Hunter, M.E., Beyers, J.L., and Robichaud, P.R. 2011. Recent trends in post-wildfire seeding in western US forests: costs and seed mixes. *International Journal of Wildland Fire* 20: 702-708.

Peppin, D., Fulé, P.Z., Sieg, C.H., Beyers, J. and Hunter, M.E. 2010. Post-wildfire seeding in forests of the West: An evidence-based review. *Forest Ecology and Management*. 260(5): 573-586.

Freeman, J., T.J. Stohlgren, M.E. Hunter, P.N. Omi, E.J. Martinson, G.W. Chong, and C.S. Brown. 2007. Rapid assessment of postfire plant invasions in coniferous forests of the western United States. *Ecological Applications* 17(6): 1656-1665.

Hunter, Molly E. and Philip N. Omi. 2006. Response of native and exotic grasses to increased soil nitrogen and relation to recovery in a post-fire environment. *Restoration Ecology* 14: 587-594.

Hunter, Molly E. and Philip N. Omi. 2006. Seed supply of native and cultivated grasses in pine forests of the southwestern United States and the potential for vegetation recovery following wildfire. *Plant Ecology* 183: 1-8.

Hunter, Molly E., Philip N. Omi, Erik J. Martinson, and Geneva W. Chong. 2006. Effects of fuel treatments, post-fire rehabilitation treatments, and wildfire on establishment of exotic plants in ponderosa pine forests in the southern Rocky Mountains. *International Journal of Wildland Fire* 15: 271-281.

Hunter, Molly E. and Eric S. Menges. 2002. Allelopathic effects of *Ceratiola ericoides* (Empetraceae) on seven rosemary scrub species. *American Journal of Botany* 89: 1113-1118.

#### **INVITED PAPERS:**

Hunter, M.E. 2007. Wildland fire use: an underutilized management option? *Natural Resources Journal*. 47(2) 1-10.

#### **REPORTS:**

Martinson, E.J., M.E. Hunter, and P.N. Omi. 2008. Fuel management activities and nonnative invasive plants. In: Wildland fire in ecosystems – fire and nonnative invasive plants, USDA Forest Service, Rocky Mountain Research Station, Gen. Tech. Rep. RMRS-GTR-42 vol. 6.

Hunter, M.E., W.D. Shepperd, L.B. Lentile, J. Butler, J.E. Lundquist, M.G. Andreu, and F.W. Smith. 2007. A comprehensive guide to fuels treatment practices for ponderosa pine in the Black Hills, Colorado Front Range, and Southwest. Gen. Tech. Rep. RMRS-GTR-198. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 93 p.

**GRANTS AND CONTRACTS:**

<u>Project</u>	<u>Investigator</u>	<u>Sponsor</u>	<u>Amount</u>
2011-2012 Buffelgrass eradication and outreach	PI	Southern Arizona Buffelgrass Coordination Center	\$14,114
2011-2012 Historical and current fire management practices in two southwestern wilderness areas: Saguaro National Park and Gila National Forest	PI	Rocky Mountain Research Station	\$22,249
2010-2013 Developing a Southwest Fire Science Consortium	Co-PI	Joint Fire Science Program	\$878,612
2009-1010 (preproposal) Developing a Southwest Fire Science Consortium	Co-PI	Joint Fire Science Program	\$90,881
2011 Fuel Reserve Fund; Assessment and Guidelines for Determining Effectiveness and Longevity of Buffelgrass treatments in Southern Arizona	PI	National Park Service	\$30,758
2009-2010 Video Image Library of Fuel Treatment Practices	Collaborator	Joint Fire Science Program	\$28,000
2009-2012 Forest Vegetation Simulator (FVS) modeling project	Co-PI	Grand Canyon National Park	\$40,220
2008- 2009 Post- wildfire seeding in forests of the Intermountain West: trends, costs, effects, use of native seed	Co-PI	Joint Fire Science Program	\$137,405
2008 Monitoring	PI	Joint Fire Science	\$82,624

Effectiveness of Prescribed Fire and Wildland Fire Use in the Gila National Forest, New Mexico		Program	
2008 Treatment Effectiveness Monitoring for the Dakota Hill Complex Burned Area Rehabilitation Treatments	Co PI	Zion National Park	\$344,156

**PROFESSIONAL AFFILIATIONS:**

Association for Fire Ecology  
Ecological Society of America  
Society of American Foresters

**SERVICE:**

2011/Present Writer and Editor: Joint Fire Science Program.  
2011 Program committee: Association for Fire Ecology and Southwest Fire Science Consortium Regional Conference.  
2007 Program committee: Association for Fire Ecology Regional Conference.  
2006/2007 Board member: Friends of Sabino Canyon.  
2002/2004 Chapter founder and president: Student Association for Fire Ecology, Colorado State University Chapter.  
2002 Board member and student co-chair: Association for Fire Ecology.

**REVIEWER:**

Applied Geography  
Biological Invasions  
Fire Ecology  
Forest Ecology and Management  
International Journal of Wildland Fire  
Journal of Arid Environments  
Rangeland Ecology and Management  
Restoration Ecology  
The Journal of Applied Ecology  
USDA Forest Service, Rocky Mountain Research Station

## Document E: Individual Faculty Information

### YEON-SU KIM

Associate Professor – 9 month – Tenured

Date of Appointment: 1998 – Present

Specializations: Economics

**Northern Arizona University – School of Forestry**

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### EDUCATION:

- 1998            Doctor of Philosophy in Forest Resources, Oregon State University, Corvallis, OR. Specializing in Economics with a Ph.D. minor in Statistics
- 1994            Master of Science in Forest Resources, Seoul National University, Seoul, South Korea. Specializing in Economics and Recreation
- 1992            Bachelor of Science in Forestry, Seoul National University, Seoul, South Korea

### PROFESSIONAL EXPERIENCE:

- 2012/Present    Affiliated Scientist, Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ.
- 2012/Present    *Professor*; 2004 – 2012: *Associate Professor*; 1998 –2004: *Assistant Professor*, School of Forestry, Northern Arizona University, Flagstaff, AZ.
- 2011/2013       *External Researcher*, Center for International Forestry Research (CIFOR), Bogor, Indonesia

### TEACHING EXPERIENCE:

- 1999/Present    Associate Professor, Department of Forestry, Northern Arizona University, Flagstaff, AZ

FS 141 First Year Seminar: Local Environments and the Land  
FOR 222 Environmental Conservation, two 8-week sessions  
FOR 255 International Wildlife Issues  
PRM 346 Wildland Recreation Management  
PRM 301 Recreation Economics (in class and web-based)  
FOR 423C/424C Forest Ecosystem Planning I & II  
FOR 440 Benefit-Cost Analysis  
FOR 493/593 Natural Resource Economics Fall semester of 1999  
FOR 499 Resource Planning for Natural Resources and Recreation  
FOR 505 Forestry Seminar Series  
FOR 506 Special Topics: Econometrics  
FOR 590 Economic and Social Issues in Forest Recreation Development (web-based)  
FOR 633 Ecological Economics



FOR 690 Research Methods  
FOR 697 Independent Study (Non-Market Valuation)  
UC 101 The University Colloquium

**Other Courses:**  
2000/2007

Economics and Planning Unit, Institute for Ecosystem Management for Continuing Education in Ecosystem Management (IEM-CEEM)

**REFERRED JOURNALS:**

Wu, T., and Y.-S. Kim. 2013. Pricing Ecosystem Resilience in Frequent-Fire Dry Forests. *Forest Policy and Economics*.27:8-12

Plumb, S., E. Nielsen, and Y.-S. Kim. 2012. Challenges of Opportunity Cost Analysis in Planning REDD+: A Honduran Case Study of Social and Cultural Values Associated with Indigenous Forest Uses. *Forests* 2012, 3(2), 244-264;

Bae, J.S., R.W. Joo, and Y.-S. Kim. 2012 Forest transition in South Korea: Reality, path and drivers. *Land Use Policy* 29:198– 207

Perez-Verdin, G., J.J. Navar-Chaidez, R. Silva-Flores, and Y.-S. Kim. 2011. The value of water under different altitude and moisture scenarios: A review of willingness-to-pay studies in Mexico. *Modern Economy* 2:769-779

Wu, T., M.A. Petriello, and Y.-S. Kim. 2011. Shifting Baseline Syndrome as a Barrier to Ecological Restoration in the American Southwest. *Ecological Restoration* 29:3

Wu, T., Y.-S. Kim, and M. Hurteau. 2011. Investing in Natural Capital: Using Economic Incentives to Overcome Barriers to Forest Restoration. *Restoration Ecology* 19(4): 441-445

Perez-Verdin, G., Y.-S. Kim, D. Hospodarsky, and A. Tecle. 2009. Factors Driving Deforestation in Common-Pool Resources in Northern Mexico. *Journal of Environmental Management* 90(1): 331-340

Hjerpe, E.E., and Y.-S. Kim. 2008. Economic impacts of national forest fuels reduction programs in the Southwest. *Journal of Forestry* 106(6): 311-316

Kim, Y.-S., S. Dewhurst, and D. Hospodarsky. 2007. The 2005 Planning Rule as a Teaching Tool. *Journal of Forestry* 105(6): 320-325

Hjerpe, E.E., and Y.-S. Kim. 2007. Regional economic impacts of Grand Canyon river runners. *Journal of Environmental Management* 85 (2007) 137–149

Pagdee, A., Y.-S. Kim, and P.J. Daugherty. 2006. What Makes Community Forest Management Successful: A meta-study from community forestry throughout the world. *Society and Natural Resources* V19(1):33-52

Kim, Y.-S., and A. Wells. 2005. The Impacts of Forest Density on Property Values. *Journal of Forestry* 103 (3): 146-151

Kim, Y.-S., and R. Johnson. 2002. The Impact of Forest and Forest Management on Neighboring Property Values. *Society and Natural Resources* 15:887-901.

#### **OTHER PUBLICATIONS:**

Kim, Y.-S. 2012. Navigating though the perils and promises of REDD+ and Payments for Ecosystem Services in J.S. Bae (ed) *REDD+ National Strategy and Implementation in Indonesia*. Korean Forest Research Institute (KFRI) and The Center for International Forestry Research (CIFOR).Seoul. South Korea.

Kim, Y.-S. 2010. Ecological Restoration as Economic Stimulus: A Regional Analysis. Ecological Restoration Institute, Northern Arizona University. *ERI-Issues in Forest Restoration*, 20p. (peer-reviewed)

Wu, T., and Y.-S. Kim. 2009. Environmental Markets: Concentrate on Criteria (Letter). *Science*: 326.

Kim, Y.-S. 2008. Travel Management Plan (TMS) Economic Effect Assessment. *Technical Report for the Coconino National Forest* (11 pages). Flagstaff, AZ.

Pagdee, A., Y.-S. Kim, and P.J. Daugherty. 2007. A response to Bradshaw's commentary paper: On definitions of success and contingencies affecting success in Community Forestry. *Society and Natural Resources* 20:8, 759 — 760

Kim, Y.-S. 2006. Forestry and Forestry Education in the U.S. *Korean Forest Policy Research Bulletin*. June 2006.

Hjerpe, E.E., and Y.-S. Kim. 2003. Regional Economic Impacts of Grand Canyon River Runners. *Technical Report for Grand Canyon National Park* (48 pages). Flagstaff, AZ.

Wells, A. and Y.-S. Kim. 2002. Quantifying forest externalities at the Wildland-Urban Interface: An Hedonic Price Method and Geographic Information Systems Approach. *Proceedings 2002 Southern Forest Economist Meeting*.

Hjerpe, E.E., and Y.-S. Kim. 2001. Economic Impacts of the Low Summer Steady Flows of the Colorado River to Private Whitewater Boaters and Anglers and River Concessionaires, 2001. *Technical Report for Grand Canyon Monitoring and Research Center*, 21 pages. Flagstaff, AZ.

Temple, R., P. Gagnon, S. Harrington, J. Bailey, Y.-S. Kim, D. Larson and B. Zipse (1999). Assessment of Forest Resources and Communities in the Four Corners Region: Synthesis Report. *Forest Trust Research Report 11*, 194 pages. Santa Fe, NM

Kim, Y.-S., and R. Johnson. 1997. Measuring the Economic Impacts of Near-urban Forests on Neighboring Properties. *Proceedings IUFRO 1.14.00 Interdisciplinary Uneven-aged Silviculture Symposium*.

Kim, Y.-S., and Y. Youn. 1993. Monetary Evaluation of the Recreational Function of Urban Forest in Seoul. *Proceedings IUFRO Interim Meeting*.

#### **BOOK CHAPTERS:**

Perez-Verdin, G., J.J. Navar-Chaidez, Y.-S. Kim, R. Silva-Flores. 2012. Chapter 14. Valuing watershed services in Mexico's temperate forests. J. Diez (ed). *Sustainable Forest Management-Current Research*. InTech ISBN 979-953-51-0621-0.

Kim, Y.-S., and E. E. Hjerpe. 2011. Chapter 14 Merging Economics and Ecology in Ecological Restoration Projects. in D.Egan, E.Hjerpe, and J.Abrams (ed). *Integrating Nature and Culture: Exploring the Human Dimensions of Ecological Restoration*. Island Press (in press) ISBN 978-1-59726-690-1

#### **PRESENTATIONS, LECTURES, AND POSTERS:**

Kim, Y.-S. J.S. Bae, Y. Noh, S.Latifah, T. Gonska. 2012. Systematic Review-Factors promoting REDD+. Poster presentation at the SAF National Convention. Spokane, Washington. Oct 24-26, 2012

Kim, Y.-S. D. Vosick. 2012. Economics of Ecological Restoration and Hazardous Fuel Reduction Treatments. Organized technical session and oral presentation at the SAF National Convention. Spokane, Washington. Oct 24-26, 2012

Kim, Y.-S. D. Vosick. 2012. Webinar: Economics of Ecological Restoration and Hazardous Fuel Reduction Treatments. Southwest Fire Science Consortium. Oct 17. 2012

Kim, Y.-S. 2012. Systematic Review-Institutions for REDD+. Indonesia' REDD+ Strategy and Implementation Workshop. The Korea International Cooperation Agency (KOICA) and Korean Forest Research Institute (KFRI). Seoul. South Korea. July 4. 2012

Kim, Y.-S. 2012. Forests, Climate Change, and REDD+. Departmental Seminar. The Forestry Study Program. University of Mataram. Mataram, Indonesia. Jan. 19, 2012

Kim, Y.-S. 2012. REDD+ for Community Forestry: An Oxymoron? The Center for International Forestry Research (CIFOR). Borgor, Indonesia. Jan. 20, 2012

Kim, Y.-S. 2012. Navigating through the perils and promises of Payments for Environmental Services for sustainable development. Invited Speaker. The Fourth International Conference on

Science and Technology for Sustainable Development of the Greater Mekong Sub-region (4th STGMS), Jan 23-24. Khon Kaen, Thailand

Kim, Y.-S. 2012. Forests, Climate Change, and REDD+. Departmental Seminar. Dept. of Environmental Science. Khon Kaen University. Thailand. Jan. 16, 2012

Allen, J.; Kim, Y.S.; Fox, B.E.; Wagner, M.R.; Charles, H. Preliminary Assessment of Global Competency Curriculum Content in SAF Accredited Forestry Programs. The 9th Biennial University Education in Natural Resources Conference, Fort Collins, Colorado, USA. March 2012

Fox, B., Y.-S. Kim, J. Allen, and M. Wagner. 2011. Congruence of Supply and Demand of Global Competencies in Forestry: Preparing Foresters for a World-wide Forestry Career. SAF National Convention. Honolulu, Hawaii. Nov.2-6, 2011

Fitch, R. and Y.-S. Kim. 2011. Tipping Point: How much fuel treatment is enough to make a real difference in fire suppression cost? 11<sup>th</sup> Biennial Conference for Research on the Colorado Plateau, Flagstaff, Arizona. Oct.24-27, 2011.

Kim, Y.-S. 2011. Lessons Learned from REDD+ pilot projects in Indonesia (Panelist) Workshop: Finding Effective Ways to Implement REDD+ project in Lombok. The Korea International Cooperation Agency (KOICA) and The Center for International Forestry Research (CIFOR). Lombok, Indonesia. Jun 21 - 22, 2011

Kim, Y.-S., B. Fox, and M. Wagner. 2011. Assessing Global Learning in Forestry: Connecting the Dots from Program to Courses. Southwest Institute for Learning with Technology, Flagstaff, Arizona. May 23-24, 2011

Kim, Y.-S. 2011. Ecosystem Services and Markets. Guest lecture in ENV555 The Environmental Science/Policy Interface. March 22. 2011

Wu, T., R. Fitch, Y.-S. Kim and D. Vosick. 2010. Tradeoffs Between Ecosystem Services Under Differing Market Conditions: A Case Study of Southwestern Ponderosa Pine Forests Restoration. A Community on Ecosystem Services, December 2010, Phoenix, ARIZONA

Kim, Y.-S. 2010. Economic Impacts of Restricting Motorized Recreation in the U.S. National Forests: A case from the American southwest. Poster presentation at XXIII International Union of Forest research Organizations (IUFRO) World Congress, August 2010, Seoul, South Korea.

Kim, Y.-S. 2010. Ecological Restoration as Economic Stimulus: Potential Regional Economic Impacts of the Southwestern Ponderosa Pine restoration in the U.S. Poster presentation XXIII

International Union of Forest research Organizations (IUFRO) World Congress, August 2010, Seoul, South Korea.

Kim, Y.-S. 2009. The role of regional economics in restoring the southwestern Ponderosa Pine ecosystems. 10<sup>th</sup> Biennial Conference for Research on the Colorado Plateau. Oct. 5-7, 2009. Flagstaff, Arizona.

Kim, Y.-S. and E.E. Hjerpe. 2009. Economic Impacts of Grand Canyon River Runners and the 2000 LSSF of the Colorado River. Grand Canyon Monitoring and Research Center Technical Workgroup Socioeconomic Workshop. Invited. Dec. 2-3. 2009. Phoenix Arizona.

Kim, Y.-S. 2009. Catching two birds with one stone: Merging economics and ecology for ecological restoration. Forestry Seminar Series. March 25. 2009. Flagstaff, Arizona

Hamann, K., Y.-S. Kim, and P. Pariso. 2009. Economic Feasibility of Tamarisk Utilization in Northeast Arizona. Poster Presentation at Tamarisk & Russian Olive Research Conference—Feb. 2009, Reno. Nevada.

Hjerpe, E.E., and Y.-S. Kim. 2006. Economic Impacts of Southwestern National Forest Fuels Reductions. Ecological Restoration Institute National Conference: Conserving and Restoring Frequent Fire Landscapes of the Southwest: Linking Science, Collaboration, and Practice, October 2006. . Flagstaff, Arizona.

Kim, Y.-S. 2006. Forestry in the U.S. Guest Lecture, Department of Forest Resources, Seoul National University, May 2006. Seoul, South Korea.

Hjerpe, E.E., and Y.-S. Kim. 2006. Regional economic impacts of National Forest fuels reduction programs in the Southwest Western Forest Economist Meeting. May 2006. Wemme Oregon.

Kim, Y.-S. 2003. Economic Benefits of Ecological Restoration and Fire Risk Reduction in the Flagstaff Wildland-Urban Interface: An application of the Hedonic Property Price Model. SWSAF/AMPF Biannual reunion meeting. Nov. 2003. Chihuahua, Mexico.

Pagdee, A., Y.-S. Kim, and P.J. Daugherty. 2003. What Makes Community Forest Management Successful: A meta-study from community forestry throughout the world. Flagstaff Community Forum, Greater Flagstaff Forest Partnership. July 2003. Flagstaff, Arizona.

Hjerpe, E.E., and Y.-S. Kim. 2003. Regional Economic Impacts of Grand Canyon River Runners, Southern Regional Science Association, April 2003. Louisville, Kentucky.

Wells, A., and Y.-S. Kim. 2002. Quantifying forest externalities at the Wildland-Urban Interface: An Hedonic Price Method and Geographic Information Systems Approach . Southern Forest Economist Meeting. April 2002. Virginia Beach, Virginia.

Kim, Y.-S., and D. Morse. 2001. Using the Hedonic Price Method and GIS to Measure the Effects of Urban Open Space Amenities on Housing Prices in Flagstaff, Arizona. Western Economics Association International, July 2001. San Francisco, California.

Hjerpe, E.E., and Y.-S. Kim. 2001. Economic Impacts of the Low Summer Steady Flows of the Colorado River to Private Whitewater Boaters and Anglers and River Concessionaires Colorado River Ecosystem Science Symposium, April 2001. Flagstaff, Arizona.

Morse, D., and Y.-S. Kim. 2001. Using the Hedonic Price Method and GIS to Measure the Effects of Urban Open Space Amenities on Housing Prices in Flagstaff, Arizona. Southern Regional Science Association Meeting, April 2001. Austin, Texas.

Wells, A., and Y.-S. Kim. 2000. Integrating Geographic Information Systems with the Hedonic Price Method to Measure the Economic Contribution of Amenities to Property Values in Flagstaff, Arizona. Western Forest Economist Meeting. May 2000. Wemme Oregon.

Kim, Y.-S. 2000. Ecological Economics in American Southwest. Invited Seminar, Graduate School of Environmental Studies, Seoul National University, May 2000. Seoul, South Korea.

Kim, Y.-S., and R. Johnson. 1999. The Impact of Forest and Forest Management on Neighboring Property Values. Pacific Northwest Environmental and Resource Economist meeting, May 1999. Eugene, Oregon.

Kim, Y.-S., and R. Johnson. 1998. Measuring the Economic Impact of Forests on Neighboring Properties. Western Forest Economist meeting, May 1998, Wemme, Oregon.

Kim, Y.-S., and R. Johnson. 1997. Measuring the Economic Impacts of Near-urban Forests on Neighboring Properties. IUFRO 1.14.00 Interdisciplinary Uneven-aged Silviculture Symposium, International Union of Forest research Organizations (IUFRO), International, Sep. 1997, Corvallis, Oregon.

Kim, Y.-S., and Y. Youn. 1993. Monetary Evaluation of the Recreational Function of Urban Forest in Seoul. IUFRO Interim Meeting, International Union of Forest research Organizations (IUFRO), International, May 1993, Korea-Taiwan.

**RESEARCH FUNDING:**

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2012-2014 The Impacts of the USDA Forest Service Woody Biomass Utilization Grants Program in the White Mountains Stewardship Area and Eastern Oregon.	Kim, Y.-S.	Glacier Land Research and Development/USFS Forest Products Lab	\$55,000 for two years
2012-2014 The Feasibility Analysis of a REDD+ Pilot Project in Lombok, Indonesia: Reference Emissions Level (REL) and Results-Based Compensation	Kim, Y.-S	Korea Forest Research Institute	\$80,000 for two years
2012-2014 Assessing Effectiveness of the Joint Fire Science Program Publications	Lee, M., and Y.-S. Kim	Joint Fire Science Program	\$82,000 for two years
2011-2011 Tipping Point: The Number of Acres that Require Treatment in Order for Fire Behavior and the Cost of Suppression to be Subdued	Kim, Y.-S., R. Fitch	USDA Forest Service (via Ecological Restoration Institute)	\$8,307
2009-2011 Job and Income Creation Effects of Ecological Restoration, ). Cooperative Work Plan under provision of Southwest Forest Health and Wildfire Prevention Act of 2004-FY09	Kim, Y.-S	USDA Forest Service (via Ecological Restoration Institute)	\$110,615
2008-2010 Economic Feasibility of Tamarisk Utilization	Kim, Y.-S	USDI-MacIntire-Stennis	\$25,264

in the Hopi Tribal Land			
2007 . Economic Feasibility of Tamarisk Utilization	Kim, Y.-S	Arizona Water Institute Faculty Incentive Award	\$6,000
2007 Economic Feasibility Study for a Hopi Biomass Plant to Utilize Tamarisk	Kim, Y.-S	NAU Academic Diversity and Equity Research Program	\$6,000
2003-2007 Understanding the Role of Forest Health Restoration in Relationships Between Community Socioeconomic Conditions and Wildfire Management in the Ponderosa Pine Region of the Southwest: Assessment of Community Economies	Kim, Y.-S., E.E. Hjerpe	USDI-MacIntire-Stennis	\$55,000

## PROFESSIONAL SERVICES

Current: Faculty Grant Program Proposal Review; Global Science and Engineering Program (GSEP) Career Panel Discussion (Jan. 2012); Interdisciplinary PhD Council, College of Engineering Forestry and Natural Sciences.

Past committees: Program and Dissertation Committees for two Ph.D. students at Politics and International Affairs (2012). Biostatistics Faculty position search committee (2012), Global Learning Initiative Committee (2010-2012) Teaching Evaluation Committee (2010-2012), Faculty Status Committee (2009-2010), Mission Research Review Committee (chair in 2010), UGRaDS 2010 Judge, University Assessment Committee, Academic Standard Committee, School of Forestry Undergraduate Curriculum Committee, Ethnic and Cultural Diversity Committee, School of Forestry Graduate Studies Committee, PRM strategic planning committee, the University's Assessment Council, International Hot Team, International Office Director Search Committee, Information Technology Across the Curriculum (ITAC) committee, several Faculty Search Committee, Support System Analyst Search Committee, International Emphasis Committee, Enrollment Committee, and several Adjunct Faculty Application Review Committees.



I helped initiating an exchange program between NAU and Woosong University in Korea in 2001.

I worked as a campus host for a Chinese exchange scholar from Yunnan University, Kunming, China from August 2007 to July 2008; for Adcharaporn Pagdee.(former student) from Khon Kaen University, Khon Kaen, Thailand in April 2010.

Joint Fire Science Program Research Proposal Review Panel; Economics of Fuel Treatments (Spring 2013).

Editorial board for the *Korean Journal of Forest Economics* and *Forest Science and Technology*

Journal Reviews for *Landscape and Urban Planning, Sustainability, Forest Policy and Economics, Korean Journal of Forest Economics, US Forest Service General Technical Report, Mountain Research and Development, International Journal of Forestry Research, Journal of Protected Area Studies, Society and Natural Resources, Forest Science and American Indian Quarterly*. Abstract reviews for International Conference on Wetland Ecosystem Services (November 17-21, 2010) held in Khon Kaen, Thailand. A working paper review for Conference of Research on the Colorado Plateau

Open Spaces Commission for the City of Flagstaff. May 2009-May 2012 (3-year term).

Economic consultant for the Coconino National Forest. I reviewed the Social and Economic Assessment Report for the Forest Plan revision of the Coconino National Forest in 2007. I provided an economic impact assessment of the proposed Travel Management Plan for the Coconino National Forest in 2008-2009.

Chapter Chair, the Northern Arizona Chapter of Society of American Foresters in 2003.

Secretary/treasurer, the Northern Arizona Chapter of Society of American Foresters from 2000 to 2002.

#### **ORGANIZATION MEMBERSHIPS:**

Society of American Foresters

International Society for Ecological Economics

#### **RECOGNITION:**

Teacher of the Year, School of Forestry, Northern Arizona University 2011

Duling Grants award, International Society of Arboriculture, 1996

## Document E: Individual Faculty Information

### THOMAS E. KOLB

Professor- 9 month- Tenured

Date of Appointment: 2002 - Present

Specialization: Professor of Forest Ecophysiology

**Northern Arizona University - Department of Forestry**

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#### EDUCATION:

- 1988            Ph.D. Forest Resources  
Department of Forestry, Pennsylvania State University
- 1984            M. S. Forest Resources  
Department of Forestry, Pennsylvania State University
- 1982            B. S. Forest Resource Management  
Department of Forestry, University of Tennessee

#### PROFESSIONAL RESEARCH AND TEACHING EXPERIENCE:

- 2002/Present            Professor of Forest Ecophysiology, School of Forestry, Northern Arizona University, Flagstaff, AZ
- 1997/2002            Associate Professor of Forest Ecophysiology, School of Forestry, Northern Arizona University, Flagstaff, AZ
- 1993/1997            Assistant Professor of Forest Ecophysiology, School of Forestry, Northern Arizona University, Flagstaff, AZ
- 1989/1992            Research Associate, School of Forest Resources, Pennsylvania State University
- 1989/1989            Instructor in Forest Ecology and Silvics, School of Forest Resources, Pennsylvania State University
- 1982/1988            Graduate Research Assistant, School of Forest Resources, Pennsylvania State University

#### TEACHING EXPERIENCE:

- 1993/Present            Professor, Department of Forestry, Northern Arizona University  
ENV 101 - Environmental Sciences, Guest Lecturer, 1993  
FOR 101 - Forestry Introduction, Guest Lecturer , 1993, 2010  
FOR 201 - Foundations of Forestry – Silvics, 1994-1995  
FOR 212 - Trees and Forests of North America  
FOR 220 – Introduction to Forest and Range Plants  
FOR 250 - Arizona Forests and Wildlife  
FOR 311 - Dendrology/Plant Taxonomy

FOR 313/FOR 314 - Forest Ecology  
FOR 398 - Forest Plant Taxonomy  
FOR 399 – Forest Ecology – Undergraduate Fire Ecology Certificate Program  
FOR 408 – Undergraduate Field Work  
FOR 454/554 - Integrated Forest Health  
FOR 485 – Undergraduate Research  
FOR 506 – Forest Sustainability  
FOR 550 - Forest Tree Ecophysiology  
FOR 599 – Dendroecology, guest lecturer  
FOR 601 - Southwest Forest Ecosystems  
FOR 612 - Forest and Range Ecology  
FOR 690 - Research Methods  
FOR 692 – Proseminar  
FOR 695 - Advanced Studies in Forestry – Silviculture  
FOR 698 – Forest Ecosystem Ecology/Ecophysiology  
UC101 – University Colloquium

1987/1989                      Professor, Department of Forestry, Pennsylvania State University  
Dendrology  
Silvics  
Spring Field Tour

## **REFERRED JOURNALS/PUBLICATIONS**

### ***Book Chapters***

Teulon, D.A.J., T.E. Kolb, E.A. Cameron, L.H. McCormick, G.A. Hoover. 1993. Pear thrips, *Taeniothrips Inconsequens* (Uzel) (Thysanoptera:Thripidae), on Sugar Maple, *Acer Saccharum* Marsh.: A Review. Pages 355-380 In: Bhatti, J.S. (editor), *Advances in Thysanoptology*. Scientia Pub., New Delhi. 457 p.

Steiner, K.C., T.E. Kolb. 1994. Northern red oak seedling response to plant interference. Pages 141-147 In: Timbal, J., A. Kremer, N. Le Goff, and G. Nepveu (editors), *Le Chene Rouge D'Amerique*. INRA Pub. France. 564 p.

Kolb, T.E. 2001. Ageing as an influence on tree response to ozone: Theory and observations. Pages 127-155 In: Huttunen, S., H. Heikkila, J. Bucher, B. Sundberg, P. Jarvis, and R. Matyssek (editors), *Trends in European Forest Tree Physiology Research. Cost Action E6: EUROSILVA*, Kluwer Academic Publishers, Netherlands.

Kolb, T.E. 2002. Ecophysiology of parasitism in the plant kingdom. Pages 57-85 In: Lopez Saez, J.A., P.Catalan, and L. Saez (editors), *Plantas Parasitas de la Peninsula Iberica e Islas Baleares (Guide on Parasitic Plants of the Iberian Peninsula and the Balearic Islands)*. MundiPrensa, Madrid, Spain.

Kolb, T.E., R. Matyssek. 2003. Limitations and perspectives about scaling ozone impacts in trees. Pages 141-173 In: Karnosky D.F., K.E. Percy, A.H. Chappelka, C. Simpson, and J. Pikkariainen (editors), *Developments in Environmental Sciences 3:141-173. Air Pollution, Global*

Change and Forests in the New Millennium. Elsevier Press. DOI 10.1016/s1474-8177(03)03006-7.

***Symposia Edited***

Cameron, E.A., D.A.J. Teulon, L.H. McCormick, T.E. Kolb. 1992. The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management. United States Department of Agriculture Forest Service General Technical Report NE-161.

Kolb, T.E. compiler. 2004. Proceedings of the Fifth Biennial Conference on University Education in Natural Resources. Natural Resources and Environmental Issues, volume XII, S.J. and Jessie E. Quinney Natural Resources Research Library, Logan, UT. 149 pp.

<http://www.cnr.usu.edu/quinney/files/uploads/UENR5.pdf>.

Refereed Publications (lead author: \*=graduate student advisee, \*\*=undergraduate student advisee)

Kolb, T.E., K.C. Steiner, H.F. Barbour. 1985. Seasonal and genetic variations in loblolly pine cold tolerance. *Forest Science* 31:926-932.

Kolb, T.E. 1988. Allelopathic effects of Kentucky bluegrass on northern red oak and yellow-poplar. *Journal of Arboriculture* 14:281-283.

Kolb, T.E., T.W. Bowersox, L.H. McCormick, K.C. Steiner. 1989. Effects of shade and herbaceous vegetation on first-year germination and growth of direct-seeded northern red oak, white ash, white pine, and yellow-poplar. Pages 156-161 In: G. Rink and C.A. Budelsky (editors), *Proceedings of the 7th Central Hardwood Forest Conference*, Southern Illinois University, Carbondale, IL. United States Department of Agriculture Forest Service General Technical Report NC-132.

Kolb, T.E., K.C. Steiner. 1989. Genetic variation among and within single-tree progenies of northern red oak. *Forest Science* 35:251-256.

Kolb, T.E., K.C. Steiner. 1989. Spacing effects on seedlings of northern red oak and yellow-poplar. *Tree Planters' Notes* 40(3):3-4.

Kolb, T.E., K.C. Steiner. 1989. Competitive ability and growth allocation of planted northern red oak and yellow-poplar seedlings. Pages 62-66 In: G. Rink and C. A. Budelsky (editors), *Proceedings of the 7th Central Hardwood Forest Conference*, Southern Illinois University, Carbondale, IL. United States Department of Agriculture Forest Service General Technical Report NC-132.

Kolb, T.E., T.W. Bowersox, L.H. McCormick. 1990. Influence of light intensity on weed-induced stresses of tree seedlings. *Canadian Journal of Forest Research* 20:503-507.

Kolb, T.E., K.C. Steiner. 1990. Growth and biomass partitioning response of northern red oak genotypes to shading and grass root competition. *Forest Science* 36:293-303.

- Kolb, T.E., K.C. Steiner. 1990. Growth and biomass partitioning of northern red oak and yellow-poplar seedlings: Effects of shading and grass root competition. *Forest Science* 36:34-44.
- Kolb, T.E., K.C. Steiner, L.H. McCormick, T.W. Bowersox. 1990. Growth response of northern red oak and yellow-poplar seedlings to light, soil moisture, and nutrients in relation to ecological strategy. *Forest Ecology and Management* 38:65-78.
- Steiner, K.C., T.E. Kolb, T.W. Bowersox. 1990. Second-year emergence of direct-seeded northern red oak. *Northern Journal of Applied Forestry* 7:138-139.
- Kolb, T.E., L.H. McCormick. 1991. Relationship between root nonstructural carbohydrate concentration and root diameter in sugar maple. *Forest Science* 37:343-346.
- Kolb, T.E., L.H. McCormick, D.L. Shumway. 1991. Physiological responses of pear thrips-damaged sugar maples to light and water stress. *Tree Physiology* 9:401-413.
- Kolb, T.E., D.A.J. Teulon. 1991. Relationship between sugar maple budburst phenology and pear thrips damage. *Canadian Journal of Forest Research* 21:1043-1048.
- Shumway, D.L., D.A.J. Teulon, T.E. Kolb. 1991. A method of identifying thrips (Thysanoptera:Thripidae) feeding sites on sugar maple (*Acer saccharum* Marsh.) leaves. *Journal of Economic Entomology* 84:1771-1773.
- Kolb, T.E., L.H. McCormick, E.E. Simons, D.J. Jeffery. 1992. Impacts of pear thrips damage on root carbohydrate, sap, and crown characteristics of sugar maples in a Pennsylvania sugarbush. *Forest Science* 38:381-392.
- Kolb, T.E., D.A.J. Teulon. 1992. Effects of temperature during budburst on pear thrips damage to sugar maple. *Canadian Journal of Forest Research* 22:1147-1150.
- Kolb, T.E., L.H. McCormick. 1993. Etiology of sugar maple decline in four Pennsylvania stands. *Canadian Journal of Forest Research* 23:2395-2402.
- Shumway, D.L., K.C. Steiner, T.E. Kolb. 1993. Variation in seedling hydraulic architecture as a function of species and environment. *Tree Physiology* 12:41-54.
- Kolb, T.E., L.H. McCormick. 1993. Impacts of pear thrips on a Pennsylvania sugarbush: Third year results. Pages 119-129 In: A. R. Gillespie, G. R. Parker, P. E. Pope, and G. Rink (editors), *Proceedings of the 9th Central Hardwood Forest Conference*, Purdue University. United States Department of Agriculture Forest Service General Technical Report NC-161.
- Kolb, T.E., M.R. Wagner, W.W. Covington. 1994. Concepts of forest health. *Journal of Forestry* 92(7):10-15.

Fredericksen, T.S., B.J. Joyce, J.M. Skelly, K.C. Steiner, T.E. Kolb, K.B. Kouterick, J.E. Savage, K. R. Snyder. 1995. Physiology, morphology, and ozone uptake of leaves of black cherry seedlings, saplings, and canopy trees. *Environmental Pollution* 89:273-283.

Fox, B.E., T.E. Kolb, E.A. Kurmes. 1996. An integrated forestry curriculum: The Northern Arizona University experience. *Journal of Forestry* 94(3):16-22.

Fredericksen, T.S., T.E. Kolb, J.M. Skelly, K.C. Steiner, B.J. Joyce, J.E. Savage. 1996. Light environment alters ozone uptake per net photosynthetic rate in black cherry trees. *Tree Physiology* 16:485-490.

Fredericksen, T.S., K.C. Steiner, J.M. Skelly, B.J. Joyce, T.E. Kolb, K.B. Kouterick, J.A. Ferdinand. 1996. Diel and seasonal patterns of leaf gas exchange and xylem water potentials of different-sized *Prunus serotina* Ehrh. trees. *Forest Science* 42:359-365.

Fredericksen, T.S., J.M. Skelly, K.C. Steiner, T.E. Kolb, and K.B. Kouterick. 1996. Size-mediated foliar response to ozone in black cherry trees. *Environmental Pollution* 91:53-63.

Fredericksen, T.S., J.M. Skelly, K.R. Snyder, K.C. Steiner, T.E. Kolb. 1996. Predicting ozone uptake from meteorological and environmental variables. *Journal of the Air and Waste Management Association* 46:464-469.

Kolb, T.E. 1996. Review of Resource Physiology of Conifers, and Ecophysiology of Coniferous Forests. *Forest Ecology and Management* 82:253-254.

Maschinski, J., T.E. Kolb, E. Smith, B. Phillips. 1997. Potential impacts of timber harvesting on a rare plant species, *Clematis hirsutissima* var. *arizonica*. *Biological Conservation* 80:49-61.

Covington, W.W., P.Z. Fule, M.M. Moore, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, M.R. Wagner. 1997. Restoring ecosystem health in ponderosa pine forests of the Southwest. *Journal of Forestry* 95(4):23-29.

Kolb, T.E., S.C. Hart, R. Amundson. 1997. Boxelder water sources and physiology at perennial- and ephemeral-stream sites in Arizona. *Tree Physiology* 17:151-160.

\*Feeney, S.R., T.E. Kolb, M.R. Wagner, W.W. Covington. 1998. Influence of thinning and burning restoration treatments on presettlement ponderosa pines at the Gus Pearson Natural Area. *Canadian Journal of Forest Research* 28:1295-1306.

Kolb, T.E., T.S. Fredericksen, K.C. Steiner, J.M. Skelly. 1998. Issues in scaling tree size and age responses to ozone: A review. *Environmental Pollution* 98:195-208.

Kolb, T.E., K.M. Holmberg, M.R. Wagner, J.E. Stone. 1998. Regulation of ponderosa pine foliar physiology and insect resistance mechanisms by basal area treatments. *Tree Physiology* 18:375-381.

Kolb, T.E., K.A. Dodds, K.M. Clancy. 1999. Effect of western spruce budworm defoliation on the physiology and growth of potted Douglas-fir seedlings. *Forest Science* 45:280-291.

\*Stone, J.E., T.E. Kolb, W.W. Covington. 1999. Effects of restoration thinning on resettlement *Pinus ponderosa* in Northern Arizona. *Restoration Ecology* 7:172-182.

Kolb, T.E., J.E. Stone. 2000. Differences in leaf gas exchange and water relations among species and tree sizes in an Arizona pine-oak forest. *Tree Physiology* 20:1-12.

\*Kouterick, K.B., J.M. Skelly, T.S. Fredericksen, K.C. Steiner, T.E. Kolb, J.A. Ferdinand. 2000. Foliar injury, leaf gas exchange and biomass responses of black cherry (*Prunus serotina* Ehrh.) half-sibling families to ozone exposure. *Environmental Pollution* 107:117-126.

\*Chen, Z., T.E. Kolb, K.M. Clancy. 2001. Mechanisms of Douglas-fir resistance to western spruce budworm defoliation: budburst phenology, photosynthetic compensation, and growth rate. *Tree Physiology* 21:1159-1169.

\*Chen, Z., T.E. Kolb, K.M. Clancy, V.D. Hipkins, L.E. DeWald. 2001. Allozyme variation in interior Douglas-fir: Association with growth and resistance to western spruce budworm herbivory. *Canadian Journal of Forest Research* 31:1691-1700.

\*Horton, J.L., T.E. Kolb, S.C. Hart. 2001. Leaf gas exchange characteristics differ among Sonoran Desert riparian tree species. *Tree Physiology* 21:233-241.

\*Horton, J.L., T.E. Kolb, S.C. Hart. 2001. Physiological response to ground water depth varies among species and with river flow regulation. *Ecological Applications* 11:1046-1059.

\*Horton, J.L., T.E. Kolb, S.C. Hart. 2001. Responses of riparian trees to inter-annual variation in depth to ground water in a semi-arid river basin. *Plant, Cell and Environment*: 24:293-304.

Kolb, T.E., P.J. Daugherty, L.E. DeWald. 2001. Paving the way from school to work: Core graduate education at Northern Arizona University. *Journal of Forestry* 99(9):10-15.

Kolb, T.E., P.Z. Fule, M.R. Wagner, W.W. Covington. 2001. Six-year changes in mortality and crown condition of old-growth ponderosa pines in different ecological restoration treatments at the G. A. Pearson Natural Area. Pages 61-66 In: R. K. Vance, C. B. Edminster, W. W. Covington, and J. A. Blake (compilers), *Ponderosa Pine Ecosystems Restoration and Conservation: Steps Towards Stewardship*, Conference Proceedings. United States Department of Agriculture Forest Service Proceedings RMRS-P-22, Ogden, Utah.

Kolb, T.E., R. Matyssek. 2001. Limitations and perspectives about scaling ozone impacts in trees. *Environmental Pollution* 115:373-393.

\*Naumburg, E., L. DeWald, T.E. Kolb. 2001. Shade responses of five grasses native to southwestern *Pinus ponderosa* forests. *Canadian Journal of Botany* 79:1001-1009.

- \*Chen, Z., T.E. Kolb, K.M. Clancy. 2002. The role of monoterpenes in resistance of Douglas-fir to western spruce budworm defoliation. *Journal of Chemical Ecology* 28:987-920.
- \*Chen, Z., T.E. Kolb, K.M. Clancy. 2002. Effects of artificial and western spruce budworm (Lepidoptera: Tortricidae) defoliation on growth and biomass allocation of Douglas-fir seedlings. *Journal of Economic Entomology* 95:587-594.
- \*Fischer, D. G., T.E. Kolb, L. E. DeWald. 2002. Changes in whole-tree water relations during ontogeny of *Pinus flexilis* and *P. ponderosa* in a high-elevation Northern Arizona meadow. *Tree Physiology* 22:675-685.
- \*Galuszka, D.M., T.E. Kolb. 2002. Tree growth and regeneration response to climate and stream flow in a species-rich Southwestern riparian forest. *Western North American Naturalist* 62:266-279.
- \*Steed, J., L.E. DeWald, T.E. Kolb. 2002. Physiological and growth responses of riparian sedge transplants to groundwater depth. *International Journal of Plant Science* 163:925-936.
- \*Chen, Z., K.M. Clancy, T.E. Kolb. 2003. Variation in budburst phenology of Douglas—fir related to western spruce budworm (Lepidoptera: Tortricidae) fitness. *Journal of Economic Entomology* 96:377-387.
- \*Horton, J.L., S.C. Hart, T.E. Kolb. 2003. Environmental water sources used by riparian trees at the Bill Williams River, Arizona, USA. *Isotopes in Health and Environmental Studies* 39:69-82.
- \*McHugh, C., and T.E. Kolb. 2003. Ponderosa pine mortality following fire in northern Arizona. *International Journal of Wildland Fire* 12:7-22.
- \*McHugh, C., T.E. Kolb, J. L. Wilson. 2003. Bark beetle attacks on ponderosa pine following fire in northern Arizona. *Environmental Entomology* 32:510-522.
- Wallin, K.F., T.E. Kolb, K. Skov, M.R. Wagner. 2003. Effects of crown scorch on ponderosa pine resistance to bark beetles in northern Arizona. *Environmental Entomology* 32:652-661.
- \*Adams, H.D., T.E. Kolb. 2004. Drought response of conifers in ecotone forests of northern Arizona: tree ring growth and leaf [\[a\]140:207-215g](#)
- Clancy, K.M., Z. Chen, T.E. Kolb. 2004. Foliar nutrients and induced susceptibility: genetic mechanisms of Douglas-fir resistance to western spruce defoliation. *Canadian Journal of Forest Research* 34:939-949.
- \*Skov, K.R., T.E. Kolb, K.F. Wallin. 2004. Tree size and drought affect ponderosa pine physiological response to thinning and burning treatments. *Forest Science* 50:81-91.
- Wallin, K.F., T.E. Kolb, K.R. Skov, M.R. Wagner. 2004. Seven-year results of the influence of thinning and burning restoration treatments on pre-settlement ponderosa pines at the Gus Pearson Natural Area. *Restoration Ecology* 12:239-247.



\*Skov, K.R., T.E. Kolb, K.F. Wallin. 2005. Difference in radial growth response to restoration thinning and burning treatments between young and old ponderosa pine in Arizona. *Western Journal of Applied Forestry* 20:36-43.

\*Adams, H.D., T.E. Kolb. 2005. Tree growth response to drought and temperature along an elevation gradient on a mountain landscape. *Journal of Biogeography* 32:1629-1640.

\*Bickford, C., T.E. Kolb, B.W. Geils. 2005. Host physiological condition positively affects dwarf mistletoe shoot growth: *Arceuthobium vaginatum* subsp. *cryptopodum* on *Pinus ponderosa*. *Oecologia* 146: 179-189.

\*Wolfson, B.A.S., T.E. Kolb, C.H. Sieg, K.M. Clancy. 2005. Effects of post-fire conditions on germination and seedling success of diffuse knapweed in northern Arizona. *Forest Ecology and Management* 216:342-358.

\*Zausen, G.L., T.E. Kolb, J.D. Bailey, M.R. Wagner. 2005. Long-term impacts of thinning and prescribed burning on ponderosa pine physiology and bark beetle abundance in northern Arizona: A replicated landscape study. *Forest Ecology and Management* 218:291-305.

Clancy, K.M., Z. Chen, T.E. Kolb. 2006. Effects of ortet genotype and western spruce budworm defoliation on foliar nutrients in Douglas-fir clones. Pages 36-43 In: *Proceedings: International Symposium of IUFRO Kanazawa 2003, Forest Insect Population Dynamics and Host Influences* (ed. by N. Kamata, A.M. Liebhold, D.T. Quiring and K.M. Clancy), pp. 37-44. Kanazawa University 21st-Century COE Program, Kakuma, Kanazawa, Ishikawa, Japan.

\*Gaylord, M.L., T.E. Kolb, K.F. Wallin, M.R. Wagner. 2006. Seasonality and lure preference of bark beetles (Coleoptera: Scolytinae) and associates in a northern Arizona ponderosa pine forest. *Environmental Entomology* 35:37-47.

McDowell, N.G., H.D. Adams, J.D. Bailey, M. Hess, T.E. Kolb. 2006. Homeostatic maintenance of ponderosa pine gas exchange in response to stand density changes. *Ecological Applications* 16:1164-1182.

\*Mullen, R.M., A.E. Springer, T.E. Kolb. 2006. Complex effects of prescribed fire on soil-water content in a high-elevation riparian meadow, Arizona. *Restoration Ecology* 14:242-250.

\*Simonin, K., T.E. Kolb, M. Montes-Helu, G.W. Koch. 2006. Restoration thinning and the influence of tree size and leaf area to sapwood area ratio on *Pinus ponderosa* Laws. water relations. *Tree Physiology* 26: 493-503.

\*Springer, A.E., M.A., Amentt, T.E. Kolb, R.M. Mullen. 2006. Evapotranspiration of two vegetation communities in a high-elevation riparian meadow at Hart Prairie, Arizona. *Water Resoures Research* 42: W03412, DOI:10.1029/2004WR003863.

Kolb, T.E., N. Guerard, R.W. Hofstetter, M.R. Wagner. 2006. Attack preferences of *Ips pini* on *Pinus ponderosa* in northern Arizona: tree size and bole position. *Agricultural and Forest Entomology* 8:295-303.

\*Gaylord, M.L., T.E. Kolb, K.F. Wallin, M.R. Wagner. 2007. Seasonal dynamics of tree growth, physiology and resin defenses in a northern Arizona ponderosa pine forest. *Canadian Journal of Forest Research* 37:1173-1183.

Kolb, T.E., J.K. Agee, P.Z. Fule, N.G. McDowell, K. Pearson, A. Sala, R.H. Waring. 2007. Perpetuating old ponderosa pine. *Forest Ecology and Management* 249:141-157.

McDowell, N.G., H.D. Adams, J.D. Bailey, T.E. Kolb. 2007. The role of stand density on growth efficiency, leaf area index and resin flow in southwestern ponderosa pine forests. *Canadian Journal of Forest Research* 37:343-355.

\*Simonin, K., T.E. Kolb, M. Montes-Helu, G.W. Koch. 2007. The influence of thinning on components of stand water balance in a ponderosa pine forest stand during and after extreme drought. *Agricultural and Forest Meteorology* 143:266-276.

\*Alstad, K.P., S.C. Hart, J.L. Horton, T.E. Kolb. 2008. Application of tree-ring isotopic analyses to reconstruct historic water-use of riparian trees. *Ecological Applications* 18:421-437.

\*Breece, C.R., T.E. Kolb, B.G. Dickson, J.D. McMillin, K.M. Clancy. 2008. Prescribed fire effects on bark beetle activity and tree mortality in southwestern ponderosa pine forests. *Forest Ecology and Management* 255:119-128.

Dore, S., T.E. Kolb, M. Montes-Helu, B.W. Sullivan, W.D. Winslow, S.C. Hart, J.P. Kaye, G.W. Koch, B.A. Hungate. 2008. Long-term impact of a stand-replacing fire on ecosystem CO<sub>2</sub> exchange of ponderosa pine forests. *Global Change Biology* 14:1-20. DOI 10.1111/j.1365-2486.2008.01613.x.

\*Fischer, M.J., K.M. Waring, R.W. Hofstetter, T.E. Kolb. 2008. The resin composition of ponderosa pine (*Pinus ponderosa*) attacked by the roundheaded pine beetle (*Dendroctonus adjunctus*) (Coleoptera: Curculionidae, Scolytinae). Pages 245-251 In: Olberding, S.D., and M.M. Moore, Technical Coordinators, Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

Kolb, T.E., N. McDowell. 2008. Tree ecophysiology research at Taylor Woods. Pages 196-202 In: Olberding, S.D., and M.M. Moore, Technical Coordinators, Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

McDowell, N., W. Pockman, C. Allen, D. Breshears, N. Cobb, T. Kolb, J. Plaut, J. Sperry, A. West, D. Williams, E. Yezpez. 2008. Mechanisms of plant survival and mortality during drought:

why do some plants survive and others succumb to drought? *New Phytologist Tansley Review*: DOI 10.1111/j.1469-8137.2008.02436.x/.

Moore, M.M., W.W. Covington, P.Z. Fule, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, M.R. Wagner. 2008. Ecological restoration experiments (1992-2007) at the G.A. Pearson Natural Area, Fort Valley Experimental Forest. Pages 209-218 In: Olberding, S.D., M.M. Moore, Technical Coordinators, Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

\*Sullivan, B.W., T.E. Kolb, S.C. Hart, J.P. Kaye, S. Dore, M.C. Montes-Helu. 2008. Thinning reduces soil carbon dioxide but not methane flux from southwestern USA ponderosa pine forests. *Forest Ecology and Management* 255:4047-4055. DOI 10.1016/j.foreco.2008.03.051.

Wallin, K.F., T.E. Kolb, K.R. Skov, M.R. Wagner. 2008. Forest management treatments, tree resistance, and bark beetle resource utilization in ponderosa pine forests of northern Arizona. *Forest Ecology and Management* 255:3263-3269. DOI 10.1016/j.foreco.2008.01.075.

Montes-Helu, M., T.E. Kolb, S. Dore, B. Sullivan, S. Hart, G. Koch, B. Hungate. 2009. Persistent effects of fire-induced vegetation change on energy partitioning and evapotranspiration in ponderosa pine forests. *Agricultural and Forest Meteorology* 149:491-500. DOI 10.1016/j.agrformet.2008.09.011.

Roman, M.O., C.B. Schaaf, C.E. Woodcock, A.H. Strahler, X. Yang, R.H. Braswell, P. Curtis, K.J. Davis, D. Dragoni, M.L. Goulden, L. Gu, D. Hollinger, T.E. Kolb, T.P. Meyers, J.W. Munger, J. Privette, A. Richardson, T.B. Wilson, S.C. Wofsy. 2009. The MODIS (Collection V005) BRDF/albedo product: Assessment of spatial representativeness over forested landscapes. *Remote Sensing of Environment* 113:2476-2498.

Amiro, B.D., A.G. Barr, J.G. Barr, T.A. Black, R. Bracho, M. Brown, J. Chen, K.L. Clark, K.J. Davis, A.R. Desai, S. Dore, V. Engel, J.D. Fuentes, A.H. Goldstein, M.L. Goulden, T.E. Kolb, M.B. Lavigne, B.E. Law, H.A. Margolis, T. Martin, J.H. McCoughey, L. Misson, M. Montes-Helu, A. Noormets, J.T. Randerson, G. Starr, J. Xiao. 2010. Ecosystem carbon fluxes after disturbance in forests of North America. *Journal of Geophysical Research* 115, G00K02, DOI 10.1029/2010JG001390.

\*Bridgeland, W.T., P. Beier, T.E. Kolb, T.G. Whitham. 2010. A conditional trophic cascade: birds benefit faster growing trees with strong links between predators and plants. *Ecology* 91:73-84. DOI: 10.1890/08-1821.1.

Dore, S., T.E. Kolb, M. Montes-Helu, S.E. Eckert, B.W. Sullivan, B.A. Hungate, J.P. Kaye, S.C. Hart, G.W. Koch, A. Finkral. 2010. Carbon and water fluxes from ponderosa pine forests disturbed by wildfire and thinning. *Ecological Applications* 20(3):663-683.

\*Fischer, M.J., K.M. Waring, R.W. Hofstetter, T.E. Kolb. 2010. Ponderosa pine characteristics associated with attack by the roundheaded pine beetle. *Forest Science* 56:473-483.

\*Johnson, T.D., T.E. Kolb, A.L. Medina. 2010. Do riparian plant community characteristics differ between *Tamarix* (L.) invaded and non-invaded sites on the upper Verde River? *Biological Invasions* 12:2487-2497. DOI 10.1007/s10530-009-9658-2.

\*Kane, J.M., T.E. Kolb. 2010. Importance of resin ducts in reducing ponderosa pine mortality following bark beetle attack. *Oecologia* 164:601–609. DOI 10.1007/s00442-010-1683-4.

\*Koepke, D., T.E. Kolb, H.D. Adams. 2010. Variation in woody plant mortality and dieback from severe drought among soils, plant functional groups, and species within a northern Arizona ecotone. *Oecologia* 163:1079-1090. DOI 10.1007/s00442-010-1671-8.

\*Sullivan, B.W., S. Dore, T.E. Kolb, S.C. Hart, M.C. Montes-Helu. 2010. Evaluation of methods for estimating soil carbon dioxide efflux across a gradient of forest disturbance. *Global Change Biology* 16:2449-2460. DOI 10.1111/j.1365-2486.2009.02139.x.

Yi, C., D. Ricciuto, X. Xu, R. Li, J. Wolbeck, X. Xu, M. Nilsson, L. Aires, J. Albertson, C. Ammann, M. Altaf Arain, A. de Araujo, M. Aubinet, M. Aurela, Z. Barcza, A. Barr, P. Berbigier, J. Beringer, C. Bernhofer, A. Black, P. Bolstad, F. Bosveld, M. Broadmeadow, N. Buchmann, S. Burns, P. Cellier, J. Chen, J. Chen, P. Ciais, R. Clement, B. Cook, P. Curtis, B. Dail, E. Dellwik, N. Delpierre, A. Desai, H. Dolman, S. Dore, D. Dragoni, B. Drake, E. Dufrêne, A. Dunn, J. Elbers, W. Eugster, M. Falk, C. Feigenwinter, L. Flanagan, T. Foken, J. Frank, J. Fuhrer, D. Gianelle, A. Goldstein, M. Goulden, A. Granier, T. Grünwald, L. Gu, H. Guo, A. Hammerle, S. Han, N. Hanan, L. Haszpra, B. Heinesch, C. Helfter, D. Hendriks, L. Hutley, A. Ibrom, C. Jacobs, T. Johansson, M. Jongen, G. Katul, G. Kiely, K. Klumpp, A. Knohl, T. Kolb, W. Kutsch, P. Lafleur, T. Laurila, R. Leuning, A. Lindroth, H. Liu, B. Loubet, G. Manca, M. Marek, H. Margolis, T. Martin, W. Massman, R. Matamala, G. Matteucci, H. McCaughey, L. Merbold, T. Meyers, M. Migliavacca, F. Miglietta, L. Misson, M. Mölder, J. Moncrieff, R. Monson, L. Montagnani, M. Montes-Helu, E. Moors, C. Moureaux, M. Mukelabai, J. Munger, M. Myklebust, Z. Nagy, A. Noormets, W. Oechel, R. Oren, S. Pallardy, K. Paw U, J. Pereira, K. Pilegaard, K. Pintér, C. Pio, G. Pita, T. Powell, S. Rambal, J. Randerson, C. von Randow, C. Rebmann, J. Rinne, F. Rossi, N. Roulet, R. Ryel, J. Sagerfors, N. Saigusa, M. Sanz, G. Mugnozza, H. Schmid, G. Seufert, M. Siqueira, J. Soussana, G. Starr, M. Sutton, J. Tenhunen, Z. Tuba, J. Tuovinen, R. Valentini, C. Vogel, J. Wang, S. Wang, W. Wang, L. Welp, X. Wen, S. Wharton, M. Wilkinson, C. Williams, S. Wofsy, G. Wohlfahrt, S. Yamamoto, G. Yu, R. Zampedri, B. Zhao, X. Zhao. 2010. Climate control of terrestrial carbon exchange across biomes and continents. *Environmental Research Letters* 5:03400. DOI 10.1088/1748-9326/5/3/034007.

\*\*Bickford, I.N., P.Z. Fule, T.E. Kolb. 2011. Growth sensitivity to drought of co-occurring *Pinus* ssp. along an elevation gradient in northern Mexico. *Western North American Naturalist* 71(3):338-348.

\*Gaylord, M.L., R.W. Hofstetter, T.E. Kolb, M.R. Wagner. 2011. Limited response of ponderosa pine bole defenses to wounding and fungi. *Tree Physiology* 31:428-437.

Lee, X., M. Goulden, D.Y. Hollinger, A. Barr, T.A. Black, G. Bohrer, R. Bracho, B. Drake, A. Goldstein, L. Gu, G. Katul, T. Kolb, B.E. Law, H. Margolis, T. Meyers, R. Monson, W. Munger,

R. Oren, K. Tha Paw U, A.D. Richardson, H.P. Schmid, R. Staebler, S. Wofsy, L. Zhao. 2011. Observed increase in local cooling effect of deforestation at higher latitudes. *Nature* 479:384-387. DOI:10.1038/nature10588.

\*McGlone, C.M., C.H. Sieg, T.E. Kolb. 2011. Invasion resistance and persistence: established plants win, even with disturbance and high propagule pressure. *Biological Invasions* 13:291-304 DOI 10.1007/s10530-010-9806-8.

\*Sorensen, C.D, A.J. Finkral, T.E. Kolb, C.H. Huang. 2011. Short- and long-term effects of thinning and fire on carbon stocks in ponderosa pine stands in northern Arizona. *Forest Ecology and Management* 261:460-472. DOI 10.1016/j.foreco.2010.10.031.

\*Sullivan, B.W., T.E. Kolb, S.C. Hart, J.P. Kaye, B.A. Hungate, S. Dore, M. Montes-Helu. 2011. Wildfire reduces carbon dioxide efflux and increases methane uptake in ponderosa pine forest soils of the southwestern USA. *Biogeochemistry* 104:251–265. DOI 10.1007/s10533-010-9499-1.

\*Zhang, H., L.E. DeWald, T.E. Kolb, D.F. Koepke. 2011. Genetic variation in ecophysiological and survival responses to drought in two native grasses: *Koeleria macrantha* and *Elymus elymoides*. *Western North American Naturalist* 71:25-32.

\*Grady, K.C., S.M. Ferrier, T.E. Kolb, S.C. Hart, G.J. Allen, T.G. Whitham. 2011. Genetic variation in productivity of foundation riparian species at the edge of their distribution: implications for restoration and assisted migration in a warming climate. *Global Change Biology* 17:3724-3735. DOI: 10.1111/j.1365-2486.2011.02524.x.

\*Coble, A.P., T.E. Kolb. 2012. Riparian tree growth response to drought and altered streamflow along the Dolores River, Colorado. *Western Journal of Applied Forestry* 27(4):205-211. DOI: <http://dx.doi.org/10.5849/wjaf.12-001>

Dore, S., M. Montes-Helu, S. Hart, B. Hungate, G. Koch, J. Moon, A.Finkral, T.E. Kolb. 2012. Recovery of southwestern ponderosa pine ecosystem carbon and water fluxes from thinning and stand replacing fire. *Global Change Biology*. DOI: 10.1111/j.1365-2486.2012.02775.x

\*\*Looney, C.E., B.W. Sullivan, T.E. Kolb, J.M. Kane, S.C. Hart. 2012. Pinyon pine (*Pinus edulis*) mortality and response to water addition across a three million year substrate age gradient in northern Arizona, USA. *Plant and Soil* 357:89-102. DOI: 10.1007/s11104-012-1150-6.

\*McGlone, C.M., C.H. Sieg, T.E. Kolb, T. Nietupsky. 2012. Established native perennial grasses out-compete an invasive annual grass regardless of soil water and nutrient availability. *Plant Ecology* 213:445–457. DOI 10.1007/s11258-011-9992-1.

Niu, S., Y. Luo, S. Fei, W. Yuan, D. Schimel, C. Ammann, M. Altaf Arain, A. Arneth, M Aubinet, A. Barr, J. Beringer, C. Bernhofer, A.T. Black, N. Buchmann, A. Cescatti, J. Chen, K.J. Davis, E. Dellwik, A.R. Desai, H. Dolman, S. Etzold, L. Francois, D. Gianelle, B. Gielen, A. Goldstein, M. Groenendijk, L. Gu, N. Hanan, C. Helfter, T. Hirano, D.Y. Hollinger, M.B. Jones,

G. Kiely, T.E. Kolb, W.L. Kutsch, P. Lafleur, B.E. Law, D.M. Lawrence, L. Li, A. Lindroth, M. Litvak, D. Loustau, M. Lund, S. Ma, M. Marek, T.A. Martin, G. Matteucci, M. Migliavacca, L. Montagnani, E. Moors, J.W. Munger, A. Noormets, W. Oechel, J. Olejnik, K. Tha Paw U, K. Pilegaard, S. Rambal, A. Raschi, R.L. Scott, G. Seufert, D. Spano, P. Stoy, M.A. Sutton, A. Varlagin, E. Weng, G. Wohlfahrt, B. Yang, Z. Zhang, X. Zhou. 2012. Thermal optimality of net ecosystem exchange of carbon dioxide and underlying mechanisms. *New Phytologist*. DOI: 10.1111/j.1469-8137.2012.04095.x.

\*Sullivan, B.W., S. Dore, M.C. Montes-Helu, T.E. Kolb, S.C. Hart. 2012. Pulse emissions of carbon dioxide during snowmelt at a high-elevation site in northern Arizona, USA. *Arctic, Antarctic, and Alpine Research* 44:247-254. DOI: <http://dx.doi.org/10.1657/1938-4246-44.2.247>

\*Coble, A.P., T.E. Kolb. 2013. Native riparian tree establishment along the regulated Dolores River, Colorado. *Western North American Naturalist*: in press.

\*Kerhoulas, L.P., T.E. Kolb, G.W. Koch. 2013. Tree size, stand density, and the source of water used across seasons by ponderosa pine in northern Arizona. *Forest Ecology and Management* 289: 425–433. DOI: <http://dx.doi.org/10.1016/j.foreco.2012.10.036>

\*Koepke, D.F., T.E. Kolb. 2013. Species variation in water relations and xylem vulnerability to cavitation at a forest-woodland ecotone. *Forest Science*: in press. DOI: <http://dx.doi.org/10.5849/forsci.12-053>; <http://www.ingentaconnect.com/content/saf/fs/pre-prints/forsci12053>

Gaylord, M.L., T.E. Kolb, W.T. Pockman, J.A. Plaut, E.A. Yopez, A.K. Macalady, R.E. Pangle, N.G. McDowell. 2013. Drought predisposes piñon-juniper woodlands to insect attacks and mortality. *New Phytologist*: in press.

\*Grady, K.C., D.C. Laughlin, S.M. Ferrier, T.E. Kolb, S.C. Hart, G.J. Allan, T.G. Whitham. 2013. Adaptive trait recognition: genotypic variation in leaf economic traits is related to climate change adaptation of a foundation riparian tree. *Functional Ecology*: in press.

Kolb, T., S. Dore, M. Montes-Helu. 2013. Extreme late-summer drought causes neutral annual carbon balance in southwestern ponderosa pine forests and grasslands. *Environmental Research Letters*: in press.

Huang, C.H., A. Finkral, C. Sorenson, T.E. Kolb. In review. Incorporating carbon revenue into economic benefits of fire risk reduction treatments. *Journal of Environmental Quality*.

Luysaert, S., M. Jammet, S. Estel, J. Pongratz, E. Ceschia, G. Churkina, J.A. Dolman, A. Don, K. Erb, M. Ferlicoq, B. Gielen, T. Grunwald, R.A. Houghton, K. Klumpp, A. Knohl, T. Kolb, T. Kuemmerle, T. Laurila, A. Lohila, D. Loustau, P. Meyfroidt, E.J. Moors, K. Novick, J. Otto, K. Pilegaard, C.A. Pio, S. Rambal, C. Rebmann, J. Ryder, A. Varlagin, M. Wattenback, P.C. Stoy. In review. Beyond land cover change - Effects of contemporary land management on surface climate. *Science*.

\*Kane, J.M., T.E. Kolb. In review. Short-term growth predicts drought-induced mortality of all dominant tree species in southwestern montane mixed-conifer forests. *New Phytologist*.

#### **OTHER TECHNICAL PUBLICATIONS:**

*(Non-Refereed Proceedings, Abstracts, Reports; lead author, \*=graduate student, \*\*=undergraduate student)*

Kolb, T.E., K.C. Steiner. 1984. Measurement of cold tolerance in loblolly pine. Pages 189-190 In: Lanner, R.M. (editor), *Proceedings of the 8th North American Forest Biology Workshop*, Utah State University, Logan, Utah.

Kolb, T.E., K.C. Steiner. 1985. Cold tolerance variation in loblolly pine needles from different branch types, families, and environments. Pages 358-367 In: Schmidting, R.C. and M.M. Griggs (editors), *Proceedings of the 18th Southern Forest Tree Improvement Conference*, Long Beach, MS.

Kolb, T.E., K.C. Steiner. 1987. Morphological responses of northern red oak and yellow-poplar to components of plant interference (abstract). Pages 519-520 In: Hay, R.L., F.W. Woods, and H. DeSelm (editors), *Proceedings of the 6th Central Hardwood Conference*, Knoxville, TN.

Kolb, T.E., L.H. McCormick. 1991. Sap characteristics of pear thrips-damaged sugar maples (abstract). Page 41 In Parker, B.L. and E.N. Doane (editors), *The 1990 Conference on Thysanoptera - Abstracts*, South Burlington, VT. Vermont Agricultural Experiment Station Bulletin 698, University of Vermont, Burlington.

Kolb, T.E., L.H. McCormick, D.A.J. Teulon, E.A. Cameron. 1991. Life history, impact, and management of pear thrips in sugar maple stands in Pennsylvania. Pages 27-30 In: Brault, D. (editor), *Proceedings of The 8th Quebec Regional Conference on Sugar Maple*, Granby, Quebec.

Kolb, T.E., D.A.J. Teulon. 1991. Relationships between sugar maple budburst phenology and pear thrips damage (abstract). Page 40 In: Parker, B.L. and E.N. Doane (editors), *The 1990 Conference on Thysanoptera - Abstracts*, South Burlington, VT. Vermont Agricultural Experiment Station Bulletin 698, University of Vermont, Burlington.

McCormick, L.H., T.E. Kolb. 1991. Effects of prior pear thrips injury on sugar maple crown condition and sugar reserves (abstract). Page 38 In: Parker, B.L. and E.N. Doane (editors), *The 1990 Conference on Thysanoptera - Abstracts*, South Burlington, VT. Vermont Agricultural Experiment Station Bulletin 698, University of Vermont, Burlington.

Cameron, E.A., D.A.J. Teulon, D. Shumway, L.H. McCormick, T.E. Kolb. 1992. Occurrence, life history, and management of pear thrips in sugar maple stands in Pennsylvania. Pages 18-19 In: *Proceedings of the 1990 North American Maple Syrup Council Technical Session*, Batavia, NY.

Kolb, T.E., L.H. McCormick. 1992. Historical growth patterns of healthy and declined sugar maples in four Pennsylvania stands (abstract). Page 5 In: Heiligmann, R.B. (editor), Proceedings of the 1992 North American Maple Syrup Council Technical Session, Concord, OH.

Kolb, T.E., L.H. McCormick. 1992. Effects of prior pear thrips damage on sap and crown characteristics of sugarbush maples (abstract). Page 26 In: Heiligmann, R.B. (editor), Proceedings of the 1992 North American Maple Syrup Council Technical Session, Concord, OH.

Kolb, T.E., L.H. McCormick, D.L. Shumway. 1992. Effects of pear thrips damage on sugar maple gas exchange and water relations (abstract). Page 46 In: Cameron, E.A., D.A.J. Teulon, L.H. McCormick, and T.E. Kolb (editors), The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management, University Park, PA. United States Department of Agriculture Forest Service General Technical Report NE-161.

Kolb, T.E., L.H. McCormick, D.L. Shumway. 1992. Effects of pear thrips damage on sugar maple sap characteristics, root carbohydrates and crown condition. Pages 46-63 In: Proceedings of the 1990 North American Maple Syrup Council Technical Session, Batavia, NY.

Kolb, T.E., L.H. McCormick, E.E. Simons, D.J. Jefferey. 1992. Sap characteristics and crown condition of sugarbush maples two years after pear thrips attack (abstract). Page 38 In: The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management. United States Department of Agriculture Forest Service General Technical Report NE-161.

Kolb, T.E., D.A.J. Teulon. 1992. Effects of temperature during budburst on pear thrips damage to sugar maple (abstract). Page 44 In: Cameron, E.A., D.A.J. Teulon, L.H. McCormick, and T.E. Kolb (editors), The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management, University Park, PA. United States Department of Agriculture Forest Service General Technical Report NE-161.

Kolb, T.E., L.H. McCormick. 1993. Effects of pear thrips damage on sap and crown characteristics of sugarbush maples. *Maple Syrup Digest* 5A (2): 20-27.

Kolb, T.E., J.M. Skelly, K.C. Steiner, K. Dunn. 1993. Effects of ambient ozone on first-year growth and physiology of black cherry (*Prunus serotina* Ehrh.) seedlings (abstract). *Bulletin of the Ecological Society of America* 74: 315.

Kolb, T.E., M.R. Wagner, W.W. Covington. 1993. Concepts of forest ecosystem sustainability, biodiversity, and health. A White Paper prepared for the Southwest University Forest Research Consortium.

Fredericksen, T.S., B.J. Joyce, K.B. Kouterick, T.E. Kolb, J.M. Skelly, K.C. Steiner, J.E. Savage, K.R. Snyder. 1994. Response of different-aged black cherry trees to ambient ozone exposure (abstract). *Bulletin of the Ecological Society of America* 75:71.



Fredericksen, T.S., J.M Skelly, K.B. Kouterick, B.J. Joyce, T.E. Kolb, K.C. Steiner, J.E. Savage, K.R. Snyder. 1994. Levels of variation in foliar ozone injury among black cherry trees (abstract). *Phytopathology* 84: 543.

Fredericksen, T.S., J.M. Skelly, K.C. Steiner, T.E. Kolb, B. J. Joyce, K. B. Kouterick, J. E. Savage. 1994. Ozone uptake of different-sized black cherry trees in high- and low-light environments. In: *Proceedings of the IUFRO Workshop on Air Pollution and Multiple Stresses*, Fredericton, New Brunswick, Canada.

Kolb, T.E., T.S. Fredericksen, B.J. Joyce, K.C. Steiner. 1994. Relationships between foliar gas exchange and environment for different-sized black cherry trees (abstract). *Bulletin of the Ecological Society of America* 75:115.

\*Kouterick, K.B., J.M. Skelly, T.S. Fredericksen, T.E. Kolb, J.E. Savage, K.R. Snyder. 1994. Foliar ozone injury and gas exchange among black cherry genotypes (abstract). *Bulletin of the Ecological Society of America* 75:116-117.

Skelly, J.M., K.C. Steiner, T.S. Fredericksen, T.E. Kolb. 1994. Scaling seedling to mature canopy black cherry responses to ambient ozone in forests of northcentral Pennsylvania. In: *Proceedings of the Mid-Atlantic Highlands Area regional meeting*, U.S. Environmental Protection Agency, Hershey, PA.

Cameron, E.A., T.E. Kolb, D.A.J. Teulon, L.H. McCormick. 1995. Pear thrips, *Taeniothrips inconsequens* (Uzel) (Thysanoptera: Thripidae) in the northeastern United States - Its impact on the sugar maple (*Acer saccharum*) resource. Pages 178-179 In: *Caring for the Forest: Research in a Changing World. Abstracts of Invited Papers, IUFRO XX World Congress, 6-12 August 1995, Tampere, Finland.*

Fredericksen, T.S., J.M. Skelly, K.C. Steiner, T.E. Kolb. 1995. Foliar ozone injury on different-sized *Prunus serotina* trees (abstract). *Bulletin of the Ecological Society of America* 76:86.

\*Holmberg, K.M., T.E. Kolb, M.R. Wagner, J.E. Stone. 1995. Stand density regulates ponderosa pine foliar physiology and insect resistance mechanisms in Arizona (abstract). *Bulletin of the Ecological Society of America* 76:342.

Kolb, T.E., M.R. Wagner, W.W. Covington. 1995. Forest health from different viewpoints. Pages 5-13 In *Forest Health Through Silviculture - Proceedings of the 1995 National Silviculture Workshop*, Mescalero, New Mexico, May 8-11, 1995. United States Department of Agriculture Forest Service General Technical Report RM-GTR-267.

\*Feeney, S.R., T.E. Kolb, M.R. Wagner, W.W. Covington. 1996. Restoration treatments benefit old-growth ponderosa pine physiology and insect resistance (abstract). *Bulletin of the Ecological Society of America* 77:137.

Fox, B.E., T.E. Kolb, E.A. Kurmes. 1996. Benefits and costs of an integrated forestry curriculum: The Northern Arizona University experience. Pages 140-148 In: J.C. Finley and

K.C. Steiner (editors), Proceedings of the First Biennial Conference on University Education in Natural Resources, The Pennsylvania State University, University Park, PA, March 3-5, 1996.

Kolb, T.E., J. Maschinski. 1996. An ecophysiological analysis of shade effects on *Clematis hirsutissima* var. *arizonica*. Pages 203-212 In: Maschinski, J., H.D. Hammond, and L. Holter (technical coordinators) Proceedings of the Second Southwestern Rare and Endangered Plant Conference, Flagstaff, AZ. United States Department of Agriculture Forest Service General Technical Report RM-GTR-283.

Kolb, T.E., M.R. Wagner. 1996. Silvicultural management of insect resistance in ponderosa pine (abstract). Page 86 In: R.F. Billings et al. (editors), Proceedings: North American Forest Insect Work Conference, Forest Entomology: Vision 20:21. Texas Forest Service Publication No. 160.

Fredericksen, T.S., J.M. Skelly, K.C. Steiner, T.E. Kolb. 1996. Ozone exposure, uptake, and response of different-sized black cherry trees. Pages 38-40 In: Proceedings of the 1995 Meeting of the Northern Global Change Program. United States Department of Agriculture Forest Service General Technical Report NE-214.

Wagner, M.R., T.E. Kolb, S.R. Feeney, J.E. Stone. 1996. Impact of ecosystem restoration on old-growth ponderosa pine resistance to phloem-feeding and folivorous insects (abstract). Page 138 In: Billings R.F., et al. (editors), Proceedings: North American Forest Insect Work Conference, Forest Entomology: Vision 20:21. Texas Forest Service Publication No. 160.

Wagner, M.R., T.E. Kolb. 1996. Team teaching forest health: The NAU experience (abstract). Page 100 In: Billings R.F., et al. (editors), Proceedings: North American Forest Insect Work Conference, Forest Entomology: Vision 20:21. Texas Forest Service Publication No. 160.

\*Feeney, S.R., T.E. Kolb, M.R. Wagner, W.W. Covington. 1997. Restoration treatments benefit old-growth ponderosa pine physiology and insect resistance (abstract). In: Proceedings of the 1996 National Society of American Foresters Convention.

Covington, W.W., P.Z. Fule, M.M. Moore, S.C. Hart, T.E. Kolb, J.N. Mast, M.R. Wagner, S.S. Sackett. 1997. Restoration of ecosystem health in southwestern ponderosa pine forests (abstract). Bulletin of the Ecological Society of America 78(4):73.

\*Dodds, K.A., T.E. Kolb, and K.M. Clancy. 1997. Western spruce budworm as a regulator of resources, physiology, and growth of Douglas-fir seedlings (abstract). In: Abstracts, The Ecological Society of America 82th Annual Meeting.

Fox, B.E., L.E. DeWald, T.E. Kolb, M.E. Lee, D.B. Wood. 1998. Assessing a forestry education: The Northern Arizona University Experience. Page 81-85 In: Heister, C.G. (compiler), Proceedings of the Second Biennial Conference on University Education in Natural Resources. Utah State University, Logan, Utah.

\*Dodds, K.A., T.E. Kolb, K.M. Clancy. 1998. Western spruce budworm as a regulator of resources, physiology, and growth of Douglas-fir seedlings (abstract). Pages 55-56 In: Proceedings of the 49th Annual Western Forest Insect Work Conference.

\*Horton, J.L., S.C. Hart, T.E. Kolb. 1998. Relationships between ground water depth and riparian tree physiological condition (abstract). Proceedings of the 1998 Meeting of the North American Forest Biology Workshop.

\*Horton, J.L., S.C. Hart, T.E. Kolb. 1998. Relationships between ground water depth and riparian tree physiological condition (abstract). Page 262 In: Abstracts, The Ecological Society of America 83th Annual Meeting.

\*Chen, Z., T.E. Kolb, K.M. Clancy. 1999. Photosynthesis and growth rate of Douglas-fir genotypes in relation to western spruce budworm defoliation (abstract). In: Proceedings of the 1999 Meeting of the Western Forest Genetics Association.

\*Chen, Z., T.E. Kolb, K.M. Clancy. 1999. An evaluation of Douglas-fir resistance to western spruce budworm herbivory (abstract). Page 237 In: Abstracts, The Ecological Society of America 84th Annual Meeting.

\*Horton, J.L., T.E. Kolb, S.C. Hart. 1999. Patterns of riparian tree physiology and growth during wet and dry years (abstract). In: Abstracts, The Ecological Society of America 84th Annual Meeting.

Kolb, T.E. 1999. Seasonal variations in leaf gas exchange and water relations in a southwestern pine-oak forest (abstract). Page 128 In: Abstracts, The Ecological Society of America 84th Annual Meeting.

\*Ament, M.A., A.E. Springer, T.E. Kolb, L.E. DeWald. 2000. Restoration of a perched aquifer system through manipulation of transpiration at the watershed scale (abstract). In: Proceedings of the 2000 Annual Meeting of the Geological Society of America.

\*Chen, Z., T.E. Kolb, K.M. Clancy, V. Hipkins, L.E. DeWald. 2000. Allozyme variation is associated with Douglas-fir phenotypic resistance to western spruce budworm defoliation (abstract). Page 259 In: Abstracts, The Ecological Society of America 85th Annual Meeting.

\*Horton, J.L., S.C. Hart, T.E. Kolb. 2000. Depth to ground water affects riparian tree water uptake and physiological condition (abstract). Page 122 In: Abstracts, The Ecological Society of America 85th Annual Meeting.

Kolb, T.E., L.E. DeWald, P.J. Daugherty. 2000. Core education for forestry graduate students at Northern Arizona University. Page 80 In: Proceedings of the Third Biennial Conference on University Education in Natural Resources.

Springer, A., M. Amentt, L. DeWald, T. Kolb, D. Fischer. 2000. Restoring riparian areas through landscape restoration: Influence of upland grazing, tree thinning, and fire on riparian ecosystems (abstract). In: Proceedings of the Annual Meeting of the Society of Ecological Restoration.

\*Chen, Z.C., T.E. Kolb, K.M. Clancy, L.E. DeWald, V.D. Hipkins. 2001. Allozyme variation is associated with Douglas-fir resistance to western spruce budworm defoliation (abstract). Page 194 In: Volney, W.J.A., J.R. Spence, and E.M. Lefebvre, Editors, Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference, May 14-18, 2001, Edmonton, Alberta. National Resources Canada, Canadian Forest Service, Northern Forestry Center, Edmonton, Alberta. Information Report NOR-X-381.

\*Chen, Z.C., T.E. Kolb, K.M. Clancy. 2001. The role of monoterpenes in resistance of Douglas-fir to western spruce budworm defoliation (abstract). Page 194 In: Volney, W.J.A., J.R. Spence, and E.M. Lefebvre, Editors, Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference, May 14-18, 2001, Edmonton, Alberta. National Resources Canada, Canadian Forest Service, Northern Forestry Center, Edmonton, Alberta. Information Report NOR-X-381.

Clancy, K.M., Z. Chen, T.E. Kolb. 2001. Greenhouse bioassay for evaluating performance of the western spruce budworm on grafted Douglas-firs (abstract). In: Abstracts, The Ecological Society of America 86th Annual Meeting.

\*Fischer, D.G., T.E. Kolb, L.E. DeWald. 2001. Environmental and ontogenetic controls over whole-tree transpiration of *Pinus flexilis* and *P. ponderosa* in northern Arizona (abstract). In: Abstracts, The Ecological Society of America 86th Annual Meeting.

Kolb, T.E. 2001. Water use by Tamarix and native riparian trees (abstract). In: Proceedings of the Tamarisk Symposium.

Kolb, T.E., C.W. McHugh, J. Wilson. 2001. Bark beetle infestations following fire in northern Arizona Page 49 In: Volney, W.J.A., J.R. Spence, and E.M. Lefebvre, Editors, Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference, May 14-18, 2001, Edmonton, Alberta. National Resources Canada, Canadian Forest Service, Northern Forestry Center, Edmonton, Alberta. Information Report NOR-X-381.

\*McHugh, C.W., T.E. Kolb, J.L. Wilson. 2001. Bark beetle infestation of ponderosa pine following fire in northern Arizona (abstract). In: Proceedings of the Sixth Biennial Conference of Research on the Colorado Plateau.

\*Skov, K.R., K.F. Wallin, T.E. Kolb. 2001. Effects of restoration thinning treatments on water relations and photosynthesis of four-size classes of *Pinus ponderosa* (abstract). In: Proceedings of the Meeting, Applications for Practitioners of Ponderosa Pine Ecosystem Restoration.

\*Skov, K.R., K.F. Wallin, T.E. Kolb. 2001. Effects of restoration thinning treatments on water relations and photosynthesis of four size-classes of ponderosa pine (abstract). Page 207 In: Volney, W.J.A., J.R. Spence, and E.M. Lefebvre, Editors, Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference, May 14-18, 2001, Edmonton, Alberta.

National Resources Canada, Canadian Forest Service, Northern Forestry Center, Edmonton, Alberta. Information Report NOR-X-381.

\*Skov, K.R., K.F. Wallin, T.E. Kolb. 2001. Restoration thinning and burning treatments affect water relations and photosynthesis of pre- and post-settlement *Pinus ponderosa* (abstract). In: Proceedings of the Sixth Biennial Conference of Research on the Colorado Plateau.

\*Steed, J.E., L.E. DeWald, T.E. Kolb. 2001. Physiological response of three riparian sedges to different ground water depths (abstract). In: Abstracts, The Ecological Society of America 86th Annual Meeting.

Wallin, K.F., T.E. Kolb, K. Skov, M.R. Wagner. 2001. Effects of defoliation on host defenses, acceptance behavior and population dynamics of bark beetles (abstract). Page 72 In: Volney, W.J.A., J.R. Spence, and E.M. Lefebvre, Editors, *Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference*, May 14-18, 2001, Edmonton, Alberta. National Resources Canada, Canadian Forest Service, Northern Forestry Center, Edmonton, Alberta. Information Report NOR-X-381.

Wallin, K., K. Skov, T.E. Kolb, M.R. Wagner. 2001. Insect population and tree resistance responses to restoration thinning treatments in ponderosa pine forests (abstract). In: Abstracts, The Ecological Society of America 86th Annual Meeting.

Bailey, J.D., T.E. Kolb. 2002. Teaching silvics: Student performance and evaluations in web-based and traditional classroom courses (abstract). In: Proceedings of the Fourth Biennial Conference on University Education in Natural Resources, North Carolina State University, Raleigh, NC.

\*Horton, J.L., S.C. Hart, T.E. Kolb. 2002. Environmental water sources used by Sonoran Desert riparian trees. (abstract). P. 98 In: Proceedings of the Third International Conference on Applications of Stable Isotope Techniques to Ecological Studies, Flagstaff, AZ.

Kolb, T.E., C.E. McHugh, K.R. Skov, M.R. Wagner, K.F. Wallin. 2002. Impacts of forest restoration treatments on tree-feeding insects and host suitability in Southwestern ponderosa pine forests (abstract). In: Abstracts, The Ecological Society of America 87th Annual Meeting.

\*Simonin, K.A., M. Montes-Helu, G.W. Koch, T.E. Kolb. 2002. Tree and stand water use responses to restoration thinning in ponderosa pine forests (abstract). In: The Ecological Society of America 87th Annual Meeting.

\*Mullen, G., T.E. Kolb, and A.E. Springer. 2003. Restoration of wet meadows: Influence of burning herbaceous communities on groundwater recharge (abstract). In: Proceedings of the 2003 Southwest Fire Initiative Research Conference, Flagstaff, Arizona.

\*Simonin, K.A., G.W. Koch, T.E. Kolb, M. Montes-Helu. 2003. Short-term effects of restoration thinning on ponderosa pine water balance (abstract). In: Proceedings of the 2003 Southwest Fire Initiative Research Conference, Flagstaff, Arizona.

\*Adams, H.D., T.E. Kolb. 2003. Using radial growth and foliar  $\delta^{13}\text{C}$  as measures of drought sensitivity in trees at ecotone forest communities in northern Arizona (abstract). In: Abstracts, The Ecological Society of America 88th Annual Meeting.

Guerard, N., T.E. Kolb, M.R. Wagner. 2003. Tree size preference and attack position on ponderosa pine for the engraver pine beetle *Ips pini*, in northern Arizona (abstract). In: Proceedings of IUFRO Working Party on Bark Beetles, Bark Beetle Biology and Management: From the 1960s to the 21st Century, Blodgett Forest Research Station, Georgetown, California, Sept. 29-October 2, 2003.

\*Gaylord, M.L., M.R. Wagner, T.E. Kolb, K.F. Wallin, E.L. Smith. 2003. Seasonal dynamics of bark beetle flight and tree growth and resin defenses in a northern Arizona ponderosa pine forest; 2002-3 (abstract). In: Proceedings of IUFRO Working Party on Bark Beetles, Bark Beetle Biology and Management: From the 1960s to the 21st Century, Blodgett Forest Research Station, Georgetown, California, Sept. 29-October 2, 2003.

\*Mullen, G., A. Springer, A., T.E. Kolb. 2003. Impacts of prescribed burning in upland meadows on understory evapotranspiration (abstract). *Eos Trans AGU*, 84(46).

Wagner, M.R., T.E. Kolb, J.D. McMillin. 2003. Outbreak status and research on pine bark beetles in the Southwestern US (abstract). In: Proceedings of IUFRO Working Party on Bark Beetles, Bark Beetle Biology and Management: From the 1960s to the 21st Century, Blodgett Forest Research Station, Georgetown, California, Sept. 29-October 2, 2003.

\*Satink-Wolfson, B., T.E. Kolb, C.H. Sieg, K.M. Clancy. 2003. Effects of fire and soil conditions on the germination and seedling success of diffuse knapweed (*Centaurea diffusa*) in northern Arizona forests (abstract). In: Proceedings of The 2nd International Wildland Fire Ecology and Fire Management Congress, Orlando, Florida, Nov. 16-20, 2003.

\*Zausen, G.L., T.E. Kolb, M.R. Wagner. 2003. Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona (abstract). In: Proceedings of the Seventh Biennial Conference of Research on the Colorado Plateau.

\*Zausen, G.L., T.E. Kolb, M.R. Wagner. 2003. Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona (abstract). In: Proceedings of the 54th Western Insect Work Conference, Guadalajara, Mexico, Nov. 3-6, 2003.

Guerard, N., T.E. Kolb, M.R. Wagner. 2003. Pine engraver, *Ips pini*, tree size preference and attack height on ponderosa pine. In: Proceedings of the 54th Western Insect Work Conference, Guadalajara, Mexico, Nov. 3-6, 2003.

\*Satink-Wolfson, B., T.E. Kolb, C.H. Sieg, K.M. Clancy. 2003. Effects of fire and soil conditions on the germination and seedling success of diffuse knapweed (*Centaurea diffusa*) in northern Arizona forests (abstract). In: Proceedings of the Seventh Biennial Conference of Research on the Colorado Plateau.

\*Bickford, C.P, T.E. Kolb, B. Geils. 2003. Effects of thinning on dwarf mistletoe shoot growth in ponderosa pine stands (abstract). In: Proceedings of the Seventh Biennial Conference of Research on the Colorado Plateau.

\*Bickford, C.P, T.E. Kolb, B. Geils. 2003. Effects of thinning on dwarf mistletoe shoot growth in ponderosa pine stands (abstract). In: Proceedings of the 2003 Meeting of the Southwest Association of Biologists.

\*Bickford, C.P, T.E. Kolb, B. Geils. 2004. Effects of thinning on dwarf mistletoe shoot growth in ponderosa pine stands (abstract). In: Proceedings of the 2004 Meeting of the Ecological Society of America.

\*Zausen, G.L., T.E. Kolb, M.R. Wagner. 2004. Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona (abstract). In: Proceedings of the Forest Health Monitoring Working Group, Sedona, AZ, Feb. 9-12, 2004.

Clancy, K.M., Z. Chen, T.E. Kolb. 2004. Foliar nutrients and induced susceptibility: genetic mechanisms of Douglas-fir resistance to western spruce budworm defoliation (abstract). Section 7 Symposium on Induced Defenses & Plant Resistance at the XXII International Congress of Entomology, 15-21 August 2004, Brisbane, Australia.

\*Gaylord, M.L., T.E. Kolb, E.L. Smith, M.R. Wagner, K.F. Wallin. 2004. Seasonality of bark beetles (Coleoptera: Scolytidae) and associated predators in a ponderosa pine forest in northern Arizona (abstract). In: Proceedings of the 55th Western Insect Work Conference, San Diego, CA, April, 2004.

Kolb, T.E. 2004. Introduction to the Proceedings of the Fifth Biennial Conference on University Natural Education in Natural Resources. In: Kolb, T.E. compiler. Proceedings of the Fifth Biennial Conference on University Education in Natural Resources. Natural Resources and Environmental Issues, volume XII, S.J. and Jessie E. Quinney Natural Resources Research Library, Logan, UT. <http://www.cnr.usu.edu/uenr/>

\*Satinck Wolfson, B., T.E. Kolb, C. Hull Sieg, K.M. Clancy. 2004. Effects of fire and soil conditions on germination and seedling success of diffuse knapweed (*Centaurea diffusa*) in northern Arizona forests (abstract). The National Fire Plan Conference & Wildland Fire 2004 meeting, 3-5 March 2004, Reno, NV.

\*Satinck-Wolfson, B., T.E. Kolb, C. Hull Sieg, K.M. Clancy. 2004. Effects of post-fire conditions on germination and seedling success of diffuse knapweed (*Centaurea diffusa*) in northern Arizona forests (abstract). 2004 Meeting of the Society for Ecological Restoration, Conference, 23-27 August 2004, Victoria, B.C., Canada.

\*Zausen, G.L., T.E. Kolb, M.R. Wagner. 2005. Long-term impacts of thinning and prescribed burning on ponderosa pine physiology and bark beetle abundance in Northern Arizona (abstract).

In: Proceedings of the 56th Western Forest Insect Work Conference, Victoria, British Columbia, Canada, March 28-April 1, 2005.

\*Breece, C.R., T.E. Kolb, K.M. Clancy, J.D. McMillin, B.G. Dickson. 2005. Effects of prescribed fire on bark beetle abundance in the Southwest (abstract). In: Proceedings of the 56th Western Forest Insect Work Conference, Victoria, British Columbia, Canada, March 28-April 1, 2005.

McDowell, N.G., H. Adams, J. Bailey, T.E. Kolb, D.A. Falk. 2005. Using stable isotopes of tree rings to assess physiological response to disturbance (abstract). In: Stable isotope analysis of trees: new methods, new uses. Special session of the American Association of Geography, Denver, Colorado, April 2005.

\*Breece, C.R., T.E. Kolb, K.M. Clancy, J. D. McMillin, B.G. Dickson. 2005. Effects of prescribed fire on bark beetle colonization in Southwest ponderosa pine forests (abstract). 8th Biennial Conference of Research on the Colorado Plateau, Flagstaff, Arizona, November 9-12, 2005.

\*Koepke, D.F., T.E., Kolb, C.P. Bickford. 2005. Patterns of woody plant mortality following drought at the ponderosa pine/pinyon-juniper ecotone (abstract). 8th Biennial Conference of Research on the Colorado Plateau, Flagstaff, Arizona, November 9-12, 2005.

Kolb, T.E. 2005. Growth responses of northern Arizona forests to climatic variation. (abstract). 8th Biennial Conference of Research on the Colorado Plateau, Flagstaff, Arizona, November 9-12, 2005.

Kolb, T.E., D.F. Koepke. 2006. A tree-centered mechanistic basis for drought-induced bark beetle outbreaks in Arizona (abstract). North American Forest Insect Work Conference, Asheville, North Carolina, May 21-25, 2006.

Montes-Helu, M.C., S. Dore, B. Sullivan, S. Hart, J. Kaye, W. Winslow, G. Koch, B. Hungate, T.E. Kolb. Carbon fluxes in disturbed southwestern ponderosa pine forests (abstract). 2006 Ameriflux Meeting, Boulder, Colorado, October 14-16, 2006.

\*Breece, C.R., T.E. Kolb, K.M. Clancy, J.D. McMillin, B.G. Dickson. 2006. Effects of prescribed fire on tree mortality and bark beetles in Southwestern ponderosa pine forests (abstract). Conserving and Restoring Frequent Fire Landscapes in the West: Linking Science, Collaboration, and Practice, October 26, 2006, Flagstaff, Arizona.

\*Koepke, D., T.E. Kolb. 2007. Tree mortality following the extreme 2002 drought at the ponderosa pine/pinyon-juniper ecotone in northern Arizona (abstract). 2007 Meeting of the Ecological Society of America, August 6-10, 2007, San Jose, California.

\*Koepke, D., T.E. Kolb. 2007. Tree mortality following the 2002 drought at the ponderosa pine/pinyon-juniper ecotone (abstract). 9th Biennial Conference of Research on the Colorado Plateau, Nov. 1-4, 2007, Flagstaff, Arizona.



Kolb, T., M. Montes-Helu, S. Dore, S. Hart, J. Kaye, B. Sullivan, B., Hungate, G. Koch. 2007. Carbon dioxide and methane fluxes in disturbed southwestern ponderosa pine forests (abstract). U.S. North American Carbon Program Investigators Meeting, January 22-24, 2007, Colorado Springs, Colorado.

Dore, S., M. Montes-Helu, B.W. Sullivan., S.C. Hart, J.P. Kaye, G. W. Koch, B.A. Hungate, T.E. Kolb. 2007. Carbon dioxide fluxes in disturbed southwestern ponderosa pine forests (abstract). 2007 Annual Meeting of the American Geophysical Union, December 10-14, 2007, San Francisco, California.

Dore, S., M. Montes-Helu, B., Sullivan., J. Kaye, W. Winslow, S.C. Hart , G. Koch, B. Hungate, T.E. Kolb. 2007. The effect of intense wildfire on ecosystem gas exchange of ponderosa pine forests in northern Arizona (abstract). U.S. North American Carbon Program Investigators Meeting, January 22-24, 2007, Colorado Springs, Colorado.

\*Johnson, T.D., T.E. Kolb, A.L. Medina. 2007. Does riparian vegetation influence tamarisk presence? (abstract). 9th Biennial Conference of Research on the Colorado Plateau, Nov. 1-4, 2007, Flagstaff, Arizona.

\*Sullivan, B., T.E. Kolb, S. Hart, M. Montes-Helu, S. Dore, B. Hungate. 2007. Effects of intense wildfire on soil carbon dioxide and methane fluxes in a Southwest, U.S. ponderosa pine forest (abstract). U.S. North American Carbon Program Investigators Meeting, January 22-24, 2007, Colorado Springs, Colorado.

\*Sullivan, B.W., T.E. Kolb, S.C. Hart. 2007. Thinning reduces carbon dioxide but not methane fluxes in southwestern ponderosa pine forest soil (abstract). 9th Biennial Conference of Research on the Colorado Plateau, Nov. 1-4, 2007, Flagstaff, Arizona.

Kolb, T.E., S. Dore, S., M. Montes-Helu, B., Sullivan, J. Kaye, W. Winslow, S. Hart , G. Koch, B. Hungate. 2008. Persistent effects of fire-induced vegetation change on energy partitioning, evapotranspiration, and carbon sequestration in northern Arizona ponderosa pine forests (abstract). Conference on Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems, January 28-31, 2008, Tucson, Arizona.

\*Hayes, C., T. DeGomez, T. Kolb, J. Anhold. 2008. Bugs & burns: Effects of fire on ponderosa pine mortality and bark beetles (abstract). Forest Health Monitoring 13th Annual Workgroup Meeting, San Antonio, TX, February 12, 2008.

Kolb, T.E., E. Friginal, M. Lee, N. Tracy-Ventura. 2008. Teaching writing within forestry. Proceedings of the Seventh Biennial Conference on University Education in Natural Resources, March 13-15, 2008, Corvallis, Oregon. <http://hdl.handle.net/1957/8085>

\*Bridgeland, W.T., P. Beier, T. Kolb, T. Whitham. 2008. Trophic cascade strength depends on interaction of tree growth, bird predation, and arthropod community characteristics (abstract). 2008 Annual Meeting of the Ecological Society of America.

\*Sullivan, B.W., S.C. Hart, T.E. Kolb. 2008. Methane uptake in forest soils is driven by diffusivity and methane oxidizer community size (abstract). Annual Meeting of the American Geophysical Union, Dec. 16, 2008, San Francisco, CA.

DeGomez, T., T. Kolb, C. Hayes, K. Williams and J. Anhold. 2009. The Effects of Prescribed Fire on Bark Beetle Dynamics in Ponderosa Pine (abstract). Forest Health Monitoring 14th Annual Workgroup Meeting, Savannah, GA.

DeGomez, T., T. Kolb, C. Hayes, K. Williams and J. Anhold. 2009. The Effects of Prescribed Fire on Bark Beetle Dynamics in Ponderosa Pine (abstract). Annual USDA Forest Service, Southwestern Regional Timber Staff/Silviculturalist meeting, Albuquerque, NM. March 17-19, 2009.

Dore, S., T.E. Kolb, M. Montes-Helu, S. E. Eckert, B. W. Sullivan, B. A. Hungate, J. P. Kaye, S. C. Hart, G. W. Koch, A. Finkral. 2009. Carbon fluxes from ponderosa pine forests disturbed by wildfire and thinning (abstract). Annual Meeting of the American Geophysical Union, Dec. 14–18, 2009, San Francisco, California, USA.

Gaylord, M.L., T.E. Kolb, N. McDowell, W. Pockman. 2009. Does drought predispose trees to insect attack? (abstract). 2009 Annual Meeting of the Ecological Society of America.

\*Johnson, T.D., T.E. Kolb, A.L. Medina. 2009. Do riparian plant community characteristics differ between tamarisk (*Tamarix L.*) invaded and non-invaded sites on the Upper Verde River, Arizona? (abstract). P 17-18 In: 2009 Tamarisk and Russian Olive Research Conference Program and Abstracts.

\*Kane, J.M., T. E Kolb. 2009. Resin duct production and size predict mortality in ponderosa pine trees in northern Arizona (abstract). Association of American Geographers Annual Meeting. Las Vegas NV. March 22-27, 2009.

\*Kane, J.M., T. E Kolb. 2009. Resin duct production and size predict mortality in ponderosa pine trees in northern Arizona (abstract). 2009 Annual Meeting of the Ecological Society of America.

Kolb, T.E., S. Dore, M. Montes-Helu, B. Sullivan, S. Eckert, J. Kaye, S.C. Hart, G. Koch, A. Finkral, B. Hungate. 2009. Carbon and water fluxes from ponderosa pine forests disturbed by wildfires and thinning (abstract). 2009 Annual Meeting of the Ecological Society of America.

Montes-Helu, M., S. Dore, S., T. E. Kolb, B. W. Sullivan, S. C. Hart, G. W. Koch, B. A. Hungate. 2009. Impacts of forest thinning on water balance (abstract). Annual Meeting of the American Geophysical Union, Dec. 14–18, 2009, San Francisco, California, USA.

\*Sullivan, B.W., S. Dore, S.C. Hart, M. Montes-Helu, T.E. Kolb. 2009. Snowmelt causes pulse emissions of CO<sub>2</sub> to the atmosphere (abstract). 2009 Annual Meeting of the Ecological Society of America.

Yepez, E., J. Plaut, J. Hill, J. Johnson, A. Porras, M. Gaylord, T. Kolb, D. Natvig, W. Pockman, N. McDowell. 2009. Rapid pinon pine mortality following experimental drought (abstract). 2009 Annual Meeting of the Ecological Society of America.

\*Coble, A.P, T.E. Kolb. 2010. Effects of river regulation on establishment and growth of native riparian trees along the Dolores River, CO (abstract). 2010 Annual Meeting of the Society of Wetlands Scientists.

Gaylord, M.L., T.E. Kolb, N. McDowell, W. Pockman, E. Yepez, J. Plaut. 2010. Does drought predispose pinon pine trees to insect attack? (abstract). 61st 2010 Western Forest Insect Work Conference.

\*\*Looney, C., B.W. Sullivan, T.E. Kolb. 2010. Soil age influences pinyon pine growth, water stress, and mortality (abstract). Proceedings of the 2010 National Convention of the Society of American Foresters. Albuquerque, New Mexico.

\*Kane, J.M., T. E. Kolb. 2010. Importance of resin ducts in reducing ponderosa pine mortality from bark beetle attack (abstract). 61st 2010 Western Forest Insect Work Conference.

\*Koepke, D.F., T.E. Kolb. 2010. Stomatal regulation during drought-stress of four co-occurring woody species in northern Arizona (abstract). 2010 Annual Meeting of the Ecological Society of America.

\*McGlone, C.M., C.H. Sieg, T.E. Kolb, T. Nietupsky. 2010. Mature native perennial grasses out-compete an invasive annual grass regardless of soil water and nutrient availability (abstract). Proceedings of the 2010 National Convention of the Society of American Foresters. Albuquerque, New Mexico.

Dore, S., T.E. Kolb, M. Montes-Helu. 2010. Multiyear analysis of the effects of wildfire and thinning on ecosystem carbon fluxes of ponderosa pine forests (abstract). Annual Meeting of the American Geophysical Union, Dec. 13-17, 2010, San Francisco, California, USA.

Stoy, P.C., G.G. Katul, J. Juang, M.B. Siqueira, K.A. Novick, R. Essery, S. Dore, T.E. Kolb, M.C. Montes-Helu, R.L. Scott. 2010. Forests tend to cool the land surface in the temperate zone: An analysis of the mechanisms controlling radiometric surface temperature change in managed temperate ecosystems (abstract). Annual Meeting of the American Geophysical Union, Dec. 13-17, 2010, San Francisco, California, USA.

Amiro, B.D., A.G. Barr, J.G. Barr, T.A. Black, R. Bracho, M. Brown, J. Chen, K.L. Clark, K.J. Davis, A.R. Desai, S. Dore, V. Engel, J.D. Fuentes, A.H. Goldstein, M.L. Goulden, T.E. Kolb, M.B. Lavigne, B.E. Law, H.A. Margolis, T. Martin, J.H. McCaughey, M. Montes-Helu, A. Noormets, J.T. Randerson, G. Starr, J. Xiao. 2011. What have we learned from forest tower flux data following disturbance (abstract)? Annual AmeriFlux and North American Carbon Program investigators Meeting, January 31 – February 4, New Orleans, Louisiana.

Gaylord, M., T. Kolb, N. McDowell, W. Pockman. 2011. The carbon starvation hypothesis: Relationship to host defense theory (abstract). North American Forest Insect Working Conference, Portland, Oregon, May 18, 2011.

\*Grady, K., S. Ferrier, T. Whitham, T. Kolb, S. Hart, G. Allen. 2011. Genetic variation in production of foundation riparian species at the edge of their distribution (abstract). National Workshop on Climate and Forests, May 16-18, 2011, Flagstaff, Arizona.

Montes-Helu, M., S. Dore, T. Kolb. 2011. Multiyear analysis of the effects of wildfire and thinning on ecosystem carbon fluxes of ponderosa pine (abstract). Annual AmeriFlux and North American Carbon Program investigators Meeting, January 31 – February 4, New Orleans, Louisiana.

Dore, S., M. Montes-Helu, A.J. Finkral, S.C. Hart, B.A. Hungate, G.W. Koch, J.B. Moon, T.E. Kolb. 2011. Forest thinning increases ecosystem carbon sequestration during drought (abstract). Annual Meeting of the American Geophysical Union, Dec. 5-9, 2011, San Francisco, California, USA.

Guo, J., B.A. Hungate, T.E. Kolb, G.W. Koch. 2012. Variation in functional rooting depth and soil water partitioning along an elevational gradient in the southwestern U.S. (abstract). Annual Meeting of the American Geophysical Union, Dec. 2012, San Francisco, California, USA.

Ouzts, J., J. Baker, G. Falco, S. Hoagland, M. Victor, T. Kolb. 2012. Translating forest science for global practitioners (abstract). Proceedings of the 2012 National Convention of the Society of American Foresters, October 2012, Spokane, WA.

## **PRESENTATIONS:**

### ***Invited***

“Life history, impact, and management of pear thrips in sugar maple stands in Pennsylvania.” The Eighth Quebec Regional Conference on Sugar Maple, February 5, 1991, Granby, Quebec, Canada.

“Historical growth patterns of healthy and declined sugar maples in four Pennsylvania stands.” The 1992 North American Maple Syrup Council Technical Session, October 22, 1992, Concord, OH.

“Impacts of pear thrips on sugar maple.” Northern Arizona University Department of Biological Sciences Seminar, March 5, 1993, Flagstaff, AZ.

“Forest health - a doctor's diagnosis.” October meeting of the Society of American Foresters Peaks Chapter, October 21, 1993, Flagstaff, AZ.

“Effects of ambient ozone on first-year growth and physiology of black cherry seedlings.” National Meeting of the Operations Research Society of America, November 2, 1993, Phoenix, AZ.

“Concepts of forest health.” Western Forest Insect Work Conference/Western International Forest Disease Working Conference, March 8, 1994, Albuquerque, NM.

“An ecophysiological approach to assessing the impact of insect herbivory on forest ecosystems.” Western Forest Insect Work Conference/Western International Forest Disease Working Conference, March 8, 1994, Albuquerque, NM.

“Concepts of forest health.” Southwest Section, Society of American Foresters, 1994 Spring Sectional Meeting, April 21, 1994, Flagstaff, AZ.

“Restoration ecology research - G. P. Pearson Natural Area.” Southwest Section, Society of American Foresters, 1994 Spring Section Meeting, April 22, 1994, Flagstaff, AZ.

“Native trees of Arizona.” Northern District Meeting of the Arizona Flower and Garden Clubs, June 4, 1994, Flagstaff, AZ.

“Size- and age-related variation in ozone impacts to black cherry trees.” Northern Arizona University Department of Biological Sciences Seminar, Nov. 28, 1994, Flagstaff, AZ.

“Concepts of forest health.” January meeting of the Society of American Foresters White Mountain Chapter, January 26, 1995, Showlow, AZ.

“Concepts of forest health.” Keynote address at the Annual Meeting of the California Licensed Foresters Association, March 3, 1995, Sacramento, CA.

“Native trees of Arizona.” April meeting of the Alpine Garden Club, April 11, 1995, Flagstaff, AZ.

“Forest health from different viewpoints.” Keynote address at the 1995 United States Department of Agriculture Forest Service National Silviculture Workshop, May 8, 1995, Mescalero, N. M.

“Planting the right tree in the right spot.” Northern Arizona Urban and Community Forestry Workshop, May 19, 1995, Flagstaff, AZ.

“Etiology of sugar maple decline in Pennsylvania.” United States Department of Agriculture Forest Service Sugar Maple Decline Workshop, June 6, 1995, Coudersport, PA.

“What is forest health?” Presentation to the Coconino National Forest, East Clear Creek Ecosystem Partnership, February 30, 1996, Flagstaff, AZ.

“Silvicultural management of insect resistance in ponderosa pine.” Second Annual North American Forest Insect Work Conference, April 8-13, 1996, San Antonio, TX.

“What is forest health?” 1996 Spring Meeting of the Grand Canyon Section of the Air and Waste Management Association, May 17, 1996, Flagstaff, AZ.

Testimony on “Forest Health in the Southwest” to the United States Senate Subcommittee on Forests and Public Land Management, Committee on Energy and Natural Resources, July 30, 1996, Washington, D. C.

“Physiology of Pruning” 1997 Fourth Annual Flagstaff Community Trees and Landscape Workshop, July 26, 1997, Flagstaff, AZ.

“Remarks from the Centennial Teacher of the Year.” Commencement address at the College of Ecosystem Science and Management Graduation Recognition Ceremony, December 13, 1997, Flagstaff, AZ.

“Scaling Ozone Chronic Impact in Trees: Limitations and Perspectives.” Keynote address at the IUFRO 7.04.00 Conference entitled "Air Pollution, Global Change and Forests in the New Millennium" and the "19th International Meeting for Specialists in Air Pollution Effects on Forest Ecosystems," May 28, 2000, Houghton, Michigan.

“Gus Pearson Natural Area Field Trip.” Annual Meeting of the Western National Association of Professional Forestry Schools and Colleges. July 27, 2000, Flagstaff, Arizona.

“Ageing as an Influence on Tree Response to Ozone: Theory and Observations.” Keynote address at the EUROSILVA Workshop on Development and Ageing in Forest Trees, September 20, 2000, Florence, Italy.

“Linkages between tree stress and defensive processes in southwestern ponderosa pine.” Symposium on use of ecophysiology to assess stand/site/insect interactions at the 2001 Meeting of the North American Forest Insect Work Conference, May 18, 2001, Edmonton, Canada.

“Bark beetle infestations following fire in northern Arizona.” Symposium on fire and forest insect interactions at the 2001 Meeting of the North American Forest Insect Work Conference, May 15, 2001, Edmonton, Canada.

“Structuring your early career as a graduate student in Health Professions or Forestry and Environmental Sciences: Things I wish someone had told me at the start.” New Graduate Student Orientation, Northern Arizona University, August 23, 2001.

“Water use by tamarisk and native riparian trees.” Symposium on Tamarisk, Tamarisk Coalition of Western Colorado, September 26, 2001, Grand Junction, Colorado.

“Impacts of forest restoration treatments on tree-feeding insects and host suitability in Southwestern ponderosa pine forests.” Symposium on Adaptive Management Experimentation in Ponderosa Pine Ecosystems, August 7, 2002, Tucson, Arizona.

“NAU research permit system.” Northern Arizona Research on National Forests and Adjacent Lands Conference, Northern Arizona University, February 3, 2003, Flagstaff, Arizona.

Testimony on “Crisis on the National Forest: Containing the Threat of Wildland Fire to the Environmental and Communities” to the United States House of Representatives Subcommittee on Forests and Forest Health, Committee on Resources, March 7, 2003, Flagstaff, Arizona.

“Long-term effects of the drought on Southwestern forests.” Flagstaff Forest Festival, April 26, 2003, Flagstaff, Arizona.

“Altered fire regimes and forest thinning in Major biomes – ponderosa pine forests.” 2003 Southwest Drought Summit, May 12, 2003, Flagstaff, Arizona.

“Greenhouse gases in disturbed and restored ponderosa pine forests.” Northern Arizona Chapter, Society of American Foresters, October 6, 2005, Flagstaff, Arizona.

“PhD Program Assessment in the NAU School of Forestry.” 2005 NAU Assessment Fair, April 6, 2005, Flagstaff, Arizona.

“Growth responses of northern Arizona forests to climatic variation.” Symposium on Ecological Impacts of Past, Present, and Future Climate Variation, 8<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, November 9, 2005, Flagstaff, Arizona.

“Funding Research in Today’s Economy.” Flagstaff Leadership Program, Science Day Agenda, May 18, 2006, Flagstaff, Arizona.

“Tree Mortality/Fire/Bark Beetle Research in northern Arizona.” Workshop on Evaluating Methods to Predict and Confirm Physiological Stresses that Might Result in Tree Mortality, July 25-26, 2006, Sisters, Oregon.

“Impact of drought on leaf-level physiology and growth of tree species over elevational gradients.” 2006 Meeting of Drought Impacts on Regional Ecosystems Network (DIRnet), August 16-18, 2006, Flagstaff, Arizona.

“Effects of thinning on drought responses on ponderosa pine forests.” 2006 Meeting of Drought Impacts on Regional Ecosystems Network (DIRnet), August 16-18, 2006, Flagstaff, Arizona.

“Carbon flux research at the NAU Centennial Forest.” Northern Arizona University School of Forestry Alumni Reunion Field Trip, October 20, 2006, Flagstaff, Arizona.

“Interactions among fire, tree resistance, and bark beetles.” Northern Arizona University School of Forestry Seminar Series, April 11, 2007, Flagstaff, Arizona.

“Carbon flux research at the NAU Centennial Forest.” Western International Forest Disease Work Conference Field Trip, October 18, 2007, Flagstaff, Arizona.

“Carbon dioxide and energy exchange in disturbed southwestern ponderosa pine forests.” 9th Biennial Conference of Research on the Colorado Plateau, Oct. 30, 2007, Flagstaff, Arizona.

“Carbon flux research at the NAU Centennial Forest.” 2008 Western Research Forest Managers Meeting Field Trip, September 23, 2008, Flagstaff, Arizona.

“The carbon balance of Arizona ponderosa pine forests.” Arizona Governor’s Forest Health Task Force, April 16, 2009, Phoenix, Arizona.

“Maintaining tree health during climate change.” Annual Meeting of the Western Chapter of the International Society of Arboriculture, June 26, 2009, Flagstaff, Arizona.

“Carbon and water balance implications of forest restoration treatments.” United States Department of Agriculture-National Institute of Food and Agriculture-National Research Initiative Managed Ecosystems Annual Awardee Meeting, November 3, 2009, Pittsburg, Pennsylvania.

“Carbon and water fluxes from ponderosa pine forests disturbed by wildfires and thinning.” January meeting of the Northern Arizona Chapter of the Society of American Foresters, January 14, 2010, Flagstaff, Arizona.

“Carbon and water balances of northern Arizona ponderosa pine forests.” Northern Arizona University, School of Forestry, Seminar Series, February 23, 2011, Flagstaff, Arizona.

“Carbon and water balances implications of restoration thinning.” USDA AFRI/NRI Managed Ecosystems Project Directors Meeting, July 19-21, 2011, Washington D.C.

“Carbon and water balances of southwestern ponderosa pine forests.” Southwestern Fire Science Consortium Webinar, December 14th, 2011. <https://forestguild.mitel-nhwc.com/join/yzhvrwk>

“Urban forestry.” University of Arizona, Coconino County, Master Gardener Program, March 7, 2012, Flagstaff, Arizona.

“Urban forestry.” University of Arizona, Coconino County, Master Gardener Program, October 10, 2012, Flagstaff, Arizona.

“Forest carbon workshop.” Willow Bend Environmental Education Center, November 10, 2012, Flagstaff, Arizona.

Volunteered Professional Presentations (oral and poster; only presentations delivered by Kolb listed for brevity)



“Cold tolerance variation in loblolly pine needles from different branch types, families, and environments.” Southern Forest Tree Improvement Conference. May 21-23, 1985, Long Beach, MS.

“Effects of shade and herbaceous vegetation on first-year germination and growth of direct-seeded northern red oak, white ash, white pine, and yellow-poplar.” Central Hardwood Forest Conference. March 5-8, 1989, Carbondale, IL.

“Competitive ability and growth allocation of planted northern red oak and yellow-poplar seedlings.” Central Hardwood Forest Conference. March 5-8, 1989, Carbondale, IL.

“Sap characteristics of pear thrips-damaged sugar maples.” The 1990 Conference on Thysanoptera. October 23-24, 1990, Burlington, VT.

“Relationships between sugar maple budburst phenology and pear thrips damage.” The 1990 Conference on Thysanoptera. October 23-24, 1990, Burlington, VT.

“Sap characteristics and crown condition of sugarbush maples two years after pear thrips attack.” The 1991 conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management. November 21-22, 1991, Penn State University.

“Effects of temperature during budburst on pear thrips damage to sugar maple.” The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management. November 21-22, 1991, Penn State University.

“Effects of pear thrips damage on sugar maple gas exchange and water relations.” The 1991 Conference on Thrips (Thysanoptera): Insect and Disease Considerations in Sugar Maple Management. November 21-22, 1991, Penn State University.

“Effects of ambient ozone on first-year growth and physiology of black cherry (*Prunus serotina* Ehrh.) seedlings.” Annual Meeting of the Ecological Society of America. July 31-August 4, 1993, University of Wisconsin, Madison, Wisconsin.

“Stand density regulates ponderosa pine foliar physiology and insect resistance mechanisms in Arizona.” Annual Meeting of the Ecological Society of America, July 31, 1995, Snowbird, Utah.

“An ecophysiological analysis of shade effects on *Clematis hirsutissima* var. *arizonica*.” Second Southwestern Rare and Endangered Plant Conference, September 13, 1995, Flagstaff, AZ.

“Size- and age-related variation in ozone impacts to black cherry trees.” Northern Arizona University School of Forestry Seminar, November 17, 1995, Flagstaff, AZ.

“Western spruce budworm as a regulator of resources, physiology, and growth of Douglas-fir seedlings.” Annual Meeting of the Ecological Society of America, August 11, 1997, Albuquerque, New Mexico.

“Ecological restoration of ponderosa pine forests: An old-growth tree perspective.” Northern Arizona University School of Forestry Seminar, October 1, 1997, Flagstaff, Arizona.

“Western spruce budworm as a regulator of resources, physiology, and growth of Douglas-fir seedlings” (poster). XVI Biennial Reunion: Asociacion Mexicana de Profesionales Forestales/Southwestern Society of American Foresters, September 18, 1997, Flagstaff, Arizona.

“Restoration treatments benefit old-growth ponderosa pine physiology and insect resistance” (poster). XVI Biennial Reunion: Asociacion Mexicana de Profesionales Forestales/Southwestern Society of American Foresters, September 18, 1997, Flagstaff, Arizona.

“Gus Pearson Natural Area Field Trip.” Flagstaff Festival of Science. October 4, 1997, Flagstaff, Arizona.

“Assessing a forestry education: The Northern Arizona University Experience.” Second Biennial Conference on University Education in Natural Resources, March 8, 1998, Logan, Utah.

“Seasonal variations in leaf gas exchange and water relations in a southwestern pine-oak forest.” Annual Meeting of the Ecological Society of America, August 12, 1999, Spokane, Washington.

“Differences in leaf gas exchange and water relations among species and tree sizes in an Arizona pine-oak forest.” Fifth Biennial Conference of the Colorado Plateau Field Station, October 25, 1999, Flagstaff, Arizona.

“Differences in leaf gas exchange and water relations among species and tree sizes in an Arizona pine-oak forest.” Northern Arizona University Department of Biological Sciences Seminar, Jan. 21, 2000, Flagstaff, AZ.

“Core education for forestry graduate students at Northern Arizona University.” Third Biennial Conference on University Education in Natural Resources, March 27, 2000, Columbia, Missouri.

“Five-year changes in mortality and crown condition of old-growth ponderosa pines in different ecological restoration treatments at the G.A. Pearson Natural Area.” Steps Towards Stewardship: Ponderosa Pine Ecosystems Restoration and Conservation Conference, April 25, 2000, Flagstaff, Arizona.

“Effects of restoration thinning treatments on water relations and photosynthesis of four size-classes of ponderosa pine” (poster). North American Forest Insect Work Conference, May 14, 2001, Edmonton, Canada.

“Allozyme variation is associated with Douglas-fir resistance to western spruce budworm defoliation” (poster). North American Forest Insect Work Conference, May 14, 2001, Edmonton, Canada.

“The role of monoterpenes in resistance of Douglas-fir to western spruce budworm defoliation” (poster). North American Forest Insect Work Conference, May 14, 2001, Edmonton, Canada.

“Research on the Coconino National Forest by Kolb’s Forestry Group.” Northern Arizona Research on National Forests and Adjacent Lands Conference, Northern Arizona University, February 3, 2003, Flagstaff, Arizona.

“Water use by Tamarix and native riparian trees.” Northern Arizona University, School of Forestry Seminar Series, February 5, 2003, Flagstaff, Arizona.

“Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona” (poster). 54<sup>th</sup> Western Insect Work Conference, Guadalajara, Mexico, Nov. 3-6, 2003.

“A tree-centered mechanistic basis for drought-induced bark beetle outbreaks in Arizona” (poster). Forest Insect Work Conference, Asheville, North Carolina, May 21-25, 2006.

“Patterns of woody plant mortality following drought at the ponderosa pine/pinyon-juniper ecotone in northern Arizona” (poster). 2006 Meeting of Drought Impacts on Regional Ecosystems Network (DIRnet), August 16-18, 2006, Flagstaff, Arizona.

“A tree-centered mechanistic basis for drought-induced bark beetle outbreaks in Arizona” (poster). 2006 Meeting of Drought Impacts on Regional Ecosystems Network (DIRnet), August 16-18, 2006, Flagstaff, Arizona.

“Effects of prescribed fire on tree mortality and bark beetles in Southwestern ponderosa pine forests.” Conserving and Restoring Frequent Fire Landscapes in the West: Linking Science, Collaboration, and Practice, October 24-26, 2006, Flagstaff, Arizona.

“Carbon dioxide and methane fluxes in disturbed southwestern ponderosa pine forests” (poster). U.S. North American Carbon Program Investigators Meeting, January 22-24, 2007, Colorado Springs, Colorado.

“Persistent effects of fire-induced vegetation change on energy partitioning, evapotranspiration, and carbon sequestration in northern Arizona ponderosa pine forests.” Conference on Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems, January 28-31, 2008, Tucson, Arizona.

“Teaching writing within forestry.” Seventh Biennial Conference on University Education in Natural Resources, March 14, 2008, Corvallis, Oregon.

“Tree ecophysiology research at Taylor Woods” (poster). Fort Valley Centennial Conference, August 8, 2008, Flagstaff, Arizona.

“Wildfire and silviculture impacts on carbon, water, and energy balances in ponderosa pine forests.” 2008 National Convention of the Society of American Foresters, Nov. 8, 2008, Reno, Nevada.

“Carbon and water fluxes from ponderosa pine forests disturbed by wildfires and thinning.” 2009 Annual Meeting of the Ecological Society of America, Aug. 4, 2009, Albuquerque, New Mexico.

“The carbon balance of southwestern ponderosa pine forests.” 2010 National Convention of the Society of American Foresters, October 30, 2010, Albuquerque, New Mexico.

“Multiyear analysis of the effects of wildfire and thinning on ecosystem carbon fluxes of ponderosa pine” (poster). Annual AmeriFlux and North American Carbon Program investigators Meeting, January 31 – February 4, 2011, New Orleans, Louisiana.

“Forest thinning mitigates reductions in carbon sequestration caused by warming and drought” (poster). 2011 National Convention of the Society of American Foresters, November 3, 2011, Honolulu, Hawaii.

#### **PROFESSIONAL AFFILIATIONS:**

Ecological Society of America  
Society of American Foresters  
The Nature Conservancy

#### **PROFESSIONAL SERVICE**

##### ***Journal Manuscript Reviewer***

1993	Canadian Journal of Forest Research (2 papers) Forest Science (1 paper)
1994	American Journal of Botany (1 paper) Proceedings of the Central Hardwood Forest Conference (1 paper) Tree Physiology (1 paper)
1995	Environmental Entomology (1 paper) Ghanan Journal of Forestry (1 paper) Journal of Applied Ecology (1 paper) Trees - Structure and Function (1 paper)
1996	Ecology (1 paper) Canadian Journal of Forest Research (2 papers)
1997	Ecological Applications (1 paper) Journal of Chemical Ecology (1 paper) Journal of Tropical Forest Science (1 paper) Tree Physiology (1 paper)

- United States Department of Agriculture, Forest Service, Rocky Mountain Research Station (1 paper, pre-submission review)
- 1998 Forest Science (1 paper)  
Journal of Arid Environments (1 paper)  
Tree Physiology (1 paper)  
Trees - Structure and Function (2 papers)  
United States Department of Agriculture, Forest Service, Northeastern Experiment Station (1 paper, pre-submission review)
- 1999 Ecology (1 paper)  
Ecoscience (1 paper)  
Environmental Entomology (1 paper)  
Forest Science (1 paper)  
Tree Physiology, Editorial Review Board
- 2000 Ecology (1 paper)  
Environmental Pollution (1 paper)  
Forest Science (1 paper)  
Journal of the American Society of Horticultural Science (1 paper)  
United States Department of Agriculture, Forest Service, Rocky Mountain Experiment Station, Proceedings of the meeting: Steps Towards Stewardship: Ponderosa Pine Ecosystems Restoration and Conservation (2 papers)  
Trees - Structure and Function (1 paper)  
Trends in Plant Science (1 paper)
- 2001 Ecology (1 paper)  
Northern Journal of Applied Forestry (1 paper)  
Tree Physiology (3 papers)  
Wetlands (1 paper)
- 2002 Canadian Journal of Plant Science (1 paper)  
Tree Physiology (2 papers)  
Tree Physiology, Editorial Review Board
- 2003 Forest Science (1 paper)  
Tree Physiology, Editorial Review Board  
Tree Physiology (1 paper)
- 2004 Tree Physiology, Editorial Review Board  
Tree Physiology (4 papers)  
Paleobiology (1 paper)  
Oecologia (2 papers)

- Restoraton Ecology (1 paper)  
 Journal of Arid Environments (1 paper)  
 Journal of Chemical Ecology (1 paper)  
 Canadian Journal of Forest Research (1 paper)  
 Ecological Applications (1 paper)
- 2005
- Tree Physiology, Editorial Review Board  
 Tree Physiology (2 papers)  
 Forest Ecology and Management (3 papers)  
 Canadian Journal of Forest Research (1 paper)  
 Forest Science (1 paper)  
 Functional Plant Biology (1 paper)  
 Hydrological Processes (1 paper)  
 New Forests (1 paper)  
 Global Change Biology (1 paper)
- 2006
- Annals of Forest Science (1 paper)  
 Ecological Applications (1 paper)  
 Environmental Management (1 paper)  
 Forest Ecology and Management (3 papers)  
 Forest Science (1 paper)  
 New Forests (1 paper)  
 New Phytologist (1 paper)  
 Plant Ecology (1 paper)  
 Tree Physiology (1 paper)  
 Trees – Structure and Function (1 paper)  
 US EPA technical manuscript review (1 paper)
- 2007
- Forest Ecology and Management – Editorial Board  
 Forest Ecology and Management (8 papers)  
 Plant Ecology (2 papers)  
 Southern Journal of Applied Forestry (1 paper)  
 Forest Science (2 papers)  
 Canadian Journal of Forest Research (2 papers)  
 New Forests (1 paper)  
 Tree Physiology (2 papers)
- 2008
- Agricultural and Forest Entomology (1 paper)  
 Agroforestry systems (1 paper)  
 Canadian Journal of Forest Research (2 papers)  
 Ecohydrology (1 paper)  
 Frontiers in Ecology and the Environment (1 paper)  
 Forest Ecology and Management (13 papers; Editorial Board)  
 Forest Science (2 papers)  
 Geophysical Research Letters (2 papers)  
 Journal of Geophysical Research – Biogeosciences (1 paper)

- Tree Physiology (4 papers)  
University of Arizona, Cooperative Extension Publication (1 paper)
- 2009
- Annals of Forest Science (2 papers)  
Environmental Pollution (1 paper)  
European Journal of Forest Research (1 paper)  
Fire Ecology (1 paper)  
Forest Ecology and Management (5 papers, Editorial Board)  
Forest Science (1 paper)  
Frontiers in Ecology and the Environment (1 paper)  
Geophysical Research Letters (2 papers)  
Global Change Biology (1 paper)  
International Journal of Plant Sciences (1 paper)  
Photosynthetica (1 paper)  
Trees – Structure and Function (1 paper)
- 2010
- Agricultural and Forest Entomology (1 paper)  
Annals of Botany (1 paper)  
Ecohydrology (1 paper)  
Forest Ecology and Management (5 papers, Editorial Board)  
Functional Ecology (1 paper)  
International Journal of Wildland Fire (2 papers)  
Natural Areas Journal (1 paper)  
Tree Physiology (2 papers)
- 2011
- Agricultural and Forest Entomology (1 paper)  
Applied Vegetation Science (1 paper)  
Austral Ecology (1 paper)  
Climatic Change (1 paper)  
Ecological Applications (1 paper)  
Ecology (1 paper)  
Environmental Entomology (1 paper)  
Forest Ecology and Management (4 papers, Editorial Board)  
Journal of Wildlife Management (1 paper)  
New Forests (1 paper)  
Oecologia (1 paper)  
Tree Physiology (1 paper)  
Western Journal of Applied Forestry (1 paper)
- 2012
- Applied Vegetation Science (1 paper)  
Canadian Journal of Forest Research (2 papers)  
Conservation Biology (1 paper)  
Dendrochronologia (2 papers)  
Ecological Applications (1 paper)  
Forest Ecology and Management (7 papers, Editorial Board)  
Forest Science (1 paper)

Frontiers in Ecology and the Environment (1 paper)  
Journal of Ecology (1 paper)  
Journal of Sustainable Forestry (1 paper)  
Nature Geosciences (2 papers)  
Tree Physiology (2 papers)  
Western Journal of Applied Forestry (2 papers)  
Wiley-Blackwell Life Science Book Proposal (1)

### ***Book Reviewer***

Reviewer for: Beyond the Ponderosa – Successful Landscape Trees for Flagstaff (1998).

Invited external reviewer for the textbook, Writing in the Sciences, Oxford University Press (2008).

### ***Proposal Reviewer***

1994/2009

United States Department of Agriculture National Research Initiative Competitive Grants Program (1 proposal)

Northern Arizona University School of Forestry Mission Research Program (6 proposals)

United States Department of Agriculture, Forest Service, Coconino National Forest, Mormon Lake Ranger District; review of proposed research on a sensitive plant (*Clematis hirsutissima* var. *arizonica*) (1 proposal)

Northern Arizona University School of Forestry Mission Research Program (6 proposals)

National Science Foundation Ecological and Evolutionary Physiology Program (1 proposal)

United States Department of Agriculture National Research Initiative Competitive Grants Program - Forest/Rangeland/Crop/Aquatic Ecosystems Program (2 proposals)

National Science Foundation Ecological and Evolutionary Physiology Program (2 proposals)

United States Department of Agriculture National Research Initiative Competitive Grants Program - Forest/Rangeland/Crop/Aquatic Ecosystems Program (1 proposal)

National Science Foundation Ecosystem Studies Program (1 proposal)

National Science Foundation Ecological and Evolutionary Physiology Program (1 proposal)

United States Department of Agriculture National Research Initiative Competitive Grants Program - Forest/Rangeland/Crop/Aquatic Ecosystems Program (1 proposal)



National Science Foundation Ecological and Evolutionary Physiology Program (1 proposal)

United States Department of Agriculture National Research Initiative Competitive Grants Program – Managed Ecosystems Research Program (1 proposal)

National Science Foundation Ecological and Evolutionary Physiology Program (1 proposal)

United States Department of Agriculture National Research Initiative Competitive Grants Program – Managed Ecosystems Research Program (1 proposal)

National Science Foundation Long Term Ecological Research Program (1 proposal)

National Science Foundation Ecological and Evolutionary Physiology Program (2 proposals)

Intramural Grants Program, Northern Arizona University

National Science Foundation, Ecological Biology (2 proposals) and Integrated Biology (1 proposal)

National Science Foundation, Population and Evolutionary Biology (3 proposals)

National Science Foundation, Ecosystem Studies Program (1 proposal)

NASA, Carbon Cycle Science (1 proposal)

NSF, RUI collaborative research (1 proposal)

National Science Foundation, IOS –Organism-environment Interactions Program (1 proposal)

National Institute for Climatic Change Research (1 proposal)

Tahoe Science Consortium (4 proposals)

National Science Foundation, Division of Environmental Biology – Ecosystem Cluster (2 proposals)

USDA Managed Ecosystems Integrated Program Panelist (15 proposals)

Kearney Foundation of Soil Science (1 proposal)

Tahoe Science Consortium (9 proposals)

Deutsche Forschungsgemeinschaft (German Research Foundation) (1 proposal)

National Science Foundation, IOS Organism-Environment Interactions Program (1 proposal)

Tahoe Science Consortium (10 proposals)

Earthwatch Institute (1 proposal)

National Science Foundation, IOS Organism-Environment Interactions Program (2 proposals)

Natural Sciences and Engineering Research Council of Canada (1 proposal)

National Science Foundation, Division of Environmental Biology – Ecosystem Studies (1 proposal)

USDA NIFA Small Business Innovation Research (SBIR) program (1 proposal)

***Invited Program Reviewer***

Invited technical reviewer of USDA Forest Service Work Unit RM-4152, Impact of Natural Ecological Disturbances on Western Conifers, Flagstaff.

Invited technical reviewer of USDA Forest Service Work Unit RM-4152, Impact of Natural Ecological Disturbances on Western Conifers, Flagstaff.

Invited technical reviewer of USDA Forest Service Work Unit RM-4156, Southwestern Forest Health Restoration and Wildland-Urban Interface Fuels Management, Flagstaff, Arizona, March 25-27, 2004.

Invited technical reviewer of USDA Forest Service Work Unit W1187, Interactions of emerging threats and bark beetle-microbial dynamics in forest ecosystems

***Invited External Promotion and Tenure Reviewer***

University of Kentucky, Department of Entomology, 2001, 2002.

The Pennsylvania State University, School of Forestry, 2001.

The University of Montana, School of Forestry, 2006.

Oregon State University, Department of Forest Science, 2007.

University of Wisconsin, College of Agricultural and Life Sciences, 2009.

Mississippi State University, Department of Forestry, 2010.

***Conference Work***

Poster session co-chairperson for the Conference on Sustainable Ecological Systems, July 12-15, 1993, Northern Arizona University, Flagstaff, AZ.

Co-moderator for the oral paper session, “What is a Healthy Forest?,” for the joint meeting of the Western Forest Insect Work Conference/Western International Forest Disease Working Conference, March 8, 1994, Albuquerque, NM.

Moderator for the oral paper session, “Plant Demography,” for the Second Southwestern Rare and Endangered Plant Conference, September 13, 1995, Flagstaff, AZ.

Volunteer assistant for the poster session at the 1996 National Society of American Foresters Convention, November 9-13, 1996, Albuquerque, New Mexico.

Technical paper and poster coordinator for the XVI Biennial Reunion: Southwestern Society of American Foresters/Asociacion Mexicana de Profesionales Forestales, September 17-21, 1997, Flagstaff, AZ.

Technical paper coordinator for the XVII Biennial Reunion: Southwestern Society of American Foresters/Asociacion Mexicana de Profesionales Forestales, October 6-10, 1999. Technical

paper and poster coordinator for the XVI Biennial Reunion: Southwestern Society of American Foresters/Asociacion Mexicana de Profesionales Forestales, September 17-21, 1997, Flagstaff, AZ.

Moderator for the oral paper session, "Employment and Forestry Curriculum," the Third Biennial Conference on University Education in Natural Resources, March 27, 2000, Columbia, MO.

Moderator for the oral paper session, "Monitoring and Evaluation I," Steps Towards Stewardship: Ponderosa Pine Ecosystems Restoration and Conservation Conference, April 25, 2000, Flagstaff, AZ.

Participant in "The National Conference on Sustainable Forest Management – Graduate Curriculum", November 10-12, 2002, Kansas City, MO.

Judge for the Braun and Buell Awards for Excellence in Ecology, 2002 Annual Meeting of the Ecological Society of America, Tucson, Arizona.

Invited participant in the Arizona Governor's Annual Forest Health and Safety Conference, March 10, 2003, Prescott, Arizona.

Invited participant in the Western Regional Workshop on Sustainable Forests, Phoenix, Arizona, February, 3-4, 2004.

Program Chair for the 5th Biennial Conference on University Education in Natural Resources, March 14-17, 2004, Flagstaff, Arizona.

Invited participant in the Summit on Forest Research for the 21st Century: Defining Strategic Directions and Rebuilding Capacity, January 4-6, 2006, Shepherdstown, West Virginia.

Judge for the graduate student competition for the Allen-Abrahamson Award, North American Forest Insect Work Conference. May 22-24, 2006, Asheville, North Carolina.

Invited participant in the workshop "Evaluating Current Methods to Predict and Confirm Tree Mortality Following Fire, July 25-26, 2006, Bend, Oregon.

Judge for the Braun and Buell Awards for Excellence in Ecology, 2009 Annual Meeting of the Ecological Society of America, Albuquerque, New Mexico.

Moderator for the oral paper session, "Living on the Edge in the Southwest," the 61st Western Forest Insect Work Conference, March 6, 2010, Flagstaff, AZ.

### ***Professional Society Service***

1999/2003

Newsletter Editor/Communications Chair – Southwest Society of American Foresters

Chair of a Review Committee on the Fort Valley Project Environmental Assessment - Southwest Society of American Foresters

Representative to the Grand Canyon Forest Partnership - Southwest Society of American Foresters

Newsletter Editor – Southwest Society of American Foresters

Representative to the Grand Canyon Forest Partnership - Southwest Society of American Foresters

Newsletter Editor – Southwest Society of American Foresters

Representative to the Grand Canyon Forest Partnership - Southwest Society of American Foresters

Newsletter Editor – Southwest Society of American Foresters

Representative to the Grand Canyon Forest Partnership - Southwest Society of American Foresters

Representative to the Greater Flagstaff Forest Partnership - Southwest Society of American Foresters

### ***Advisory Boards***

Flagstaff, Arizona, Tree Board, 1995-2000

Member of the Science Planning and Integration Team, Grand Canyon Forests Partnership, 1998

Chair of the Science Planning and Integration Team, Grand Canyon Forests Partnership, 1999

President, Board of Directors, Greater Flagstaff Forests Foundation, Inc., 2002-4

Invited participant in the Science Roadmap Delphi for Natural Resources, The Board on Natural Resources, the Board on Oceans, Atmosphere, and Climate, and the Association of Public and Land-Grant Universities, 2012

### **UNIVERSITY SERVICE**

#### ***Committees - Northern Arizona University***

1993/1994

Ad-hoc Adjunct Faculty Committee (Chair) - School of Forestry

Ph.D. Implementation Committee - School of Forestry

Department Chair Advisory Committee - School of Forestry

Department Chair Search Committee - School of Forestry

Review Committee on Teaching Requirements - School of Forestry

Graduate Studies Committee - School of Forestry

Mission Research Board - School of Forestry

Coordinator of the Northern Arizona Arboretum - School of Forestry

Review Committee for Forestry 311 (Chair) - School of Forestry

1994/1995

Graduate Studies Committee - School of Forestry

Mission Research Board - School of Forestry

Coordinator of the Northern Arizona Arboretum - School of Forestry

Review Committee for Forestry 311 (Chair) - School of Forestry

Silviculturist Search Committee (Chair) - School of Forestry

1995/1996

Graduate Studies Committee - School of Forestry

Silviculturist Search Committee (Chair) - School of Forestry

Forest Ecosystem Health Search Committee - School of Forestry

Curriculum Committee - School of Forestry

Mission Research Review Committee - School of Forestry

1996/1997

Graduate Studies Committee - School of Forestry

Forest Ecosystem Health Search Committee - School of Forestry

Curriculum Committee - School of Forestry

Mission Research Review Committee - School of Forestry

Scholarship Committee - School of Forestry

Adjunct Faculty Committee - School of Forestry

Committee on Faculty Status - School of Forestry

University Campus Improvement and Beautification Committee

Dean's Advisory Council – College of Ecosystem Science and Management

1997/1998

Curriculum Committee - School of Forestry  
Scholarship Committee - School of Forestry (Chair)  
University Campus Improvement and Beautification Committee  
Dean's Advisory Council – College of Ecosystem Science and Management  
Professional Program Review Committee – School of Forestry  
Committee on Faculty Status - School of Forestry

1998/1999

Curriculum Committee - School of Forestry  
Committee on Faculty Status - School of Forestry  
Scholarship Committee - School of Forestry  
University Campus Improvement and Beautification Committee  
Dean's Advisory Council – College of Ecosystem Science and Management  
Professional Program Review Committee – School of Forestry  
Review Committee of the Native American Forestry Program – School of Forestry (Chair)

1999/2000

University Campus Improvement and Beautification Committee  
University Organized and Applied Research Task Group  
Coordinator – College of Ecosystem Science and Management Adopt-A-Plot Effort

2000/2001

University Campus Improvement and Beautification Committee  
Southwest Forest Science Complex Landscape Beautification Committee (Chair)  
Promotion and Tenure Committee – College of Ecosystem Science and Management  
Coordinator - College of Ecosystem Science and Management Adopt-A-Plot Effort  
Dean Search Committee - College of Ecosystem Science and Management  
Merriam-Powell Center for Environmental Research, Research Steering Committee

2001/2002

University Campus Improvement and Beautification Committee  
Southwest Forest Science Complex Landscape Beautification Committee (Chair)  
Graduate Studies Coordinator – School of Forestry  
Research Steering Committee - Merriam-Powell Center for Environmental Research  
Research Permit Committee (Chair) - Merriam-Powell Center for Environmental Research

2002/2003

University Campus Improvement and Beautification Committee  
Graduate Studies Coordinator - School of Forestry

Mission Research Board (Chair) - School of Forestry

Promotion and Tenure Committee - College of Ecosystem Science and Management  
Research Permit Committee (Chair) - Merriam-Powell Center for Environmental Research  
University Graduate Committee

2003/2004  
Graduate Studies Coordinator – School of Forestry  
Research Permit Committee (Chair) - Merriam-Powell Center for Environmental Research  
University Graduate Committee

2004/2005  
Research Permit Committee (Chair) - Merriam-Powell Center for Environmental Research  
Centennial Forest Research Committee  
Curriculum Committee (Chair) - School of Forestry  
Strategic Planning Committee (Chair) - School of Forestry  
Workload and Performance Criteria Review Committee - School of Forestry  
University Academic Associate Deans Council  
University Curriculum Committee  
University Intramural Grants Program – Reviewer

2005/2006  
Curriculum Committee (Chair) - School of Forestry  
University Academic Chairs Council  
University Curriculum Committee  
Student Services Specialist Search Committee (Chair) - School of Forestry  
Mission Research Committee - School of Forestry  
Silviculture Faculty Position, Search Committee - School of Forestry  
ARCS (Achievement Rewards for College Scientists) Foundation – Application Reviewer  
Executive Committee - Merriam-Powell Center for Environmental Research

2006/2007  
Faculty Status Committee - School of Forestry,  
Executive Committee - Merriam-Powell Center for Environmental Research  
University Vice President for Research, Search Committee

Forest Economics/Policy Faculty Position, Search Committee - School of Forestry

2007/2008

University Vice President for Research, Search Committee

University Graduate Committee (Graduate College representative for five dissertation defenses)

Graduate Coordinator - School of Forestry,

Curriculum Committee - School of Forestry

Faculty Status Committee (Chair) - School of Forestry

2008/2009

University Graduate Committee - representative from the College of Engineering, Forestry, and Natural Sciences (Graduate College representative for five dissertation defenses)

Graduate Coordinator - School of Forestry

Curriculum Committee - School of Forestry

Faculty Status Committee - School of Forestry

Mission Research Committee - School of Forestry

2009/2010

Promotion and Tenure Committee - College of Engineering, Forestry, and Natural Sciences

University Graduate Committee - representative from the College of Engineering, Forestry, and Natural Sciences; Policy subcommittee member (Graduate College representative for three dissertation defenses)

Graduate Coordinator – School of Forestry

Curriculum Committee – School of Forestry

2010/2011

Promotion and Tenure Committee - College of Engineering, Forestry, and Natural Sciences

University Graduate Committee - representative from the College of Engineering, Forestry, and Natural Sciences (Graduate College representative for two dissertation defenses)

Graduate Coordinator – School of Forestry

Curriculum Committee – School of Forestry

Committee on Faculty Status – School of Forestry

2011/2012

Soils/Ecosystem Ecology Faculty Search Committee (Chair) – School of Forestry

2012/2013

Curriculum Committee – School of Forestry

### ***Student Groups***

Faculty Advisor – NAU Ultimate Team, 1998-1999, 1999-2000, 2001-2002.

### ***Special University Service Projects***

Organizer and co-author of a poster for graduate student recruitment for the Northern Arizona University School of Forestry sent to 200 universities in North America, 1994.

Arbor Day Tour Leader - Led a tour for the public on the trees of the Northern Arizona University Campus, April 26, 1997.

Board on Natural Resources Ecology Section - National Association of State Universities and Land Grant Colleges - Delegate from Northern Arizona University, 1999.

Volunteer participant at the “Paying Attention to Retention” Workshop, Northern Arizona University, November 28, 2000.

“Team Leader” for a student tree planting project, Northern Arizona University, May 31, 2001.

Volunteer leader of knapweed weeding project on the NAU campus in cooperation with the Coconino County, Arizona, Juvenile Detention Center, July 7, 2001.

Gave a talk titled “Structuring your early career as a graduate student in Health Professions or Forestry and Environmental Sciences: Things I wish someone had told me at the start” in the New Graduate Student Orientation, Northern Arizona University, August 23, 2001.

Led an orientation for new graduate students in the School of Forestry, August, 2001, 2002, 2003, 2007, 2008, 2009

Evaluator of applications for “Outstanding Graduate Teaching Assistant,” Northern Arizona University, March 22, 2002

Presenter to new students and parents about the School of Forestry at summer orientation, May 30 to June 8, 2006 (five presentations)

Poster judge for the 16th annual Celebration of Undergraduate Research and Design, Northern Arizona University, College of Engineering, Forestry, and Natural Sciences, April 23, 2009.

Taught high school students about forest carbon balance in the Northern Arizona University, Centennial Forest Climate Change Challenge Course, July 6, 2010.

## **ACADEMIC ADVISING**

### ***High School 2008***

Honors course Research Mentor for Sinaqua High School for 1 student. I provided the student with information about the NAU carbon flux project, allowed the student “shadow” me at work, and took the student on a tour of research sites.

### ***Undergraduate 1993/2004***

Advised an average of eight undergraduate forestry students per semester at Northern Arizona University.

### ***Undergraduate Research Mentoring***

Mentor to 1 student, recipient of a Hooper Undergraduate Research Award, Northern Arizona University, 2005 (\$1,700).



Co-mentor 1 student, participant in the NSF-funded Environmental Sciences Research Experience for Undergraduate Students, Northern Arizona University, 2006.

Co-faculty mentor to 1 student, recipient of a Hooper Undergraduate Research Award, Northern Arizona University, 2008 (\$4,500).

Co-mentor to 1 student, participant in the NSF-funded Environmental Sciences Research Experience for Undergraduate Students, Northern Arizona University, 2008.

Mentor to 1 student, recipient of a Hooper Undergraduate Research Award, Northern Arizona University, 2009 (\$4,500), and recipient of the 3rd Place Award for the Best Research Poster, Northern Arizona University, College of Engineering, Forestry, and Natural Sciences, 2010 Undergraduate Research Symposium.

Co-mentor to 1 student, participant in the NSF-funded Environmental Sciences Research Experience for Undergraduate Students, Northern Arizona University, 2012.

### ***Graduate Students – Committee Chair***

1 student M.S. (1997), Forestry, Northern Arizona University. Thesis: Thinning effects on northern Arizona presettlement ponderosa pine growth, water relations, photosynthesis, and foliar nutrients.

1 student . M.S. (1997), Forestry, Northern Arizona University. Thesis: Old-growth ponderosa pine physiology, growth, and insect resistance mechanisms following thinning and burning

1 student . M.S. (1998), Forestry, Northern Arizona University. Thesis: Western spruce budworm as a regulator of resources, physiology, and growth of Douglas-fir seedlings

1 student . M.S. (2000), Forestry, Northern Arizona University. Thesis: Riparian tree response to variability in climate and streamflow: West Clear Creek.

1 student Ph.D. (2000), Forestry, Northern Arizona University. Dissertation: Relationships between depth to ground water and Southwestern riparian tree physiological condition (co-advised with S.C. Hart)

1 student . Ph.D. (2001), Forestry, Northern Arizona University. Dissertation: Role of Douglas-fir genotype in resistance to western spruce budworm herbivory

1 student . M.S. (2001), Forestry, Northern Arizona University. Thesis: Prediction of ponderosa pine mortality following fire in northern Arizona

1 student . M.S. (2002), Forestry, Northern Arizona University. Thesis: Effects of restoration thinning on tree physiology and growth of *Pinus ponderosa*: Variation between young and old trees

1 student. M.S. (2003), Forestry, Northern Arizona University. Thesis: Differences in tree-ring response to drought in northern Arizona among species, elevations, and communities

1 student. M.S. (2003), Forestry, Northern Arizona University. Thesis: Transpiration response of ponderosa pine to restoration thinning

1 student. M.S. (2004), Forestry, Northern Arizona University. Thesis: Effects of post-fire conditions on germination and seedling success of *Centaurea diffusa* in northern Arizona

1 student. M.S. (2005), Forestry, Northern Arizona University. Thesis: Host physiological condition positively affects dwarf mistletoe shoot growth: *Arceuthobium vaginatum* subsp. *cytopodum* on *Pinus ponderosa*

1 student. M.F. (2005), Forestry, Northern Arizona University. Professional Paper: Hydrological and ecological implications associated with the introduction and removal of small dams

1 student. M.S. (2005), Forestry, Northern Arizona University. Thesis: Long-term effects of thinning and prescribed burning on ponderosa pine water stress and bark beetle resistance in northern Arizona

1 student. M.S. (2006), Forestry, Northern Arizona University. Thesis: Effects of prescribed fire on bark beetle activity and tree mortality in southwestern ponderosa pine forests

1 student. M.S. (2007), Forestry, Northern Arizona University. Thesis: Severe wildfire and restoration thinning alter carbon dioxide and methane fluxes in ponderosa pine soil. (co-advised with S.C. Hart)

1 student. M.S. (2008), Forestry, Northern Arizona University. Thesis: Ecology and management of tamarisk in the Southwest and on the upper Verde River, Arizona

1 student. M.S. (2010), Forestry, Northern Arizona University. Thesis: Riparian tree response to variation in climate and altered stream flow among the Dolores River, Colorado

1 student. Ph.D. (2010), Forestry, Northern Arizona University. Dissertation: Cheat grass – native plant interactions in an invaded southwestern forest

1 student. M.S. (2010), Forestry, Northern Arizona University. Thesis: Atmospheric dust, plant nutrient uptake, and ecosystem development (co-advised with S.C. Hart)

1 student. M.S. (2011), Forestry, Northern Arizona University. Thesis: Drought-induced woody plant mortality in northern Arizona: Influences of soils, functional groups, and physiology

1 student. Ph.D. (2011), Forestry, Northern Arizona University. Dissertation: Three million years of soil development affect aboveground and belowground processes in semiarid woodlands (co-advised with S.C. Hart)

1 student. M.F. (2012), Forestry, Northern Arizona University. Professional Paper: Ponderosa pine forest carbon balance: a synthesis over western North America

1 student. Ph.D. (2012), Forestry, Northern Arizona University. Dissertation: Restoration of riparian forests during climate change (co-advised with S.C. Hart)

1 student. Ph.D. (2012), Forestry, Northern Arizona University. Dissertation: Patterns and processes of tree mortality in montane forest of northern Arizona.

***Graduate Students – Committee Member***

6 students, M.S. (1995) Forestry, Northern Arizona University.

9 students, M.S. (1996) Forestry, Northern Arizona University.  
 3 students, Ph.D. (1997) Forestry, Northern Arizona University.  
 1 student, M.S. (1998) Forestry, Northern Arizona University.  
 3 Students, M.S. (1999) Biology, Northern Arizona University.  
 1 student, Ph.D. (1999) Forestry, Northern Arizona University.  
 1 student, M.S. (2000) Forestry, Northern Arizona University.  
 3 students, M.S. (2001) Forestry, Northern Arizona University.  
 1 student, M.S. (2002) Forestry, Northern Arizona University.  
 3 students, Ph.D. (2003) Forestry, Northern Arizona University.  
 2 students, M.S. (2003) Geology, Northern Arizona University.  
 8 students, M.S. (2004) Forestry, Northern Arizona University.  
 1 student, Ph.D. (2005) Forestry, Northern Arizona University.  
 1 student, M.S. (2005) Forestry, Northern Arizona University.  
 1 student, Ph.D. (2005) Forestry, Northern Arizona University.  
 1 student, M.F. (2005) Forestry, Northern Arizona University.  
 2 students, M.S. (2005) Forestry, Northern Arizona University.  
 1 student, M.S. (2006) Forestry, Northern Arizona University.  
 2 students, M.S. (2007) Forestry, Northern Arizona University.  
 1 student, Ph.D. (2007) Forestry, Northern Arizona University.  
 1 student Ph.D. (2008) Biology, Northern Arizona University.  
 1 student, M.S. (2009), Biology, Northern Arizona University.  
 2 students, Ph.D. (2009) Forestry, Northern Arizona University.  
 2 students, M.S. (2009) Forestry, Northern Arizona University.  
 1 student, M.F. (2009) Forestry, Northern Arizona University.  
 2 students, Ph.D. (2009) Forestry, Northern Arizona University.  
 1 student, M.S. (2010) Biology, Northern Arizona University.  
 1 student, M.S. (2010) Forestry, Northern Arizona University.  
 4 students, M.S. (2011) Forestry, Northern Arizona University.  
 2 students, M.S. (2012) Forestry, Northern Arizona University.  
 2 students, Ph.D. (in progress), Forestry, Northern Arizona University.  
 1 student, M.S. (in progress) Biology, Northern Arizona University.  
 1 student, Ph.D. (in progress) Biology, Northern Arizona University.  
 1 student M.S. (in progress) Forestry, Northern Arizona University.

***Postdoctoral Sponsor***

1 student (2002)  
 1 student (2005-2011)  
 1 student (2009)  
 1 student (2002-2003)  
 1 student (2009)  
 1 student (2001-2002, 2004-2011)  
 1 student (2000-2001)

**GRANTS**

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
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2012 Assessing evapotranspiration rate changes for proposed restoration of the forested uplands of the Desert LCC. U.S. Bureau of Reclamation	T. Kolb, A. Springer and S. Masek-Lopez	Desert Landscape Conservation Cooperative	\$135,332
2012 MRI: Acquisition of a scanning electron microscope for multi-disciplinary research and training at Northern Arizona University	T. Kolb, J. Ingram, K. Nishikawa, N. Johnson, D Sterns	US National Science Foundation	\$612,560
2011 Tree death from bark beetles: carbon starvation or hydraulic failure?	T. Kolb, McIntire Stennis	Mission Research Program	\$98,800
2011, Translating forest science for global practitioners	T Kolb, P. Fule, P. Freiderici, C. Chambers, C. Huang, A. McGinvey, and K. Waring	National Needs Fellowship Program	\$251,500
2011 Challenging a mutualism paradigm: Do bark beetles need fungi?	with M. Gaylord, R. Hofstetter, G. Koch, and D. Six.	Population and Community Ecology Program	\$150,000
2011 Potential impacts of climate change on insect and pathogen resistance in southwestern riparian hardwoods: Implications for assisted migration and restoration	with K. Grady, and T. Whitham	USDA Forest Service Forest Health Protection Environmental Monitoring Program	\$18,158
2009, Native tree regeneration and health on the lower Dolores River	T. Kolb	Dolores Water Conservancy District	\$20,000
2009 Does climate-change-associated drought predispose trees to insect attack?	T. Kolb	Department of Energy, National Institute for Climatic Change Research	\$238,610

2008 The economic value of carbon sequestration in southwestern ponderosa pine forests	with A. Finkral and C. Huang.	USDA Forest Service, Rocky Mountain Research Station, Joint Venture Agreement	\$59,518
2008 Management influences on carbon sequestration in Southwest ponderosa pine forests	with G. Koch	Science Foundation Arizona, Competitive Advantage Award	\$164,622
2008 Verification Methodology for Forest Carbon Sequestration	with A. Finkral, C. Huang, M. Montes-Helu, J. Smith, G. Koch, M. Hurteau, and D. Spalding	Northern Arizona University, Environmental Research, Development, and Education for the New Economy	\$87,780
2008, Carbon and Water Balance Implications of Forest Restoration Thinning	with G. Koch, A. Finkral, M. Montes-Helu, M. Hurteau, S. Dewhurst, S. Hart, S. Dore, and D. Spalding	USDA National Research Initiative Competitive Grants, Managed Ecosystems Program	\$399,904
2007 The leading edge of climatic change impacts: Causes and consequences of tree mortality in Arizona mixed conifer forests	T. Kolb	Mission Research Program/McIntire Stennis	\$89,412
Impacts of forest thinning on water balance	with D. Breshears, M. Montes-Helu, and P. Flikkima	Arizona Water Institute	\$50,000
2007 MRI: Acquisition of off-axis integrated-cavity output spectroscopy instruments for ecological research and training at Northern Arizona University	with G.W. Koch, B.A. Hungate, D.S. Kaufman, E. Schwartz	US National Science Foundation	\$161,440
2007 Bugs 'n' burns: Effects of fire on ponderosa pine bark beetles	with T. DeGomez	USDA Forest Service Evaluation Monitoring Program	\$113,000

## **Document E: Individual Faculty Information**

### **MARTHA E. LEE**

Professor – 9 month – Tenured

Date of Appointment: 1996 - Present

Specializations: Wildland Recreation

**Northern Arizona University – School of Forestry**

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#### EDUCATION:

- 1975            B.S., Utah State University, Outdoor Recreation
- 1982            M.S., Oregon State University, Forest Management/Resource Recreation
- 1991            Ph.D., Oregon State University, Forest Recreation (Psychology, Marketing, Tourism, and Research Methods, supporting areas)

#### PROFESSIONAL EXPERIENCE:

- 2004/Present    Professor, School of Forestry, Northern Arizona University
- 1996/2004       Associate Professor, School of Forestry, Northern Arizona University.
- 1990/1996       Assistant Professor, School of Forestry, Northern Arizona University
- 1986/1990       Research Assistant (half-time), Ph.D Student, Oregon State University
- 1982/1986       Research Assistant (full-time), Oregon State University
- 1980/1982       Graduate Research Assistant, Department of Resource Recreation Management, Oregon State University
- 1975/1980       Senior Department Clerk Typist, Department of Forestry and Outdoor Recreation, Utah State University
- 1973/1975       Research Technician, Institute for Outdoor Recreation and Tourism, Utah State University

#### TEACHING EXPERIENCE:

- 1986/Present
- FOR 101 Introduction to Forestry
  - FOR 203 Project Learning Tree
  - FOR 207 Project WET
  - FOR 230 Multicultural Perspectives on Natural Resource Management
  - FOR 325W Forest Management
  - FOR 421 Forest Science
  - FOR 445 Wilderness Management
  - FOR 444 Wilderness Management for Professionals (on-line class)
  - FOR 697 Environmental Interpretation
  - FOR 500 Ecosystem Science and Management Principles

FOR 573 Human Dimensions of Natural Resource Management  
FOR 692 Proseminar  
FOR 506 Directed Study  
FOR 689 Professional Paper  
FOR 697 Independent Study  
PRM 346 Wildland Recreation Management

*Teaching Prior to NAU*

Tourism Marketing and Research (18 students). Undergraduate course taught 1 quarter at Oregon State University.

Microcomputer Applications: An Introduction for Resource Managers (co-taught). Oregon State University. (10-30 students/session; 2-3 sessions/year)

## **PUBLICATIONS**

### **REFERRED:**

Van Riper, C.J., Lee, M.E., van Riper, C. III., Kyle, G.T. (in review). Understanding the relationship between social networking and satisfaction to inform planning of leisure and outdoor recreation professional meetings. *Annals of Leisure Research*.

Lee, M.E., van Riper, C.J., van Riper, C. III., Kyle, G.T. (in press). Reaching toward the integration of research into resource management activities: A 20-year evaluation of the Colorado Plateau Biennial Conferences. In: van Riper, C. III., Villarreal, M., van Riper, C.J., & Johnson, M.J. (Eds.), *The Colorado Plateau V: Research, Environmental Planning, and Management for Collaborative Conservation*. University of Arizona Press.

Lee, M. and P. Hancock. 2011. Restoration and stewardship volunteerism. Pp. 23-38 in D. Egan, E. E. Hjerpe, and J. Abrams (Eds), *Human dimensions of ecological restoration*. Washington, D.C.: Island Press.

Hultine, K.R. J. Belnap, C. van Riper III, J.R. Ehleringer, P.E. Dennison, M.E. Lee, P.L. Nagler, K.A. Snyder, S.M. Uselman, and J.B. West. 2010. Tamarisk biocontrol in the western United States: Ecological and societal implications. *Frontiers in Ecology and the Environment* 8(9):467-474.

Lee, M. and B. Stafford. 2008. Application of OFM on the Red Rock Ranger District of the Coconino National Forest. Pp. 229-238 in Driver, B. L. (Ed.), *Managing to optimize the beneficial outcomes of recreation*. State College, PA: Venture Publishing, Inc.

Perez-Verdin, G.; M. Lee; and D. Chavez. 2008. Planeación de la recreación forestal en áreas naturales protegidas del sur de Durango, Mexico (Planning forest recreation in two natural protected areas of southern Durango, México). *Madera y Bosques* 14(1):53-67.

Muleady-Mecham, N. E.; M. E. Lee; and B. D. Burch. 2004. A public opinion survey on wildland fire in Grand Canyon National Park. *George Wright Society Forum* 21(4):12-21.

Perez-Verdin, G.; M. E. Lee; and D. J. Chavez. 2004. Planning for outdoor recreation in a protected area in southern Durango, Mexico: Analysis of local residents' perceptions. *Society and Natural Resources* 17(10):897-910.

Pierskalla, C. D.; M. E. Lee; T. V. Stein; D. H. Anderson; and R. Nickerson. 2004. Understanding relationships among recreation opportunities: A meta-analysis of nine studies. *Leisure Sciences* 26(2):163-180.

Lee, M. E. and R. Miller. 2003. Managing elk in the wildland-urban interface: Attitudes of Flagstaff, Arizona residents. *Wildlife Society Bulletin* 31(1):185-191.

Besculides, A., M. E. Lee, and P. J. McCormick. 2002. Cultural benefits of tourism to Hispanic and non-Hispanic residents. *Annals of Tourism Research* 29(2):303-319.

Behan, J. R.; M. T. Richards, and M. E. Lee. 2001. Effects of tour jeeps in a wildland setting on non-motorized recreationist benefits. *J. Park and Recreation Admin.* 19(2):1-19.

Anderson, D. H., R. Nickerson, T. V. Stein, and M. E. Lee. 2000. Planning to provide community and visitor benefits from public lands. Pp. 197-212 in, Gartner, W. C. and D. W. Lime (Eds.), *Trends in outdoor recreation, leisure and tourism*. New York: CABI Publishing.

Lee, M. E. and B. L. Driver. 1999. Benefits-based management: A new paradigm for managing amenity resources. In Aley, J.; W. R. Burch; B. Conover; and D. R. Field (Eds.), *Ecosystem management: Adaptive strategies for natural resources organizations in the 21<sup>st</sup> century*. Philadelphia: Taylor and Francis Publishers.

Pierskalla, C. and M. Lee. 1998. An ecological perception model of leisure outcomes. *Leisure Sciences* 20(1):67-79.

Lee, M. E. and J. Tainter. 1996. Managing for diversity in heritage values. Pp. 339-349 in Driver, B. L.; D. L. Dustin; T. Baltic; G. Elsner; and G. L. Peterson (Eds.), *Nature and the human spirit: Toward an expanded land management ethic*. University Park, PA: Venture Press.

Stein, T. and M. E. Lee. 1995. Managing recreation resources for positive outcomes: An application of benefits-based management. *J. Park and Recreation Admin.* 13(3):52-70.

Hospodarsky, D. H.; D. Chavez; and M. E. Lee. 1995. Racial and ethnic minority use of the Tonto National Forest. U.S. Forest Service Res. Rept. PSW-RP-95-216. Southwest Forest and Range Exp. Station, Riverside, CA. 98 p.

Lee, M. E.; D. R. Field; and K. S. Martinson. 1990. Visitor crowding and conflict at Whiskeytown: A social carrying capacity approach. Pp. 125-142 in van Riper III, Stohlgren, Viers, and Hillyer (Eds), *Examples of resource inventory and monitoring in national parks of California*. Transactions and Proceedings Series No. 8. USDI National Park Service, Washington, D.C.



Lee, M. E. and P. J. Brown. 1990. Great Basin National Park: A tourism laboratory. *Parks and Recreation* 25(3):36-41.

Baas, J. M.; M. J. Manfredo; M. E. Lee; and D. J. Allen. 1989. Evaluation of an informational brochure for promoting charterboat trip opportunities along the Oregon coast. *J. Travel Research* 27(3):35-37.

Manfredo, M. J.; M. Lee; and K. Ford. 1988. Alternative markets for charterboat operators affected by declining salmon allocations in Oregon. *Coastal Management* 16:215-227.

Lee, M. E.; P. J. Brown; and M. J. Manfredo. 1983. User validation of planning criteria for inventorying and monitoring recreation resources. Pp. 318-322 in Bell and Atterbury (Eds.), *Renewable resource inventories for monitoring changes and trends*. Corvallis: Oregon State University. SAF 83-14.

#### **REVIEWED PUBLICATIONS:**

Kolb, T., E. Friginal, M. Lee, N. Tracy-Venture, and J. Grieve. 2008. Teaching writing within forestry. Proceedings, Seventh Biennial Conference on University Education in Natural Resources, March 13-15, 2008, Oregon State University, Corvallis. Permanent citation URL: <http://hdl.handle.net/1957/8085>

Perez-Verdin, G., M. E. Lee, and D. J. Chavez. 2008. The dual role of local residents in the management of natural protected areas in Mexico. Pp. 3-22 in, Chavez, D.J., P.L. Winter, and J.D. Absher (Eds), *Recreation visitor research: Studies of diversity*. USDA Forest Service Gen. Tech. Rept. PSW-GTR-210. Pacific Southwest Research Station, Albany, CA.

Perez-Verdin, G., M. E. Lee, and D. J. Chavez. 2008. Use of the recreation opportunity spectrum in natural protected area planning and management. Pp. 23-38 in, Chavez, D.J., P.L. Winter, and J.D. Absher (Eds), *Recreation visitor research: Studies of diversity*. USDA Forest Service Gen. Tech. Rept. PSW-GTR-210. Pacific Southwest Research Station, Albany, CA.

Glidden, N. J. and M. E. Lee. 2007. Inter-observer agreement of a multi-parameter campsite monitoring program on the Dixie National Forest, Utah. Pp. 331-338 in, Watson, A.; J. Sproull, and L. Dean, comps. *Science and stewardship to protect and sustain wilderness values: Eighth World Wilderness Congress symposium*. USDA Forest Service Proceedings RMRS-P-49. Ft. Collins, CO.

Behan, J. R., M. T. Richards, M. E. Lee. 2000. How do visitor density and anthropogenic change in frontcountry wilderness settings affect recreation benefits? In, Cole, D. N.; S. F. McCool; W. A. Freimund; and J. O'Loughlin, comps. *Wilderness science in a time of change conference—Volume 1: Changing perspectives and future directions*. USDA Forest Service Proceedings RMRS-P-15-VOL-1.

Stewart, W.; D. Cole; R. Manning; W. Valliere; J. Taylor; and M. Lee. 2000. Preparing for a day hike at the Grand Canyon: What information is useful? In, Cole, D. N.; S. F. McCool; W. T. Borrie; and J. O'Loughlin, comps. Wilderness science in a time of change conference—Volume 4: Wilderness visitors, experiences, and visitor management. USDA Forest Service Proceedings RMRS-P-15-VOL-4.

Lee, M. E. 1995. A benefits-based approach to leisure services. Pp. 348-356 in Proceedings of 4th International Outdoor Recreation and Tourism Trends Symposium, St. Paul, MN.

Knopf, R. C.; S. J. Spear; R. J. Virden; and M. E. Lee. 1995. Increasing demand for a nationally renowned outdoor recreation resource: What is the appropriate managerial response? Pp. 97-100 in Proceedings of 4th International Outdoor Recreation and Tourism Trends Symposium, St. Paul, MN.

Lee, M. E. and D. Stephens. 1995. Anasazi cultural parks study: Assessment of visitor experiences at three cultural parks. National Park Service Colorado Plateau Technical Report Series Tech. Rept. NPS/NAUCPRS/NRTR-95/7.

Hospodarsky, D. H. and M. E. Lee. 1995. Ethnic use of the Tonto: Geographic expansion of the recreation knowledge base. Pp. 45-47 in Chavez (Ed), Proceedings of the second symposium on social aspects and recreation research. USDA For. Serv. Gen. Tech. Rept. PSW-GTR-156.

Lee, M. 1993. Studying visitor experiences at Colorado Plateau national parks. Colorado Plateau 3(1):4-5.

Brown, P. J. and M. E. Lee. 1992. Great Basin changes with a new national park. Natural Resource News 2(4):8.

Lee, M. E. and E. Starkey. 1990. Researchers study newest national park. Park Science 10(2):3-4.

Lee, M. E. and P. J. Brown. 1990. Recreation and park management: Papers from the First National Symposium on Social Science in Resource Management. College of Forestry, Oregon State Univ., Corvallis.

Martinson, K. S. and M. E. Lee. 1989. Great Basin National Park: The nation's newest. Notes on People, Parks, and Forests 2(1). Cooperative Park Studies Unit and Department of Forest Resources, Oregon State University, Corvallis.

Lee, M. E. and D. R. Field. 1988. A weekend in a park: Implications for interpretation. Notes on People, Parks and Forests 1(1). Cooperative Park Studies Unit and Dept. of Forest Recreation Resources, Oregon State University, Corvallis.

Field, D. R., M. E. Lee and K. Martinson. 1985. Human behavior and recreation habitats: Conceptual issues. Pp. 227-231 in Riparian Ecosystems and Their Management: Reconciling Conflicting Uses. USDA For. Serv. Gen. Tech. Rep. RM-120.

## REPORTS

Lee, M. 2012. Visitor Use of Fossil Creek Kiosks. Report to U.S. Forest Service. School of Forestry, Northern Arizona University, Flagstaff.

Lee, M. 2012. Fossil Creek visitor preferences, summer 2011. Report to U.S. Forest Service. School of Forestry, Northern Arizona University, Flagstaff.

Lee, M., E. Anderson, and A. Rotert. 2010. Synthesis of existing data on Fossil Creek visitors. Report to U.S. Forest Service. School of Forestry, Northern Arizona University, Flagstaff.

Lee, M. and K. Carr. 2010. El Morro National Monument visitor study final report. Report to National Park Service. School of Forestry, Northern Arizona University, Flagstaff.

Hancock, P. H. and M. Lee. 2007. Fossil Creek resident survey. School of Forestry, Northern Arizona University, Flagstaff.

Hancock, P. and M. Lee. 2007. Summary report: What makes volunteer groups successful? School of Forestry, Northern Arizona University, Flagstaff.

Hancock, P.; M. Lee; K. McDaniels; and J. Hockersmith. 2007. 2004-2006 Fossil Creek visitor survey. School of Forestry, Northern Arizona University, Flagstaff.

Lee, M.; D. Stephens; and T. Liestman. 2007. Heritage opportunity spectrum for tourism (HOST) project: Tools for managing U.S. Forest Service heritage sites. Final Report. School of Forestry, Northern Arizona University, Flagstaff.

Hancock, P.; K. McDaniels; and M. Lee. 2006. Fossil Creek campsite condition rating study. School of Forestry, Northern Arizona University, Flagstaff.

M. Lee was one of 22 contributing authors. 2005. Fossil Creek state of the watershed report: Current conditions of the Fossil Creek watershed prior to return of full flows and other decommissioning activities. Northern Arizona University.

Lee, M., P. Hancock, and A. Mullen. 2005. Short- and long-term management, stewardship, and education/outreach needs for Fossil Creek. School of Forestry, Northern Arizona University. 14 pp.

Lee, M. and G. Teich. 2004. Southwest Exotic Plant Information Clearinghouse (SWEPIC) website survey final report. School of Forestry, Northern Arizona University. 69 pp.

Lee, M. and G. Teich. 2004. Aztec Ruins National Monument visitor study: Final report. School of Forestry, Northern Arizona University. 84 pp.

- Lee, M. and K. Fuller. 2003. Colorado National Monument 2002-03 visitor survey final report. School of Forestry, Northern Arizona University. 66 p.
- Lee, M, A. Stephens, and K. Fuller. 2003. Colorado Canyons National Conservation Area user study—Final report. School of Forestry, Northern Arizona University. 146 pp
- Lee, M. and K. Fuller. 2002. Munds Park trails study—Final report. School of Forestry, Northern Arizona University, Flagstaff. 25 pp.
- Lee, M. E., A. Hockenberry, and J. Delost. 2002. Petrified Forest National Park visitor study—Final report. School of Forestry, Northern Arizona University, Flagstaff. 67 pp.
- Boussard, L., M. E. Lee, and A. J. Stevens. 2002. Kaibab National Forest user study final report. School of Forestry, Northern Arizona University, Flagstaff. 175 pp.
- Lee, M., S. Smith, and A. Succa. 2000. Navajo National Monument visitor survey—Final report. School of Forestry, Northern Arizona University, Flagstaff. 38 pp.
- Delost, J. and M. Lee. 2000. Hovenweep National Monument visitor study-Final report. School of Forestry, Northern Arizona University, Flagstaff. 125 pp.
- Besculides, A. and M. Lee. 1999. Los Caminos Antiguos Scenic and Historic Byway, 1998 community survey—Executive summary. School of Forestry, Northern Arizona University, Flagstaff. 33 pp.
- McClory, A. and M. Lee. 1999. Los Caminos Antiguos Scenic and Historic Byway, 1998 visitor survey—Executive summary. School of Forestry, Northern Arizona University, Flagstaff. 36 p.
- Lee, M. and A. Hiller. 1999. How do you feel about elk? 1999 survey of Flagstaff residents—Final report. School of Forestry, Northern Arizona University, Flagstaff. 26 pp.
- Lee, M. and L. Treadwell. 1998 survey of visitors to Flagstaff National Park Service monuments—Final report. School of Forestry, Northern Arizona Univ., Flagstaff. 89 p.
- Lee, M. E., D. H. Hospodarsky, and P. D. Lloyd. 1998. Zion National Park 1995-96 visitor study executive summary. School of Forestry, Northern Ariz. Univ., Flagstaff. 37 pp.
- Lee, M. E., D. Hospodarsky, and P. D. Lloyd. 1998. Zion National Park 1995-96 visitor study summary tables. School of Forestry, Northern Ariz. Univ., Flagstaff. 179 pp.
- Lee, M., D. Hospodarsky, and P. D. Lloyd. 1997. A preliminary visitor study at Wupatki National Monument. School of Forestry, Northern Ariz. Univ., Flagstaff. 18 pp.
- Lee, M. E. and S. Tillotson. 1996. Social science and cultural resource research needs on the Colorado Plateau. School of Forestry, Northern Ariz. Univ., Flagstaff. 129 p.

- Lee, M. E. and C. Pierskalla. 1996. Sedona red rocks visitor study report 2: Statistical abstract. School of Forestry, Northern Ariz. Univ., Flagstaff. 434 p.
- Lee, M. E. and C. Pierskalla. 1996. Sedona red rocks visitor study report 1: Executive summary. School of Forestry, Northern Ariz. Univ., Flagstaff. 36 p.
- Pierskalla, C. and M. E. Lee. 1996. Sedona red rocks visitor study report 3: Identifying setting characteristics responsible for shaping leisure outcomes in the Sedona Ranger District of Arizona. School of Forestry, Northern Ariz. Univ., Flagstaff. 26 p.
- Tillotson, S. and M. E. Lee. 1996. Coconino National Forest community benefits: A compilation of research. School of Forestry, Northern Ariz. Univ., Flagstaff. 32 p.
- Lloyd, P. D. and M. Lee. 1996. Human and wild turkey interactions: An annotated bibliography. Prepared for Arizona Game and Fish. School of Forestry, Northern Ariz. Univ., Flagstaff, 9 p.
- Stein, T. V. and M. E. Lee. 1995. Ruby Canyon-Black Ridge user study final report. School of Forestry, Northern Ariz. Univ., Flagstaff. 161 p.
- Lee, M. E. and T. Stein. 1994. Kaibab National Forest visitor activity group needs analysis. School of Forestry, Northern Ariz. Univ., Flagstaff. 104 p.
- Lee, M. E.; R. C. Knopf; T. Stein; D. Hospodarsky; R. Virden; and P. Gordon. 1994. Kaibab visitor study final report. School of Forestry, Northern Ariz. Univ., Flagstaff. 121 p.
- Lee, M. E.; P. Gordon; and L. Tucker. 1993. 1992 Kaibab visitor study statistical abstract. School of Forestry, Northern Ariz. Univ., Flagstaff. 130 p.
- Lee, M. E. and L. Grover. 1992. Lee's Ferry carrying capacity study final report. School of Forestry, Northern Ariz. Univ., Flagstaff. 197 p.
- Lee, M. E. and R. Stark. 1989. Past recreation use in the Great Basin National Park region. CPSU/OSU 89-4, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis 20 p.
- Hospodarsky, D. and M. E. Lee. 1989. The Pacific Northwest outdoor recreation consumption projection study: Idaho report. Forest Resources Dept., Oregon State University, Corvallis.
- Hospodarsky, D. and M. E. Lee. 1989. The Pacific Northwest outdoor recreation consumption projection study: Washington report. Forest Resources Dept., Oregon State Univ., Corvallis.
- Lee, M. E.; R. Schreyer; P. J. Brown; and D. R. Field. 1989. 1989 Great Basin Easter weekend survey: Statistical abstract. CPSU/OSU 89-3, Cooperative Park Studies Unit, Oregon State Univ., Corvallis. 55 p.
- Lee, M. E.; R. Schreyer; P. J. Brown; and D. R. Field. 1989. 1988 Great Basin visitor study: Statistical abstract. CPSU/OSU 89-2, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 79 p.

Lee, M. E. 1988. Astoria visitor survey final report. Dept. of Forest Recreation Resources, Oregon State Univ., Corvallis. 49 p.

Lee, M. E.; D. R. Field; and K. Martinson. 1988. Visitor crowding and conflict at Whiskeytown: A carrying capacity approach. OSU/CPSU 88-7, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 55 p.

Lee, M. E. and D. R. Field. 1988. Human use issues at Whiskeytown: Visitor perceptions of management and impacts. OSU/CPSU 88-4, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 37 p.

Lee, M. E.; D. R. Field; and C. Johnson. 1987. 1986 Ft. Clatsop visitor study. OSU/CPSU 87-3, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 30 p.

Lee, M. E.; D. R. Field; and G. Baker. 1987. Fort Vancouver visitor study. OSU/CPSU 87-2, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 49 p.

Stark, R; M. E. Lee; D. R. Field; C. van Riper III, and M. Avery. 1986. Recreation places: A description of recreation sites at Whiskeytown. OSU/CPSU 86-3, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 49 p.

Lee, M. E.; D. R. Field; and A. Gross. 1986. Whiskeytown--An overview of the visitor and the recreation resource. OSU/CPSU 86-8, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis. 98 p.

Lee, M. E.; D. R. Field; and K. Schwarzkopf. 1984. People, human behavior and animals in parks and preserves: A working bibliography. OSU/CPSU 84-11, Cooperative Park Studies Unit Report, Oregon State Univ., Corvallis.

Lee, M. E.; P. J. Brown; and M. J. Manfredo. 1982. Visitor perceptions of appropriate standards for ROS criteria at Steens Mountain, Oregon, Vol. II. Dept. of Resource Recreation Management Report, Oregon State Univ., Corvallis. 96 p.

Lee, M. E.; P. J. Brown; and M. J. Manfredo. 1982. Measuring dispersed use and visitor preferences for specific recreation activities, settings, and experiences in the Steens Mountain Study Area, Vol. I. Dept. of Resource Recreation Management Report, Oregon State Univ., Corvallis. 95 p.

Lee, M. E. 1982. Characteristics and preferences of deer hunters on Steens Mountain, Oregon, 1980. Dept. of Resource Recreation Management Report, Oregon State University, Corvallis. 18 p.

## **PRESENTATIONS**

Lee, M. 2012. "A decade of Wilderness partnerships." Invited presentation. Coconino National Forest Wilderness Awareness Workshop. April 23-24, 2012. Sedona, AZ

Lee, M. 2011. "Colorado Plateau Research Conferences: Are we meeting our objectives?" Invited presentation at the Plenary Session, "Biennial Conference: Past, Present and Future, 11<sup>th</sup> Biennial Conference on Culture and Natural Resource Management on the Colorado Plateau, October 24-27, Flagstaff, AZ.

Petriello, M.A., M.E. Lee & C.L. Chambers. 2011. Public perceptions, knowledge, and willingness to conserve bats in a wildland-urban interface. Joint Annual Meeting of the Arizona-New Mexico Chapters of the American Fisheries Society and The Wildlife Society. Feb. 3 - 5, 2011. Pinetop, AZ.

Lee, M. 2011. "Planning and managing for positive recreation experiences." Invited presentation, Master Watershed Stewards Class, May 19, 2011, Sedona, AZ.

Lee, M., J. Beard, F. Thompson (joint presenters). 2010. Recreation opportunity spectrum: an introduction. Invited presentation, USFS national training session, "ROS/SMS/BEIG Training: Reviving the Embers. October 26-28, 2010, Flagstaff, AZ.

Lee, M. 2010. Heritage opportunity spectrum. Invited presentation, USFS national training session, "ROS/SMS/BEIG Training: Reviving the Embers. October 26-28, 2010, Flagstaff, AZ.

Lee, M. 2010. Wilderness recreation opportunity spectrum. Invited presentation, USFS national training session, "ROS/SMS/BEIG Training: Reviving the Embers. October 26-28, 2010, Flagstaff, AZ.

Beard, J. and M. Lee (joint presenters). 2010. Sedona Red Rock visitor study. . Invited presentation, USFS national training session, "ROS/SMS/BEIG Training: Reviving the Embers. October 26-28, 2010, Flagstaff, AZ.

Carr, K. (presenter) and M. Lee. 2009. If you preserve it, they will come: an in-depth look at visitors to El Morro National Monument. Poster presented at 10<sup>th</sup> Biennial Conference for Research on the Colorado Plateau. October 5-8, 2009, Flagstaff, AZ.

Hospodarsky, D. H. (presenter) and M. Lee. 2009. A social marketing approach to managing resource theft at Petrified Forest National Park. 10<sup>th</sup> Biennial Conference for Research on the Colorado Plateau, October 5-8, 2009, Flagstaff, AZ.

Hultine, K. R. (presenter), J. Belnap, J.R. Ehleringer, C. van Riper, P.E. Dennison, M. Lee, P. Nagler, K. Snyder, S. Uselman, and J.B. West. 2009. Biocontrol of tamarisk in the western United States: an event underway with significant ecological and societal implications. Tamarisk and Russian Olive Research Conference, February 18-19, 2009, Reno, NV.

Kolb, T. (presenter), E. Friginal, M. Lee, N. Tracy-Ventura, and J. Grieve. 2008. Teaching writing within forestry. Presented at the Seventh Biennial Conference on University Education in Natural Resources, March 13-15, 2008, Oregon State University, Corvallis, OR. Permanent citation URL: <http://hdl.handle.net/1957/8085>

Hancock, P. (presenter) and M. Lee. 2007. Fossil Creek: Fostering stewardship and engaging local residents as partners. Ninth Biennial Conference of Research on the Colorado Plateau, October 29-November 1, Flagstaff, AZ.

Hospodarsky, D. (presenter) and M. Lee. 2007. Conclusions about visitor and resource incidence at Petrified Forest National Park, Arizona. Paper accepted for presentation at the Ninth Biennial Conference of Research on the Colorado Plateau, October 29-November 1, Northern Arizona University. A scheduling error on the part of conference organizers precluded the opportunity for the authors to make the oral presentation of the paper.

Lee, M. 2006. Heritage opportunity spectrum for tourism. Invited speaker, Heritage Tourism Workshop, "Heritage Tourism in the Southwest," Santa Fe, NM, November 13-16, 2006. Sponsored by Bureau of Land Management and U.S. Forest Service.

Hospodarsky, D. (presenter), M. Lee, and K. McBride. 2005. Stealing or "just looking:" studies of visitors and resource incidence at Petrified Forest National Park, Arizona. Eighth Biennial Conference of Research on the Colorado Plateau. Flagstaff, AZ.

Tomczak, L. (presenter) and M. Lee. 2005. Motivations for off-highway vehicle recreation and perceptions of management strategies and proposed policies of off-highway vehicle riders and Forest Service managers. Eighth Biennial Conference of Research on the Colorado Plateau. Flagstaff, AZ.

Hancock, P. (presenter), M. Jedra, and M. Lee. 2005. Recreation monitoring on Fossil Creek. Eighth Biennial Conference of Research on the Colorado Plateau. Flagstaff, AZ.

Lee, M. 2003. From OHVers to Solitude Seekers: An overview of wildland recreation on the Colorado Plateau. Seventh Biennial Conference of Research on the Colorado Plateau. Flagstaff, AZ.

Hospodarsky, D. (presenter), M. Lee, and T. Combrink. 2003. The role of public-private partnerships in forest restoration: Some intermediate findings. Southwest Fire Initiative Conference. Flagstaff, AZ.

Lee, M. 2003. Recreation and wildlife in the Flagstaff wildland-urban interface. Invited presentation, Flagstaff Forest Festival. Flagstaff, AZ.

Delost, J. M. (presenter) and M. Lee. 2001. Public attitudes toward prescribed fire and selective thinning in Arizona. Putting the Pieces Together...Practicing Forest Ecosystem Management Conference. Flagstaff, AZ.

Demillion, M. (presenter) and M. Lee. 2000. Social aspects of Wilderness restoration methods. Poster, Steps Toward Stewardship: Ponderosa Pine Forest Ecosystem Restoration Conservation Conference. Flagstaff, AZ.



- Pierskalla, C.D. (presenter), D. Anderson, M. E. Lee, R. Nickerson, and T. V. Stein. 2000. Identifying relationships among recreation activities, settings, and benefits: A meta-analysis of ten visitor studies. The Eighth International Symposium on Society and Resource Management. Bellingham, WA.
- Lee, M. E. 1999. Desired future conditions: Managing for positive outcomes. Invited presentation, Recreation or Wreckreation: What's It Going to Be in the Greater Grand Canyon. Sponsored by Grand Canyon Trust. Flagstaff, AZ
- Lee, M., A. Hiller (presenter), and R. Miller. 1999. Attitudes of Flagstaff residents toward elk management. Poster, 4<sup>th</sup> International Symposium on Urban Wildlife Conservation. Tucson, Arizona.
- Lee, M. (presenter), D. Bruns, D. Anderson, B. Marans. 1996. Lessons learned from benefits-based management implementation pilots. The Sixth International Symposium on Society and Resource Management. University Park, PA.
- Lee, M. 1996. Benefits-based management and ecosystem management planning. The Sixth International Symposium on Society and Resource Management. University Park, PA.
- Lee, M. E. 1996. Understanding user conflicts. Invited presentation, Resource Issue Interpretation (RIM) Conference. National Park Service, Flagstaff, AZ.
- Lee, M. E. 1995. Benefits-based management pilot project. Invited presentation, Workshop on ROS and Benefits-Based Management. U.S. Forest Service, Sisters, OR.
- Lee, M. E. 1995. Session on individual social values. Ecosystem Management Shortcourse for U.S. Forest Service. Northern Arizona University.
- Bruns, D.; B. L. Driver; M. E. Lee; D. Anderson; and P. J. Brown. 1994. Pilot tests for implementing benefits-based management. The Fifth International Symposium on Society and Resource Management. Ft. Collins, CO.
- Bruns, D.; D. Anderson; and M. Lee. 1994. PLI: Pilot tests for implementing benefits-based management. Continuing Education Session at National Recreation and Park Association Congress for Recreation and Parks, Education and Training Conference. Minneapolis, MN.
- Lee, M. E. and T. Stein (presenter). 1994. Understanding the relationships among visitor activities, benefits, and settings on Bureau of Land Management lands in western Colorado. The Fifth International Symposium on Society and Resource Management. Ft. Collins, CO.
- Stephens, D. and M. Lee. 1994. Visitor experiences and motivations at cultural sites. The 59th Annual Meeting of the Society for American Archaeology. Anaheim, CA.
- Stephens, D. and M. Lee. 1994. An experience based approach to cultural resource management. The Fifth International Symposium on Society and Resource Management. Ft. Collins, CO.

Lee, M. E. and D. Lime (co-presenters). 1993. Role of visitor surveys in measuring visitor expectations. Invited presentation, National Park Service Rocky Mountain Region's Joint Conference on Interpretation, Resources Management, Research, and Ecosystem Management. Denver, CO.

Lime, D. and M. E. Lee. 1993. National Park Service social science initiatives. National Park Service Rocky Mountain Region's Joint Conference on Interpretation, Resources Management, Research, and Ecosystem Management. Denver, CO.

Lee, M. E. and D. Stephens (presenter). 1993. Visitor experiences and motivations at cultural parks. NAU Cooperative Park Studies Unit Second Biennial Conference of Research on the Colorado Plateau. Flagstaff, AZ.

Lee, M. E. 1993. Results of the Kaibab National Forest visitor study. Grand Canyon Rotary Club. Grand Canyon National Park, AZ.

Lee, M. E. and B. L. Driver. 1992. Benefits-based management: A new paradigm for managing amenity resources. The Second Canada/US Workshop on Visitor Management in Parks, Forests, and Protected Areas, Madison, WI.

Lee, M. E. 1992. Using a marketing plan as a tool in wildland recreation management. Fourth North American Symposium on Society and Resource Management. Madison, WI.

Lee, M. E. 1992. Experience-based management and the Recreation Opportunity Spectrum. Invited presentation, PAIRS: Successful Partnerships Workshop. USDA Forest Service and The National Forest Recreation Assn.

Lee, M. E. 1991. Resident use of and attitudes toward Great Basin National Park. First Biennial Conference for Research in Colorado Plateau National Parks, Flagstaff, AZ.

Lee, M.E. and P. J. Brown. 1990. A marketing approach to providing recreation experience opportunities for urban-based wildland visitors. National Recreation and Park Association 1990 Symposium on Leisure Research, Phoenix, AZ.

Lee, M.E. 1987. The Oregon Charterboat 1985-1986 Promotional Project. Conference on Marketing Tourism: The Ocean Charterboat Case, Newport, OR.

Lee, M.E. 1986. Survey of visitors to Oregon Pavilion at EXPO-86. Governor's Tourism Conference, Seaside, OR.

## **PROFESSIONAL SERVICE**

### ***Professional***

Member American Forest Foundation Forest Ecosystem Advisory Committee – advised Project Learning Tree curriculum. 2010.

Member of planning team, U. S. Forest Service national training session, “ROS/SMS/BEIG training: Reviving the Embers,” October 26-28, 2010, Flagstaff, AZ.

Board of Directors, Friends of Northern Arizona Forests. 2009-

Invited consultant to Diablo Trust on summer 2008 recreation survey; trained Diablo Trust volunteer interviewers

Invited session moderator and presenter, “Constitution Day: Engaging students.” American Democracy Project (ADP) National Meeting, June 7-9, 2007, Philadelphia, PA.

Invited session moderator, “Human management issues.” 2006 Natural Areas Conference. September 20-23, 2006. Flagstaff, AZ.

Invited presenter, “Creative funding ideas—NAU/FS partnership.” Southwestern Region Wilderness Management Workshop. November 16, 2005.

Secretary, Board of Directors, Arizona Natural History Association Board. 2003-

Invited presenter, Arizona Parks and Recreation Association Workshop, “USFS partnerships.” June 9, 2005.

Invited facilitator, SAF Southwest Section Meeting, “Foresters—‘Do we still matter?’” November 7-9, 2002, Payson, AZ.

Invited panelist, “Coconino National Forest Public Services Workshop.” February 26-28, 2002, Flagstaff, AZ.

Invited panelist, “Planning and Environmental Assessment” panel, Putting the Pieces Together ... Practicing Forest Ecosystem Management Conference. April 25-28, 2001, Flagstaff, AZ.

Wilderness patrol volunteer, Peaks Ranger District, Coconino National Forest. Summer 1999.

Invited participant, workshop on the application of visitor carrying capacity frameworks to management and protection of non-renewable resources. September 14-16, 1999, Flagstaff, AZ.

Co-coordinator of the “Wilderness for Science” symposia of the 1999 National Conference on Wilderness Science. May 23-27, 1999, Missoula, MT.

Consult regularly with Coconino and Kaibab National Forest managers on social science research needs as part of ecosystem management planning process. 1997-

Invited participant, workshop on the Visitor Experience, Resource Protection (VERP) framework, National Park Service. June 18-20, 1996, Denver, CO.

Invited participant, Zion National Park VERP planning meeting. July 9-11, 1996, Zion National Park, UT.

Invited member, carrying capacity research advisory team, Arizona State Parks. 1996.

Invited discussant, session on the Benefits Approach to Leisure Policy Analysis, The Sixth International Symposium on Society and Natural Resources. May 18-23, 1996, University Park, PA.

Invited participant in Grand Canyon National Park Colorado River management workshop. September 19-24, 1995.

Chair of social science session at the Biennial Conference of Research on the Colorado Plateau, Northern Arizona University. October 1995.

Organized and participated in workshop on benefits-based management for 4th International Outdoor Recreation and Tourism Trends Symposium, St. Paul, MN. 1995.

Invited participant in Glen Canyon National Recreation research step-down workshop. May 22-24, 1995.

Member, Social Assessment Team, Red Rock/Oak Creek ecosystem planning effort, U.S. Forest Service, Sedona District, Coconino National Forest. 1995.

Invited member of Grand Canyon National Park resources management plan scoping session. January 1994.

Invited speaker, Grand Canyon Rotary Club. 1993.

Hosted 2 Russian forestry scientists, August 19-22, 1992.

Invited participant in PAIRS: Successful Partnerships conference jointly sponsored by USDA Forest Service and The National Forest Recreation Association, Chandler, AZ. 1992.

Part of a multi-agency and university group assessing the feasibility of a regional recreation demand study. 1992.

Facilitator and organizer of ROS (Recreation Opportunity Spectrum) Implementation through Silviculture and Visual Management Workshop jointly hosted by NAU School of Forestry and Southwest Region of U.S. Forest Service. 1991.

Reviewed research proposals for University of Wyoming Cooperative Park Studies Unit. 1991.

Review journal articles--Society and Natural Resources, J. Forestry, Environmental Management, and for USFS.

Invited participant, Leisure Benefits Applications Workshop sponsored by USDA Forest Service, Estes Park, CO. May 1991.

Facilitated Bureau of Land Management Steens Mountain Winter Recreation Program Workshop, Burns, OR. 1989.

### ***University***

Member, American Democracy Project Steering Committee. 2007-09

Member, Colorado Plateau Cooperative Ecosystem Studies Unit Advisory Committee. 2006

Coordinator, American Democracy Project. 2005-07.

Member, Search Committee, CPCESU Director. 2006.

Member, Search Committee, Vice Provost for Research and Graduate Studies and Dean of the Graduate School. 2000-01.

Member, Faculty Senate. 1999-2004.

Member, Faculty Senate Elections Committee. 2003-2004.

Member, Faculty Senate Executive Committee. 2000-01.  
Member, Academic Standards, Curriculum and Student Life Faculty Senate Council. 1999-01.  
Invited to be part of a faculty group representing NAU to the Working Group from Dept. of Interior agencies regarding establishment of a Cooperative Ecosystem Studies Unit. 1998.  
Member, Anthropology Department faculty search committee. 1996-97.  
Member, NAU NCAA Accreditation Self-Study Team, Subcommittee on NAU Mission and Purpose. 1996-97.  
Member, NAU Faculty Senate Council on Faculty Rights and Responsibilities. 1996-97.  
Member of the Higher Learning Coalition sub-group of the Colorado Plateau Forum. 1995  
Member, President's Commission on the Status of Women. 1993-5.  
Participated in the NAU "Meet the Pres." television broadcast. July 1993.  
Review research proposals for National Park Service Cooperative Park Studies Unit at NAU. 1993.  
Invited speaker, Arizona Park and Recreation Association District II Mini Conference. 1992.  
Member, committee to look at a Land Management master's program. 1992.  
Member, NAU Recreation and Tourism Study Group. 1992.  
Participant and planning committee member, committee to organize a conference on "Research protocols for working in national parks." 1992.  
Guest lecturer, RLS 447-Research and Evaluation Methods, School of Health and Physical Education. Spring 1991.

### ***College of Engineering, Forestry, and Natural Science***

College Representative, University Library Committee. 2010

### ***College of Ecosystem Science and Management***

Member, College Promotion and Tenure Committee. 1997-98.  
Member, Dean's Advisory Council. 1997-98.  
Member, Professional Research Support Committee. 1995.  
Member, Ph.D. Implementation Committee. 1993-94.  
Chair, Five-Year Recreation Program Planning Committee. 1992-93.  
Member, Geography Program Planning Committee. 1992.  
Chair, search committee for policy assistant professor position, 1992.  
Member of planning committee for the merger of the Department of Geography and Public planning and the School of Forestry, 1992  
Member of Scholarship Committee, 1991-94.  
Member of search committee for wildlife-forestry assistant professor position, 1991.

### ***School of Forestry***

Member, Mission Research Board. 2011, 2012.  
Member, Forestry Curriculum Review Committee. 2010-  
Chair and Member, Mission Research Board. 2010.  
Member, Annual Review Committee. 2009.  
Member, Forestry Curriculum Change/New Programs Committee, 2008.  
Member, Forestry Organizational Alternatives Committee, 2007-08  
Member, Forest Entomology Assistant Professor Search Committee. 2007-08  
Member, Associate Director, School of Forestry Search Committee. 2005-06.

Member, Silviculture Assistant Professor Search Committee. 2005-06.  
Member, Annual Review Committee. 2004-2007  
Member, Curriculum Committee. 2004–2012.  
Member, Scholarship Committee. 2004–2012.  
Member, Forest Management/Operations Search Committee. 2004-05.  
Member, School of Forestry Dean Search Committee, 2003.  
Member, Director’s Advisory Committee, 2003-2005.  
Member, Strategic Planning Committee, 2003-  
Forestry Honors Advisor, 2003-  
Chair, Community/Commercial Assistant Professor Search Committee, 2001.  
Member, Professional Program Review Committee. 1998-2000  
Member, COFS Committee. 1998-99, 1999-00.  
Coordinator, FOR 312 (Semester B). 1997-2000  
Member, Scholarship Committee. 1997-99, 2004  
Member, Curriculum Committee. 1997-99, 2004-  
Member, Wildland Recreation Economist Search Committee. 1997-98.  
Member, Forestry Chair's Advisory Committee. 1995-97. 1999-00.  
Member, Dept. of Forestry Graduate Studies Committee. 1994-97.  
Chair, Research Assistant Search Committee. 1996.  
Member, Dept. of Forestry Chair Search Committee. 1994.  
Member, Dept. of Forestry Advisory Committee. 1993-94.  
Member, Dept. of Forestry Teaching Loads Committee. 1993-94.  
Member, Mission Research Board. 1992-94.  
Attend club functions and otherwise support Forestry Club.  
Attend spring awards and graduation ceremonies and socials.

### ***Membership in Professional Organizations***

Society of American Foresters  
Phi Kappa Phi  
Alpha Zeta  
Xi Sigma Pi  
The Nature Conservancy  
Arizona Association for Environmental Education

### ***Community Service***

Organized and participated in School of Forestry, “Kids for Conservation” activities at the Coconino County Fair. 2004 -  
Partnered with Arizona Game and Fish to do fly tying for kids at 2003 Coconino County Fair.  
Member, Coconino County Parks and Recreation Commission Member. 2003-04.  
Chair, Coconino County Fair Committee. 2003-04.  
Coconino County Fair Committee Member. 2001-04.

### **PROFESSIONAL DEVELOPMENT AND PRESENTATIONS**

Attended Project Learning Tree Facilitator Retreat, October 15, 2011, Flagstaff, AZ  
Attended e-learning classes on BbLearn – summer 2011.

Invited presentation, E-Learning Spring 2008 Showcase – “Conveying Course Expectations – The Getting Started Orientation”

Kolb, T. (presenter), E. Friginal, M. Lee, N. Tracy-Ventura, and J. Grieve. 2008. Teaching writing within forestry. Presented at the Seventh Biennial Conference on University Education in Natural Resources, March 13-15, 2008, Oregon State University, Corvallis.

Attended e-learning classes on Vista and Dreamweaver – summer 2007.

Sabbatical, fall semester 2001.

Attended writing workshop sponsored by English Department, 1996.

Attended the Native American cultural awareness workshop sponsored by the Faculty Development Office in 1991.

Attended the video-conference and follow-up workshop on writing across the curriculum sponsored by the Office for Professional Development in 1991.

### **TEACHING AWARDS RECEIVED**

NAU School of Forestry 2008-2009 Teacher of the Year.

Award presented by the Coconino National Forest for the FOR 445 Wilderness Management Class on-going partnership. Fall 2008.

NAU School of Forestry 2006-07 Teacher of the Year.

NAU Consortium of Professional Schools 2006-07 Teacher of the Year.

Xi Sigma Pi Forestry Honor Fraternity, NAU Alpha Pi Chapter Teacher of the Year 2004

Xi Sigma Pi Forestry Honor Fraternity, NAU Alpha Pi Chapter Teacher of the Year 1993

### **ADVISING:**

#### *Undergraduate Advisement*

Currently mentor approximately 5-7 Forestry undergraduates.

#### *Graduate Student Advisement*

	Degree Completion
1 student, M.S.	1991
1 student, M.S.	1993
1 student	--
2 students, M.S.	1994
1 student	--
2 students, M.S.	1996
1 student, M.S.	--
1 student, M.S.	--
3 students, M.S.	1999
1 student, M.S.	2001
1 student, M.S.	2003
1 student, M.S.	2004

1 student, M.S.	2006
1 student, M.F.	2005
2 students, M.S.	2007
1 student, MF	2009
5 students, MS	2011
1 student, MS	2012
1 student ,M.S.	--
1 student, M.S.	--
1 student, M.S.	1992
1 student, M.S.	1993
2 students, M.S.	1995
1 student, M.S.	1998
1 student, M.S.	2000
1 student, M.S.	--
1 student, M.S.	1997
1 student, M.S.	2004
1 student, M.S.	2001
1 student, Ph.D.	2003
1 student, M.S.	2003
1 student, M.S.	2002
1 student, M.S.	2005
1 student, M.S.	2006
1 student, M.L.S.	2006
1 student	2010
7 students	2007



## SCHOLARSHIP/RESEARCH ACTIVITIES

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2012-2014. Assessing effectiveness of the Joint Fire Science Program Publications	Co-Principal Investigator	Joint Fire Science Program	\$82,000
2011-2012. Fossil Creek visitors preference and trend report	PI	U.S. Forest Service	\$15,302
2009-2012. Middle Fossil Creek water quality improvement project	PI	U.S. Forest Service	\$121,620
2009-2011. Bats in the wildland-urban interface: Understanding resident perceptions, knowledge, and support for conservation	Co-PI with Carol Chambers	School of Forestry Mission Research	\$33,680
2009-2014. Middle Fossil Creek riparian habitat protection and restoration	PI	U.S. Forest Service	\$19,530
2009-2010. Synthesis of existing data on Fossil Creek visitors	PI	U.S. Forest Service	\$11,598
2009-2010. Evaluating USGS/SBSC Biennial Conferences	PI	U.S. Geological Survey	\$4,676
2007-2010. El Morro National Monument visitor survey	PI	National Park Service	\$21,285

## **Document E: Individual Faculty Information**

### **ROBERT L. MATHIASSEN**

Professor – 9 month – Tenured

Date of Appointment: 1981 - Present

Specializations: Forestry/Biology

**Northern Arizona University – School of Forestry**

### **EDUCATION:**

- 1977            Ph.D., Plant Pathology University of Arizona Tucson, AZ
- 1984            M.A., Community College Northern Arizona University Flagstaff, AZ
- 1974            M.S., Plant Pathology Colorado University
- 1972            B.A., Biology California State University - Stanislaus

### **RESEARCH EXPERIENCE:**

- 1990/1997    State Forest Pathologist, Idaho Department of Lands, Coeur d'Alene
- 1990/1996    Adjunct Professor, North Idaho College, Coeur d'Alene
- 1988/1990    Plant Pathologist, USDA Forest Service, Forest Health Protection, State and Private Forestry, Ogden, UT
- 1986/1988    Adjunct Professor and Research Fellow, School of Forestry, Northern Arizona University Arizona University, Flagstaff, AZ
- 1986           Visiting Professor, Department of Biology, Southern Oregon College, Ashland, OR
- 1981/1986    Adjunct Professor and Research Fellow, School of Forestry, Northern Arizona University, Flagstaff, AZ
- 1981           Forestry Research Assistant, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO
- 1980           Lecturer, Department of Forestry, Humboldt State University, Arcata, CA
- 1979/1981    Research Associate, Department of Plant Pathology, University of Arizona, Tucson, AZ
- 1978           Assistant Professor, Department of Botany and Plant Pathology, Michigan State University, East Lansing

- 1978 Forestry Technician, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO
- 1975/1976 Graduate Teaching and Research Assistant, Department of Plant Pathology, University of Arizona, Tucson, AZ
- 1972/1974 Graduate Teaching Assistant, Department of Botany and Plant Pathology, Colorado State University, Fort Collins
- 1973/1974 Forestry Technician, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO
- 1972 Research Assistant/Lab Technician, Colorado State Forest Service, Insect and Disease Laboratory, Fort Collins, CO

### TEACHING EXPERIENCE

1997 / Present

- FOR 101 - Introduction to Forestry
- FOR 254 - Introduction to Forest Health.
- FOR 452/552 - Forest Tree Diseases
- FOR 454/554 - Integrated Forest Health

### REFERRED JOURNALS

- Scott, J. M., and R. L. Mathiasen. 2012. Assessing growth and mortality of bristlecone pine infected by western spruce dwarf mistletoe using dendroecology. *Forest Science* 58: 366-376.
- Smith, L., R. Mathiasen, and R. Hofstetter. 2011. Biomass of witches' brooms caused by Douglas-fir dwarf mistletoe in northern Arizona. *Journal of the Arizona-Nevada Academy of Science* 43: 40-47.
- Mathiasen, R. L. 2011. Morphological comparisons of white fir and red fir dwarf mistletoes in the Sierra Nevada and southern Cascade Mountains. *Madroño* 58: 101-105.
- Mathiasen, R. L. 2011. Susceptibility of conifers to three dwarf mistletoes in the Klamath-Siskiyou Mountains. *Western Journal of Applied Forestry* 26: 13-18.
- Mathiasen, R. L., and C. M. Daugherty. 2010. Susceptibility of Brewer spruce (*Picea breweriana*) to dwarf mistletoes (*Arceuthobium* spp., Viscaceae). *Northwest Science* 84: 295-301.
- Mathiasen, R. L. 2010. First report of white fir dwarf mistletoe (*Arceuthobium abietinum* f. sp. *concoloris*) on Mexican spruce (*Picea mexicana*) in northern Mexico. *Plant Disease* 94: 635.

- Quinonez, S., and R. Mathiasen. 2010. First report of *Arceuthobium blumeri* on *Pinus ayacahuite* and *A. globosum* subsp. *globosum* on *Pinus durangensis* from Sinaloa, Mexico. *Plant Disease* 94: 377.
- Mathiasen, R., and C. Daugherty. 2010. First report of limber pine dwarf mistletoe (*Arceuthobium cyanocarpum*) on sugar pine (*Pinus lambertiana*) from California. *Plant Disease* 94: 134.
- Mathiasen, R. L., and C. M. Daugherty. 2009. Additional morphological measurements of *Arceuthobium siskiyouense* and *A. monticola* (Viscaceae). *Journal of the Botanical Research Institute of Texas* 3: 741-749.
- Mathiasen, R. L., C. M. Daugherty, and B. P. Reif. 2009. *Arceuthobium rubrum* (Viscaceae) in Mexico. *Madroño* 56: 99-103.
- Mathiasen, R. L., and C. M. Daugherty. 2009. *Arceuthobium abietinum* subspecies *wiensii*, a new subspecies of fir dwarf mistletoe (Viscaceae) from northern California and southern Oregon. *Madroño* 56: 118-126.
- Scott, J. M., and R. L. Mathiasen. 2009. Bristlecone pine dwarf mistletoe: *Arceuthobium microcarpum* subsp. *aristatae* (Viscaceae), a new subspecies of western spruce dwarf mistletoe from northern Arizona. *Journal of the Botanical Research Institute of Texas* 3: 13-22.
- Mathiasen, R. L. 2009. Comparative susceptibility of conifers to knobcone pine dwarf mistletoe. *Western North American Naturalist* 69 (3): 42-48.
- Mathiasen, R. L., and C. M Daugherty. 2009. First report of mountain hemlock dwarf mistletoe (*Arceuthobium tsugense* subsp. *mertensianae*) on sugar pine (*Pinus lambertiana*) from Oregon. *Plant Disease* 93: 321.
- Mathiasen, R. L. 2008. New combinations for *Arceuthobium aureum* (Viscaceae) in Mexico and Central America. *Novon* 18: 501-507.
- Mathiasen, R. L., D. L. Nickrent, D. C. Shaw, and D. M. Watson. 2008. Mistletoes: Pathology, systematic, ecology, and management. *Plant Disease* 92: 988-1006.
- Mathiasen, R. L., M. C. González Elizondo, M. González Elizondo, B. E. Howell, I. L. López Enriquez, J. Scott, and J. A. Tena Flores. 2008. Distribution of dwarf mistletoes (*Arceuthobium* spp., Viscaceae) in Durango, Mexico. *Madroño* 55: 161-169.
- Mathiasen, R. L., and C. M. Daugherty. 2008. Distribution of red fir (*Abies magnifica* A. Murray) and noble fir (*Abies procera* Rehder) in Oregon based on dwarf mistletoe host specificity. *Northwest Science* 82: 108-119.

Kenaley, Shawn, Robert L. Mathiasen, and E. James Harner. 2008. Mortality associated with a bark beetle outbreak in dwarf mistletoe-infested ponderosa pine stands in northern Arizona. *Western Journal of Applied Forestry* 22: 113-120.

Mathiasen, R. L. 2007. First report of Durangan dwarf mistletoe, *Arceuthobium vaginatum* subsp. *durangense*, on *Pinus engelmannii* and *Pinus cooperi* in Mexico. *Plant Disease* 91: 1201.

Mathiasen, R. L., C. M. Daugherty, B. E. Howell, J. C. Melgar, and S. E. Sesnie. 2007. New morphological measurements of *Psittacanthus angustifolius* and *Psittacanthus pinicola* (Loranthaceae). *Madroño* 54: 156-163.

Hoffman, Chad, Robert Mathiasen, and Carolyn Sieg. 2007. Dwarf mistletoe effects on fuel loadings in ponderosa pine forests in northern Arizona. *Canadian Journal of Forest Research* 37: 662-670.

Mathiasen, R. L. 2007. A new combination for Hawksworth's dwarf mistletoe. (Viscaceae). *Novon* 17: 217-221.

Mathiasen, R. L., and C. M. Daugherty. 2007. *Arceuthobium tsugense* subsp. *amabilae*, a new subspecies of hemlock dwarf mistletoe (Viscaceae) from Oregon. *Novon* 17: 222-227.

Mathiasen, R., B. Howell, and G. Garnett. 2007. First report of *Arceuthobium aureum* subsp. *aureum* in Mexico. *Plant Disease* 91: 469.

Hedwall, S. J., and R. L. Mathiasen. 2006. Wildlife use of Douglas-fir dwarf mistletoe witches' brooms in the Southwest. *Western North American Naturalist* 66 (4): 450-455.

Mathiasen, R., A. Sediles, and S. Sesnie. 2006. First report of *Arceuthobium hondurensis* and *Struthanthus deppeanus* in Nicaragua. *Plant Disease* 90: 1458.

Howell, B., S. Kenaley, and R. Mathiasen. 2006. First report of *Psittacanthus macrantherus* on *Pinus devoniana* and *Quercus castanea* in Mexico. *Plant Disease* 90: 1461.

Kenaley, Shawn, Robert L. Mathiasen, and Carolyn M. Daugherty. 2006. Selection of dwarf mistletoe-infected ponderosa pines by bark beetles, *Ips* spp. (Coleoptera: Scolytidae), in northern Arizona. *Western North American Naturalist* 66: 279-284.

Parker, T. J., K. A. Clancy, and R. L. Mathiasen. 2006. Interactions among fire, insects, and pathogens in coniferous forests of the interior western United States and Canada. *Agricultural and Forest Entomology* 8: 167-189.

Mathiasen, Robert L., William K. Olsen, and Carleton B. Edminster. 2006. Site index curves for white fir in the southwestern United States developed using a guide curve method. *Western Journal of Applied Forestry*. 21 (2): 87-93.

- Mathiasen, R. L., and C. M. Daugherty. 2006. Additional taxonomic studies of *Arceuthobium pendens* (Viscaceae): a rare dwarf mistletoe from central Mexico. *Madroño* 53 (1): 69-71.
- Garnett, G. N., C. L. Chambers, and R. L. Mathiasen. 2006. Use of witches' brooms by Abert squirrels in ponderosa pine forests. *Wildlife Society Bulletin* 34: 467-472.
- Mathiasen, R., and J. Melgar. 2006. First report of *Arceuthobium hondurense* in Department El Paraiso, Honduras. *Plant Disease* 90: 685.
- Kenaley, S., B. Howell, and R. Mathiasen. 2006. First report of *Cladocolea cupulata* on *Pinus douglasiana* and *P. herrerae* in northern Mexico. *Plant Disease* 90: 681.
- Howell, Brian, Jose C. Melgar, and Robert L. Mathiasen. 2005. Efecto de *Psittacanthus angustifolius* en el crecimiento de *Pinus oocarpa* en Honduras. *Tatascan* 17 (1): 27-38.
- Mathiasen, R. L., and C. M. Daugherty. 2005. Susceptibility of conifers to western hemlock dwarf mistletoe in the Cascade Range of Washington and Oregon. *Western Journal of Applied Forestry* 20: 94-100.
- Mathiasen, R., M. Haefeli, and N. Marcus. 2005. Southwestern dwarf mistletoe, *Arceuthobium vaginatum* subsp. *cryptopodum* found parasitizing *Picea pungens*. *Plant Disease* 89: 106.
- Daugherty, C., and R. Mathiasen. 2005. First report of *Arceuthobium gillii* on *Pinus engelmannii*. *Plant Disease* 89: 106.
- Howell, B. E., and R. L. Mathiasen. 2004. Growth impacts of *Psittacanthus angustifolius* Kuijt on *Pinus oocarpa* Schiede in Honduras. *Forest Ecology and Management* 198: 75-88.
- Parker, T. J., and R. L. Mathiasen. 2004. A comparison of rating systems for dwarf mistletoe-induced witches' brooms in ponderosa pine. *Western Journal of Applied Forestry* 19: 54-59.
- Mathiasen, R., A. Flores, H. Miranda, and L. Cadio. 2004. First report of *Arceuthobium vaginatum* subsp. *vaginaum* on *Pinus pseudostrobus*. *Plant Disease* 88: 1046.
- Garnett, G., R. L. Mathiasen, and C. L. Chambers. 2004. A comparison of wildlife use in broomed and unbroomed ponderosa pine trees in northern Arizona. *Western Journal of Applied Forestry* 19: 42-46.
- Shaw, D. C., D. A. Watson, and R. L. Mathiasen. 2004. Comparison of dwarf mistletoe (*Arceuthobium* spp., Viscaceae) in the western United States with mistletoes (*Amyema* spp., Loranthaceae) in Australia – ecological analogs and reciprocal models for ecosystem management. *Australian Journal of Botany* 52: 481-498.

- Nickrent, Daniel L., Miguel A. García, María P. Martín, and Robert L. Mathiasen. 2004. A phylogeny of all species of *Arceuthobium* (Viscaceae) using nuclear and chloroplast DNA sequences. *American Journal of Botany* 91: 125-138.
- Daugherty, C. M., and R. L. Mathiasen. 2003. Incidence of mistletoes in the pinyon-juniper woodlands of the Coconino National Forest, Arizona. *Western North American Naturalist* 63: 382-390.
- Mathiasen, R. L., J. Melgar, J. Beatty, C. Parks, D. L. Nickrent, S. Sesnie, C. Daugherty, B. Howell, and G. Garnett. 2003. New distributions and hosts for mistletoes parasitizing pines in southern Mexico and Central America. *Madroño* 50: 115-121.
- Wass, E. F., and R. L. Mathiasen. 2003. A new subspecies of hemlock dwarf mistletoe (*Arceuthobium tsugense* subsp. *contortae*, Viscaceae) from British Columbia and Washington. *Novon* 13: 268-276.
- Mathiasen, R. L., M. Haefeli, and D. Leatherman. 2003. First report of *Arceuthobium vaginatum* subsp. *cryptopodum* on *Pinus mugo*. *Plant Disease* 87: 1395.
- Mathiasen, R. L., and C. M. Daugherty. 2002. Adult sex ratio of *Arceuthobium gillii* (Viscaceae). *Madroño* 49: 12-15.
- Mathiasen, R., B. Howell, and J. Melgar. 2002. First report of *Arceuthobium hawksworthii* in Honduras. *Plant Disease* 86: 815.
- Melgar, J., R. Mathiasen, and B. Howell. 2002. First report of *Phoradendron breedlovei* in Honduras. *Plant Disease* 86: 440.
- Mathiasen, R., D. Nickrent, and C. Daugherty. 2002. First report of *Arceuthobium hondurensis* in Oaxaca, Mexico. *Plant Disease* 86: 72.
- Mathiasen, Robert L., and Christopher S. Albion. 2001. Sporocarp production of ectomycorrhiza associated with ponderosa pine in four stand types in northern Arizona. *Harvard Papers in Botany* 6: 147-154.
- Mathiasen, Robert L., and Carolyn M. Daugherty. 2001. Susceptibility of foxtail pine and western white pine to limber pine dwarf mistletoe in northern California. *Western Journal of Applied Forestry* 16: 58-60.
- Gilbertson, R., and R. Mathiasen. 2001. First report of *Phoradendron macrophyllum* on *Populus tremuloides*. *Plant Disease* 85: 1120.
- Melgar, J., M. Berrios, R. Mathiasen, and B. Howell. 2001. First report of *Psittacanthus angustifolius* on *Psidium guineense* and *Pinus tecunumanii* in Honduras. *Plant Disease* 85: 1120.

- Melgar, J., Mathiasen, R., and B. Howell. 2001. First report of *Arceuthobium globosum* subsp. *grandicaule* in Honduras. *Plant Disease* 85: 563.
- Mathiasen, R., D. Nickrent, C. Parks, J. Beatty, and S. Sesnie. 2001. First report of *Arceuthobium hondurensis* in Mexico. *Plant Disease* 85: 444.
- Mathiasen, R., C. Parks, J. Beatty, and S. Sesnie. 2000. First report of *Psittacanthus angustifolius* on pines in Guatemala and Mexico. *Plant Disease* 84: 808.
- Mathiasen, R., J. Beatty, and J. Melgar. 2000. First report of *Arceuthobium hondurensis* on *Pinus tecunumannii*. *Plant Disease* 84: 372.
- Mathiasen, R., J. Melgar, J. Beatty, and C. Parks. 2000. First report of *Psittacanthus angustifolius* on *Pinus oocarpa* and *Pinus maximinoi*. *Plant Disease* 84: 203.
- Shaw, David, Elizabeth A. Freeman, and Robert L. Mathiasen. 2000. Evaluating the accuracy of ground-based hemlock dwarf mistletoe rating: a case study using the Wind River Canopy Crane. *Western Journal of Applied Forestry* 15: 8-14.
- Daugherty, C. M., and R. L. Mathiasen. 2000. Adult sex ratio of *Phoradendron juniperinum* in ten severely infected *Juniperus monosperma* in northern Arizona. *Madroño* 46: 169-176.
- Mathiasen, R. L., and K. Marshall. 1999. Dwarf mistletoes in the Siskiyou-Klamath Mountain Region. *Natural Areas Journal* 19 (4): 379-385.
- Mathiasen, R., S. Sesnie, J. Calderon, and A. Soto. 1999. First report of golden dwarf mistletoe on *Pinus maximinoi*. *Plant Disease* 83: 878.
- Mathiasen, R. L. 1999. Comparative susceptibility of subalpine firs to Douglas-fir dwarf mistletoe. *Canadian Journal of Plant Pathology* 21: 45-51.
- Mathiasen, R. L., and D. C. Shaw. 1999. Adult sex ratio of *Arceuthobium tsugense* in six severely infected *Tsuga heterophylla*. *Madroño* 45 (3): 210-214.
- Mathiasen, R. L., C. G. Parks, B. W. Geils, and J. S. Beatty. 1999. Notes on the distribution, host range, plant size, phenology, and sex ratio of two rare dwarf mistletoes from Central America: *Arceuthobium hawksworthii* and *A. hondurensis*. *Phytologia* 84 (2): 154-164.
- Mathiasen, R. L. 1998. Comparative susceptibility of conifers to larch dwarf mistletoe based on natural infection in the Pacific Northwest. *Forest Science* 44 (4): 559-568.
- Mathiasen, R. L., J. R. Allison, and B. W. Geils. 1998. Western dwarf mistletoe on Colorado blue spruce and Norway spruce in California. *Plant Disease* 82: 351.



- Mathiasen, R. L. 1998. Infection of young western larch by larch dwarf mistletoe in northern Idaho and western Montana. *Western Journal of Applied Forestry* 13: 41-46.
- Beatty, J. S., R. L. Mathiasen, and C. G. Parks. 1998. Additional populations of *Arceuthobium hondurense* discovered in Honduras. *Phytologia* 85: 268-270.
- Mathiasen, R. L. 1996. Dwarf mistletoes in forest canopies. *In: Proceedings of the Forest Canopies Symposium, Sixty-seventh Annual Meeting of the Northwest Scientific Association, March 23-26, 1994, Ellensburg, WA. Northwest Science (Special Issue) 70: 61-71.*
- Mathiasen, R. L., J. T. Hoffman, J. C. Guyon, and L. L. Wadleigh. 1996. Comparison of two roadside survey procedures for dwarf mistletoes on the Sawtooth National Forest, Idaho. *Great Basin Naturalist* 56: 129-134.
- Mathiasen, R. L., J. S. Beatty, and D. L. Hildebrand. 1996. First report of lodgepole pine dwarf mistletoe on subalpine fir. *Plant Disease* 80: 342.
- Mathiasen, R. L., J. S. Beatty, and D. L. Hildebrand. 1995. First report of larch dwarf mistletoe on Pacific silver fir and on mountain hemlock in the Cascade Mountains, WA. *Plant Disease* 79: 1249.
- McDonald, G. M., R. Hoff, T. M. Rice, and R. L. Mathiasen. 1994. Measuring early performance of second generation resistance to blister rust in western white pine. *In: Proceedings of the Symposium - Interior cedar-hemlock-white pine forests: Ecology and management. Ed. by D. M. Baumgartner, J. E. Lotan, and J. R. Tonn, March 2-4, 1993, Spokane, WA, pp. 133-150.*
- Geils, B. W., and R. L. Mathiasen. 1990. Intensification of dwarf mistletoe on Southwestern Douglas-fir. *Forest Science* 36: 955-969.
- Mathiasen, R. L., F. G. Hawksworth, and C. B. Edminster. 1990. Effects of dwarf mistletoe on Douglas-fir in the Southwest. *Great Basin Naturalist* 50: 173-179.
- Mathiasen, R. L., and F. G. Hawksworth. 1990. Distribution of limber pine dwarf mistletoe in Nevada. *Great Basin Naturalist* 50: 91-92.
- Mathiasen, R. L., C. B. Edminster, and F. G. Hawksworth. 1990. Infection of young Douglas-firs by dwarf mistletoe in the Southwest. *Great Basin Naturalist* 50: 67-71.
- Mathiasen, R. L. 1989. Improving assessment of dwarf mistletoe infection in Southwestern ponderosa pine stands. *In: Proceedings of the IX World Forestry Congress, Mexico City, Mexico, 1985, Volume I, pp. 145-150.*
- Mathiasen, R. L., and F. G. Hawksworth. 1988. Dwarf mistletoes on western white pine and whitebark pine in northern California and southern Oregon. *Forest Science* 34: 429-440.

- Mathiasen, R. L., E. A. Blake, and C. B. Edminster. 1987. Estimates of site potential for ponderosa pine based on site index for several Southwestern habitat types. *Great Basin Naturalist* 47: 467-472.
- Mathiasen, R. L., and L. R. Loftis. 1987. Douglas-fir dwarf mistletoe parasitizing Pacific silver fir in northern California. *Great Basin Naturalist* 47: 161-162.
- Mathiasen, R. L., F. G. Hawksworth, and C. B. Edminster. 1986. Effects of dwarf mistletoe on spruce in the White Mountains, Arizona. *Great Basin Naturalist* 46: 685-689.
- Mathiasen, R. L. 1986. Infection of young Douglas-firs and spruces by dwarf mistletoes in the Southwest. *Great Basin Naturalist* 46: 528-534.
- Mathiasen, R. L., E. A. Blake, and C. B. Edminster. 1986. Estimates of site potential for Douglas-fir based on site index for several southwestern habitat types. *Great Basin Naturalist* 46: 277-280.
- Wagner, M. R., and R. L. Mathiasen. 1985. Dwarf mistletoe-pandora moth interaction and its contribution to ponderosa pine mortality in Arizona. *Great Basin Naturalist* 45: 423-426.
- Mathiasen, R. L. 1984. Comparative susceptibility of corkbark fir and Douglas-fir to Douglas-fir dwarf mistletoe. *Forest Science* 30: 842-847.
- Mathiasen, R. L., and K. H. Jones. 1983. Range extensions for two dwarf mistletoes (*Arceuthobium* spp.) in the Southwest. *Great Basin Naturalist* 43: 741-746.
- Mathiasen, R. L. 1982. Taxonomic studies of dwarf mistletoes (*Arceuthobium* spp.) parasitizing *Pinus strobiformis*. *Great Basin Naturalist* 42: 120-127.
- Mathiasen, R. L. 1979. Distribution and effect of dwarf mistletoes parasitizing *Pinus strobiformis* in Arizona, New Mexico, and northern Mexico. *Southwestern Naturalist* 24: 455-461.
- Mathiasen, R. L. 1979. Survey of eastern spruce dwarf mistletoe in the lower peninsula of Michigan. *Plant Disease Reporter* 63: 532-535.
- Hawksworth, F. G., and R. L. Mathiasen. 1978. Hosts of juniper mistletoe at Walnut Canyon National Monument, Arizona. *Great Basin Naturalist* 39: 89.
- Mathiasen, R. L. 1978. Seed germination and infection techniques for three southwestern dwarf mistletoes. *Plant Disease Reporter* 62: 64-67.
- Mathiasen, R. L. 1977. Southern range extension of the white fir dwarf mistletoe in Arizona. *Great Basin Naturalist* 36: 461-462.

Hawksworth, F. G., J. T. Fisher, and R. L. Mathiasen. 1975. An unusual occurrence of *Arceuthobium cyanocarpum* on ponderosa pine near Boulder, Colorado. *Plant Disease Reporter* 59: 758-759.

### **PROFESSIONAL PUBLICATIONS (*In Press or Review*)**

Mathiasen, R. L., and S. K. Kenaley. In press. Distribution and morphological characteristics of *Arceuthobium hondurense* and *A. nigrum* (Viscaceae) in Mexico. *Journal of the Botanical Research Institute of Texas*.

Shaw, D. C., and R. L. Mathiasen. In press. Management of higher parasitic plants – mistletoes. Chapter 5 in *Management of Infectious Forest Diseases*. P. Gonthier (ed.). CAB International, Oxford, UK.

Kenaley, S. K., and R. L. Mathiasen. In review. Distribution of *Arceuthobium gillii* and *A. nigrum* (Viscaceae) based on morphological characters and ribosomal DNA intertranscribed spacer sequences. *Brittonia*.

Parker, T. J., C. L. Chambers, and R. L. Mathiasen. In review. Dwarf mistletoe and breeding bird abundance in ponderosa pine forests. *Journal of Wildlife Management*.

Smith, Laine, Richard Hofstetter, and Robert Mathiasen. In review. Branch-scale arthropod communities associated with Douglas-fir dwarf mistletoe witches' brooms in northern Arizona. *Southwestern Naturalist*.

### **USDA FOREST SERVICE PUBLICATIONS (Refereed by USDA Forest Service)**

Mathiasen, Robert L. 2010. Proposed Nomenclatural Changes in *Arceuthobium*: Published and Forthcoming. Pp. 79-95 in *Proceedings of the 57th Annual Western International Forest Disease Work Conference*. J. Adams (ed.). USDA Forest Service, Forest Health Technology Enterprise Team, Ft. Collins, CO. 126 p.

Katy M. Mallams, and Robert L. Mathiasen. 2010. Mistletoes on Hardwoods in the United States. USDA Forest Service, Forest Insect and Disease Leaflet 147. 12 p.

Baker, F. A., J. G. O'Brien, Robert Mathiasen, and M. E. Ostry. 2006. Eastern spruce dwarf mistletoe. USDA Forest Service, Forest Insect and Disease Leaflet NA-PR-04-06. 8 p.

Mathiasen, Robert, John Pronos, and Jerome Beatty. 2005. Dwarf mistletoes on sugar pine and western white pine. USDA Forest Service, Forest Insect and Disease Leaflet 113. 11 p.

Pronos, John, Robert L. Mathiasen, and Jerome S. Beatty. 2004. Gray pine dwarf mistletoe.

USDA Forest Service, Pacific Southwest Region, Forest Insect and Disease Leaflet 179, 7 p.

Wass, E. F., and Mathiasen, R. L. 2004. Shore pine dwarf mistletoe: Should it be classified as a subspecies or a race of hemlock dwarf mistletoe? Pp. 37-43 *in* Proceedings of the 51st Annual Western International Forest Disease Work Conference. B. Geils (ed.). USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Beatty, Jerome S., and Robert L. Mathiasen. 2003. Dwarf mistletoes on ponderosa pine. USDA Forest Service, Pacific Northwest Region, Forest Insect and Disease Leaflet 40, 8 p.

Mathiasen, R. L., C. G. Parks, D. L. Nickrent, J. S. Beatty, and B Geils. 2002. Status of dwarf mistletoes in Central America. Pp. 78-92 *in* Proceedings of the 48th Western International Forest Disease Work Conference. P. Angwin (ed.). USDA Forest Service, Pacific Southwest Region, Redding, CA. 254 p.

Parks, C. G., R. L. Mathiasen, and J. S. Beatty. 2002. Status of true mistletoes on pines In Central America. Pp. 61-67 *in* Proceedings of the 48th Western International Forest Disease Work Conference. P. Angwin (ed.). USDA Forest Service, Pacific Southwest Region, Redding, CA. 254 p.

Daugherty, C. M., and R. L. Mathiasen. 2002. Sex ratio of juniper mistletoe on one-seeded juniper in northern Arizona. Pp. 68-77 *in* Proceedings of the 48th Western International Forest Disease Work Conference. P. Angwin (ed.). USDA Forest Service, Pacific Southwest Region, Redding, CA. 254 p.

Mathiasen, Robert, Jerome S. Beatty, and John Pronos. 2002. Pinyon pine dwarf mistletoe. USDA Forest Service, Forest Insect and Disease Leaflet 174, 7 p.

Hadfield, J. M., R. L. Mathiasen, and F. G. Hawksworth. 2000. Douglas-fir dwarf mistletoe. USDA Forest Service, Pacific Northwest Region, Forest Insect and Disease Leaflet 54, 12 p.

Filip, G. M., J. S. Beatty, and R. L. Mathiasen. 2000. Fir dwarf mistletoe. USDA Forest Service, Pacific Northwest Region, Forest Insect and Disease Leaflet 89, 8 p.

Taylor, J. E., and R. L. Mathiasen. 1999. Limber pine dwarf mistletoe. USDA Forest Service, Northern Region, Forest Insect and Disease Leaflet 171, 7 p.

Beatty, J. S., G. M. Filip, and R. L. Mathiasen. 1997. Larch dwarf mistletoe. USDA Forest Service, Pacific Northwest Region, Forest Insect and Disease Leaflet 169, 7 p.

Hildebrand, D. L., J. S. Beatty, and R. L. Mathiasen. 1996. Mountain hemlock dwarf mistletoe in Washington. USDA Forest Service, PNW Region, Forest Insects and Diseases, FID Report 96-7, 5 p.

Mathiasen, R. L., B. W. Geils, and C. E. Carlson. 1995. Larch dwarf mistletoe not found on alpine larch. USDA Forest Service Research Note RM-RN-533, 4 p.

Mathiasen, R. L., J. Schwandt, and J. Eaton. 1995. Monitoring blister rust infection in rust-resistant western white pine plantations in northern Idaho. *In: Proceedings of the Forty-first Western International Forest Disease Work Conference, Boise, Idaho, September 9-12, 1993*, pp. 112-125.

Mathiasen, R. L. 1994. Natural infection of new hosts by hemlock dwarf mistletoe. USDA Forest Service Research Note RM-RN-530, 6 p.

James, R. L., R. L. Mathiasen, and J. W. Schwandt. 1991. Sphaeropsis blight of ponderosa pine in northern Idaho. USDA Forest Service, Northern Region, Forest Pest Management Report 91-10, 8 p.

Edminster, C. B., H. T. Mowrer, R. L. Mathiasen, T. M. Schuler, W. K. Olsen, and F. G. Hawksworth. 1991. GENGYM: A variable density stand table projection system calibrated for mixed conifer and ponderosa pine stands in the Southwest. USDA Forest Service Research Paper RM-297, 32 p.

Edminster, C. B., R. L. Mathiasen, and W. K. Olsen. 1991. A method for constructing site index curves from height-age measurements applied to Douglas-fir in the Southwest. USDA Forest Service Research Note RM-510, 6 p.

Mathiasen, R. L. 1989. Management of dwarf mistletoes using uneven-aged cutting methods. USDA Forest Service, Ninth Intermountain Region Silviculture Workshop Proceedings, Jackson Hole, WY, Sept. 18-21, pp. 186-194.

Mathiasen, R. L., and E. A. Blake. 1984. Relationships between dwarf mistletoes and habitat types in western coniferous forests. *In: Biology of dwarf mistletoes: Proceedings of the Symposium*. USDA Forest Service General Technical Report RM-111, pp. 111-116.

Mathiasen, R. L., and F. G. Hawksworth. 1980. Taxonomy and effects of the dwarf mistletoe on bristlecone pine on the San Francisco Peaks, Arizona. USDA Forest Service Research Paper RM-224, 10 p.

#### **ARTICLES** (Non-referred, service-oriented publications)

Mathiasen, Robert L., Carolyn M. Daugherty, and Vidal Guerra De la Cruz. 2010. Muerdagos enanos (*Arceuthobium* spp.) en el sur de Mexico: Distribucion, hospederos y cambios en la nomenclatura. Pp. 160-166 in *Proceedings of the XV Simposio Nacional de Parasitologia Forestal*, November 18-20, 2009, Oaxaca, Mexico.

Mathiasen, R. L. 2005. Forest diseases in Whiskeytown National Recreation Area, California.

USDI, National Park Service, Unpublished report. 14 p.

Mathiasen, R. L., J. S. Beatty, and C. G. Parks. 1999. Evaluation of mistletoes on pines in Honduras. Report submitted to the United States Agency for International Development, Tegucigalpa, Honduras (USAID/Honduras), 26 p.

Mathiasen, R. L. 1997. Pruning western white pine to reduce mortality caused by white pine blister rust. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 16, 4 p.

Mathiasen, R. L. 1997. Schweinitzii root and butt rot. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 17, 2 p.

Mathiasen, R. L. 1994. Mortality in a precommercially thinned and unthinned mixed conifer stand infested with Armillaria root disease. Idaho Dept. of Lands, Insect/Disease Report 94-2, 21 p.

Mathiasen, R. L., and J. W. Schwandt. 1993. Monitoring genetically improved western white pine plantations for blister rust infection in northern Idaho. Idaho Dept. of Lands, Insect and Disease Report 93-2, 10 p.

Mathiasen, R. L. 1991. Elytroderma disease. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 11, 2 p.

Mathiasen, R. L. 1991. Common needle diseases in Idaho. Idaho Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 12, 2 p.

Mathiasen, R. L. 1991. Western gall rust. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 13, 2 p.

Mathiasen, R. L. 1991. White pine blister rust in Idaho. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 14, 4 p.

Mathiasen, R. L. 1991. Laminated root disease. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 2, 4 p.

Mathiasen, R. L. 1991. Armillaria root disease. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 3, 4 p.

Mathiasen, R. L. 1991. Dwarf mistletoes. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 4, 4 p.

Mathiasen, R. L. 1991. Annosus root disease. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 8, 4 p.

Mathiasen, R. L. 1991. Important stem decays in Idaho. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 9, 3 p.

Mathiasen, R. L. 1991. Broom rusts in Idaho. Idaho Dept. of Lands, State Forester Forum, Forest Pest No. 10, 2 p.

Mathiasen, R. L. 1984. Improving assessment of dwarf mistletoe infection in Southwestern ponderosa pine stands. Arizona Forestry Note No. 21, School of Forestry, Northern Arizona University, Flagstaff, AZ, 12 p.

Mathiasen, R. L., and F. G. Hawksworth. 1983. Dwarf mistletoes on true firs in the Southwest. Arizona Forestry Note No. 18, School of Forestry, Northern Arizona University, Flagstaff, AZ, 12 p.

### **PRESENTATIONS AND POSTERS**

Mathiasen, R. L. 2012. Research on the relationships between fire, wildlife, and dwarf mistletoes in the southwestern United States. Charles Sturt University, Albury, Australia, March 21, 2012.

Mathiasen, R. L. 2011. Update on the taxonomy, hosts, and current taxonomic research on dwarf mistletoes in California. California Pest Council, McClellan, CA, November 15, 2011.

Mathiasen, R. L. 2011. Current research on the systematics of *Arceuthobium*. Western International Forest Disease Work Conference, Dwarf Mistletoe Working Group Meeting, Leavenworth, WA, October 14, 2011.

Mathiasen, R. L. 2011. Recent research on the systematic of dwarf mistletoes (*Arceuthobium* spp., Viscaceae). University of Arizona, Tucson, AZ. April 14, 2011.

Mathiasen, R. L. 2011. Dwarf mistletoe research in northern Mexico: status of the distribution and importance of dwarf mistletoes in Durango, Mexico. Presentation for the Comisión Nacional Forestal (CONAFOR), Durango, Mexico April 7, 2011.

Mathiasen, R. L. 2009. Dwarf mistletoe management needs in Mexico. Presentation at the Society of Mexican Forest Resource Managers, Oaxaca, Oaxaca, Mexico, November 23, 2009.

Mathiasen, R. L., C. M. Daugherty, and V. Guerra de la Cruz. 2009. Dwarf mistletoes (*Arceuthobium* spp.) in southern Mexico: Distribution, hosts, and changes in nomenclature. Presentation at the XV Simposio Nacional Parasitología Forestal, Oaxaca, Oaxaca, Mexico, November 20, 2009.

Mathiasen, R. L. 2009. Changes in nomenclature for *Arceuthobium*: published and forthcoming. Special paper presentation at the 57th Western International Forest Disease Work Conference, Durango, CO, July 24, 2009.

Daugherty, C. M., and R. L. Mathiasen. 2009. The distribution of red fir and noble fir based on infection by Pacific silver fir dwarf mistletoe. Poster presented at the 57th Western

International Forest Disease Work Conference, Durango, CO, July 21, 2009.

Mathiasen, R. L. 2008. The distribution of red fir and noble fir in Oregon based on dwarf mistletoe host specificity. Invited presentation for the Department of Forest Science, Oregon State University, Corvallis, OR. September 22, 2008.

Mathiasen, R. L. 2006. Using prescribed fire to improve forest health at Whiskeytown National Recreation Area, CA. Presentation at Northern Arizona University, Flagstaff, AZ, May 5, 2006.

Mathiasen, R. L. 2006. Muérdagos en Pinos de Centro América con Nueva Información de Nicaragua. Invited presentation at the Universidad Nacional Agraria, Managua, Nicaragua, March 27, 2006.

Daugherty, C. M., and R. L. Mathiasen. 2005. Muérdago Enano en México: Necesidades de investigación. Invited presentation at the XIII Simposio Nacional Parasitología Forestal, Morelia, Mexico, November 25, 2005. Co-presentation by both authors.

Mathiasen, R. L. 2005. Dwarf mistletoes of the Klamath-Siskiyou Mountains in northwestern California. Invited presentation for the Spring Seminar Series at Shasta College, Redding, CA, April 8, 2005.

Mathiasen, R. L. 2005. Dwarf mistletoes of California and Oregon. Invited presentation for the Northern California Chapter, Society of American Foresters, Shasta City, CA, February 15, 2005.

Mathiasen, R. L. 2003. Loranthaceous mistletoes parasitizing pines in southern Mexico and Central America. Presentation at the 54<sup>th</sup> Western Forest Insect Work Conference, Guadalajara, Mexico, November 7, 2003.

Daugherty, Carolyn M., and Robert L. Mathiasen. 2003. The roadside survey: A valuable tool in the acquisition of biogeographical data. Poster presented at the Association of Pacific Coast Geographers Conference, Portland, OR, September 18, 2003.

Mathiasen, R. L. 2003. Shore pine dwarf mistletoe: Should it be a race or subspecies of hemlock dwarf mistletoe. Presentation at the 51<sup>st</sup> Annual Western International Forest Disease Work Conference, Grants Pass, OR, August 19, 2003.

Mathiasen, R. L. 2002. Ecology of dwarf mistletoes in western North America: Fire and wildlife relationships. Symposium presentation at the Third International Canopy Conference, Cairns, Australia, June 23, 2002.

Mathiasen, R. L. 2001. Mistletoes parasitizing pines in Central America. Invited seminar given on April 21, 2000 at the University of Arizona, Tucson, AZ.



Mathiasen, R. L., C. G. Parks, D. L. Nickrent, J. S. Beatty, and B. W. Geils. 2000. Status of dwarf mistletoes in Central America. Presentation at the 48th Western International Forest Disease Work Conference, Kona, Hawaii, August 15, 2000.

Parks, C. G., R. L. Mathiasen, and J. S. Beatty. 2000. Status of true mistletoes on pines in Central America. Presentation at the 48th Western International Forest Disease Work Conference, Kona, Hawaii, August 15, 2000.

Daugherty, C. M., and R. L. Mathiasen. 2000. Sex ratio of juniper mistletoe on one-seed juniper in northern Arizona. Presentation at the 48th Western International Forest Disease Work Conference, Kona, Hawaii, August 15, 2000.

Albion, C. S., R. L. Mathiasen, and R. L. Peterson. 1999. Sporocarp production of ectotrophic ectomycorrhizae associated with ponderosa pine following management activities and wildfire in the Coconino National Forest. Poster presented at Fifth Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, October 25-28, 1999.

Mathiasen, R. L. 1998. Dwarf mistletoe research at Northern Arizona University. Presentation at the Western International Forest Disease Work Conference, Dwarf Mistletoe Working Committee meeting, October 5, 1998.

## RESEARCH PROPOSALS FUNDED (2007 - Present)

<u>Project</u>	<u>Investigator</u>	<u>Sponsor</u>	<u>Amount</u>
2009 Identification and habitat type relationships of the fungi associated with Armillaria root disease in Arizona and New Mexico	Dr. Robert Mathiasen	NAU School of Forestry Mission Research Board	\$36,000 for two-year project
2007 Surface fuel loading in Douglas-fir dwarf mistletoe-infested mixed conifer forests in Arizona	Dr. Robert Mathiasen	NAU School of Forestry Mission Research Board	\$36,000 for two-year project.

## RESEARCH PROPOSALS NOT FUNDED (1997 - Present)

Relationships of dwarf mistletoes parasitizing ponderosa pine in the western United States. Submitted to NAU Faculty Grants Program in 2010. Principal Investigator: Dr. Robert Mathiasen. Funding requested: \$7433.00.

Effects of lodgepole pine dwarf mistletoe on surface fuel loading in lodgepole pine stands in central Oregon. USDA Forest Service. Funding requested: \$150,000.00.

Distribution and impact of mistletoes and bark beetles in piñon-juniper woodlands on tribal lands in northeastern Arizona. Submitted to the School of Forestry Mission Research program. Principal Investigator: Dr. Robert Mathiasen. Funding requested: Masters student funding.

Host susceptibility of true firs parasitized by hemlock dwarf mistletoe in the Pacific Northwest. Submitted to the NAU Intramural Grants program. Principal Investigator: Dr. Robert Mathiasen. Funding requested: \$12,600.

## PROFESSIONAL MEMBERSHIPS

California Botanical Society  
American Phytopathological Society  
Western International Forest Disease Work Conference

## Document E: Individual Faculty Information

### MARGARET M. MOORE

Professor – 9 month – Tenured

Date of Appointment: 1992 – Present

Specializations: Forest and range plant community ecology; restoration ecology; historical ecology

**Northern Arizona University - School of Forestry**

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### EDUCATION

- 1987 University of Minnesota, St. Paul, MN. Ph.D. degree, Forest Ecology and Remote Sensing and GIS
- 1982 North Dakota State University, Fargo, North Dakota, M.S. degree, Range Ecology and Natural Resource Management
- 1980 Valley City State University, Valley City, North Dakota, B.A. degree, General Biology and Earth & Environmental Science – double major (summa cum laude)
- 1977 Southside Virginia Community College, Alberta, Virginia, General Science

### PROFESSIONAL EXPERIENCE

- 1999/ Present School of Forestry, Northern Arizona University, Flagstaff, AZ. Undergraduate and graduate teaching and research responsibilities in forest/range community ecology, plant identification, and landscape ecology.
- 1992/1999 Associate Professor, School of Forestry, Northern Arizona University, Flagstaff, AZ. Undergraduate and graduate teaching and research responsibilities in forest/range ecology, plant identification, remote sensing and GIS.
- 1986/1992 Assistant Professor, School of Forestry, Northern Arizona University, Flagstaff, Undergraduate and graduate teaching and research responsibilities in forest/range ecology, plant identification, remote sensing and GIS.
- 1985/1986 Instructor, Department of Forest Resources, University of Minnesota, St. Paul, Minnesota, St. Paul, MN. Taught an upper-division course in Aerial Photograph Interpretation; and Lectures and field exercises in vegetation classification, mapping, and sampling for the Department's 10-week senior capstone field session (Cloquet, MN).
- 1985 Instructor, Department of Forest Resources, University of Minnesota, St. Paul, MN. Taught an upper-division course in Range Ecology and Management.
- 1982/1986 Graduate Research/Teaching Assistant, Department of Forest Resources, University of Minnesota, St. Paul, MN. Research involved image processing of multi-temporal satellite data (Landsat TM and MSS) and GIS for forest cover type classification in north-central Minnesota. Also, instructed upper-division Aerial Photograph Interpretation labs (3 yrs.).

- 1982 Research Field Assistant, Botany/Biology Department, North Dakota State University, Fargo, ND, and the Minnesota Chapter of the Nature Conservancy, Minneapolis, MN. Sampling design & inventory of Maple-Basswood forest communities in Ottertail Co., MN.
- 1980/1982 Graduate Teaching Assistant, Botany/Biology Department, North Dakota State University, Fargo, ND. Instructed lab courses in General Biology, two Introductory Botany Courses, and Environmental Science.
- 1980/1981 Graduate Research Assistant, Botany/Biology Department, North Dakota State University, Fargo, ND, and the North Dakota State Land Department, Bismarck, ND. Conducted range inventory and condition analysis research on the North Dakota State School Lands. Primary tasks included recording plant composition on specific range sites, and determining the range condition for establishing stocking rates. Also evaluated riparian areas and extent of noxious weeds.
- 1977/1980 Lab Assistant, Biology Department, Valley City State College, Valley City, North Dakota. Assisted in the preparation of laboratory experiments for Botany, Organic Chemistry, and Microbiology courses.

## TEACHING EXPERIENCE

1987/Present

FOR 211 Forest Measurements  
 FOR 220 Introduction to Forest and Range Plants  
 FOR 311  
 FOR 312  
 FOR 313 Forest Ecology I  
 FOR 314 Forest Ecology II  
 FOR 323W Forest Management I  
 FOR 326W Forest Management IV  
 FOR 501  
 FOR 524 Aerial Photo Interpretation  
 FOR 525 GIS and Spatial Techniques in Forstry  
 FOR 544 Landscape Ecology  
 FOR 601  
 FOR 695 Advanced Studies in Forestry  
 ENV 544 Landscape Ecology

## REFERRED

Puhlick, J. J., M. M. Moore, and A. Weiskketal. *In press*. Factors influencing height-age relationships and recruitment of ponderosa pine regeneration in northern Arizona. *Western Journal of Applied Forestry*.

- Zegler, T. J., M. M. Moore, M. L. Fairweather, K. B. Ireland, and P. Z. Fulé. 2012. *Populus tremuloides* mortality near the southwestern edge of its range. *Forest Ecology and Management* 282:196-207.
- Puhlick, J. J., D. C. Laughlin, and M. M. Moore. 2012. Factors influencing ponderosa pine regeneration in the southwestern USA. *Forest Ecology and Management* 264: 10-19.
- Laughlin, D.C., M.M. Moore, and P.Z. Fulé. 2011. A century of increasing pine density and associated shifts in understory plant strategies. *Ecology* 92:556-561.
- Bakker, J.D., F. Rudebusch, and M.M. Moore. 2010. Effects of long-term livestock grazing and habitat on understory vegetation. *Western North American Naturalist* 70:334-344.
- Sánchez Meador, A.J., and M. M. Moore. 2010. Lessons from long-term studies of harvest Methods in southwestern ponderosa pine-Gambel oak forests on the Fort Valley Experimental Forest, Arizona, U.S.A. *Forest Ecology and Management* 260:193-206.
- Laughlin, D.C., J.J. Leppert, M.M. Moore, and C.H. Sieg. 2010. A multi-trait test of the leaf-height-seed plant strategy scheme with 133 species from a pine forest flora. *Functional Ecology* 24:493-501.
- Laughlin, D.C., S.C. Hart, J.P. Kaye, and M.M. Moore. 2010. Evidence for indirect effects of plant diversity and composition on net nitrification. *Plant and Soil* 330:435-445.
- Sanchez Meador, A.J., P.F. Parysow, and M.M. Moore. 2010. A new method for delineating tree patches and assessing spatial reference conditions of ponderosa pine forests in northern Arizona. *Restoration Ecology* doi: 10.1111/j.1526-100X.2010.00652.x
- Laughlin, D. C., and M. M. Moore. 2009. Climate-induced temporal variation in the productivity diversity relationship. *Oikos* 118:897-902.
- Sánchez Meador, A.J., M. M. Moore, J. D. Bakker, and P. F. Parysow. 2009. 108 years of change in spatial pattern following selective harvest of a ponderosa pine stand in northern Arizona. *Journal of Vegetation Science* 20:79-90.
- Sánchez Meador, A. J., P. F. Parysow, and M. M. Moore. 2008. Historical stem mapped permanent plots increase precision of reconstructed reference conditions in ponderosa pine forests of northern Arizona. *Restoration Ecology* doi:10.1111/j.1526-100x.2008.00442.x (Sept. 2008)
- Bell, D. M., P. F. Parysow, and M. M. Moore. 2009. Assessing the representativeness of the oldest permanent inventory plots in northern Arizona ponderosa pine forests. *Restoration Ecology* 17:369-377.
- Laughlin, D.C., J. D. Bakker, M. L. Daniels, M. M. Moore, C. A. Casey, and J. D. Springer. 2008. Restoring plant species diversity and community composition in a ponderosa pine-bunchgrass ecosystem. *Plant Ecology* 197:139-151.
- Bakker, J.D., and M.M. Moore. 2007. Controls on vegetation structure in southwestern ponderosa pine forests, 1941 and 2004. *Ecology* 88:2305-2319.

- Laughlin, D. C., M. M. Moore, J. D. Bakker, C. A. Casey, J. D. Springer, P. Z. Fulé, and W. W. Covington. 2006. Assessing targets for the restoration of herbaceous vegetation in ponderosa pine forests. *Restoration Ecology* 14: 548-560
- Moore, M.M., C.A. Casey, J.D. Bakker, J.D. Springer, P.Z. Fulé, W.W. Covington, and D. C. Laughlin. 2006. Herbaceous vegetation responses (1992-2004) to restoration treatments in a ponderosa pine forest. *Rangeland Ecology and Management* 59:135-144.
- Binkley, D., M. M. Moore, W. H. Romme, and P. Brown. 2006. Was Aldo Leopold right about the Kaibab Deer Herd? *Ecosystems* 9:227-241.
- Kaye, J.P., S.C. Hart, P.Z. Fulé, W.W. Covington, M.M. Moore, and M.W. Kaye. 2005. Initial carbon, nitrogen, and phosphorus fluxes following ponderosa pine restoration treatments. *Ecological Applications* 15: 1581-1593.
- Heinlein, T. A, M. M. Moore, P. Z. Fulé, and W. W. Covington. 2005. Fire history and stand structure of two ponderosa pine-mixed conifer sites: San Francisco Peaks, Arizona, USA. *International Journal of Wildland Fire* 14:307-320.
- Olberding, S. D., J. E. Mitchell, and M. M. Moore. 2005. "Doing the best we could with what we had": USFS Research in the Southwest. *Rangelands* (June 2005):29-36.
- Korb, J. E., J. D. Springer, S. R. Powers, and M. M. Moore. 2005. Soil seed banks in *Pinus ponderosa* forests in Arizona: Clues to site history and restoration potential. *Applied Vegetation Science* 8:103-112.
- Moore, M. M., and D. W. Huffman. 2004. Tree encroachment on meadows of the North Rim, Grand Canyon National Park, Arizona, USA. *Arctic, Antarctic, and Alpine Research* 36 (4):460-469.
- Moore, M. M., D. W. Huffman, P. Z. Fulé, W. W. Covington, and J. E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50:162-176.
- Huffman, D. W., and M. M. Moore. 2004. Responses of Fendler's ceanothus to forest thinning, prescribed fire, and drought in an Arizona ponderosa pine forest. *Forest Ecology and Management* 198:105-115.
- Fulé, P. Z, J. E. Crouse, A. E. Cocke, M. M. Moore, and W. W. Covington. 2004. Changes in canopy fuels and potential fire behavior 1880-2040: Grand Canyon, Arizona. *Ecological Modelling* 175:231-248.
- Kerns, B. K., M. M. Moore, M. E. Timpson, and S. C. Hart. 2003. Soil properties associated with vegetation patches in a *Pinus ponderosa*-bunchgrass mosaic. *Western North American Naturalist* 63(4): 452-462.

- Fulé, P. Z., J. E. Crouse, T. A., Heinlein, M. M. Moore, W. W. Covington, and G. Verkamp. 2003. Mixed severity fire regime in a high-elevation forest: Grand Canyon, Arizona. *Landscape Ecology* 18:465-486.
- Waltz, A.E.M., P.Z. Fulé, W.W. Covington, and M.M. Moore. 2003. Diversity in ponderosa pine forest structure following ecological restoration treatments. *Forest Science* 49:885-900.
- Huffman, D. W., and M. M. Moore. 2003. Ungulate herbivory on buckbrush in an Arizona ponderosa pine forest. *Journal of Range Management* 56:357-362.
- Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2003. Assessing fire regimes on Grand Canyon landscapes with fire scar and fire record data. *Intern. Journal of Wildland Fire* 12:129-145.
- Fulé, P.Z., W. W. Covington, H. B. Smith, J. D. Springer, T. A. Heinlein, K. D. Huisinga, and M. M. Moore. 2002. Comparing ecological restoration alternatives: Grand Canyon, AZ. *Forest Ecology and Management* 170:19-41.
- Fulé, P. Z., W. W. Covington, M. M. Moore, T.A. Heinlein, and A. E. M. Waltz. 2002. Natural variability in forests of Grand Canyon, USA. *Journal of Biogeography* 29:31-47.
- Kerns, B. K., M. M. Moore, and S. C. Hart. 2001. Estimating forest-grassland dynamics using soil phytolith assemblages and  $\delta^{13}\text{C}$  of soil organic matter. *EcoScience* 8:478-488.
- Moore, M. M., W. W. Covington, and P. Z. Fulé. 1999. *Invited Feature* – Reference conditions and ecological restoration: A southwestern ponderosa pine perspective. *Ecological Applications* 9:1266-1277.
- Mast, J. N., P. Z. Fulé, M. M. Moore, W. W. Covington, and A.E.M. Waltz. 1999. Restoration of presettlement age structure of an Arizona ponderosa pine forest. *Ecological Applications* 9:228-239.
- Fulé, P. Z., W. W. Covington, and M. M. Moore. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. *Ecological Applications* 7:895-908.
- Covington, W. W., P. Z. Fulé, M. M. Moore, S. C. Hart, T. E. Kolb, J. N. Mast, S. S. Sackett, and M. R. Wagner. 1997. Restoration of ecosystem health in southwestern pine forests. *Journal of Forestry* 95:23-29.
- Covington, W. W., and M. M. Moore. 1994. Postsettlement changes in natural fire regimes and forest structure: Ecological restoration of old-growth ponderosa pine forests. *Journal of Sustainable Forestry* 2:153-181.
- Covington, W. W., and M. M. Moore. 1994. Southwestern ponderosa forest structure: Changes since Euro-American settlement. *Journal of Forestry* 92:39-47.
- Morgan, P., G.H. Aplet, J.B. Haufler, H.C. Humphries, M.M. Moore, and W.D. Wilson. 1994. Historical range of variability: A useful tool for evaluating ecosystem change. *Journal of Sustainable Forestry* 2:87-111.

- Moore, M. M., and D. A. Deiter. 1992. Stand density index as a predictor of herbage production in northern Arizona pine forests. *Journal of Range Management* 45:267-271.
- Moore, M. M., and M. E. Bauer. 1990. Classification of forest vegetation in north-central Minnesota using Landsat Multispectral Scanner and Thematic Mapper data. *Forest Science* 36:330-342.
- Brand, M. D., M. M. Moore, and R. P. Williams. 1988. North Dakota's School Lands and their management. *Rangelands* 10:51-53.
- Bakker, J. D., M. M. Moore, and D. C. Laughlin. 2008. The Hill Plots: A rare long-term vegetation study. Pp. 148-157; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.
- Bakker, J. D., A. J. Sánchez Meador, P. Z. Fulé, D. W. Huffman, and M. M. Moore. 2008. 'Growing Trees Backwards': Description of a stand reconstruction model. Pp. 136-147; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.
- Chancellor, W. W., D. W. Huffman, and M. M. Moore. 2008. Characteristics of buckbrush shrubs exposed to herbivores after seven years of protection. Pp. 171-175; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.
- Crouse, J. E., M. M. Moore, and P. Z. Fulé. 2008. Revisiting Pearson's Climate and Forest Type Studies on the Fort Valley Experimental Forest. Pp. 176-187; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.
- De Blois, B. P., A. J. Finkral, A. J. Sánchez Meador, and M. M. Moore. 2008. Early Thinning Experiments Established by the Fort Valley Experimental Forest. Pp. 197-203; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.
- Dyer, J. H., A. J. Sánchez Meador, M. M. Moore, and J. D. Bakker. 2008. Forest Structure and Tree Recruitment Changes on a Permanent Historical Cinder Hills Plot over a 130-Year Period. Pp. 214-221; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.



Huffman, D. W., and M. M. Moore. 2008. Dynamics of Buckbrush Populations under Simulated Forest Restoration Alternatives. Pp. 257-263; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Kerns, B. K., M. M. Moore, and S. C. Hart. 2008. Understanding ponderosa pine forest-grassland vegetation dynamics at Fort Valley Experimental Forest using phytolith analysis. Pp. 264-270; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Laughlin, D. C., and M. M. Moore. 2008. Forest and Range Research on the ‘Wild Bill Plots’ (1927-2007). Pp. 281-289; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Moore, M. M., W. W. Covington, P. Z. Fulé, S. C. Hart, T. E. Kolb, J. N. Mast, S. S. Sackett, and M. R. Wagner. 2008. Ecological restoration experiments (1992-2007) at the G. A. Pearson Natural Area, Fort Valley Experimental Forest. Pp. 290-304; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Olberding, S. D., and Moore, M. M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

Pearson, H. A., W. P. Clary, M. M. Moore, and C. H. Sieg. 2008. Range management research, Fort Valley Experimental Forest. Pp. 68-85; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Sánchez Meador, A. J., and M. M. Moore. 2008. 93 years of stand density and land-use legacy research at the Coulter Ranch study site. Pp. 321-330; *In* Olberding, S. D., and Moore, M. M., tech coords., Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 408 p.

Bakker, J.D., M.M. Moore, and W.W. Covington. 2006. Long-term vegetation studies in the Southwest. Pp. 187-195 in Long-term silvicultural & ecological studies: results for science and management. L.C. Irland, A.E. Camp, J.C. Brissette, & Z.R. Donohew (eds.). Global Institute for Sustainable Forestry,

School of Forestry & Environmental Studies, Yale University, New Haven, CT. GISF Res. Paper 005.

Huffman, D.W., M.M. Moore, W.W. Covington, J.E. Crouse, and P.Z. Fulé. 2001. Ponderosa pine forest reconstruction: comparisons with historical data (peer-reviewed). Pp. 3-8 *in* Vance, G. K, C. B. Edminster, W. W. Covington, and J. A Blake (compilers), Ponderosa Pine Ecosystem Restoration and Conservation: Steps Toward Stewardship. Proc. RMRS-P-22, Ogden, UT, USDA – Forest Service, Rocky Mountain Research Station.

Springer, J. D., A. E. M. Waltz, P.Z. Fulé, M. M. Moore, and W. W. Covington. 2001. Seeding versus natural regeneration: a comparison with historical data (peer-reviewed). Pp. 67-73 *in* Vance, G. K, C. B. Edminster, W. W. Covington, and J. A Blake (compilers), Ponderosa Pine Ecosystem Restoration and Conservation: Steps Toward Stewardship. Proc. RMRS-P-22, Ogden, UT, USDA – Forest Service, Rocky Mountain Research Station.

Fulé, P. Z., T. A. Heinlein, W. W. Covington, and M. M. Moore. 2000. Continuing fire regimes in remote forests of Grand Canyon National Park (peer-reviewed). Proceedings: Wilderness science in a time of change. USDA, Forest Service RMRS-P-15 Vol. 5: 242-248.

Heinlein, T. A., P. Z. Fulé, W. W. Covington, M. M. Moore, and H. B. Smith. 2000. Development of ecological restoration experiments in fire adapted forests at Grand Canyon National Park (peer-reviewed). Proceedings: Wilderness science in a time of change. USDA, Forest Service RMRS-P-15 Vol. 5: 249-254.

## **BOOK CHAPTERS**

Moore, M. M. 1994. Analysis and mapping of late-successional forests in the Southwest. Introduction. pp. 108-110. *In*: Remote Sensing and GIS in Ecosystem Management, V.A. Sample, editor. Island Press, Inc., Washington, D.C. 369 p

## **REPORTS AND PRESENTATIONS**

Strahan, R. T., D. C. Laughlin, and M. M. Moore. 2012. Using functional traits to predict demographic parameters of herbaceous perennial plants. Oral presentation at the Annual Range Ecology and Management Society Meetings, Spokane, WA. *January, 2012*.

Strahan, R. T., D. C. Laughlin, and M. M. Moore. 2011. Using functional traits to predict demographic parameters of herbaceous perennial plants. Poster presentation at the 96th Annual Meeting of the Ecological Society of America, Austin, TX. *August 7-12, 2011*.

Zegler, T. J., M. M. Moore, K.B. Ireland, M. L. Fairweather, and P. Z. Fulé. 2011. Rapid aspen decline on the southwestern edge of its range. Poster presentation, Forest Health Protection-Forest Health Monitoring, *January 2011*. <http://fhm.fs.fed.us/posters/index.shtml>

Puhlick, J. J., D. C. Laughlin and M. M. Moore. 2010. A predictive regional-scale model for

southwestern ponderosa pine regeneration densities. Oral presentation, Society of American Foresters National Convention, technical session, Albuquerque, NM; *October 2010*.

Strahan, R. T., J. D. Bakker, D. C. Laughlin and M. M. Moore. 2010. A thirty-year (1912-1941) retrospective analysis of vegetation recovery following grazing in southwestern ponderosa pine-bunchgrass forests. Poster presentation, Society of American Foresters National Convention, Albuquerque, NM; *October 2010*.

Zegler, T. J., M. M. Moore, K.B. Ireland, M. L. Fairweather, and P. Z. Fulé. 2010. Rapid aspen decline on the southwestern edge of its range. Poster presentation, Society of American Foresters National Convention, Albuquerque, NM; *October 2010*.

Puhlick, J. J., and M. M. Moore. 2010. Optimal plot size for sampling tree regeneration in ponderosa pine forests on the Coconino National Forest. Poster presentation, Southwestern Society of American Foresters Meeting, Flagstaff, AZ., *April 9, 2010*.

Moore, M. M., J. D. Bakker, D. C. Laughlin, A. J. Sánchez Meador, J. J. Puhlick, M. P. Petrova, and E. C. Turnblom. 2009. Controls on conifer regeneration patterns (1909-2011) and implications for future stand development in southwestern forests. Poster presentation, USDA-NIFA-NRI Managed Ecosystems Project Directors Meeting, Pittsburgh, PA. *November 3, 2009*.

Springer, J., D.C. Laughlin, and M.M. Moore. 2009. Restoring plant diversity in a ponderosa pine forest. *The Plant Press (Arizona Native Plant Society)* 33: 8-9.

Laughlin, D.C., M.M. Moore, and P. Z. Fulé. 2009. Long-term changes in forest structure and functional strategies in ponderosa pine forests. 10<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ, *October 6, 2009*.

Moore, M. M., A. J. Sánchez Meador, J. D. Bakker, D. C. Laughlin, D. W. Huffman, and S. D. Olberding. 2009. Ecological lessons learned from the Fort Valley Experimental Forest. Invited oral presentation at the 7<sup>th</sup> North American Forest Ecology Workshop: Ecological lessons from long-term studies in experimental forest. Logan, UT, *June 22-26, 2009*.

Moore, M. M., W. W. Covington, P. Z. Fulé, S. C. Hart, T. E. Kolb, J. N. Mast, S. S. Sackett, and M. R. Wagner. 2008. Ecological restoration experiments (1992-2007) at the G. A. Pearson Natural Area, Fort Valley Experimental Forest. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Bakker, J. D., M. M. Moore, and D. C. Laughlin. 2008. The Hill Plots: A rare long-term vegetation study. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Bakker, J. D., A. J. Sánchez Meador, P. Z. Fulé, D. W. Huffman, and M. M. Moore. 2008. 'Growing Trees Backwards': Description of a stand reconstruction model. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Chancellor, W. W., D. W. Huffman, and M. M. Moore. 2008. Characteristics of buckbrush shrubs exposed to herbivores after seven years of protection. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Crouse, J. E., M. M. Moore, and P. Z. Fulé. 2008. Revisiting Pearson's Climate and Forest Type Studies on the Fort Valley Experimental Forest. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

De Blois, B. P., A. J. Finkral, A. J. Sánchez Meador, and M. M. Moore. 2008. Early Thinning Experiments Established by the Fort Valley Experimental Forest. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Dyer, J. H., A. J. Sánchez Meador, M. M. Moore, and J. D. Bakker. 2008. Forest Structure and Tree Recruitment Changes on a Permanent Historical Cinder Hills Plot over a 130-Year Period. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Huffman, D. W., and M. M. Moore. 2008. Dynamics of Buckbrush Populations under Simulated Forest Restoration Alternatives. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Kerns, B. K., M. M. Moore, and S. C. Hart. 2008. Understanding ponderosa pine forest-grassland vegetation dynamics at Fort Valley Experimental Forest using phytolith analysis. Poster presentation, Fort Valley Exp. Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *Aug., 2008*.

Laughlin, D. C., and M. M. Moore. 2008. Forest and Range Research on the 'Wild Bill Plots' (1927-2007). Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Sánchez Meador, A. J., and M. M. Moore. 2008. 93 years of stand density and land-use legacy research at the Coulter Ranch study site. Poster presentation, Fort Valley Experimental Forest - A Century of Research 1908 – 2008 Conference, Flagstaff, AZ, *August 7-9, 2008*.

Sánchez Meador, A.J., P. F. Parysow, and M. M. Moore. 2007. Historical stem-mapped permanent plots increase precision of reconstructed reference conditions in ponderosa pine forests of northern Arizona. Poster presentation at the 9<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ *Oct./Nov. 2007*.

Bell, D. M., P. F. Parysow, and M. M. Moore. 2007. Assessing the representativeness of the oldest permanent inventory plots in northern Arizona ponderosa pine forests. Poster presentation at the 9<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ *Oct./Nov. 2007*.

Moore, M. M., J. D. Bakker, A.J. Sánchez Meador, W. W. Covington, S. D. Olberding, and C. E. Edminster. 2006. Long-term vegetation research in the Southwest: past, present, future. Oral presentation (invited speaker) at the Long-term Research Session, Society of American Foresters National Convention, Pittsburgh, PA. *October 25-29, 2006.*

Moore, M. M., A. J. Sánchez Meador, D. W. Huffman, J. D. Bakker, D. M. Bell, P. F. Parysow, and P. Z. Fulé. 2006. Long-term and anticipated changes in southwestern conifer forests: Analysis and Modeling of historical USDA permanent plot data. Oral presentation at the 2006 USDA/CSREES NRI Managed Ecosystem Project Investigators Reports; Agronomy, Crop, and Soil Science Society Meetings; Indianapolis, Indiana. November 14, 2006

Bakker, J. D., M. M. Moore, and A. J. Sánchez Meador. 2006. Land-use legacies in southwestern ponderosa pine forests: Effects of historical livestock grazing. Oral presentation at the 3<sup>rd</sup> International Fire Ecology & Management Congress, San Diego, CA. *November 13-17 2006.*

Sánchez Meador, A. J., M. Moore, and J. D. Bakker. 2006. Land-use legacies in southwestern ponderosa pine forests: Effects of past harvesting practices. Oral presentation at the 3<sup>rd</sup> International Fire Ecology & Management Congress, San Diego, CA. *November 13-17 2006.*

Sánchez Meador, A.J., J.H. Dyer, J.D. Bakker, and M. M. Moore. 2006. Quantifying Temporal Changes (1876-2004) in Tree Spatial Pattern Using Historically Mapped Permanent Plots. Oral presentation at the 2006 Western Mensurationists Meeting, Fortuna, CA. *June 18-20, 2006.*

Laughlin, D. and M. M. Moore. 2006. Climate-induced temporal variation in productivity-diversity relationships. Poster presentation at the 91st Annual Meeting of the Ecological Society of America, Memphis, TN. August, 2006.

Bakker, J. D., M. M. Moore, and A. J. Sánchez Meador. 2005. Historical studies on the Colorado Plateau: An Overview. Oral presentation at the 8<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ November, 2005.

Sánchez Meador, A. J., M. M. Moore, and J. D. Bakker. 2005. Historical studies on the Colorado Plateau: Results from two long-term data sets. Oral presentation at the 8<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ Nov. 2005.

Laughlin, D. and M. M. Moore. 2005. Plant production and diversity in a ponderosa pine forest: The importance of inter-annual climatic variability. Oral presentation at the 8<sup>th</sup> Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ November, 2005.

Bell, D.M., P. F. Parysow, and M. M. Moore. 2005. Assessing the representativeness of the oldest set of permanent inventory plots in northern Arizona ponderosa pine forests. Poster presentation at the 90<sup>th</sup> Annual Meeting of the Ecological Society of America, Ontario, Canada. August, 2005.

Sánchez Meador, A. J., P. F. Parysow, and M. M. Moore. 2004. Reconstructing Ponderosa Pine Spatial Reference Conditions in Northern Arizona Using Permanent Plots. Ecological Society of America Conference. August 1-6, 2004, Portland, OR.

Binkley, D., M. M. Moore, W. H. Romme, and P. Brown. 2004. Bringing back the Kaibab deer story: A complete case study for land stewardship. Oral Presentation at the Fifth Biennial Conference on University Education in Natural Resources, Flagstaff, Arizona, March 14-17, 2004.

Fulé, P.Z., M. Fisher, A.E. Cocke, J.E. Crouse, M.M. Moore, and W.W. Covington. 2004. Fire in the urban/wildland interface: a landscape modeling approach. Final report, Research Joint Venture Agreement No. RMRS-99158-RJVA. USDA Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.

Sánchez Meador, A. J., P. F. Parysow, and M. M. Moore. 2003. Forest stand reconstruction using historical permanent plots. Poster presentation at the 88<sup>th</sup> Annual Meeting of the Ecological Society of America, Savannah, GA. August, 2003.

Moore, M. M., Binkley, D., P. Brown, W. H. Romme, and W. W. Covington. 2003. Landscape legacies: Predators, prey, and Aldo Leopold on the Kaibab Plateau. Oral presentation at the 7<sup>th</sup> Biennial Colorado Plateau Conference, Flagstaff, AZ. Nov, 2003.

Bakker, J. D., and M. M. Moore. 2003. Historical ecology insights from long-term permanent plots: Understory vegetation on the Hill plots. Oral presentation at the 7<sup>th</sup> Biennial Colorado Plateau Conference, Flagstaff, AZ. November, 2003.

Meador, A. J., M. M. Moore, W. W. Covington, P. Z. Fulé, P. F. Parysow, D. W. Huffman, J. D. Bakker, and A. J. Meador. "Quantifying Forest Reference Conditions for Ecological Restoration: The Woolsey Plots". Southwestern Fire Initiative Conference. April 29, 2003. Flagstaff, AZ.

Moore, M. M., C. A. Casey, J.D. Springer, P. Z. Fulé, and W. W. Covington. 2002. When is understory herbaceous biomass and diversity restored?: A seven-year case study from southwestern ponderosa pine. Poster presentation at the 87<sup>th</sup> Annual Meeting of the Ecological Society of America, Tucson, AZ. August, 2002.

Bakker, J. D., M. M. Moore, J.D. Springer, and J. E. Crouse. 2002. Long-term (85-year) understory vegetation change in *Pinus ponderosa* stands in northern Arizona. Oral presentation at the 87<sup>th</sup> Annual Meeting of the Ecological Society of America, Tucson, AZ. August, 2002.

Huffman, D. W., and M. M. Moore. 2002. Response of buckbrush (*Ceanothus fendleri* Gray.) to overstory thinning and prescribed fire. Oral presentation at the 87<sup>th</sup> Annual Meeting of the Ecological Society of America, Tucson, AZ. August, 2002.

Machina, L.M., M. M. Moore, and L.E. DeWald. 2002. *Lupinus argenteus* and *Blepharoneuron tricholepis* growth and reproductive potential in ponderosa pine restoration treatments. Oral

presentation at the 87<sup>th</sup> Annual Meeting of the Ecological Society of America, Tucson, AZ. August, 2002.

Hart, S.C., J.P. Kaye, W. W. Covington, P. Z. Fulé, and M. M. Moore. 2002. Water, nutrient, and carbon fluxes following ecological restoration of southwestern ponderosa pine forests. Oral presentation at the 87<sup>th</sup> Annual Meeting of the Ecological Society of America, Tucson, AZ. August, 2002.

**SPONSORED RESEARCH (Last 5 years)**

**NOTE: \*\*M. M. Moore is Principal Investigator (PI)** unless otherwise indicated. Co-Investigators (Co-PIs) are listed where applicable. All proposals listed are/were **FUNDED** (unless indicated as pending or not funded).

<u>Project</u>	<u>Investigator</u>	<u>Sponsor</u>	<u>Amount</u>
(2012): Is Recent Aspen Mortality Linked to Extreme Drought Events?	Moore, M. M.	NAU CEFNS and Lucking Family Award	\$7,500
2011 Southwest forest dynamics: Interactions of climate and other disturbances.	Moore, M. M., . P. Z. Fulé	USFS Rocky Mountain Research Station, Research Joint Venture Agreement	\$17,930
2010 Rapid aspen decline on the southwestern edge of its range	Moore, M. M., P. Z. Fulé, and M. Fairweather	USFS Forest Health Protection	\$26,445
2009 “Rapid aspen decline on the southwestern edge of its range”	Moore, M. M.,P. Z. Fulé, and M. Fairweather	USFS Forest Health Protection	\$22,353
2008-2011 “What is driving quaking aspen decline on the Kaibab National Forest rangelands?”	Moore, M. M.,P. Z. Fulé, C. H. Sieg, and M. Fairweather	USFS Rocky Mountain Research Station, Research Joint Venture	\$86,002
2009 Long-term response of northern Arizona grasses to climate and land-use	Moore, M. M	Mission Research Board, School of Forestry	\$93,000

change			
2007 Controls on conifer regeneration patterns (1909-2011) and implications for future stand development (2012-2062) in southwestern forests	Moore, M. M., J. D. Bakker, and D. C. Laughlin	USDA-NRI Competitive Grants Program	\$399,774

## RESEARCH SUPERVISION AND ACADEMIC ADVISING

### *Undergraduate*

I also advise undergraduate students in FOR497 Independent Study or FOR485 Undergraduate Research (~1 student per year, respectively for example, 2005-08, I've advised four students in FOR485).

### *Graduate*

Major professor: 6 Ph.D. students; 13 M.S. students, 2 M.F. students. The Ph.D. program in Forestry began in July, 1994, and since that time I have served as major professor for six Ph.D. students (1 of these – in progress). Since the summer of 1987, I have served as major professor for fourteen M.S. graduate students (thesis option; 2 in progress), and two M.F. students (1 in progress). I have generated funding for all of my graduate students with either McIntire-Stennis funds, NAU School of Forestry's Bureau of Forestry Research funds or with external grants.

Thesis and non-thesis committee member. Since the spring of 1987, I have served on an average of 2-4 M. S. thesis committees per year, 1 M. F. non-thesis committee per year, and ~ 1 Ph.D. committees per year (Forestry or Biology or Environmental Science).

## Workshops and Short Courses

Instructor, CEEM Module II workshop, USFS, USDI continuing education February 2000 (Landscape Analysis Techniques)

Instructor, TREES workshop, U.S. Forest Service program to certify specialists in Silviculture. Northern Arizona University.

October 1986 (Plant Ecology); - October 1987 (Range Ecology);

October 1989, 1991, 1993, 1995 (Habitat Typing with R. Pfister, Univ. of MT).

September 1987 - 1989 (GIS and basic statistics)

## SERVICE ACTIVITIES



### ***School of Forestry and College-level***

Member, SoF Search Committee for Forest Soils position, 2011-12  
Member, College (CEFNS) Promotion and Tenure Committee, 2008-09  
Member, Committee on Faculty Service (promotion and tenure), School-level, 1992 - 1993 (Chair), 1994 - 1995, 1996 – 1997, 1999-2000 (Chair), 2002-2003 (Chair), 2003-2004, 2004-2005, 2005-2006; 2008-09; 2009-10; 2010-11; 2011-12  
Member, Curriculum Committee, 1988-1991; 2009-2010; 2010-2011, 2011-12  
Member, SoF Curriculum Review Committee, 2010-2011; 2011-12  
Member, Scholarship Committee, 2001-2002 (Chair); 2009-2010, 2010-2011, 2011-12  
Member, Research Faculty Committee, 2009-2010  
Member, Mission Research Board (reviews McIntire-Stennis proposals, etc.), 1991-1994; 1998-2000; 2001-2002, 2005-2006, 2006-2007 (Chair); 2011-12; 2012-13  
Member, Search Committee for Associate Dean, School of Forestry, 12/05-5/06.  
Member, FSC/COFS, Committee on Faculty Service, College-level, 2002-2003 (Chair)  
Member, Search Committee for Fire Science faculty position, 12/04-5/05.  
Member, Information Technology Committee, 5/99 – 7/00 (Chair); 2003-04, 2004-2005 (Chair)  
Member, College Committee, Dept. of Geography GIS Certificate Program; fall, 1999.  
Member, Search Committee for Forest Biometrician faculty position, 1/98 - 10/98.  
Member, Search Committee for Forest Ecosystem Health faculty position, 4/96 - 2/97.  
Member, Search Committee for Forest Wildlife Ecology faculty position, 10/95 - 5/96.  
Member, Ph.D. Planning Committee (1988-90) & Ph.D. Implementation Committee (1990-93)  
Member, Computer Committee, 1988-1993; Chair, 1991-1993.  
Member, Search Committee for Ecophysiology faculty position, 3/92.  
Member, Search Committee for Forest Wildlife Biologist/Management faculty position, 10/91.  
Member, Search Committee for Forest Recreation Management faculty position, 3/90.  
Advisor, Forestry Club, 1987-1988; fall, 1988.

### ***University-level***

Member, Provost's Academic Computing Council, 2002-2003; 2003-2004, 2004-2005  
Member, Undergraduate Admissions Advisory Council, fall, 1999  
Member, Undergraduate Liaison Program (Admissions), appointed, fall, 1997  
Member, Undergraduate Admissions Advisory Council, appointed 1995-1997  
Member, Search Committee for Environmental Science/Ecology Faculty position (College of Arts and Science), 10/95-4/96.  
Member, Academic Computer Services Steering Committee, appointed 1992-1994.  
Member, University Program Review Committee, 1989-1990; and re-appointed 1992-1993.

### ***Outside the University***

Reviewer, manuscripts submitted for publication for the following journals (1987-present):  
Forest Science, Ecology, Ecological Applications, Forest Ecology and Management,  
Photogrammetric Engineering and Remote Sensing, Remote Sensing of Environment, Landscape Ecology, Ecology, Rangeland Ecology and Management, Western North American Naturalist, Plant Ecology  
Reviewer, proposals for National Science Foundation (2007); USDA-National Research Initiative (NRI) competitive grants (2001-present); National Fish and Wildlife Foundation (2006)

Judge, Buell/Braun Student Awards, Ecological Society Meetings, Tucson, AZ; Aug.2002  
Member, Interagency and University Review Team, to examine the initial results of a community stewardship and land management effort in SW Colorado called "The Ponderosa Pine Forest Partnership" (San Juan National Forest). June – October, 2001.  
Program Chair, International Association for Landscape Ecology - U.S. Chapter; for two National Meetings in Tucson, AZ 1994, and Minneapolis, MN 1995.  
Member, Interagency Task Force to examine hazardous fuels Grand Canyon National Park; 9/94.  
Member, Peer Evaluation Team (3 persons), evaluated the remote sensing and GIS techniques used by the USFS Region 5 (northern California) and Region 6 (Pacific Northwest) for classifying and mapping old-growth forests in the Douglas-fir region. 1990.  
Member, Program Committee, Peaks Chapter of the Soc. of American Foresters, 1989-1991.

## **PROFESSIONAL RECOGNITION**

"Most Effective Research Mentor Award", Honorable Mention, Northern Arizona University's Research and Creativity Awards, 2010-2011.

"Researcher of the Year" Award, School of Forestry, Northern Arizona University, 2010-2011 academic year

"Teacher of the Year" Award, School of Forestry, Northern Arizona University, 2005-2006 Academic year

*Science*, 2002 (Sept. 2002), Vol. 297, p. 2196, "Out of the Vault, Into the Forest"; special insert on my historical permanent plot research

Semi-finalist, NAU's 9<sup>th</sup> Annual "Woman of the Year" award (Teaching, Research, Service), 2003

LOUIE Award, 2002, *Teaching*, Northern Arizona University

"Teacher of the Year" - Xi Sigma Pi Chapter award; School of Forestry, Northern Arizona University; 1999-2000 academic year

Co-recipient of the "Contributing to Forestry Award" for Distinguished Professional Forest Resource Management in the Southwest; presented by the Southwest Section of The Society of American Foresters; received Jan. 1998.

Presented testimony before Senate Subcommittee on Forest and Public Land Management; Senate Committee on Energy and Natural Resources (on Restoration of Forest Ecosystem Health), Flagstaff, AZ, 8/29/95; S.HAG 104-182 (P+2), pp. 189-208.

## **ACADEMIC HONOR SOCIETIES**

Gamma Sigma Delta National Agriculture Honor Society  
Sigma Xi National Research Honorary

Xi Sigma Pi (Delta Chapter) National Forestry Honor Society  
Alpha Chi (Beta Chapter) National Honor Society

**MEMBERSHIP IN PROFESSIONAL SOCIETIES**

Society of American Foresters  
Ecological Society of America  
Society for Range Management  
The Nature Conservancy

## **Document E: Individual Faculty Information**

### **ANDREW J. SÁNCHEZ MEADOR**

Assistant Professor – 9 month - Tenured

Date of Appointment: 2012 – Present

Specializations: Forest Biostatistics and Quantitative Ecology

**Northern Arizona University – School of Forestry**

### **EDUCATION:**

- 2006            Doctor of Philosophy, Forest Science;  
Northern Arizona University (NAU), Flagstaff, AZ
- 2002            Master of Science, Forestry;  
Mississippi State University (MSU), Starkville, MS,
- 1999            Bachelor of Science, Forestry;  
Mississippi State University, Starkville, MS

### **PROFESSIONAL EXPERIENCE:**

- 2012/Present    Assistant Professor of Biostatistics and Quantitative Ecology,  
School of Forestry, NAU, Flagstaff, AZ
- 2012/Present    Program Director of Biometrics and Forest Mgmt.,  
Ecological Restoration Institute, NAU, Flagstaff, AZ
- 2010/2012       Forest Restoration Program Manager Lincoln National Forest,  
US Forest Service, Alamogordo, NM
- 2007/2010       Biometrician Forest Mgmt. Service Center,  
US Forest Service, Washington Office, Fort Collins, CO
- 2002/2006       Graduate Research Assistant/Ph.D. Research,  
School of Forestry, NAU, Flagstaff, AZ
- 1999/2001       Graduate Research Assistant/M.S. Research,  
School of Forestry, MSU, Starkville, MS
- 1996/1999       Landowner Support Forester Champion International Corp.  
Jasper, AL

### **TEACHING EXPERIENCE:**

- 1999/Present    FOR 315/316 - Principles/Application of Silviculture  
FOR 315 - Forest Resources Sampling Module (2-week session)  
FOR 485 – Repeat Photography in Forestry

## RESEARCH AND TEACHING INTERESTS

Forest biometrics, statistics and applied sampling • Spatial and temporal analysis techniques • Vegetation dynamics, simulation, and process modeling • Applications of R and information design • Ecological restoration and quantitative ecology • Demographic modeling • Computer vision techniques

## PEER-REVIEWED

Gedeon, C.I., Drickamer, L.C., and A.J. Sánchez Meador. 2012. Importance of burrow-entrance mounds of Gunnison's prairie dogs (*Cynomys gunnisoni*) for vigilance and mixing of soil. *The Southwestern Naturalist*. 57(1): 100-104. [Download](#) (Impact Factor: 0.309)

Sánchez Meador, A.J., Parysow, P.F., and M.M. Moore. 2011. A new method for delineating tree patches and assessing spatial reference conditions of ponderosa pine forests in northern Arizona. *Restoration Ecology*. 19(4): 490-499. [Download](#) (Impact Factor: 1.681)

Sánchez Meador, A.J. and M.M. Moore. 2010. Lessons from long-term studies of harvest methods in southwestern ponderosa pine-Gambel oak forests on the Fort Valley Experimental Forest, Arizona, U.S.A. *Forest Ecology and Management*. 260(2): 193-206. [Download](#) (Impact Factor: 2.487)

Sánchez Meador, A.J., Parysow, P.F., and M.M. Moore. 2010. Historical stem-mapped permanent plots increase precision of reconstructed reference data in ponderosa pine forests of northern Arizona. *Restoration Ecology*. 18(2): 224-234. [Download](#) (Impact Factor: 1.681)

Sánchez Meador, A.J., Moore, M.M., Bakker, J.D. and P.F. Parysow. 2009. 108 years of change in spatial pattern following selective harvest of a ponderosa pine stand in northern Arizona, USA. *Journal of Vegetation Science*. 20(1): 79-90. [Download](#) (Impact Factor: 2.77)

Bakker, J.D., Sánchez Meador, A.J., Fulé, P.Z., Huffman, D.W., and M.M. Moore. 2008 "Growing Trees Backwards": Description of a Stand Reconstruction Model. Pp 136-142 in Olberding, S.D., and M.M. Moore (tech coords). 2008. Fort Valley Experimental Forest - A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p. [Download](#)

De Blois, B.P., Finkral, A.J., Sánchez Meador, A.J., and M.M. Moore. 2008. Early Thinning Experiments Established by the Fort Valley Experimental Forest. Pp 197-203 in Olberding, S.D., and M.M. Moore (tech coords). 2008. Fort Valley Experimental Forest - A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p. [Download](#)

Dyer, J.H., Sánchez Meador, A.J., Moore, M.M., and J.D. Bakker. 2008. Forest Structure and Tree Recruitment Changes on a Permanent Historical Cinder Hills Plot Over a 130-Year Period. Pp 214-221 in Olberding, S.D., and M.M. Moore (tech coords). 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p. [Download](#)

Sánchez Meador, A.J. and M.M. Moore. 2008. 93 Years of Stand Density and Land-Use Legacy Research at the Coulter Ranch Study Site. Pp 321-330 in Olberding, S.D., and M.M. Moore (tech coords). 2008. Fort Valley Experimental Forest - A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p. [Download](#)

Sánchez Meador, A.J. and S.D. Olberding. 2008. Fort Valley's Early Scientists: A Legacy of Distinction. Pp 331-338 in Olberding, S.D., and M.M. Moore (tech coords). 2008. Fort Valley Experimental Forest - A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53. Fort Collins, CO: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p. [Download](#)

Abella, S.R., Covington, W.W., Fulé, P.Z., Lentile, L.B., Sánchez Meador, A.J., and P. Morgan. 2007. Past, Present, and Future Old Growth in Frequent-Fire Conifer Forests of the Western United States. *Ecology and Society* 12(2): 16. [Download](#) (Impact Factor: 3.310)

## **IN REVIEW**

Rathbun, L., and A.J. Sánchez Meador. In Review. Using non-spatial models to calculate spatial indices: canopy cover estimates in the Forest Vegetation Simulator. *Forest Science*. XX(X): XX-XX. [Download](#)

Tarancón, A.A., Fulé, P.Z., Shive, K.L., Sieg, C., Sánchez Meador, A.J. and B. Strom. In Review. Simulating post-wildfire forest trajectories under alternative climate and management scenarios. *Journal of Applied Ecology*. XX(X): XX-XX. [Download](#)

Reynolds, R.T., Sánchez Meador, A.J., Youtz, J.A., Nicolet, T., Jackson, P.L., Matonis, M.S., Delorenzo, D., and A.D. Graves. In Review. Restoring resiliency and sustainability of frequent-fire forests in the Southwestern U.S.: A science-based framework. General Technical Report RMRS-GTR-XX. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

## **REPORTS AND OTHER PUBLICATIONS**

Cawrse, D., Keyser, C., Keyser, T., Sánchez Meador, A.J., Smith-Mateja, E., and M Van Dyck. 2009. Forest Vegetation Model Validation Protocols. U.S. Department of Agriculture, Forest Service, Forest Management Service Center. 10 p. [Download](#)

Sánchez Meador, A.J., 2006. Modeling spatial and temporal changes of ponderosa pine forests in northern Arizona since Euro-American settlement. Ph.D. dissertation. School of Forestry, NAU, Flagstaff, AZ. 168 p.

Friederici, P., and A.J. Sánchez Meador. 2005. Working Paper 9: Restoration of ponderosa pine forests to presettlement conditions. Ecological Restoration Institute, NAU, Flagstaff, AZ. 8 pp. [Download](#)

Moore, M.M., Huffman, D.W., Bakker, J.D., Sánchez Meador, A.J., Bell, D.M., Fulé, P.Z., Parysow, P.F., and W.W. Covington. 2004. Quantifying forest reference conditions for ecological restoration: The Woolsey plots. Final report for the Southwest Fire Initiative. Prepared for the Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ. 55 p. [Download](#)

Meador, A.J., 2001. Applications in growth and yield of longleaf pine (*Pinus palustris* mill.): A comparison of artificial neural networks and other traditional modeling methodologies. M.S. thesis. School of Forestry, MSU, Starkville, MS. 72 p.

## **PRESENTATIONS**

Desired Conditions for Restoring the Resilience of Southwestern Frequent-fire Forests. Youtz, J., P. Jackson, T. Nicolet, R.T. Reynolds, and A.J. Sánchez Meador. 2012. National Convention of the Society of America Foresters, Spokane, WA.

Tree Spatial Patterns and “The Art of Looking Sideways.” Sánchez Meador, A. J. 2012. No. Az. Univ., School of Forestry Seminar Series. Flagstaff, AZ. [invited presentation]

Canopy Cover: Spatial Statistics Developed from the Non-Spatial Model FVS. \*Rathbun, L. and A.J. Sanchez Meador. 2011. National Convention of the Society of America Foresters, Honolulu HI.

Ponderosa Pine: Past Present and Future. \*Sánchez Meador, A.J. 2011. Southwest Interagency Fuels Workshop, Southwest Fire Science Consortium. Flagstaff, AZ. [invited presentation]

Controls on conifer regeneration patterns (1909-2011) and implications for future stand development in southwestern forests. \*Moore, M.M., J.D. Bakker, D.C. Laughlin, A.J. Sánchez Meador, J.J. Puhlick, M.P. Petrova, and E.C. Turnblom. 2009. USDA CSREES NRI Managed Ecosystems Annual Awardee Meeting, Pittsburgh, PA. [invited presentation]

Ecological lessons learned from the Fort Valley Experimental Forest. \*Moore, M.M., A. Sánchez Meador, J.D. Bakker, D.C. Laughlin, D.W. Huffman, and S.D. Olberding. 2009. North American Forest Ecology Workshop, Logan, UT.

Long-term forest structure and tree recruitment changes on a cinder hills permanent sample plot in northern Arizona. \*Dyer, J.H., A.J. Sánchez Meador, M.M. Moore, and J.D. Bakker. 2008. Fort Valley Centennial Conference, Flagstaff, AZ. [poster presentation]

Heterogeneity of tree sizes within stands decreases Eucalyptus growth. \*Stape, J.L., A.J. Sánchez Meador, and D. Binkley. 2008. IUFRO conference on Factors Influence Productivity in Tropical Plantations, Porto Seguro, Bahia, Brazil. [poster presentation]

Using FIA data and FVS in support of state-and-transition planning models. Vandendriesche, D. and Sánchez Meador\*, A.J. 2008. National Convention of the Society of American Foresters. Reno, NV. [invited presentation]

Facilitating consistency in volume and biomass estimation using National Estimator Libraries. Oberle\*, M., D. A.J. Sánchez Meador, and K. Cormier. 2008. Forest Inventory and Analysis Symposium, Park City, UT.

Using PPP and remote sensing to estimate biomass for forest stewardship projects. Sánchez Meador\*, A.J., Ken Cormier, Matt Oberle, Gary Boyack, and Dave Johns. 2007. National Convention of the Society of America Foresters, Portland, OR. [poster presentation]

Historical stem-mapped permanent plots increase precision of reconstructed reference conditions in ponderosa pine forests of northern Arizona. Sánchez Meador, A.J., P.F. Parysow\*, and M.M. Moore. 2005. 9th Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ.

3P Remote Sensing (3PRS): An efficient way to estimate stand volume in low value/biomass timber. Oberle\*, M., D. Johns, K. Cormier, G. Boyack, and A.J. Sánchez Meador. 2007 National Silviculture Workshop, Ketchikan, AK. [poster presentation]

Land use legacies in southwestern ponderosa pine forests: Effects of historical harvesting practices. Sánchez Meador\*, A.J., M.M. Moore, and J.D. Bakker. 2006. "Do past management activities compound the effects of fire exclusion in western forests?" Special Session, 3rd International Fire Ecology and Management Congress, San Diego, CA. [invited presentation]

Land use legacies in southwestern ponderosa pine forests: Effects of historical livestock grazing. Bakker\*, J.D., M.M. Moore, and A.J. Sánchez Meador. 2006. "Do past management activities compound the effects of fire exclusion in western forests?" Special Session, 3rd International Fire Ecology and Management Congress, San Diego, CA. [invited presentation]

Quantifying long-term changes in ponderosa pine spatial pattern and stand development using the Woolsey plots. Sánchez Meador\*, A.J. 2006. Department of Forestry, Mississippi State Univ., MS.



Long-term vegetation research in the Southwest: past, present, future. \*Moore, M.M., J.D. Bakker, A.J. Sánchez Meador, W.W. Covington, C. Edminster, and S.D. Olberding. 2006. “Managed Ecosystems: Results from Research, Education and Extension USDA CSREES National Research Initiative Projects, 2006”. Agronomy, Crop, and Soil Science Societies Meeting, Indianapolis, IN. [invited presentation]

Long-term vegetation research in the Southwest: Past, present, future. Moore\*, M.M., J.D. Bakker, A.J. Sánchez Meador, W.W. Covington, S.D. Olberding, and C.B. Edminster. 2006. “Long Term Forest Research: Sustaining a Scientific Legacy” Symposium, National Convention of the Society of American Foresters. Pittsburgh, PA.

Quantifying temporal changes (1876-2004) in tree spatial pattern using historically mapped permanent plots. Sánchez Meador\*, A.J., J.H. Dyer, J.D. Bakker and M.M. Moore. 2006. Western Mensurationists' Meeting, Fortuna, CA.

Historical studies on the Colorado Plateau: Results from two long-term data sets. Sánchez Meador\*, A.J., M.M. Moore, and J.D. Bakker. 2005. 8th Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ.

Historical studies on the Colorado Plateau: An overview. Bakker\*, J.D., M.M. Moore, and A.J. Sánchez Meador. 2005. 8th Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ.

Reconstructing ponderosa pine spatial reference conditions in northern Arizona using permanent plots. Sánchez Meador\*, A.J., P.F. Parysow, and M.M. Moore. 2004. 89th Annual Meeting of the Ecological Society of America, Portland, OR. [poster presentation]

Quantifying forest reference conditions for ecological restoration: The Woolsey plots. \*Meador, A., M. Moore, W. Covington, P. Fulé, P. Parysow, D. Huffman, and J. Bakker. 2003. Southwest Fire Initiative Conference, Flagstaff, AZ.

**SPONSORED RESEARCH GRANT ACTIVITY**

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2012. Modeling snag fall and downed log decay rates in southwestern ponderosa pine forests.	Sánchez Meador, A.J	McIntire-Stennis, Mission Research	\$86,000
2010. Characterizing Crown Biomass and Crown Density Profiles in Conifer Forests of the Interior Northwest. National	Affleck, D.L.R., J. Goodburn, L.P. Queen, A.J. Sánchez Meador, C. Seielstad, and R.E. Keane	National Interagency Fire Center, Joint Fire Science Program	\$394,364

Interagency Fire Center			
2008. Controls on historical and contemporary tree regeneration patterns (1909-2009) and implications for future stand development (2010-2060) in southwestern forests	Moore, M.M., J.D. Bakker, D. Laughlin and A.J. Sánchez Meador.	USDA National Research Initiative (NRI) Competitive Grants Program, USDA	\$399,774
2005. A conceptual framework of vegetation dynamics in ponderosa pine forest ecosystems of the Southwest	Moore, M.M., J.D. Bakker, and A.J. Sánchez Meador.	Integrative Environmental Research Program, Merriam-Powell Center for Environmental Research	\$1,717

### **In Review**

Rollins, K.S., Christman, L.S., Sanchez Meador, A.J., & Taylor, M.H. 2012. Economic returns to fuels treatments measured as wildfire suppression costs avoided. United States Department of the Interior, Bureau of Land Management, Joint Fire Science Program. 2013-2015. \$354,309.

Sanchez Meador, A.J. 2012. Old Meets New: Using Aerial Photography and Computer Vision to Quantify Vegetation Structure. Northern Arizona University Faculty Grant Program. 2013-2014. \$9,744.

Huang, C., & Sánchez Meador, A.J. 2012. The Economics of Fuel Treatment Effectiveness in the Southwest Forest. United States Department of the Interior, Bureau of Land Management, Joint Fire Science Program. 2013-2015. \$433,998.

Huffman, D.W., Sanchez Meador, A.J., & Waltz, A. 2012. Using landscape metrics to compare effectiveness of managed wildfire and mechanical thinning for restoring southwestern ponderosa pine forests. United States Department of the Interior, Bureau of Land Management, Joint Fire Science Program. 2013-2015. \$105,288.

### **Unsuccessful**

Sánchez Meador, A.J., K.M. Sánchez Meador, and C. Stewart. 2011. Southern Sacramento Mountains Restoration Project. Collaborative Forest Landscape Restoration Program , USDSA Forest Service. 2011-2021. \$7,972,144

Abella, S., A.J. Sánchez Meador, C.W. Denton, D.G. Brewer and M. Manthei. 2009. Assessing fuel treatment longevity in ponderosa pine forests: Using untapped silvicultural resources. National Interagency Fire Center, Joint Fire Science Program, 2009-2011. \$317,600

Abella, S., A.J. Sánchez Meador, C.W. Denton, D.G. Brewer and J. S. Bradybaugh. 2009. Developing a comprehensive guide to forest thinning for fuel reduction in frequent-fire ponderosa pine and mixed conifer forests. National Interagency Fire Center, Joint Fire Science Program, 2009-2010. \$140,100

Sánchez Meador, A.J., T. Matney, and E.B. Schultz. 2007. Development and Delivery of a National Woody Biomass Estimator Library (NWBEL). National Interagency Fire Center Joint Fire Science Program, 2007-2008. \$119,400

Moore, M.M., A.J. Sánchez Meador, J.D. Bakker, and D.C. Laughlin. 2006. Controls on historical and contemporary tree regeneration patterns (1909-2009) and implications for future stand development (2010-2060) in southwestern forests. USDA CSREES National Research Initiative Program. Pre-proposal accepted; final proposal in December 2006. \$400,000

Moore, M.M., J.D. Bakker, A.J. Sánchez Meador, and D.W. Huffman. 2005. A multi-scaled assessment of temporal and spatial patterns in southwestern forests: long-term dynamics and effects of restoration treatments. USDA CSREES National Research Initiative Program. Submitted in December 2005. \$400,000

### **Scientific Journal Reviews**

Forest Ecology & Management (7)

Canadian Journal of Forest Research (3)

Forest Science (3)

### **Mentor**

Hooper Undergraduate Research Program, NAU, Flagstaff, AA

Co-Advised (w/ M. Moore) 2 students August 2005 - December 2006

### **SERVICES**

Southwest Fire Science Consortium - Review & Evaluation Committee Member, (August 2011 - present)

Society of American Foresters - Board Member (Western Regional), Forest Science and Technology Board, (January, 2013 - Present)

Board Member (Natural Resources), Forest Science and Technology Board, (October 2011 - 2013)

A1 Working Group Chair (Inventory and Biometrics), Forest Science and Technology Board, (October 2008 - October 2010)

Invited Panel Participant: 2011 Southwest Interagency Fuels Workshop, Southwest Fire Science Consortium (March 2011)

University/Academic Representative: Southwestern Region Silviculture Certification Panel, Forest Service (Spring 2010 - present)

Statistical Consultant: Provide statistical advice and assistance to various research staff, students, and manager/biologists including experimental design, sampling, statistical modeling development and selection, and software/programming design/implementation (January 2002 - present)

Invited Author/Participant: Old-growth writing workshop, “Managing old growth in frequent-fire forests of the West”, conducted by the National Commission on Science for Sustainable Forestry, the Ecological Restoration Institute, and the Southwestern Ecological Restoration Institutes (April 2006)

Student-Faculty Representative and Chair: NAU Forestry Graduate Student Association (August 2003 – December 2004)

President: MSU College of Forest Resources Dean’s Council (August 1996 – July 1998)

President: MSU Forestry Club (August 1995 – July 1996)

## **AWARDS**

Outstanding Contribution to Forestry Award; Society of American Foresters SW Chapter (2012)

## **PROFESSIONAL ACTIVITIES**

### **Professional Memberships**

Society of American Foresters (1998-Present)

Xi Sigma Pi Honor Society (inducted in 1999)

Western Mensurationists (2005-2010)

Association of Fire Ecology (2006-2008)

Ecological Society of America (2002-2008)

Registered Foresters of Mississippi; #02078 (2000-2002)

## **Document E: Individual Faculty Information**

### **AREGAI TECLE**

Professor – 9 month – Tenured

Date of Appointment: 2000 – Present

Specializations: Hydrology and Decision Systems Analysis

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

- 1988 Ph.D., University of Arizona Hydrology/Decision Agric. Econ. Tucson, Arizona Systems and Analysis
- 1986 M.S., University of Arizona Tucson, Arizona. Hydrology
- 1979 M.S., Ball State University, Muncie, Indiana, Natural Res/Energy. Geology
- 1980 Ph.D. program, Ball State University Muncie, Indiana
- 1971 B.A., Anderson University, Anderson, Indiana. Major: Biology Chemistry
- 1969 Ahmadu Bello University, Zaria, Nigeria. Pre-veterinary medicine
- 1968 Addis Ababa University, Addis Ababa, Ethiopia. Pre-medicine

### **PROFESSIONAL EXPERIENCE**

- 2000/Present Professor of Hydrology and Decision Systems Analysis, NAU
- 2000/Present Professor of hydrology and decision systems analysis with teaching and research focus on hydrology, water quality, riparian area and watershed restoration and multicriterion/multi-objective decision-making and conflict resolution in natural resources management
- 2009/2010 Visiting Professor, Graduate program in Environmental Science, Addis Ababa University
- 2009/2010 Research Fellow, Africa Union Headquarters in Addis Ababa, Ethiopia

### **TEACHING EXPERIENCE:**

- 2008/Present
- FOR 222 Environmental Conservation
  - FOR326W Watershed Management
  - FOR 340 & FOR 340H Environmental Hydrology
  - FOR 340 & FOR 340L Environmental Hydrology Laboratory
  - FOR 465 Watershed restoration
  - ENSC 731 Urban Environmental Systems Analysis (in Ethiopia)
  - ENSC 612 Water Resources Management (in Ethiopia)
  - FOR 563 Watershed Hydrology
  - FOR 565 Watershed restoration

## **Non-Credit teaching experience during 2003 – 2011**

- 2008/2009      Workshop organized on Navajo Nation Hydrology Capacity Building  
2006/ 2009      Seminar presentation at the 22<sup>nd</sup> International seminar on forest  
Administration and management in Flagstaff, Arizona, October 1 – 22, 2006.

## **REFERRED ARTICLES:**

Teclé, A., P. Heinrich, J. Leeper, J. Tallsalt-Robertson and A. Garcia. 2012. Development of a rainfall-runoff model for Black Creek Watershed, Navajo Nation. *Hydrology and Water Resources in Arizona and the Southwest*, Vol. 42.

Patrick, B and A. Teclé. 2012. Water Supply and Groundwater Issues in the Upper Verde Valley of Arizona. *Hydrology and Water Resources in Arizona and the Southwest*, Vol. 42.

Dai, I. and A. Teclé. 2012. An attempt at water yield modeling in the Centennial forest in northern Arizona. *Hydrology and Water Resources in Arizona and the Southwest*, Vol. 42.

Teclé, A. and S. Jibrin. 2011. Incorporating fuzzy logic and stochastic processes in multiobjective forest management. *Hydrology and Water Resources in Arizona and the Southwest*, Vol. 41.

Dai, I. and A. Teclé. 2011. Chevelon Canyon Trend Analysis using vulnerability Indicators. *Hydrology and Water Resources in Arizona and the Southwest*, Vol. 41.

Poff, Boris A.; Teclé, Aregai; Neary, Daniel G.; Geils, Brian. 2010. Compromise Programming in forest management. *Journal of the Arizona-Nevada Academy of Science*. 42(1):44-60.

Ogbaharya, D. and A. Teclé. 2010. comparative analysis of community-based natural resources management in Eritrea and Ethiopia. *Journal of East African Studies*.4(3):490-509.

Buschmann, S. and A. Teclé. 2009. Weir removal and riparian restoration to improve parts of the Issel River in Northwestern Germany. *Hydrology and Water Resources in Arizona and the Southwest* 39:27-34.

Perez-Verdin, Gustavo, Yeon-Su Kim, Denver Hospodarsky, and Aregai Teclé. 2009. Factors Driving Deforestation in Common-Pool Resources in Northern Mexico. *Journal of Environmental Management* [90\(1\)](#):331-340.

Perez-Verdin, Gustavo, Hernandez diaz, Jose Ciro, Marquez-Linares, Marco Antonio , Aregai Teclé. 2009. Aplicación de técnicas multicriterio en el manejo integral forestal en Durango, México. *Madera y Bosques* 15(1):27-46.

Teclé, A. 2007. Sustainable natural resources management in an era of global climate change. *Forum on Public Policy* 3(4):443-454.

## **OTHER PUBLICATIONS:**

Teclé, A. and A. Desta. 2011. Hydrologic Modeling to Determine Water Yield from an Arizona Forested Watershed. Proceedings of the 24th Symposium of the Arizona Hydrological Society, held at the High Country Conference Center in Flagstaff, AZ., Sept. 18 -20, 2011.

#### **PUBLISHED BOOK CHAPTERS:**

Poff, B., D.G. Neary, V. Henderson, and A. Teclé. **2012**. The hidden treasures of long-term paired watershed monitoring in the forests and grasslands of Arizona, USA. In: Revisiting Experimental Studies in Forest Hydrology. IAHS Publication 353, Pp. 42-48.

Poff, Boris; Aregai Teclé; Daniel G. Neary and Brian W. Geils. **2012**. Spatio-temporal multi-objective decision making in forest management. Pp. 121-129, In C. Van Riper III, M. Villarreal, C. van Riper, and M. Johnson, eds. The Colorado Plateau V: Research, environmental planning, and management for collaborative conservation. The University of Arizona Press, Tucson, AZ.

Teclé, A. 2010. Sustainable management of natural resources in an era of global climate change. Pp. 419-433, In Ruth A. Reck (ed.), Climate Change and Sustainable Development. Linton Atlantic books, Ltd., Cambridge, UK.

Poff, B., D. Neary, and A. Teclé. 2010. Fire and fire surrogate treatment impacts on soil moisture condition in southwestern ponderosa pine forests. Pp. 121-129, In C. Van Riper III, B.F. Wakeling and T.D. Sisk (eds.), The Colorado Plateau IV: Shaping Conservation through Science and Management. The University of Arizona Press, Tucson, Arizona.

#### **RESEARCH RESULTS AND OTHER REPORTS:**

Teclé, A., G. Garfin, P. Heinrich, D. Anderson, N. Cobb, M. Dai, J. Leeper, J. Tallsalt-Robertson. 2009. AWI-08-51 Hydroclimate Management Capacity Building and Watershed-based Precipitation-Runoff Modeling in the Navajo Nation. Submitted to the Navajo Nation and published at NAU Website.

Garfin, G., A. Ellis, N. Selover, D. Anderson, A. Teclé, P. Heinrich and M. Crimmins. 2007. AWI-07-21, Assessment of the Navajo Nation hydroclimate network, A final Report to the Arizona Water Institute.

Teclé, A. G. Garffin, G., and D. Anderson, 2007. Stream flow gaging stations in the Navajo Nation: their present conditions and some recommendations for the future. Submitted to Arizona Water Institute.

Boris Poff.. 2007. Modeling the ponderosa pine forest ecosystem in a dynamic multiobjective

decision-making framework on a landscape scale, a Ph.D. dissertation submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Forest Science, Northern Arizona University, Flagstaff, AZ.

Jackson leanard. .2007. The influence of parent material on vegetation response 15 years after the Dude Fire, Arizona, a Master's thesis submitted in partial fulfillment of the requirement for the degree of Master of Science in Forestry, Northern Arizona University, Flagstaff, AZ.

### **PRESENTATIONS:**

Patrick, B. and A. Teclé. 2012. Water Supply and Groundwater Issues in the Upper Verde Valley of Arizona. Presented at the 56th meeting of the Arizona Nevada Academy of Science at Glendale College in Glendale, Arizona, April 14.

Dai, I. and A. Teclé. 2012. Presented at the 56th Annual meeting of the Arizona Nevada Academy of Science at Glendale College in Glendale, Arizona, April 14.

Teclé, A. and A. Desta. 2011. Presented at the 24th Annual Symposium of the Arizona Hydrological Society at the High Country Conference Center in Flagstaff, AZ, Sept. 18 -20.

Teclé, A. and S. Jibrin. 2011. Incorporating fuzzy logic and stochastic processes in multiobjective forest management. Presented at the 53rd Annual Meeting of the Arizona Nevada Academy of Sciences at Glendale College in Glendale, Arizona on April 9, 2011.

Dai, I. and A. Teclé. 2011. Chevelon Canyon climate change trend analysis using vulnerability indicators. Presented at the 53rd Annual Meeting of the Arizona Nevada Academy of Sciences at Glendale College in Glendale, Arizona on April 9, 2011.

Teclé, A. 2010. Ethiopia and my sabbatical/Fulbright Fellowship experience. Presented at School of Forestry Seminar Series on November 10, 2010.

Teclé, A. and A. Assefa. 2010. Precipitation-runoff relationship modeling to determine water yield from a ponderosa pine forest watershed. Society of American foresters Annual Symposium, held in Albuquerque, NM, on Oct. 2-5.

Koestner, K. A., D. G. Neary, G. J. Gottfried, and A. Teclé. 2010. Morphological response of small watersheds in the Southwestern oak-savannas to warm and cool season prescribed fire: Peloncillo Mountains, NM. Presented at the Geological society of America annual meeting in Denver, CO. in Oct. 31 – Nov. 3.

Koestner, K. A., D. G. Neary, G. J. Gottfried, and A. Teclé. 2010. Evaluating channel morphology in small watersheds of oak-savannas in Southwestern New Mexico, U.S.A.: Do seasonal prescribed burn treatments have a significant impact on sediment processes? Presented at the European Geosciences Union General Assembly in Vienna, Austria on May 2 – 7.



Teclé, A. 2010. The role and responsibilities of universities to promote environmental protection and safety, an invited talk given at the 2010 World Environment Day celebration workshop held in the College of Natural Sciences, Addis Ababa University.

Teclé, A. 2010. Conflict Management in an ethnically and religiously diverse society. An invited talk given to students and faculty of the Trinity College of Theology in Addis Ababa, Ethiopia.

Teclé, A. 2010. The Role of the African Union on Effective Conflict Management in Africa. An invited talk given to students and staff from Seton Hall University in the United States who were visiting Ethiopia at the time.

Teclé, A. 2010. Sustainable Management of Natural Resources in an Era of Global Climate Change. An invited talk given at a climate Change Management Workshop for natural resources management experts from East African Countries at Addis Ababa University in Addis Ababa, Ethiopia.

Teclé, A. 2010. The Challenges and Opportunities of Mainstreaming Environment and Sustainability in Ethiopian Higher Education. Opening talk at the First Mainstreaming Environment and Sustainability in Ethiopian Higher Education Symposium held at the UN Economic Commission for Africa Conference Center on May 6 and 7, 2010.

Teclé, A., Angie Garcia, Paul Heinrich, Gregg Garfin, Diana Anderson, John Leeper, and Jolene Tallsalt-Robertson. 2009. Development of a rainfall-runoff model for Black Creek watershed, Navajo Nation. Presented at the 53rd Annual Meeting of the Arizona-Nevada Academy of Sciences in Tucson, Arizona. April 4.

Buschmann, S. and A. Teclé. 2009. Small scale restoration plan for the Issel River. Presented at the 53rd Annual Meeting of the Arizona-Nevada Academy of Sciences in Tucson, AZ April 4.

Teclé, A. 2009. Lessons learned from evaluating Navajo Nation surface water measurement and monitoring. Presented at the Second Annual Winter Watershed Conference of the Little Colorado River Watershed Coordinating Council. Show Low, Arizona. January 28-30.

Teclé, A. 2008. Water balance approach to rainfall-runoff modeling in North Central Arizona. Presented at the 3rd American Institute of Professional Geologists, 3rd International Professional Geologists Conference and 43rd Arizona hydrological Society Meeting in Flagstaff, Arizona. September 19-23.

Hoenig, M. and A. Teclé. 2008. Using controlled floods to restore the Grand Canyon. Presented at the 45th American Institute of Professional Geologists, 3rd International Professional Geologists Conference and 21st Arizona hydrological Society Meeting in Flagstaff, Arizona. September 19-23.

Teclé, A. 2008. Surface water measurement and monitoring in the Navajo nation. Presented at the 5th Annual Navajo Nation Drinking Water Supply Conference at Fort McDowell Resort in Scottsdale, Arizona on June 16 through 19.

Teclé, A. 2008. The state of surface water measurements in the Navajo Nation. Presented at the Navajo Hydroclimate Data Measurement, Storage and Processing Workshop in Window Rock, Arizona on June 12 and 13.

Teclé, A. 2008. Global Climate Change Effects on Natural Resources: Challenges and Possible Solutions. Presented at the 2008 Focus the Nation at Northern Arizona University, Flagstaff, in AZ.

Teclé, A., G. Garfin, M. Crimmins, N. Selover, A. Ellis, D. Anderson, N. Cobb, P. Heinrich, E. Alden, J. Leeper, J. Tallsalt-Robertson and T. Showa. 2007. The state of stream flow measurement, data quality and adequacy in the Navajo Nation. Presented at the 9th Biennial Conference of Research on the Colorado Plateau, Northern Arizona University in Flagstaff, AZ, Oct. 29- Nov. 1.

Alden, E. and A. Teclé. 2007. Invasion by exotic plant species of Northern Arizona riparian areas and possible solutions. Presented at the 9th Biennial Conference of Research on the Colorado Plateau, Northern Arizona University in Flagstaff, AZ, Oct. 29- Nov. 1.

Hoenig, M. and A. Teclé. 2007. Changes in precipitation in the Chevelon Creek Watershed of Arizona. Presented at the Ninth Biennial Conference of Research on the Colorado Plateau at the du Bois Center, Northern Arizona University in Flagstaff, AZ, Oct. 29- Nov. 1

Poff, B., D.G. Neary and A. Teclé. 2007. The Effects of Fire and Fire surrogate treatments on soil moisture availability in southwestern ponderosa pine forests. Presented at the 2007 Annual Conference of the American Water Resources association in Albuquerque, NM.

Poff, B., D.G. Neary and A. Teclé. 2007. Fire and Fire surrogate treatment impacts on soil moisture condition in southwestern ponderosa pine forests. Presented at the 9th Biennial Conference of Research on the Colorado Plateau, Northern Arizona University in Flagstaff, AZ, Oct. 29- Nov. 1.

Teclé, A. 2007. Sustainable natural resources management in an era of global climate change. Presented at the Oxford Round Table on Global Warming and Sustainable Development: Governing a Crisis, an Interdisciplinary Perspective at Saint Anne's College, Oxford University in August 12-17.

Koestner, K.A., D.G. Neary, G.J. Gottfried, and A. Teclé. 2007. Comparing bedload conditions in the Cascabel Watersheds, Coronado National Forest. Presented at the 51st Annual Meeting of the Arizona-Nevada Academy of Sciences in Flagstaff, Arizona. March 31.

Teclé, A. and A. Desta. 2007. Modeling precipitation-runoff relationships for water yield from Arizona's forested watersheds. Presented at the 51st Annual Meeting of the Arizona-Nevada Academy of Sciences in Flagstaff, Arizona. March 31.

Poff, B., and A. Tecele, D.G. Neary, B. Geils, and R. Huang. 2007. Spatio-temporal multiobjective decision-making in forest watershed management. Presented at the 51st Annual Meeting of the AZ-NV Academy of Sciences in Flagstaff, Arizona. Mar 31.

Garfin, G., A. Tecele, D. Anderson, M. Crimmins, A. Ellis, J. Leeper, N. Selover, and J. Tallsalt-Robertson. 2007. Evaluation of Navajo Nation's hydroclimate network: Preliminary report. Presented at the 51st Annual Meeting of the Arizona-Nevada Academy of Sciences in Flagstaff, Arizona. March 31.

Gustavo Perez-Verdin, Yeon-Su Kim, Denver Hospodarsky, and Aregai Tecele. 2007. Factor Driving deforestation in common-pool resources in Durango, Mexico. Presented at the 2007 SOFEW global change and forestry: economic and policy implications conference in Mississippi State University, March 4-6, 2007.

M. Hoenig, and A. Tecele. 2007. Investigating the state of Chevelon Creek and possible restoration alternatives. Presented at the 51st Annual Meeting of the Arizona-Nevada Academy of Sciences in Flagstaff, Arizona. March 31.

#### RESEARCH AND OTHER GRANTS FUNDED

<u>Project</u>	<u>Investigator</u>	<u>Sponsor</u>	<u>Amount</u>
2011 Travel support for 4 students to attend and present papers at the 53rd Annual Meeting of the Arizona	PI	Nevada Academy of Science at Glendale College in Glendale, AZ	\$150.00
2009 -2013. Wildfire and fire prevention vegetation treatment impacts on forest hydrology	PI	BFR funding, School of Forestry, Northern Arizona University	\$98,000
2009- 2010 ). To teach at Addis Ababa University and do research at Africa Union in addis Ababa, Ethiopia	PI	US Department of State Arizona and the Council for International Exchange of Scholars (Fulbright Scholar Program).	\$119,360.00
2007-2009 Hydroclimate capacity building in the Navajo Nation	PI	Arizona Water Institute	\$50,000
2007. Request to	PI	USDA Forest	\$3,401.00

fund a weather station and two stream gauge sheds		Service Rocky Mountain Research Station	
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## **MAJOR PROFESSIONAL SELF-IMPROVEMENT ACTIVITIES**

2012 - Sustainability Commission working procedures and responsibilities training, Flagstaff City Hall, on April 21.

2012 – Faculty Grievance Committee Training, Cline Library, Northern Arizona University, March 24.

2007 - Received a certificate for participation in a Oxford Round Table on Global Warming and Sustainable Development: Governing a Crisis, an Interdisciplinary Perspective at Saint Anne's College, University of Oxford in August 12-17.

2007 - Received a certificate for participation in a workshop on an Institute on Educating Beyond our Borders: Race, Ethnicity, Identity, and Privilege at the National Conference on Race and Ethnicity in San Francisco, CA on May 29 – June 2.

## **CONFERENCES, MEETINGS, AND WORKSHOPS**

2012 - Arizona Nevada Academy of Sciences 56th Annual meeting. Held at Glendale College in Glendale Watershed restoration 3, AZ on April 14.

2011 – Verde River Partnership Annual Meeting, Verde Valley Campus of Yavapai College in Clarkdale, Arizona, Dec. 12.

2011 – Arizona Hydrological Society 24th Annual Symposium held at the High Country Conference Center in Flagstaff, AZ., Sept. 18-20.

2011 – Workshop on Water management and climate change in Northern Arizona. Held at the High country conference Center in Flagstaff, AZ on June 8.

2011 – Arizona Nevada Academy of Sciences 55th Annual meeting. Held at Glendale College in Glendale, AZ on April 9.

2010 – American Society of Foresters 2011 Annual conference. Held at the Albuquerque Convention Center in Albuquerque, NM on Oct. 2 -5.

2010 – First symposium on Mainstreaming environment and Sustainability Education in Ethiopian universities. Participants in the symposium include presidents of 19 Ethiopian universities, University of Juba administrators, leaders of private colleges in Addis Ababa, civil society leaders and donor agency representatives. Held on May 6-7, 2010.

2010 - A stakeholders' consultative workshop on the proposed PhD in Environmental Science in the Graduate Program in Environmental Science at Addis Ababa University on May 11.

2010 - A workshop to celebrate World Earth Day in which I was also the facilitator. It convened in the College of Natural Sciences, Addis Ababa University, June 4, 2010.

2009 - 53rd Annual Meeting of the Arizona Nevada Academy of Science in Tucson, Arizona, April 4.

2009 - Second Annual Winter Watershed Conference of the Little Colorado River Watershed Coordinating Council. Show Low, Arizona. January 28-30.

2009 - 89th American Meteorologists Association Annual Meeting at the Phoenix Convention Center, Phoenix, AZ. January 11-15.

2008 – Colorado River Basin Science and resources Management Symposium on Coming Together: Coordination of Science and Restoration Activities for the Colorado River Ecosystem at the Doubletree Resort Hotel, Scottsdale, AZ., November 18-20.

2008 - 45th Annual Meeting of the American Institute of Professional Geologists, 3rd International Professional Geology Conference and 21st Arizona hydrological Society Annual Meeting in Flagstaff, Arizona. September 19-23.

2008 - 5th Annual Navajo Nation Drinking Water Supply Conference at Fort McDowell Resort in Scottsdale, Arizona on June 16 through 19.

2008 - Navajo Hydroclimate Data Measurement, Storage and Processing Workshop in Window Rock, Arizona on June 12 and 13.

2008 - Focus the Nation at Northern Arizona University, Flagstaff, AZ

2007 - 9th Biennial Conference of Research on the Colorado Plateau, Northern Arizona University in Flagstaff, AZ, Oct. 29- Nov. 1.

2007 - Oxford Round Table on Global Warming and Sustainable Development: Governing a Crisis, an Interdisciplinary Perspective at saint Anne's College, University of Oxford, England in August 12-17.

2007 - Arizona Nevada Academy of Sciences 51st Annual Meeting held at Northern Arizona University in Flagstaff, AZ, March 31.

2007 - A conference on the Tuareg Culture and Society at Stanford University, on June 2.

## **ADVISING/MENTORING**

### ***Graduate student theses and dissertations supervised or supervising***

Graduate students in progress- 3  
 Graduate students completed- 3  
 Thesis and dissertation committee member for 25 other students  
 Undergraduate students: 5 - 12 students each year.

**Administrative, adult education, and extension responsibilities last five years**

**University committees**

<i>Activities</i>	<b>Time of Service</b>
NAU Grievance Committee member	2010 – to date
Faculty Search Committee, NAU Physics and Astronomy Department	2010 - 2011
Advisory Board member. Arizona Water Institute (NAU part)	2005 – 2009
New faculty mentor, NAU Faculty Development Program	2005 – 2009
Elected Chair – NAU Commission on Ethnic Diversity	2005 –2007
NAU CED Minority Student Recruitment & Retention Committee	2004 – to date
NAU Liberal Studies Committee	2002 – 2009
NAU Commission on Ethnic Diversity (CED)	1996–to date
NAU Commission on Ethnic Diversity Executive Board Member	1997–to date
<b><i>School of Forestry Service Activities:</i></b>	<b>Time of Service</b>
Member Soil and Ecosystem Ecology faculty recruiting committee	2011-2012
Member –Adjunct 4 faculty application review committee	2011-2012
Chair – Academic Review Committee	2010 – to date
Member, Forest Health /Entomology faculty recruiting committee	Spring 2008
Forestry Organizational Alternatives Committee (FOAC)	2007 – 2008
Coordinator - Water and Watershed restoration focus area	2006 – to date
Chair – Ethnic and Cultural Diversity Program Committee	2005 – to date
Faculty Status Committee	2002 – 2009
Forestry Club member,	1988 - to date

**SPECIAL PROFESSIONAL RECOGNITION**

Provost’s Award for Excellence in Global Learning for 2011 given by Northern Arizona University’s Office of International Studies

Senior Fulbright Fellow to work at Africa Union Commission Headquarters in Addis Ababa, Ethiopia and at Addis Ababa University in Addis Ababa, Ethiopia

Outstanding Service Award, Arizona Nevada Academy of Sciences

Member 24<sup>th</sup> Annual Conference Organizing Committee, AHS

Member Fulbright Program Alumni Association

Represented NAU at the invitation to NBC News/Discover Town Hall and Reception at ASU in Tempe, AZ on August 25.

Invited participant in the Coconino County group discussion for University of Arizona Extension weather and climate project in the School of Forestry at NAU on July 26.

US Department of State invited presenter at the 2011 Pre-departure Orientation for US Fulbright Scholars and Students going to Sub-Saharan Africa, at the Hyatt Regency in Washington D.C. June 19-21

Invited NSF IGERT Proposal Review Panelist in Washington D.C., June 25 and 27

Occasional reviewer of proposals submitted to USGS, NSF, EPA & others

Reviewed about 100 journal articles submitted to 16 different journal articles; and

I reviewed 15 additional book chapters.

### **Professional license**

1991/Present Certified Professional Hydrologist (P.H.) by the American Institute of Hydrology

### **Offices held in Professional Organizations**

2012/Present Elected member, Sustainability Commission of the City of Flagstaff, Arizona

2010/2011 Member organizing committee, Annual Symposium of the Arizona Hydrological Society held at the High Country conference Center in Flagstaff

2010 Co-organizer of a symposium on Mainstreaming Environment and Sustainability Education in Ethiopian and South Sudanese universities.

2010/Present Director Northern Arizona Section of the Arizona Nevada Academy of Sciences

2008 Co-chair Joint Conference of the 3<sup>rd</sup> American Institute of Professional Geologists, 3<sup>rd</sup> International Professional Geologists Conference and 23<sup>rd</sup> Arizona hydrological Society Annual Meeting in Flagstaff, Arizona. September 19-23.

2004/Present Board of governors Member, Arizona-Nevada Academy of Science (ANAS)

1991/Present Chairman, Corporate Scholarship Committee, Arizona Hydrological Society. Developed rules, criteria and a procedure to select winners for the award. The award consists of 3 – \$3000.00 and 3 plaques given to 3 winners annually. Every year I select three referees to help evaluate applicants and select the winners.

### **Offices held in Private and Voluntary Organizations**

2005/2009 Advisory Board Member, Colorado Plateau Technical Water Advisory Board

- 2002/Present Advisory Board Member, Aspen Telecommunications, LLC.
- 2001/Present Appointed member, Colorado Plateau Water Resources Advisory Board.
- 2000/2009 Advisory Board member, Verde Watershed Research and Education Program.

### **Editorial Responsibilities**

- 2003/2009 Newsletter Review Board member, Arizona Hydrological Society
- 2000/Present Associate Editor for hydrology and water resources of the Journal of the Arizona Nevada Academy of Sciences

### **Membership in Professional Organizations**

- 2002/Present Member, European Academy of Sciences
- 1981/Present Member, American Water Resources Association (AWRA)
- 1987/Present Member, American Society of Agricultural Engineers(ASAE)
- 1988/Present Member, Arizona Hydrological Society (AHS)
- 1989/Present Member, Arizona-Nevada Academy of Science (ANAS)
- 1989/Present Member, International Union of Forestry Research organization (IUFRO), Hydrology Working Group
- 1989/Present Member, International Water Resources Association IWRA)
- 1989/Present Member, Society of American Foresters (SAF)
- 1993/Present Member, the Institute of Management Science & Operation Research Society
- 1996/Present Member, International Society of Multiple Criteria Decision Making
- 1994/Present Member, Institute for Operations Research and the Management Science
- 1987/Present Member, American Society of Civil Engineers(ASCE)
- 1983/Present Member, American Geophysical Union (AGU)



## **Document E: Individual Faculty Information**

### **ANDREA E. THODE**

Assistant Professor – 9 month – Tenured

Date of Appointment:

Specializations: Fire Ecology

**Northern Arizona University – School of Forestry**

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### **EDUCATION:**

2005            University of California, Davis, Ph.D. Ecology

1996            University of California, Davis, B.S. Environmental Biology & Management

### **PROFESSIONAL EXPERIENCE:**

2011/Present   Associate Professor, School of Forestry, Northern Arizona University

2005/2011     Assistant Professor, School of Forestry, Northern Arizona University

2003/2005     Fire Ecologist/Sierra Nevada Fire and Fuels Monitoring Team Leader, Forest Service Region 5 - Tahoe National Forest

2001/2003     Fire Ecologist, Forest Service Region 5 - Eldorado National Forest

2001Fire       Ecologist, Forest Service Region 5 - Fire and Aviation Management

1997/2001     GIS Analyst, Information Center for the Environment, Dept. of Environmental Science and Policy University of California, Davis

### ***TEACHING EXPERIENCE***

#### ***NAU Courses***

##### **2006/Present**

FOR251-Introduction to Wildland Fire.

FOR351-Fire Monitoring and Modeling.

FOR351-Fire Monitoring and Modeling – Hybrid 7 week course.

FOR505-Current Topics in Fire Ecology.

FOR506-Forestry Seminar.

FOR399/310-Applied Forest Ecology – Hybrid 5 week course.

FOR313/314-Forest Ecology. Recovery, Community Ecology and Landscape Ecology Sections.

FOR313/314-Forest Ecology. Disturbance Ecology.

FOR 551-Fire Ecology and Management.

#### ***Other University Courses***

Co-Instructor of a UC Davis Fire Ecology Class, University of California, Davis (Winter Quarter 2001-2003).

Co-Coordinator of a Graduate Student Statistics Course, University of California, Davis. (Spring 2001)

Co-Coordinator of a Fire Ecology Seminar, University of California, Davis (Spring Quarter 2000).

GIS for Resource Managers and Professionals Teaching Assistant. UC Davis University Extension, Sacramento, CA. 1997.

GIS Applications Class Student Teaching Assistant. UC Davis, Davis, CA. Fall Quarter 1996.

Co-founder, Initial Curriculum Development, Teaching, and Program Management for Students for Environmental Education at Davis (SEED), University of California, Davis (1994-1999). UC Davis undergraduates are given academic credit for curriculum development and for teaching in elementary school classrooms. <http://www.ice.ucdavis.edu/seed/default.htm>

### ***University Guest Lectures***

Thode, A.E. Applying Ecology in Management. Guest lecture in Fire Ecology Class. Northern Arizona University. April 13, 2010.

Thode, A.E. Fire Ecology and Fire Science. Guest lecture in Introduction to Forestry (FOR101), Northern Arizona University. Dec 2006; April 2, 2009; March 30, 2010.

Thode, A.E. Fire and Forest Health. Guest lecture in Forest Health Class, Northern Arizona University. Feb 22, 2006.

Thode, A.E. Landscapes, Fuel Treatments and Fire Regimes. Guest lecture in Graduate Landscape Ecology Class, Northern Arizona University. March 28, 2006.

Thode, A.E. Fire as an Ecosystem Process. Guest lecture in Semester D, Northern Arizona University. Feb 8, 2006.

### ***Outside Courses***

Thode, A.E. Fire and Ecosystem Dynamics. Invited lecture in M-580: Interagency Fire in Ecosystem Management Training Course, National Advanced Fire and Resource Institute (NAFRI). Spring 2006, 2007, 2009 and 2010. Tucson, AZ.

Thode, A.E. Fire and Plants. Invited lecture, M-80: Interagency Fire Effects Training Course, FUTA. Feb 2006 and 2007. Albuquerque, NM.

Interagency Fire Effects Class (Rx-310 and Rx-340). 2001-2005. USFS Region 5, Mather and McClellan Airforce bases, CA.

Thode, A.E. Ecological and Historical Role of Fire. Rx-410: Forest Service Smoke Management Techniques Class. 2004. USFS Region 5, McClellan airforce base, CA.

## **PUBLICATIONS**

## **PEER REVIEWED REFEREED JOURNALS**

Brisbin, H1, A. Thode, M. Brooks. Post-fire restoration treatment effects on the soil seed bank of a pinyon-juniper woodland in Zion National Park, Utah, USA. *Weed Technology*. In Revision.

Kocher, S., E. Toman, S. Trainor, V. Wright, J. Briggs, C. Gobel, A. Oxarart, G. Montblanc, T. Steelman, A. Thode, T. Waldrop. How Can We Span the Boundaries Between Wildland Fire Science and Management in the United States? *Journal of Forestry*. In Press.

van Wagtenonk, J., K. van Wagtenonk, A. Thode 2012. Factors Associated with the severity of intersecting fires in Yosemite National Park, California, USA. *Fire Ecology*. 8(1): 11-32.

Thode, A., Jan W. van Wagtenonk, Jay D. Miller, and James F. Quinn. 2011. Quantifying the Fire Regime Distributions for Severity in Yosemite National Park, California, USA. *International Journal of Wildland Fire*. 20: 223-239.

Scudieri, C1., C. Sieg, S. Haase, A. Thode; S. Sackett. 2010. Understory vegetation response after 30 years of interval prescribed burning in two ponderosa pine sites in northern Arizona. *Forest Ecology and Management*. 260: 2134-2142.

Lutz J., J. van Wagtenonk, A. Thode, J. Miller, J. Franklin. 2009. Climate, lightning ignitions, and fire severity in Yosemite National Park, California, USA. *International Journal of Wildland Fire*. 18:765-774.

Kobziar, L., M. Rocca, C. Dicus, C. Hoffman, N. Sugihara, A. Thode, J Varner, P. Morgan. 2009. Challenges to educating the next generation of wildland fire professionals in the US. *Journal of Forestry* 107: 339-345.

Miller, J., H. Safford, M. Crimmins, A. Thode. 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. *Ecosystems* 12:16-32.

Collins, B, J. Miller, A. Thode, M. Kelly, J. van Wagtenonk, S. Stephens. 2009. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. *Ecosystems* 12:114-128

Miller, J. and A. Thode. 2007. Quantifying burn severity in a heterogeneous landscape with a relative version of the delta Normalized Burn Ratio (dNBR). *Remote Sensing of Environment*. 109:66-80.

## **Submitted**

Garmoe, M1, A. Thode, M. Hunter. Understory vegetation response to a post-fire Imazapic herbicide application in Zion National Park, Utah, USA. *Rangeland Ecology and Management*.

## **In preparation**

McMaster, M.1, A. Thode, M. Kearsley, E. Aumack. In Prep. Effects of post-fire seeding with ryegrass (*Lolium perenne* spp. multiflorum) on understory plant communities in a ponderosa pine forest in northern Arizona. *International Journal of Wildland Fire*.

Thode, A., K. Weber, K. Haubensak, M. Brooks. In Prep. Effects of a post-fire Imazapic herbicide application and native seeding on *Brome* spp. in Zion National Park, Utah, USA. *International Journal of Wildland Fire*.

## **PROCEEDINGS**

Sisk, T., Christine Albano, Ethan Aumack, Eli J. Bernstein, Timothy E. Crews, Brett G. Dickson, Steve Fluck, Melissa McMaster<sup>1</sup>, Andi S. Rogers, Steven S. Rosenstock, David Schlosberg, Ron Sieg, and Andrea Thode. In press. Integrating restoration and conservation objectives at the landscape scale: The Kane and Two-mile Ranch project. In C. van Riper III, B.W. Wakeling, and T.D. Sisk, editors. *The Colorado Plateau IV: Integrating research and resources management for effective conservation*. University of Arizona Press, Tucson, Arizona, USA.

## **Reports**

Thode. A., H. Brisbin<sup>1</sup>, K. Weber, M. Brooks. 2011. Understanding Understory and Seed Bank Effects of Post-Fire Herbicide and Seeding Applications at Zion National Park. Final Report (pending USGS Review) to the Joint Fire Science Program. Project Number 07-2-4-0. Agreement no. 04HQAG0122.

Garmoe<sup>1</sup>, M, A. Thode, M. Hunter, M. Brooks. 2010. Treatment Effectiveness Monitoring for the Dakota Hill Complex Burned Area Emergency Response Treatments. Final Report to Zion National Park, Cooperative Agreement no. H1200040002.

Thode. A., K. Weber, K. Haubensak, H. Brisbin<sup>1</sup>, M. Brooks. 2010. Treatment Effectiveness Monitoring for the Kolob Fire Burned Area Rehabilitation Treatments. Final Report (pending USGS Review) to Zion National Park, Cooperative Agreement no. H1200040002.

McMaster, M.1, A. Thode, B. Brost, M. Williamson, E. Aumack, D.Mertz. 2010. Changes in vegetation and fuels due to the Warm Fire on the Kaibab National Forest. Final Report to the Joint Fire Science Program. Project Number 07-1-2-18. Agreement no. 08-CS-11030703-002.

## **Other**

L.Bahn, V. Wright, E. Montblanc, A. Thode. An Interdisciplinary Discussion about Fire/Fuels Science and Management. Proceedings of The George Wright Society Conference on Parks, Protected Areas and Cultural Sites, March 14-18, 2011. New Orleans, LA.

<http://www.georgewright.org/1105bahn.pdf>

Ransom, M, and A. E. Thode. 2000. Interactive GIS Decision Support: The Fire Area Cost Estimator (FACE). Proceedings ESRI Users Conf.,  
<http://gis.esri.com/library/userconf/proc00/professional/papers/PAP496/p496.htm>

Beardsley, K., A. E. Thode, J. Viers, J. Quinn, and J. Kearney. 1998. Improving Water Quality Reporting in California: The GeoWaterbody System. Proceedings ESRI Users Conf.,  
<http://gis.esri.com/library/userconf/proc98/PROCEED/TO600/PAP573/P573.HTM>

## **BOOKS AND BOOK CHAPTERS**

Sugihara, N, J. van Wagtenonk, J. Fites-Kaufman, K. Shaffer and A. Thode, (eds.). 2006. Fire in California ecosystems. University of California Press, Berkeley, CA.

Thode, A., J. Kershner, K. Roby, L. Decker, and J. Beyers. 2006. Fire, watershed resources and aquatic ecosystems. In: Fire in California ecosystems; N. Sugihara, J. van Wagtenonk, J. Fites-Kaufman, K. Shaffer and A. Thode (eds.) University of California Press, Berkeley, CA.

N. Sugihara, J. van Wagtenonk, J. Fites-Kaufman, K. Shaffer and A. Thode. 2006. The Future of Fire in California's Ecosystems. In: Fire in California ecosystems; N. Sugihara, J. van Wagtenonk, J. Fites-Kaufman, K. Shaffer and A. Thode (eds.) University of California Press, Berkeley, CA.

## **POSTERS (First author is the presenter unless otherwise noted)**

Higgins, A1., K. Waring, A. Thode. Presented by A. Polinko and B. Goodrich. Effects of burn entry and severity on tree composition in Grand Canyon National Park. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27- March 1, 2012. Santa Fe, NM.

Fallon, J., Y. Kim, A. Thode, V. Wright. Science Communication in the Southwest Fire Science Consortium. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27- March 1, 2012. Santa Fe, NM.

Scudieri, C1., C. Sieg, A. Thode, S. Haase, S. Sackett. Understory vegetation response after 30 years of interval prescribed burning in two ponderosa pine sites in northern Arizona. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27- March 1, 2012. Santa Fe, NM.

Flying, M2., M. McMaster1, A. Thode. Changes in fuel loads after a fire and by fire severity. Poster presented at the Undergraduate Research and Design Symposium (UGRADS). April, 2010. NAU, Flagstaff, AZ.

Gdula, E., W. Bunn, A. Thode, K. Waring, A. Higgins<sup>1</sup>. Using MTBS data to assist land management decisions Grand Canyon National Park. 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Higgins, A<sup>1</sup>., A. Thode, K. Waring, E. Gdula, W. Bunn. 2009. Regeneration in mixed conifer forests following fires of mixed severities of the last sixteen years in Grand Canyon National Park, AZ, USA. 10th Biennial Conference of Research on the Colorado Plateau. Oct. 5-8, 2009, Flagstaff, AZ. \*\* Also presented in: 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Garmoe, M<sup>1</sup>., A. Thode, M. Hunter, M. Brooks, C. Decker and K. Fuhrmann. Effectiveness of Imazapic Herbicide in Reducing Post-Fire Cheatgrass Invasion in Zion National Park-Updated. Poster presented at the Eastern Nevada Landscape Coalition 2009 Annual Meeting, June 13, 2009. Ely, NV

Elian, J<sup>2</sup>., H. Brisbin<sup>1</sup>, A. Thode. Effectiveness of Chemical Greenhouse Germination Triggers. Poster presented at the Celebration of Undergraduate Research and Design (CURD) Symposium. April, 2009. NAU, Flagstaff, AZ.

Weber, K., A. Thode, M. Brooks, K. Fuhrmann, and C. Decker. Effectiveness of native seeding and landscape scale herbicide application at controlling cheatgrass in Zion National Park: First season of Data. Poster presented at the International Association for Wildland Fire's The '88 Fires: Yellowstone and Beyond; Sep 22-27, 2008. Jackson Hole, WY. \*\*Also presented in: Society for Range Management's Wildfire and Invasive Plants in Western Deserts; 2008 Dec 9-11; Reno, NV.

McMaster, M<sup>1</sup>., A. Thode, E. Aumack, D. Mertz. Effects on native plant regeneration and understory community response following a post-fire seeding of *Lolium multiflorum* in a ponderosa pine forest in northern Arizona. Poster presentation at Wildfires and Invasive Plants in American Deserts, December 9-11, 2008. Reno, Nevada

Garmoe, M<sup>1</sup>., A. Thode, M. Hunter, M. Brooks, C. Decker and K. Fuhrmann. Effectiveness of Imazapic Herbicide in Reducing Post-Fire Cheatgrass Invasion in Zion National Park. Poster presented at the International Association for Wildland Fire, The '88 Fires: Yellowstone and Beyond Conference, Sep 22-27, 2008. Jackson Hole, WY. \*\*Also presented in: Society for Range Management's Wildfire and Invasive Plants in Western Deserts; Dec 9-11, 2008. Reno, NV.

Brisbin, Hondo<sup>1</sup>, A. Thode, and M. Brooks . Effects of herbicide applications and native seeding on the post-fire seedbank of a *Bromus tectorum* infected Pinyon-Juniper woodland. Poster presented at the International Association for Wildland Fire, The '88 Fires: Yellowstone and Beyond Conference, Sep 15, 2008. Jackson Hole, WY

**PRESENTATIONS (First author is the presenter unless otherwise noted)**

Wright, V., A. Thode, M. Matonis, J. Fallon, A. Mottek- Lucas. Understanding Science Communication among Fire Professionals. 18th International Symposium on Society and Resource Management, June 17-22, 2012. Edmonton, Alberta, Canada and JFSP All Consortia Meeting, June 5-7, 2012. Boise, ID

Wright, V., A. Thode, A. Mottek Lucas, J. Fallon, M. Matonis. A social network approach to understanding Science Communication among Fire Professionals. The International Association of Wildland Fire's Third Human Dimensions of Wildland Fire Conference, April 17-19, 2012. Seattle, WA USA

Thode, A., M. Garmoe, H. Brisbin, K. Weber, K. Haubensak, M. Brooks. Effects of post-fire restoration work in Zion National Park. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27- March 1, 2012. Santa Fe, NM.

Hall, W., A. Thode. Using the Forest Vegetation Simulator to Model Crown Fire Potential for Proposed Restoration Treatments: An Analysis of the Four Forest Restoration Initiative. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27- March 1, 2012. Santa Fe, NM.

Thode, A., M. Garmoe, H. Brisbin, K. Weber, K. Haubensak, M. Brooks. Effects of post-fire restoration work in Zion National Park. The George Wright Society Conference on Parks, Protected Areas and Cultural Sites, March 14-18, 2011. New Orleans, LA.

Koenig-Palmer, K., A. Thode, M. Hunter. Modeling long-term changes to stand structure and fuels within different burn severities using the Forest Vegetation Simulator with the Fire and Fuels Extension in Grand Canyon National Park. The George Wright Society Conference on Parks, Protected Areas and Cultural Sites, March 14-18, 2011. New Orleans, LA.

Higgins, A., K. Waring, A. Thode. Mixed conifer regeneration following fires of mixed severities of the last eleven years in Grand Canyon National Park. The George Wright Society Conference on Parks, Protected Areas and Cultural Sites, March 14-18, 2011. New Orleans, LA.

McMaster, M1., A. Thode, M. Kearsely. Seeds of change: A comparison of seeding vs. natural recovery for post-fire rehabilitation in a ponderosa pine forest. 95th Annual Meeting, Ecological Society of America, August 2-8, 2010. Pittsburgh, PA.

Weber, K., A. Thode, D. Laughlin, P. Fulé, M. Brooks, C. Decker, K. Fuhrmann. Plant response to BAER treatments in Zion National Park: can Plateau herbicide and native seeding prevent cheatgrass invasions? 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Brisbin, H1., A. Thode, M. Brooks, C. Decker. Interactions of Herbicide, Native Seed and Bromus tectorum within a post-fire seed bank. 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

McMaster, M1., A. Thode. Effects on native plant regeneration and understory community response after post-fire seeding with Lolium multiflorum in a ponderosa pine forest in northern

Arizona on native plant regeneration and understory community. 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Garmoe, M1., A. Thode, M. Hunter, C. Decker. Effectiveness and Implications of an Imazapic Herbicide Application to Reduce Post-Fire Cheatgrass Invasion in Zion National Park. 4th International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Weber, K., Thode A., M. Brooks, K. Fuhrmann and C. Decker. Effectiveness of Native Seeding and Landscape Scale Herbicide Applications for Controlling Cheatgrass in Zion National Park. Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems. Jan 28th-31st, 2008. Tucson, AZ.

McMaster, M1., A. Thode, E. Aumack, and D. Mertz. The warm fire's effects on understory vegetation, ponderosa pine mortality and fuels: implications for post-fire management. Ninth Biennial Conference of Research on the Colorado Plateau: Integrating Science and Management on the Colorado Plateau. Oct. 29th – Nov. 1st, 2007. Flagstaff, AZ.

Thode, A.E. and Weber, K. Effectiveness of native seeding and landscape scale herbicide applications at controlling cheatgrass in Zion National Park: Study Design Overview. Ninth Biennial Conference of Research on the Colorado Plateau: Integrating Science and Management on the Colorado Plateau. Oct. 29th – Nov. 1st, 2007. Flagstaff, AZ.

Lutz, J., J. van Wagendonk, A. Thode, J. Miller, and J. Franklin. Predicting fire in Yosemite National Park: snow depth, natural ignitions, burn severity and burn complexity. ESA/SER Joint Meeting 2007: Ecology-based restoration in a changing world. August 5th – 10th, 2007. San Jose, CA.

Thode, A. and J. Miller. Quantifying the Fire Regime Attributes of Severity and Spatial Complexity Using Landsat TM Imagery in Yosemite National Park. Association for Fire Ecology 3rd International Fire Ecology and Management Congress November 13th- 17th, 2006. San Diego, CA.

Miller, J. and A. Thode. Mapping burn severity in heterogeneous landscapes with a relativized version of the delta Normalized Burn Ration (dNBR). Association for Fire Ecology 3rd International Fire Ecology and Management Congress November 13th- 17th. 2006. San Diego, CA.

Thode, A. and J.D. Miller. 2006. Burn Severity Mapping in the Sierra Nevada, CA using Landsat-TM Imagery: A Comparison of Methods. American Society of Photogrammetry and Remote Sensing (ASPRS) Conference: Prospecting for Geospatial Information Integration. May 1-5, 2006. Reno, NV. (Talk given by J.D. Miller for A. Thode)

Miller, J. and A. Thode. Burn Severity Mapping in the Sierra Nevada, CA using Landsat-TM Imagery: A Comparison of Methods. American Society of Photogrammetry and Remote



Sensing (ASPRS) Conference: Prospecting for Geospatial Information Integration. May 1-5, 2006. Reno, NV

Thode, A., N. Sugihara, L. Levien and J. F. Quinn. Assessing Landscape Patterns of Fire Severity and Fire Regimes using Burn Severity Mapping for the Sierra Nevada, CA. The Second International Wildland Fire Ecology and Fire Management Congress. Burn Severity Mapping Session. November 16th-20th, 2003.

Thode, A., and M. Ransom. Decision support for managers and the public: The Fire Area Cost Estimator (FACE). Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Social and Economic Aspects of Fire Session. November 27th-December 1st, 2000.

### **INVITED PRESENTATIONS**

Thode, A. The Southwest Fire Science Consortium. Opening Plenary. Fire Landscapes, Wildlife, and People: Building Alliances for Restoring Ecosystem Resilience. February 27-March 1, 2012. Santa Fe, NM.

Thode, A. and J. Miller. Quantifying the Fire Regime Attributes of Severity and Spatial Complexity Using Landsat TM Imagery. US-IALE 22nd Annual Conference: Disturbances across gradients: From desert seas to mountain islands. April 9-13th, 2007. Tucson, AZ.

Thode, A. and J. Miller. Quantifying the Fire Regime Attributes of Severity and Spatial Complexity Using Field and Imagery Data in Yosemite National Park. Yosemite Fire Science Symposium, May 9-10, 2006. Yosemite National Park, CA.

### **GRADUATE STUDENTS**

#### ***Advised or Co-Advised***

1 student, M.F. May 2007. Using the Relative delta Normalized Burn Ratio (RdNBR) two years post-fire to determine burn severity for the Peppin fire in south central New Mexico.

1 student, M.S. August 2009, co-advisor. Understory vegetation response to 30 years of interval prescribed burning in two ponderosa pine sites.

1 student, M.F. December 2009. Supplemental Ponderosa Pine Sites to the Photo Series for Quantifying Forest Residues in the Southwestern Region

1 student, M.S. August 2010. Post-fire restoration treatment effects on the soil seed bank of a pinyon-juniper woodland in Zion National Park, Utah, USA.

1 student, M.S. August 2010, co-advisor. Effects of post-fire imazapic herbicide applications to reduce cheatgrass in Zion National Park, USA.

1 student, M.S. August 2010, co-advisor. Effects of fire and post-fire seeding on plant communities in a ponderosa pine forest in northern Arizona.

1 student, M.S. May 2011, co-advisor. The effects of burn entry and burn severity on stand structure and composition in grand canyon national park

1 student, M.S. May 2011, co-advisor. Modeling long-term changes to the ponderosa pine forests of Grand Canyon National Park.

1 student, M.F. December 2011. Using the Forest Vegetation Simulator to determine proposed restoration treatment effectiveness and maintenance interval: an analysis of the Four Forest Restoration Initiative

1 student, M.S. expected May 2013, co-advisor.

1 student, M.F. expected May 2014, co-advisor.

1 student, M.F. expected May 2014.

***Committee Member (Forestry Students unless otherwise noted)***

1 student, M.S. (Environmental Science and Policy), May 2007. Wildland fire use analysis using BurnPro, Coconino National Forest, Arizona.

1 student, M.F. August 2007. Analysis of Current and Historical Surface Flows and Hydrologic Response to Restoration Treatments in the Upper Lake Mary Watershed, Arizona

**UNDERGRADUATE STUDENT RESEARCHERS**

1 student, NSF Integrative Graduate Education and Research Traineeship (IGERT). Testing different methods for seedbank studies in Pinyon/Juniper Woodlands. Academic Years 2007 and 2008.

1 student, Hooper Sustainability Undergraduate Research Award. Fuel Loading Changes after the Warm Fire by Burn Severity. Academic Years 2008 and 2009.

1 student, Hooper Sustainability Undergraduate Research Award. Effects of nutrients and the herbicide Imazapic on cheatgrass germination potential. Academic Years 2009 and 2010.

**PROFESSIONAL ACTIVITIES**

***Society Experience***

**Association for Fire Ecology (AFE)**

Education Committee Member (2005-Present)

Education Committee Chair (2010)

Education Committee Chair Elect (2008-2009)  
Board Member (2001-2007)  
Treasurer (2003-2005)  
Founding Board Member (2000)  
Website Coordinator and Website Committee (2000-2002)  
Outreach Coordinator and Outreach Committee (1999-2005)

***Student Section of the Association for Fire Ecology (SAFE)***

Co-Founder (2001)  
Founding Co-Chair (2001-2002)  
Board Member for UC Davis (2001-2005)  
Co-coordinator, Mentor Lunch at “Fire Conference 2002: Managing Fire and Fuels in the Remaining Wildlands and Open Spaces of the Southwestern United States”  
Helped coordinate student poster and presentations competition at “Fire Conference 2002: Managing Fire and Fuels in the Remaining Wildlands and Open Spaces of the Southwestern United States”

***Society Memberships***

*Association for Fire Ecology*  
International Association of Wildland Fire  
*International Association for Landscape Ecology*  
Tall Timbers Research Station  
Ecological Society of America

***Participation in Technical Conferences and Workshops***

**Member Student Program Planning**, “5<sup>th</sup> International Fire Ecology and Management Congress: Uniting Research, Education and Management”. Dec 3-7, 2012. Portland, OR.

**Program Committee Chair**, “Fire, Landscapes, Wildlife and People: Building Alliances for Restoring Ecosystem Resilience”. Feb 27-Mar 1, 2011. Santa Fe, AZ.

**Steering Committee**, “Fire, Landscapes, Wildlife and People: Building Alliances for Restoring Ecosystem Resilience”. Feb 27-Mar 1, 2011. Santa Fe, AZ.

**Workshop Steering Committee and Program Committee Member**, 2011 Interagency Fuels Workshop. 2011. Flagstaff, AZ.

**Workshop Co-development and Leader**, “Developing a Southwest Fire Science Consortium”. Jan 2010. Flagstaff, AZ.

**Workshop Development and Leader**, “Developing Future Fire Professionals in the Southwest”. Feb 2009. Flagstaff, AZ.

**Special Session Committee Member**, “Challenges and Opportunities for Educating Future Fire Professionals” at The '88 Fires: Yellowstone and Beyond, Sep 22 -27, 2008. Jackson Hole, WY.

**Program Committee Chair**, “Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems”. Jan 28-31, 2008. Tucson, AZ.

**Steering Committee**, “Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems”. Jan 28-31, 2008. Tucson, AZ.

**Special Session Chair**, “Applications of Remotely Sensed Burned Area and Severity Data” for the Third International Fire Ecology and Management Congress. Nov 13-17, 2006. San Diego, CA

**Steering Committee Member**, “Fire Conference 2002: Managing Fire and Fuels in the Remaining Wildlands and Open Spaces of the Southwestern United States” Nov 2002. San Diego, CA.

**Steering Committee Member**, “Fire Conference 2000: The First National Congress on Fire Ecology, Prevention and Management” Nov 2000. San Diego, CA.

**Co-chair**, Fire and Watersheds, Water Quality and Aquatic Ecosystems session in “Fire Conference 2000: The First National Congress on Fire Ecology, Prevention and Management” Nov 2000. San Diego, CA.

## **SERVICE**

**Co-development of a wildland fire science focus area** within the School of Forestry at NAU. **Development and Administration of the Undergraduate Fire Ecology and Management Certificate** within the School of Forestry at NAU. This is targeted at current fire professionals with training and experience that lack an educational component in their career. It is based on hybrid distance learning courses.

**Chair, Developing Future Fire Professionals in the Southwest Taskforce.** The Taskforce addresses the challenges of developing a diverse cadre of fire professionals with the training, education, and experience needed for effective fire management. The focus of the group is to design a new approach to wildland fire education in the Southwest, based on practical, experiential learning.

**Funded a Diversity Recruitment/Fire Program Coordinator Position** to integrate educational and management programs in fire in the Southwest

### ***University Committee Work***

2005-2006: Fire Program Committee, Integrative Graduate Education and Research Trainee (IGERT) Committee

2006-2007: IGERT Committee, Geospatial Research and Information Laboratory (GRAIL) Advisory Committee, Mission Research Committee, Fire Program Committee, Fire Science Faculty Search Committee.

2007-2008: IGERT Committee (Fall), Attended Consortium for the Status of Women meetings (Spring), Annual Review Committee, Ad-hoc Curriculum Development Committee Chair  
2008-2009: Consortium for the Status of Women, Annual Review Committee, Curriculum Development Committee Chair  
2009-2010: Annual Review Committee, Fire/Diversity Program Coordinator Search Chair  
2010-2011: Mission Research Committee, Curriculum Review Committee, Faculty Senate

### ***Community Service Related To My Profession***

Taught Fire Ecology to the Youth Conservation Corps in the field. Jun 22, 2006. Centennial Forest, Flagstaff, AZ

Taught Fire Ecology to NAU Senior Forester Academy Students in the field. Jun 2006, 2007, 2009 and 2010. Centennial Forest, Flagstaff, AZ

National Public Radio Interview on Wildland Use Fires. 2006

Talked with Home Owners Association about fire preparedness education. 2007

CNN live TV interview on Colorado Wildfires. July 2012.

(<http://mms.tveyes.com/ExpandGuest.asp?ln=701012>)

Seattle NPR interview. July 2012.

### ***Manuscript/Proposal Reviews***

12/05	Review for the University of Arizona Extension
01/06	Review for the Tall Timbers Fire Ecology Conference Proceedings
01/07	Review for International Journal of Wildland Fire
07/07	Review for International Journal of Wildland Fire
08/07	Review for Forest Ecology and Management
10/07	Review for Rangeland Ecology and Management
11/07	Review for Forest Ecology and Management
04/09	Review for International Journal of Wildland Fire
05/09	Review for Forest Ecology and Management
06/10/Present	Associate Editor for Fire Ecology (5 reviews)
02/11	Proposal reviewer for the Joint Fire Science Program - Graduate Research Innovation Program (GRIN)
02/12	Proposal reviewer for the Joint Fire Science Program - Graduate Research Innovation Program (GRIN)

### **AWARDS**

USFS Southwest Region Certificate of Appreciation. Assistance and guidance in planning the Southwest Interagency Fuels Workshop. Mar 2011.

Association for Fire Ecology Dedication and Service Award. Jan 2008.

USFS Leadership Award. Developing and providing college courses for Forest Service wildland fire managers. Apr 2008.

### **OTHER SIGNIFICANT INFORMATION**

**Red Carded** (2001-2003, 2005, 2006, 2012), FF1 Task Book

**National Interagency Prescribed Fire Training Center**, Student (Mar 2002). This is a hands-on month long training in Florida. We traveled all over Florida lighting and managing prescribed fires. Through this training I acted as holding boss, ignition specialist and burn boss on different prescribed fires.

**Volunteer Prescribed Fire Crew-Member**, University of California, Davis, Solano County Land Trust, The Nature Conservancy, and Audubon Society (04/00– 12/05) Crew member of a cooperative prescribed fire team to help with ecologically based prescribed fires.

**RESEARCH GRANTS/FUNDING**

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
(Aug 2012): Monitoring the Treatment Effectiveness of Recent Southwest Wildfires	PI: Jose Iniguez, RMRS; Co-PIs: Carolyn Sieg, Mike Battaglia, and Paula Fornwalt, RMRS; Andrea Thode and Molly Hunter, NAU; Don Falk, U of A	RMRS Fire Plan Money	\$336,000 (Pending)
(July 2012): Rapid ecosystem shifts are triggered by interactions of severe landscape disturbance and climate variability	Don Falk, U of A; Co- PIs: Rachel Loehman, Rocky Mountain Research Station, Missoula, MT; Andrea Thode, NAU; Jonathan Overpeck, U of A.	NSF, Division of Environmental Biology, Ecosystems full proposal	\$654,996 (\$176,990 NAU Portion)
(November 2011): Untangling the Las Conchas web: how effective were mechanical and fire treatments in changing fire behavior and reducing fire severity?	PI, Alexander Evans, Forest Guild; David Gori and Anne Bradley, The Nature Conservancy; Jose Iniguez, RMRS; and Don Falk, U of A	Joint Fire Science Program	\$430,661 (\$280,876 NAU Portion)
(November 2011): Regional landscape analysis of fuel treatment effectiveness in the 2011 Southwest fires	Jose M Iniguez; Co- PIs: Ellis Margolis, U of A; Andrea Thode, NAU; and Don Falk, U of A	Joint Fire Science Program	\$193,474 (\$15,710 NAU Portion)

(July 2010): Past, Present, and Future Forest Distributions and Disturbance Regimes on Tribal Lands in the Southwest	PI: Pete Fulé; Co-PIs: Amanda Stan, Steven Sesnie and Andrea Thode, NAU; Marnie Carroll, Diné College	NASA ROSES 2010	\$ 1,994,720
(February 2011): Southwest Fire Science Consortium (Extended One Year)	Co-PIs: Molly Hunter and Pete Fulé, NAU; Jose M. Iniguez, RMRS; Alexander Evans, Forest Guild	Joint Fire Science Program	\$459,002 (\$389,706 NAU Portion)
(August 2008): Forest Vegetation Simulator Modeling - Completion	PI Co-PI Molly Hunter, NAU	Colorado Plateau Cooperative Ecosystem Studies Unit proposal to Grand Canyon National Park	\$16,441 (Funded)
(February 2010): Developing a Southwest Fire Science Consortium	PI Co-PIs: Molly Hunter and Pete Fulé, NAU; Jose M. Iniguez, RMRS; Alexander Evans, Forest Guild	Joint Fire Science Program	\$373,482 (\$225,332 NAU Portion)
(November 2009): Mastication in a Southwest ponderosa pine system: what are the fire behavior and ecological implications?	PI Co-PIs: Karen Haubensak, NAU; Jose M. Iniguez, RMRS; Tessa Nicolet, USFS R3	Joint Fire Science Program	\$283,770 (\$273,770 NAU Portion)
(August 2009): Developing a Southwest Fire Science Consortium	PI Co-PIs: Molly Hunter, NAU; Jose M. Iniguez, RMRS; Alexander Evans, Forest Guild	Joint Fire Science Program	\$90,881(\$70,165 NAU Portion)
(November 2007): Effects of the Warm Fire on understory vegetation and	PI	NAU Intramural Grants Program	\$6000

ponderosa pine mortality			
(August 2008): Burn Severity Research Project	PI	Colorado Plateau Cooperative Ecosystem Studies Unit proposal to Grand Canyon National Park	\$144,000
(August 2008): Forest Vegetation Simulator Modeling	PI	Colorado Plateau Cooperative Ecosystem Studies Unit proposal to Grand Canyon National Park	\$40,220
(December 2007): Evaluating the effectiveness of landscape scale seeding and herbicide use on the Kolob Fire	PI	Joint Fire Science Program	\$324,798 (\$203,654 NAU Portion)

***Pre-NAU Funding***

Forest Service Region 5, Fire and Aviation Program: 2004 Fire and Fuels Monitoring (\$230,000)

Forest Service Region 5, Sierra Nevada Frameworks: 2003 Fire and Fuels Study Plan (\$290,000)

Forest Service Region 5, Sierra Nevada Frameworks: 2002 Fire and Fuels Study Plan (\$320,000)

2002 Switzer Environmental Fellowship Recipient (\$13,000)

**CURRICULUM DEVELOPMENT FUNDING**

US Forest Service Fire and Aviation Workforce Diversity Proposals (Internal to the USFS) (April 2010): Collaborative Efforts for Developing Fire and Aviation

NAU was invited to submit a proposal with the Kaibab and Coconino National Forests I was the lead overall. Others from NAU SOF included Kristen Waring and James Allen. Federal FY 2011-2014 \$511,108 (\$126,004 NAU portion) Funded for \$150,000.

US Forest Service Southwestern Region (September 2009): USDA Forest Service Upper Division Fire Management Project.



PI – New proposal but brought in as a modification to the previous agreement.  
Jul 2007 –Jul 2012  
\$88,000 (Funded)

US Forest Service Southwestern Region (July 2009): USDA Forest Service Wildland Fire Professional Development Course Tuition  
I led the effort to secure this funding.  
Sep 2009 –May 2012  
\$60,000 (Funded) The USFS and Distance Learning could not work out a way for this money to be passed in an agreement so it was lost.

NAU Distance Learning, Course Development Program (December 2008): Undergraduate Fire Ecology Certificate  
I wrote a proposal to fund the development of one distance learning hybrid courses  
FY 2008  
\$5,000 (Funded)

US Forest Service Fire and Aviation Workforce Diversity Proposals (Internal to the USFS) (April 2007): Collaborative Efforts for Developing Fire and Aviation  
NAU was invited to submit a proposal with the Kaibab and Coconino National Forests  
I was the lead overall. Others from NAU SOF included Kristen Waring and Aregai Tecele.  
Federal FY 2008-2011  
\$596,711 (\$85,838 NAU portion) (Not funded)

NAU Distance Learning, Course Development Program (May 2007): Undergraduate Fire Ecology Certificate  
I wrote one proposal to fund the development of five distance learning hybrid courses and a teaching fee  
FY 2008  
\$17,600 (Funded)

US Forest Service Southwestern Region (May 2007): USDA Forest Service Upper Division Fire Management Project.  
PI  
Jul 2007 –Jun 2011  
\$7,000 (Funded)

NAU Distance Learning, Proposition 301 (October 2006): School of Forestry Fire Ecology and Fire Science Program  
I took the lead on this and worked with the current Dean, David Patton  
Aug 2007 –June 2010  
\$489,169 (Funded for \$186,000 for 1 faculty member for three years, funding was cut the last two years)

## Document E: Individual Faculty Information

### **KRISTEN M. WARING**

Associate Professor – 9 month – Non Tenured

Date of Appointment: August 2006

Specializations: Silviculture

**Northern Arizona University – Department of Forestry**

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#### EDUCATION

- 2005            Ph.D. Silviculture and Forest Health  
University of California, Berkeley, CA
- 2000            M.S. Forest Entomology  
University of Montana, Missoula, MT
- 1997            B.S. Forest Resources Management, Minor: Wildlife Biology  
University of Montana, Missoula, MT

#### PROFESSIONAL AND RESEARCH EXPERIENCE

- 2012/Present    Associate Professor of Silviculture, Department of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2006/2012      Assistant Professor of Silviculture, Department of Forestry, Northern Arizona University, Flagstaff, Arizona
- 2005/2006      Postdoctoral Scholar, Forest Ecology, University of California, Berkeley, California
- 2000/2005      Graduate Student Researcher, Silviculture, University of California, Berkeley, California
- 2001            Research Volunteer, Forest Pathology, University of California, Berkeley, California
- 1998/2000      Graduate Research Assistant, Forest Entomology, University of Montana, Missoula, Montana
- 1998/1999      Research Technician, Silviculture, Seasonal, University of Montana, Missoula, Montana
- 1997            Forestry Technician, Silviculture Crew, USDA Forest Service, Powell Ranger District, Clearwater National Forest, Powell, Idaho
- 1995            Forestry Technician, Forest Inventory and Analysis. USDA Forest Service Flathead National Forest, Kalispell, Montana

#### TEACHING EXPERIENCE

- 2006/Present    Associate and Assistant Professor, Silviculture,  
Northern Arizona University, Flagstaff, AZ  
FOR 315: Silviculture: Principles Fall 2006-2011  
FOR 316: Silviculture: Applications Fall 2006-2011

FOR 317: Silviculture and Fire Applications Winter 2008, Winter 2009, Spring 2011, co-taught  
FOR 317: Silviculture and Fire Applications (online)  
FOR 318: Fuel Treatments and Modeling (co-developer, online)  
FOR 454/554: Forest Health Spring 2009-2012, co-taught  
FOR 498/698: Senior/Graduate Seminar in International Silviculture Spring 2007  
FOR 499: Women in Natural Resources Seminar Spring 2010, co-taught  
FOR 506: Graduate Seminar in Forest Ecology Spring 2008  
FOR 506: Economic and Ecological Effects of Introduced Forest Pests Fall 2007, co-taught  
FOR 510: Multiple Resources Silviculture Fall 2007, Spring 2009, Spring 2011  
FOR 520: Applied Forest Stand Dynamics Spring 2008- 2011, co-taught; Spring 2012

Graduate Student Instructor University of California, Berkeley, CA  
Multiple Resources Silviculture, Fall 2004  
The Biosphere, Fall 2003  
Introduction to Environmental Science, Spring 2003

Teaching Assistant, University of Montana, Missoula, MT  
Forest Insects and Disease, Spring 2000  
Forest Mensuration, Spring 1999  
Multiple Resources Silviculture, Spring 1999

Reader/grader, University of Montana, Missoula, MT  
Multiple Resources Silviculture, Fall 1999

## REFERRED JOURNALS

O'Hara, K.L. and **K.M. Waring** 2005. Forest restoration practices in the Pacific Northwest and California. Pp 445-461. *In: Restoration of Boreal and Temperate Forests*. J.A. Stanturf and Palle Madsen, Editors. CRC Press. Boca Raton, FL.

Looney, C.E. and **K.M. Waring**. 2013. ***Pinus strobiformis* (southwestern white pine) stand dynamics, regeneration, and disturbance ecology: A review. *Forest Ecology and Management*. 287:90-102.**

Looney, C.E. and **K.M. Waring**. 2012. Patterns of forest structure, competition and regeneration in southwestern white pine (*Pinus strobiformis*) forests. ***Forest Ecology and Management*. 286:159-170.**

**Waring, K.M.** and B. Goodrich. 2012. Artificial regeneration of five-needled pines of western North America: a survey of current practices and future needs. *Tree Planters Notes*. 55(2):55-71.

Fischer, M.J., **K.M. Waring**, R.W. Hofstetter and T. Kolb. 2010. Ponderosa pine characteristics associated with attack by the roundheaded pine beetle. *Forest Science*. 56(5):473-483.

O'Hara, K.L., A. Youngblood, and **K.M. Waring**. 2010. Maturity selection vs. improvement selection:

Lessons from a Mid-20<sup>th</sup> Century controversy in the silviculture of ponderosa pine. *Journal of Forestry*. 108 (8):397-407.

Gonzalez, P., G.P. Asner, J.J. Battles, M.A. Lefsky, **K.M. Waring** and M. Palace. 2010. Forest carbon densities and uncertainties from Lidar, Quickbird, and field measurements in California. *Remote Sensing of Environment*. 114:1561-1575.

**Waring K.M.**, D.M. Reboletti, L.A. Mork, C. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T. S. Davis. 2009. Modeling the impacts of two bark beetle species under a warming climate in the Southwestern USA: Ecological and economic consequences. *Environmental Management*. 44:824-835. DOI 10.1007/s00267-009-9342-4

**Waring, K.M.** and K.L. O'Hara. 2009. Stand development and tree growth response to sugar pine mortality in Sierran mixed-conifer forests. *Northwest Science*. 83(2):89-100.

Battles, J.J., T. Robards, A. Das, **K. Waring**, J.K. Gilles, G. Biging and F. Schurr. 2008. Climate change impacts on forest growth and tree mortality: A data-driven modeling study in the mixed-conifer forest of the Sierra Nevada, California. *Climatic Change*. 87 (Suppl. 1): S193-S213.

**Waring, K.M.** and K.L. O'Hara. 2008. Redwood/tanoak stand development and response to tanoak mortality caused by *Phytophthora ramorum*. *Forest Ecology and Management*. 255: 2650-2658.

Waring, T.D. and **K.M. Waring**. 2006. Mercury levels in trees, shrubs, and grasses growing on mercury contaminated sites in southwestern Montana. *Intermountain Journal of Sciences*. 12(1-2):18-26.

**Waring, K.M.** and K.L. O'Hara. 2006. Estimating relative error in growth ring analyses of second-growth coast redwood (*Sequoia sempervirens*). *Canadian Journal of Forest Research*. 36: 2216-2222.

**Waring, K.M.** and K.L. O'Hara. 2005. Ten-year response of western larch to pruning in western Montana. *Western Journal of Applied Forestry*. 20(4):228-232.

**Waring, K.M.** and K.L. O'Hara. 2005. Silvicultural strategies in forest ecosystems affected by introduced pests. *Forest Ecology and Management*. 209:27-42.

**Waring, K.M.** and D.L. Six. 2005. Distribution of bark beetle attacks following whitebark pine restoration treatments: A case study. *Western Journal of Applied Forestry*. 20(2):110-116.

#### *In review*

Angell, N., **Waring, K.M.**, and T.A. Graves. Predicting height growth of sugar pine regeneration using stand and individual tree characteristics. *Forestry*. *In review*.

Johnson, K.A. and **K.M. Waring**. Effectiveness of prescribed fire in meeting management and ecological objectives at Zion National Park, USA. *International Journal of Wildland Fire*. *In review*.

#### ***In revision***

Erickson, C.C. and **K.M. Waring**. Old ponderosa pine growth and mortality responses to restoration treatments at Mt. Trumbull, AZ. *Applied Vegetation Science*. *Accepted with revisions*.

#### **OTHER TECHNICAL PUBLICATIONS AND ABSTRACTS**

Battles, J.J., T. Robards, A. Das, **K Waring**, J.K. Gilless, F. Schurr, J. LeBlanc, G. Biging, and C. Simon. 2006. Climate change impact on forest resources. Public Interest Energy Research, California Energy Commission. CEC-500-2005-193-SF.

**Waring, K. M.** 2005. Radiata pine tree growth as affected by western gall rust infection: results from a genetics trial. January 2005. Submitted to: Center for Forestry, University of California-Berkeley.

O'Hara, K. L., S. L. Stephens, M. Spencer, and **K. M. Waring**. 2004. Progress Report: Ecological impacts of sudden oak death on tanoak/redwood ecosystems. October 2004. Submitted to: Pacific Southwest Research Station, USDA Forest Service.

**Baker , K. M.** and K. L. O'Hara. 2003. Stand growth and development of Monterey pine in the Presidio of San Francisco, California. February 2003. Submitted to: Presidio Trust and Presidio National Park.

#### ***Other***

**Baker, K. M.** and D. L. Six. 2000. Incidence of the red turpentine beetle in whitebark pine: preliminary results. 2000. Nutcracker Notes: Research and Management Newsletter about Whitebark Pine Ecosystems.11: 17-18.

#### **PROCEEDINGS**

Fischer, M. J., **Waring, K.M.**, Hofstetter , R.W., and Kolb T. E.. 2008. The resin composition of ponderosa pine (*Pinus ponderosa*) attacked by the roundheaded pine beetle (*Dendroctonus adjunctus*) (Coleoptera: Curculionidae, Scolytinae). Proceedings of the Fort Valley Centennial Conference, August 7-9, 2008.

O'Hara, K.L. and **K.M. Waring**. 2008. Implementation of a thinning and burning study in tanoak-redwood stands in Santa Cruz and Mendocino Counties. p. 417-418. *In*: Frankel, Susan J., Kliejunas, John T., Palmieri, Katharine M., tech. coords. Proceedings of the sudden oak death third science symposium. Gen. Tech. Rep. PSW-GTR-214, Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 491 p.

**Waring, K.M.**, and K.L. O'Hara. 2007. Stand dynamics of coast redwood/tanoak forests following tanoak decline. Pp 475-480 *in* Proceedings of the Redwood Region Forest Science

Symposium: What does the Future Hold? (R.B. Standiford, G.A. Giusti, Y. Valachovic, W.J. Zielinski, and M.J. Furniss, editors). USDA For. Serv. Gen. Tech. Rep. PSW-GTR-194.

Sherrill, K., Lefsky, M.A., Battles, J.J., **Waring, K.M.**, and P. Gonzalez. 2006. An error propagation analysis of aboveground biomass estimates from LIDAR remote sensing. Eos, Transactions, American Geophysical Union 87: Fall Meeting Supplement, Abstract B43D-07.

**Waring, K.M.**, and K.L. O'Hara 2006. Residual tree response to tanoak decline in California. Pp. 187-189 in Proceedings of the Sudden Oak Death Second Science Symposium: The State of Our Knowledge (S.J. Frankel, P.J. Shea, and M.I. Haverty, technical coordinators). USDA Forest Service, PSW-GTR-196. 571 p.

**Baker, K.M.** and K.L. O'Hara. 2001. Prioritizing restoration in forests adversely affected by an exotic pest. p. 104-105. In: Volney, W.J.A., Spence, J.R. and E.M. Lefebvre, eds., Boreal Odyssey: Proceedings of the North American Forest Insect Work Conference, May 14-18, 2001, Edmonton, Alberta, Canada. Natural Resources Canada Information Report NOR-X-381. 234 pp.

#### **MISCELLANEOUS PUBLICATIONS AND RESEARCH REPORTS**

Blanford, M., K.M. Waring, and A. Polinko. 2012. Seedling growth response to western spruce budworm in mixed conifer forests. Society of American Foresters National Convention, October 24-28, 2012. Spokane, WA.

Goodrich, B. and K.M. Waring. 2012. *Pinus strobiformis* ecology in southwestern mixed conifer forests: geographic distribution in regeneration dynamics, spatial patterns and adaptive traits. Western International Forest Disease Work Conference, October 8-12, 2012. Lake Tahoe, CA.

Higgins, A., **Waring, K.** and Thode, A. 2012. Effects of burn entry and severity on tree composition in Grand Canyon National Park. Fire Landscapes, Wildlife and People: Building Alliances for Restoring Ecosystem Resilience. Southwest Fire Ecology Conference, Feb. 27-Mar. 1 2012. Albuquerque, NM.

Looney, C., **Waring, K.** and M.L. Fairweather. 2011. Early effects of white pine blister rust (*Cronartium ribicola*) on white pines in Arizona and New Mexico. Cultural and Natural Resource Management on the Colorado Plateau: Science and Management at the Landscape Scale. 11<sup>th</sup> Biennial Conference of Research on the Colorado Plateau. October 24-27, 2011. Flagstaff, AZ.

Thomas, Z.S., Bastow, Z.A., and **K.M. Waring.** 2011. Economic and ecological effects of ponderosa pine thinning and thin/burn treatments on Vermejo Park Ranch, NM. Cultural and Natural Resource Management on the Colorado Plateau: Science and Management at the Landscape Scale. 11<sup>th</sup> Biennial Conference of Research on the Colorado Plateau. October 24-27, 2011. Flagstaff, AZ.

Angell, N., **Waring, K.M.**, and R. St. Laurent. 2011. Determinants of pygmy sugar pine in the Lake Tahoe Basin, CA and NV. 8<sup>th</sup> North American Forest Ecology Workshop. June 23-27, 2011. Roanoke, VA. *Student poster competition winner.*

Erickson, C.E. and **K.M. Waring\***. 2011. Relationships between old ponderosa pine growth, restoration treatments, and climate in northern Arizona. National Workshop on Climate and Forests: Planning Tools and Perspectives on Adaptation and Mitigation Options. May 16-18, 2011. Flagstaff, AZ. \*Presenter

Higgins, A., **Waring, K.M.**, Thode, A., Gdula, E. and W. Bunn. 2010. Post-fire vegetation response in Grand Canyon National Park, AZ. Society of American Foresters National Convention. Oct. 27-30, 2010. Albuquerque, NM.

Johnson, K.A., and **K.M. Waring**. 2010. A long-term comparison of pre- and post-prescribed fire treatments in Bryce Canyon and Zion National Parks, UT. Society of American Foresters National Convention. Oct. 27-30, 2010. Albuquerque, NM.

Polinko, A., **Waring, K.M.** and Angell, N.<sup>1</sup> 2010. Biomass and carbon stocking in mixed-conifer stands of the Lake Tahoe Basin. Society of American Foresters National Convention. Oct. 27-30, 2010. Albuquerque, NM.

Spannuth, A., Angell, N. and **K.M. Waring**. 2010. Fire in the Lake Tahoe Basin: The effectiveness of fuel reduction treatments. CEFNS Undergraduate Research and Design Symposium, Northern Arizona University, April 23, 2010, Flagstaff, AZ.

Erickson, C.E. and **K.M. Waring**. 2010. Landscape-scale old ponderosa pine mortality at Mt. Trumbull, northern Arizona. Western Forest Insect Work Conference, April 5-9, 2010. Flagstaff, AZ. \*\* Also presented in: 10<sup>th</sup> Biennial Conference of Research on the Colorado Plateau. Oct. 5-8, 2009. Flagstaff, AZ.

Angell, N., and **Waring, K.M.** 2010. Restoring stand structures to promote sugar pine (*Pinus lambertiana*) regeneration. 5<sup>th</sup> Biennial Tahoe Basin Science Conference: Measuring the Success of Ecosystem Restoration in the Lake Tahoe Basin. March 16-17, 2010, Incline Village, NV.

Higgins, A., Thode, A., **Waring, K.** Gdula, E. and Bunn, W. 2009. Regeneration in mixed conifer forests following fires of mixed severities of the last sixteen years in Grand Canyon National Park, AZ, USA. 10<sup>th</sup> Biennial Conference of Research on the Colorado Plateau. Oct. 5-8, 2009, Flagstaff, AZ. \*\* Also presented in: 4<sup>th</sup> International Fire Ecology and Management Congress: Fire as a Global Process. Nov 30 – Dec 4, 2009. Savannah, GA

Gdula, E., Bunn, W., Thode, A., Higgins, A. and **Waring K.** 2009. Using MTBS data to assist land management decisions Grand Canyon National Park. 4<sup>th</sup> International Fire Ecology and Management Congress, Nov. 30-Dec. 4, 2009, Savannah, GA.

Angell, N., and **Waring, K.M.** 2009. Restoration of sugar pine (*Pinus lambertiana*) under various stand structures in the Lake Tahoe Basin, CA & NV. Southwest Society of American Foresters Section Meeting, April 17-18, 2009, Eagar, AZ.

**Waring K.M.**, D.M. Reboletti, L.A. Mork, C. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T. S. Davis. 2009. Modeling the impacts of two bark beetle species under warming climate in the southwestern U.S.A.: ecological and economic consequences. Western Forest Insect Work Conference, March 23-27, 2009, Spokane, WA.

Fischer, M.J. , **Waring, K.M.**, Hofstetter , R.W., and Kolb T. E.. 2008. The resin composition of ponderosa pine (*Pinus ponderosa*) attacked by the roundheaded pine beetle (*Dendroctonus adjunctus*) (Coleoptera: Curculionidae, Scolytinae). Fort Valley Centennial Conference, August 7-9, 2008, Flagstaff, AZ.

**Waring K.M.**, D.M. Reboletti, L.A. Mork, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T. S. Davis. An Inconvenient Pest: Evaluating the ecological and economic consequences of range shift of *Dendroctonus mexicanus* (Coleoptera: Scolytidae). 9<sup>th</sup> Biennial Conference of Research on the Colorado Plateau. October 29- November 1, 2007

**Baker, K.M.**, M. Spencer, K.L. O'Hara, and S. Stephens. Investigating the Relationship of Stand Structure and Development to Spread and Incidence of "Sudden Oak Death" in Redwood / Tanoak Forests, Sudden Oak Death Science Symposium, Monterey, CA Dec. 2002.

**Baker, K.M.** and K.L. O'Hara. Tree vigor in multiaged stands: Implications of different stocking scenarios in ponderosa pine, Tree Resistance to Insects, IUFRO Working Party 7.01.02, Flagstaff, AZ, June 2002.

**Baker, K.M.** and D.L. Six. Whitebark pine restoration programs: A look at endemic bark beetle distributions, Society of American Foresters Centennial Convention, Washington, DC. Nov. 2000.

## **PRESENTATIONS**

Angell, N., **Waring, K.M.\***, and T. Graves. 2012. Predicting height growth of understory sugar pine using stand and individual tree characteristics. 8<sup>th</sup> IUFOR International Conference on Uneven-aged Silviculture, Nov. 12-16 2012. Lincoln University, New Zealand. \*Presenter

Thomas, Z. and **K.M. Waring**. 2012. Ponderosa pine restoration on Vermejo Park Ranch, New Mexico. Society of American Foresters National Convention, October 24-28, 2012. Spokane, WA.

Looney, C. and **K.M. Waring**. 2012. Early effects of white pine blister rust (*Cronartium ribicola*) on white pines in Arizona and New Mexico. Conserving Plant Biodiversity in a Changing World: A View from Northwestern North America. March 13-14, 2012. Seattle, WA.



**Waring, K.M.**, N. Angell, and T. Graves. 2011. Predicting height growth of sugar pine regeneration using stand and individual tree characteristics. 8<sup>th</sup> North American Forest Ecology Workshop. June 23-27, 2011. Roanoke, VA.

Johnson, K.A. and **K.M. Waring**. 2011. A multifaceted analysis of fire monitoring handbook data from Zion National Park. George Wright Society Conference. March 14-18, 2011. New Orleans, LA.

Higgins, A., Thode, A. and **K.M. Waring**. 2011. Mixed conifer regeneration following fires of mixed severities of the last eleven years in Grand Canyon National Park. George Wright Society Conference. March 14-18, 2011. New Orleans, LA.

Erickson, C.E. and **K.M. Waring**. 2010. Landscape-scale old ponderosa pine mortality at Mt. Trumbull, northern Arizona. Society of American Foresters National Convention. Oct. 27-30, 2010. Albuquerque, NM.

Angell, N., and **Waring, K.M.** 2009. Restoring stand structures to promote sugar pine (*Pinus lambertiana*) recruitment. Society of American Foresters National Convention, Sept. 30-Oct. 4, 2009, Orlando, FL.

Gonzalez, P., Battles, J.J. and **K.M. Waring**. 2009. Climate change and the detection of possible elevation shifts of forest species in the Sierra Nevada, California. Ecological Society of America 94<sup>th</sup> Annual Meeting, August 2-7, 2009, Albuquerque, NM.

Fischer, M.J., and **Waring, K.M.** 2009. The characteristics of ponderosa pine associated with attack by the roundheaded pine beetle. Western Forest Insect Work Conference, March 23-26, 2009, Spokane, WA.

**Waring, K.M.**, D.M. Reboletti, L.A. Mork, C. Huang, R.W. Hofstetter, A.M. Garcia, P.Z. Fulé, and T. S. Davis. 2008. Southern and Mexican pine beetles and climate change: An assessment of potential ecological and economic effects of a range shift. Ecological Society of America 93<sup>rd</sup> Annual Meeting. August 3-8, 2008, Milwaukee, WI.

**Waring, K.M.**, Reboletti, D., Mork, L.\*, Huang, C., Hofstetter, R., Garcia, A., Fule, P., and Davis, S.\* 2008.

An Inconvenient Pest! Assessing the spread of a non-native bark beetle. National Center for Ecological Analysis and Synthesis Distributed Graduate Seminar Synthesis Meeting, February 4-8 2008, Santa Barbara, CA. \*Presenters

Gonzalez, P., Asner, G.P., Battles, J.J., Lefsky, M.A. and **K.M. Waring**. 2007. Monitoring forest carbon and impacts of climate change in California with forest inventories, high resolution satellite images, and LIDAR. US Dept. of Energy National Energy Technology Laboratory Meeting, April 2007.

Sherrill, K., Lefsky, M.A., Battles, J.J., **Waring, K.M.**, and P. Gonzalez. 2006. An error propagation analysis of aboveground biomass estimates from LIDAR remote sensing. American Geophysical Union Fall Meeting, Dec. 2006.

**Waring, K. M.** and K. L. O'Hara. 2006. Managing forest stands affected by introduced pests. Society of American Foresters National Convention. Oct. 25-28, 2006. Pittsburgh, PA..

**Waring, K. M.** and K. L. O'Hara. 2005. Residual tree response to tanoak decline in California. Sudden Oak Death Science Symposium II. January 2005. Monterey, CA.

**Waring, K. M.** and K. L. O'Hara "Silvicultural strategies in forest ecosystems affected by introduced pests". Meeting the challenge: Silvicultural Research in a Changing World, IUFRO Division 1 Conference, La Grande Motte, France. June 2004.

**Waring, K. M.** and K. L. O'Hara. "Stand dynamics of redwood/tanoak stands following tanoak decline" Redwood Region Science Symposium, Rohnert Park, CA March 2004.

**Waring, K. M.** and K. L. O'Hara. "Prioritizing restoration in forests adversely affected by an exotic pest" North American Forest Insect Working Conference, Edmonton, Canada, May 2001.

**Baker, K. M.** and D.L. Six. "Effects of whitebark pine restoration programs on bark beetle attacks" Western Forest Insect Working Conference, Portland, OR. February 2000.

**Baker, K. M.** and D.L. Six. "Assessing bark beetle risk in whitebark pine restoration programs" Western Forest International Disease Conference / Western Forest Insect Working Conference, Breckenridge, CO. September 1999.

#### **INVITED PRESENTATIONS / SESSION MODERATOR**

**Waring, K.M.** 2010. "Invasive insects" Session moderator. Western Forest Insects Working Conference, April 5-9, 2010. Flagstaff, AZ.

**Waring, K.M.** 2007 and 2008. "Invasive species" 3 hr session. International Seminar in Forest Administration and Management (ISFAM), Flagstaff, AZ, October 2007 and 2008.

**Waring, K.M.** 2006. "Ecology and silviculture of coast redwood" Northern Arizona Chapter of the Society of American Foresters, December 7, 2006.

**Waring, K.M.** 2006. "Stand dynamics and silviculture of redwood". Applied Forest Stand Dynamics Graduate Course, NAU, Nov. 9<sup>th</sup> 2006.

**Waring, K.M.** and Six, D.L. 2001. "Restoration ecology: Incorporating insects" Session Co-moderators. North American Forest Insect Working Conference, Edmonton, Canada, May 2001.

#### **UNDERGRADUATE STUDENT ADVISOR**

1 Student, Mentor, School of Forestry, Northern Arizona University, Summer 2009

1 student, Senior Thesis Advisor, School of Forestry, Northern Arizona University May 2010.

1 Student, Senior Thesis Advisor, School of Forestry, Northern Arizona University May 2011

### **GRADUATE STUDENTS**

1 student, Doctor of Philosophy, School of Forestry, Northern Arizona University May 2015.  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2009.  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2011.  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2011  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2011  
1 Student, Master of Science, School of Forestry, Northern Arizona University August 2011  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2011  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2012  
1 Student, Master of Science, School of Forestry, Northern Arizona University May 2014  
1 Student, Master of Forestry, School of Forestry, Northern Arizona University May 2009  
1 Student, Master of Forestry, School of Forestry, Northern Arizona University May 2012  
1 Student, Master of Forestry, School of Forestry, Northern Arizona University Dec 2013  
1 Student, Master of Forestry, School of Forestry, Northern Arizona University May 2014  
1 Student, Master of Forestry, School of Forestry, Northern Arizona University May 2014

### **Committee Member, Ph.D. students**

1 Student, School of Forestry, Northern Arizona University December 2008  
1 Student, School of Forestry, Northern Arizona University May 2009  
1 Student, School of Forestry, Northern Arizona University May 2011  
1 Student, School of Forestry, Northern Arizona University May 2012

### **Committee Member, MS students**

1 Student, School of Forestry, Northern Arizona University August 2009  
1 Student, School of Forestry, Northern Arizona University December 2010  
2 Students, School of Forestry, Northern Arizona University May 2011  
1 Student, School of Forestry, Northern Arizona University May 2012

### **MF professional paper reader**

1 Student, School of Forestry, Northern Arizona University December 2008  
1 Student, School of Forestry, Northern Arizona University May 2009  
2 Students, School of Forestry, Northern Arizona University December 2010  
1 Student, School of Forestry, Northern Arizona University December 2011

### **PROFESSIONAL AFFILIATIONS**

Society of American Foresters  
Xi Sigma Pi  
Ecological Society of America  
Arizona-Nevada Academy of Science

### **PROFESSIONAL HONORS AND OFFICES HELD**

Named Most Influential Faculty by Gold Axe Award Recipient, Ryan Thomas, 2011

Xi Sigma Pi Teacher of the Year, 2009  
 Leadership Award for outstanding commitment to the disability community Northern Arizona University, 2009

**PROFESSIONAL SERVICE**

Northern Arizona University Committees  
 Search Committee, Forest Soils and Ecosystem Ecology Spring 2012  
 School of Forestry Landscape Committee AY 09/10-11/12  
 IGERT Internal Oversight Committee AY 08/09-11/12  
 Curriculum Review Committee, School of Forestry AY 10/11  
 School of Forestry “#1” Committee AY 09/10  
 NAU Faculty Senator AY 08/09-10/11  
 Elections subcommittee AY 08/09  
 Faculty Senate Representative  
 to the Undergraduate Curriculum Committee AY 09/10-10/11  
 Chair, Assistant Professor of Forest Entomology Search Committee Spring 2008  
 Cultural and Ethnic Diversity Committee, School of Forestry 2007-2009  
 Annual Review Committee AY 07/08-09/10  
 AY 11-12  
 AY 07-08  
 Curriculum Development Committee  
 Ad Hoc Committees to review Adjunct Faculty  
 Peter Brown (Fall 2007), John Vankat (Spring 2009)  
 Dennis Dye (Fall 2009), Christina Vojta (Spring 2010)

University of California, Berkeley Committees  
 Graduate Programs Committee, Student Member 2003  
 Forest Science Graduate Applications Review Committee,  
 Student Member 2003  
 Faculty Search Committee, Forest Watershed Management,  
 Student Representative 2002

**GRANTS RECEIVED** (last five years)

<u>Project</u>	<u>Investigators</u>	<u>Sponsor</u>	<u>Amount</u>
2013-2015 Surveying cone and seed insect predators of southwestern white pine: identification and assessment of impact	Richard Hofstetter (PI); <b>Kristen Waring</b> (co-PI); Joel McMillan and John Anhold (USFS Cooperators)	USDA Forest Health Protection Evaluation Monitoring Program	\$78,180
2012-2013 Southwestern white pine monitoring and	<b>Kristen Waring</b> (PI); Mary Lou Fairweather and Brian Geils	USDA Forest Service, Washington Office Forest Health	\$28,000 (1.5 yrs)

gene conservation	(USFS Cooperators)	Protection	
2012-2014 Stand response to western spruce budworm defoliation and mortality in New Mexico	<b>Kristen Waring</b>	Mission Research Program, NAU	\$47,000 (2 yrs)
2012-2017 Translating forest science for Global Practitioners	PI: Tom Kolb; co-PI's: Pete Fulé, Peter Friederici, Paul Beier, Carol Chambers, Ching-Hsung Huang, Annette McGivney, and <b>Kristen Waring</b>	USDA National Institute of Food and Agriculture (NIFA) National Needs Graduate and Postgraduate Fellowships Program (NNF)	\$251,500 (5 yrs)
2011-2015 White pine blister rust in the Southwest: implications for mixed conifer stand structure and the regeneration of white pine	<b>Kristen Waring</b>	Mission Research Program, NAU	\$91,000 (4 yrs)
2010-2013 Fire and aviation management workforce diversity	NAU School of Forestry: Andrea Thode (lead), <b>Kristen Waring</b> , James Allen USDA Forest Service: Russ Copp (Coconino NF), Dave Mertz (Kaibab NF)	USDA Forest Service Internal Proposal	\$511,108 (requested, 3 yrs) (award amount \$150,000, NAU portion \$126,004)
2009-2012 White pine blister rust in the Southwest: monitoring the health of southwestern white pine	<b>Kristen Waring</b> , Mary Lou Fairweather	USDA Forest Health Protection evaluation monitoring program	\$137,201 (3yrs)
2009-2011 Effectiveness of prescribed fire treatments in meeting management objectives: An analysis of Fire Monitoring Handbook	PI: <b>Kristen Waring</b> ; co-PI: Mark Miller, NPS	National Park Service Reserve Fuels Fund	\$15,867 (2yrs)

data from Zion and Bryce Canyon National Parks			
2009-2011 Old ponderosa pine at Mt. Trumbull, AZ: Assessing landscape-scale mortality trends and snag characteristics	Kristen Waring	Mission Research Program, NAU	\$45,000 (2yrs)
2009-2011 Grand Canyon National Park Burn Severity Research Topics	PI: Andrea Thode; Co-PI, <b>Kristen Waring</b>	National Park Service and Grand Canyon National Park.	\$144,000 (2.5yrs)
2008 Travel award for Ecological Society of America Annual Meeting in Milwaukee, WI.	Kristen Waring	Employee Development Support Funds, NAU	\$300 one time award
2008-2009 Ponderosa pine tree growth and crown characteristics associated with attack by the roundheaded pine beetle (Coleoptera: Scolytidae)	Kristen Waring	Intramural Grant Program, NAU	\$8,500 (1 yr)
2007-2011 Restoring sugar pine in the Tahoe Basin: Regeneration ecology and recruitment dynamics of sugar pine under various stand structures	Kristen Waring and Kevin O'Hara	USDA Forest Service PSW Research Station	\$183,788 (3.5 years)
2007-2009 Effect of thinning on crown architecture of southwestern ponderosa pine and its relationship to tree physiology and bark beetle attacks	Kristen Waring	Mission Research Program, NAU	\$38,666 (2 years)



## **APPENDIX I**

**School of Forestry Faculty Publications, 2004-Present**



## NAU School of Forestry Faculty Publications

Last updated on February 25, 2012

### In Press

- Bowker, M.A.**, Miller, M.E, Garman, S.L, Belote, T. In press. Applying Threshold Concepts to Conservation Management of Dryland Ecosystems: Case Studies on the Colorado Plateau. Pages xxx in Guntenspergen, G., (Ed.) Application of threshold concepts in natural resource decision making. Springer, Berlin. *In press.*
- Bowker, M.A.**, Maestre, F.T., Mau, R.L. In press. What determines semi-arid ecosystem multifunctionality? Biodiversity and patch size distribution of biological crusts. *Ecosystems.*
- Bowker, M.A.**, Eldridge, D.J., Val, J., Soliveres, S. In press. Dual ecosystem engineering of hydrological functioning in patterned landscapes from micro- to macro-scale. *Soil Biology & Biochemistry.*
- Brisbin, H, **A. Thode**, M. Brooks. In press. Post-fire restoration treatment effects on the soil seed bank of a pinyon-juniper woodland in Zion National Park, Utah, USA. *Invasive Plant Science and Management.*
- Coble, A.P. and **T.E. Kolb**. In press. Native riparian tree establishment along the regulated Dolores River, Colorado. *Western North American Naturalist.*
- Cushman, S., B.H. McRae, F. Adriaensen, K. Zeller, **P. Beier** and M. Shirley. In press. Biological corridors. Pages x-xx in D.W. Macdonald and K. Willis, editors. Key Topics in Conservation Biology, Volume 2. Wiley.
- Gaylord, M.L., **T.E. Kolb**, W.T. Pockman, J.A. Plaut, E.A. Yezpez, A.K. Macalady, R.E. Pangle, N.G. McDowell. In press. Drought causes predisposition to insect attacks and decline of piñon-juniper woodlands. *New Phytologist.*
- Hagell, S., A. Whipple, and **C.L. Chambers**. In press. Population genetic patterns among social groups of the endangered Central American spider monkey (*Ateles geoffroyi*) in a human-dominated landscape. *Ecology and Evolution.*
- Hofstetter, R.W.**, J.C. Moser, S. Bloomquist and M.P. Ayres. In press. Phoretic mites associated with bark beetles and their fungi. In Wingfield and Eifert (eds.), The Ophiostomatoid Fungi: Expanding Frontiers.
- Klepzig, K.D. and **R.W. Hofstetter**. In press. From attack to emergence: interactions between southern pine beetle, mites, microbes and trees. In Wingfield and Eifert (eds.), The Ophiostomatoid Fungi: Expanding Frontiers.
- Kurth, V.J., N. Fransioli, **P.Z. Fulé**, S.C. Hart, and C.A. Gehring. In press. Stand-replacing wildfires alter the community structure of wood-decay fungi in southwestern ponderosa pine forests of the U.S.A. *Fungal Ecology.*
- Mathiasen, R.L.** and S.K. Kenaley. In press. Distribution and morphological characteristics of *Arceuthobium hondurensis* and *A. nigrum* (Viscaceae) in Mexico. *Journal of the Botanical Research Institute of Texas.*
- Perez-Verdin, G., J.J. Navar-Chaidez, **Y.-S. Kim**, R. Silva-Flores. 2012. Chapter 14. Valuing watershed services in Mexico's temperate forests. Julio Diez (editor). *Sustainable Forest Management-Current Research.* InTech ISBN 979-953-51-0621-0.
- Schaefer, J., and **P. Beier**. In press. Going public: an active role for scientists in conservation. *International Journal of Environmental Studies.*

Smith, L., **R. Hofstetter**, and **R. Mathiasen**. In press. Insect communities associated with Douglas-fir dwarf mistletoe witches' brooms in Northern Arizona. *The Southwestern Naturalist*.

## **2013**

- Christopolou, A. **P.Z. Fulé**, P. Andriopoulos, D. Sarris, and M. Arianoutsou. 2013. Dendrochronology-based fire history of *Pinus nigra* forests in Mount Taygetos, Southern Greece. *Forest Ecology and Management* 293: 132-139.
- Grady, K.C., D.C. Laughlin, S.M. Ferrier, **T.E. Kolb**, S.C. Hart, G.J. Allan, T.G. Whitham. 2013. Conservative leaf economic traits correlate with fast growth of genotypes of a foundation riparian species near the thermal maximum extent of its geographic range. *Functional Ecology* DOI: 10.1111/1365-2435.12060
- Kerhoulas, L.P., **T.E. Kolb** and G.W. Koch. **2013**. Tree size, stand density, and the source of water used across seasons by ponderosa pine in northern Arizona. *Forest Ecology and Management* 289: 425-433.
- Koepke, D.F. and **T.E. Kolb**. 2013. Species variation in water relations and xylem vulnerability to cavitation at a forest-woodland ecotone. *Forest Science* on line at: <http://dx.doi.org/10.5849/forsci.12-053>.
- Kolb, T.**, S. Dore, M. Montes-Helu. 2013. Extreme late-summer drought causes neutral annual carbon balance in southwestern ponderosa pine forests and grasslands. *Environmental Research Letters* 8:015015. <http://stacks.iop.org/1748-9326/8/015015>
- Looney, C.E. and **K.M. Waring**. 2013. *Pinus strobiformis* (southwestern white pine) stand dynamics, regeneration, and disturbance ecology: A review. *Forest Ecology and Management* 287: 90-102.
- Mathiasen, R. L.**, and C. M. Daugherty. 2013. Additional morphological measurements of *Arceuthobium littorum* and *A. occidentale* (Viscaceae). *Phytologia* 95: 70-78.
- Shaw, D.C., and **R.L. Mathiasen**. 2013. Diseases caused by higher parasitic plants – mistletoes. Pages. 97-114 in P. Gonthier and N. Nicolotti (eds.), *Infectious Forest Diseases*. CAB International Press, Oxford, UK.
- Shive, K.L., A.M. Kuenzi, C.H. Sieg, and **P.Z. Fulé**. 2013. Pre-fire fuel reduction treatments influence plant communities and exotic species nine years after a large wildfire. *Applied Vegetation Science* DOI: 10.1111/avsc.12015.
- Sullivan, B.K., D.R. Van Haverbeke, and **C.L. Chambers**. 2013. Wildlife and anthropogenic changes in the arid southwest. Pages 169-191 in R. Malloy, J. Brock, A. Floyd, M. Livingston, and R. H. Webb, editors. *Design with the desert: Conservation and sustainable development*. CRC Press Inc.
- Wu, T., and **Y.-S. Kim**. 2013. Pricing ecosystem resilience in frequent-fire dry forests. *Forest Policy and Economics* 27: 8-12.

## **2012**

Abella, S.R., E.C. Engel, J.D. Springer, and **W.W. Covington**. 2012. Relationships of exotic plant communities with native vegetation, environmental factors, disturbance, and

- landscape ecosystems of *Pinus ponderosa* forests, USA. *Forest Ecology and Management* 271: 65-74.
- Bae, J.S., Joo, R.W., and **Y.-S. Kim**. 2012. Forest transition in South Korea: reality, path and drivers. *Land Use Policy* 29: 198-207.
- Barrett, K.J., E.L. Kalies, and **C.L. Chambers**. 2012. Predator occupancy rates in a thinned ponderosa pine forest, Arizona: A pilot study. *Wildlife Society Bulletin* 36: 232-239.
- Beier, P.** 2012. Conceptualizing and designing corridors for climate change. *Ecological Restoration* 30: 312-319.
- Beier, P.** and A. Gregory. 2012. Desperately seeking stable 50-year-old landscapes with patches and long, wide corridors. *PLOS Biology* 10:e1001253: 4 pages.
- Beier, P.** and M.F. Ingraldi. 2012. There is no evidence that the Forest Service's goshawk recommendations improve goshawk nest productivity. *Wildlife Society Bulletin* 36: 153-154.
- Brost, B.M. and **P. Beier**. 2012. Comparing linkage designs based on land facets to linkage designs based on focal species. *PLOS One* 7(11): e48965. doi:10.1371/journal.pone.0048965.
- Brost, B.M. and **P. Beier**. 2012. Use of land facets to design linkages for climate change. *Ecological Applications* 22: 87-103.
- Cardoza, Y.J., **R.W. Hofstetter** and F.E. Vega. 2012. Insect-Associated Microorganisms and Their Possible Role in Outbreaks. Pages 155-174 in P. Barbosa, D.K. Letourneau and A.A. Agrawal (eds.), *Insect Outbreaks Revisited*. Blackwell Publishing, Ltd., Oxford.
- Carroll, M. B. Milakovsky, **A. Finkral**, A. Evans and M.S. Ashton. 2012. Managing carbon sequestration and storage in temperate and boreal forests. Pages 205-226 in M.S. Ashton, M.L. Tyrell and D. Spalding (eds.), *Managing Forest Carbon in a Changing Climate*. Springer Netherlands.
- Coble, A.P., **T.E. Kolb**. 2012. Riparian tree growth response to drought and altered streamflow along the Dolores River, Colorado. *Western Journal of Applied Forestry* 27: 205-211.
- Cortés Montaña, C., **P.Z. Fulé**, D.A. Falk, J. Villanueva-Díaz, and L.L. Yocom. 2012. Linking old-growth forest composition, structure, fire history, climate and land-use in the mountains of northern México. *Ecosphere* 3:106. <http://dx.doi.org/10.1890/ES12-00161.1>
- Davis, T.S. and **R.W. Hofstetter**. 2012. Plant secondary chemistry mediates the performance of a nutritional symbiont associated with a tree-killing herbivore. *Ecology* 93: 421-429.
- Dore, S., M. Montes-Helu, S.Hart, B. Hungate, G. Koch, J. Moon, **A. Finkral**, **T.E. Kolb**. 2012. Recovery of southwestern ponderosa pine ecosystem carbon and water fluxes from thinning and stand replacing fire. *Global Change Biology* 18: 3171-3185.
- Finkral, A.J.**, A.M. Evans, C.D. Sorensen, and D.L.R. Affleck. 2012. Estimating consumption and remaining carbon in burned slash piles. *Canadian Journal of Forest Research* 42: 1744-1749.
- Fox, B.E.** and J.J. Doherty. 2012. Design to learn, learn to design: Using backward design for information literacy instruction. *Communications in Information Literacy* 5: 144-155.
- Fulé, P.Z.**, J.E. Crouse, J.P. Roccaforte, and E.L. Kalies. 2012. Do thinning and/or burning treatments in western USA ponderosa or Jeffrey pine-dominated forests help restore natural fire behavior? *Forest Ecology and Management* 269: 68-81.

- Fulé, P.Z.**, L.L. Yocom, C. Cortés Montaña, D.A. Falk, J. Cerano Paredes, and J.D. Villanueva. 2012. Testing a pyroclimatic hypothesis on the México-U.S. border. *Ecology* 93:1830–1840.
- Graves, T., J. Royle, K. Kendall, **P. Beier**, J. Stetz, and A. McLeod. 2012. Balancing precision and risk: should multiple detection methods be analyzed separately in N-mixture models? *PLoS One*: <http://dx.plos.org/10.1371/journal.pone.0049410>.
- Hofstetter, R.W.**, **M.L. Gaylord**, S. Martinson and **M.R. Wagner**. 2012. Attraction to monoterpenes and beetle-produced compounds by syntopic *Ips* and *Dendroctonus* bark beetles and their predators. *Agricultural and Forest Entomology* 14: 207-215.
- Honig, K.A., and **P.Z. Fulé**. 2012. Simulating effects of climate change and ecological restoration on fire behavior in a southwestern USA ponderosa pine forest. *International Journal of Wildland Fire* 21: 731-742.
- Huffman, D.W., J.E. Crouse, W.W. Chancellor, and **P.Z. Fulé**. 2012. Influence of time since fire on pinyon-juniper woodland structure. *Forest Ecology and Management* 274:29–37.
- Ireland, K. B., A. B. Stan, and **P. Z. Fulé**. 2012. Bottom-up control of a northern Arizona ponderosa pine forest fire regime in a fragmented landscape. *Landscape Ecology*. DOI 10.1007/s10980-012-9753-0.
- Kalies, E.L., B.G. Dickson, **C.L. Chambers** and **W.W. Covington**. 2012. Community occupancy responses of small mammals to restoration treatments in ponderosa pine forests, northern Arizona, USA. *Ecological Applications* 22: 204-217.
- Kocher, S., E. Toman, S. Trainor, V. Wright, J. Briggs, C. Gobel, E. MontBlanc, A. Oxarart, D. Pepin, T. Steelman, **A. Thode**, and T. Waldrop. 2012. How Can We Span the Boundaries Between Wildland Fire Science and Management in the United States? *Journal of Forestry* 110: 421-428.
- Korb, J.E., **P.Z. Fulé**, and M.T. Stoddard. 2012. Forest restoration in a surface fire-dependent ecosystem: an example from a mixed conifer forest, southwestern Colorado, USA. *Forest Ecology and Management* 269:10–18.
- Laughlin, D., J. Chaitanya, P. M. van Bodegom, Z. A. Bastow, and **P.Z. Fulé**. 2012. A predictive model of community assembly that incorporates intraspecific trait variation. *Ecology Letters* 15: 1291–1299.
- Looney, C.E., B.W. Sullivan, **T.E. Kolb**, J.M. Kane, S.C. Hart. 2012. Pinyon pine (*Pinus edulis*) mortality and response to water addition across a three million year substrate age gradient in northern Arizona, USA. *Plant and Soil* 357: 89-102.
- Looney, C.E. and **K.M. Waring**. 2012. Patterns of forest structure, competition and regeneration in southwestern white pine (*Pinus strobiformis*) forests. *Forest Ecology and Management* 286: 159-170.
- Lopez, R.G. and **P. Beier**. 2012. Weathered antlers as a source of DNA. *Wildlife Society Bulletin* 36: 380-382.
- McGlone, C.M., C.H. Sieg, **T.E. Kolb**, T. Nietupsky. 2012. Established native perennial grasses out-compete an invasive annual grass regardless of soil water and nutrient availability. *Plant Ecology* 213: 445–457.
- McGlone, C.M., M.T. Stoddard, J.D. Springer, M.L. Daniels, **P.Z. Fulé**, and **W.W. Covington**. 2012. Nonnative species influence vegetative response to ecological restoration: two forests with divergent restoration outcomes. *Forest Ecology and Management* 285: 195–203.
- McRae, B., S. Hall, **P. Beier**, and D. Theobald. 2012. Where to restore connectivity? Detecting barriers and quantifying restoration benefits. *PLoS One* doi:10.1371/journal.pone.0052604.

- Mering, E.D., and **C.L. Chambers**. 2012. Artificial roosts for tree-roosting bats in northern Arizona. *Wildlife Society Bulletin* 36: 765-772.
- Niu, S., Y. Luo, S. Fei, W. Yuan, D. Schimel, C. Ammann, M. Altaf Arain, A. Arneeth, M Aubinet, A. Barr, J. Beringer, C. Bernhofer, A.T. Black, N. Buchmann, A. Cescatti, J. Chen, K.J. Davis, E. Dellwik, A.R. Desai, H. Dolman, S. Etzold, L. Francois, D. Gianelle, B. Gielen, A. Goldstein, M. Groenendijk, L. Gu, N. Hanan, C. Helfter, T. Hirano, D.Y. Hollinger, M.B. Jones, G. Kiely, **T.E. Kolb**, W.L. Kutsch, P. Lafleur, B.E. Law, D.M. Lawrence, L. Li, A. Lindroth, M. Litvak, D. Loustau, M. Lund, S. Ma, M. Marek, T.A. Martin, G. Matteucci, M. Migliavacca, L. Montagnani, E. Moors, J.W. Munger, A. Noormets, W. Oechel, J. Olejnik, K. Tha Paw U, K. Pilegaard, S. Rambal, A. Raschi, R.L. Scott, G. Seufert, D. Spano, P. Stoy, M.A. Sutton, A. Varlagin, E. Weng, G. Wohlfahrt, B. Yang, Z. Zhang, X. Zhou. 2012. Thermal optimality of net ecosystem exchange of carbon dioxide and underlying mechanisms. *New Phytologist* 194: 775-783.
- Noss, R.F., A.P. Dobson, R. Baldwin, **P.Beier**, C.R. Davis, D.A. DellaSalla, J. Francis, H. Locke, K. Nowak, R. Lopez, C. Reining, S.C. Trombulak, and G. Tabor. 2012. Bolder thinking for conservation. *Conservation Biology* 26: 1-4.
- Plumb, S., E. Nielsen, and **Y.-S. Kim**. 2012. Challenges of opportunity cost analysis in planning REDD+: A Honduran case study of social and cultural values associated with indigenous forest uses. *Forests* 3: 244-264
- Puhlick, J.J., **D.C. Laughlin**, and **M.M. Moore**. 2012. Factors affecting ponderosa pine regeneration in the southwestern USA. *Forest Ecology and Management* 264: 10-19.
- Ramstead, K.M., **J.A. Allen**, and A.E. Springer. 2012. Have wet meadow restoration projects in the Southwestern U.S. been effective in restoring geomorphology, hydrology, soils, and plant species composition? *Environmental Evidence* 1(11): 1-16.
- Roccaforte, J.P., **P.Z. Fulé**, W.W. Chancellor, and D.C. Laughlin. 2012. Woody debris and tree regeneration dynamics following severe wildfires in Arizona ponderosa pine forests. *Canadian Journal of Forest Research* 42:593-604.
- Ross, C.S., J.P. Kaye, M.W. Kaye, V.J. Kurth, R. Brimmer, S.C. Hart, and **P.Z. Fulé**. 2012. Ecosystem carbon remains low for three decades following fire and constrains soil CO<sub>2</sub> responses to precipitation in southwestern ponderosa pine forests. *Ecosystems* 5: 725-740.
- Rudnick, D.A., S.J. Ryan, **P. Beier**, S.A. Cushman, F. Dieffenbach, C.W. Epps, L.R. Gerber, J. Hartter, J.S. Jenness, J. Kintsch, A.M. Merenlender, M. Perkl, M. Ryan, D.V. Preziosi, and S.C. Trombulak. 2012. The role of landscape connectivity in planning and implementing conservation and restoration priorities. *Issues in Ecology* 16:1-20.
- Scott, J.M., and **R.L. Mathiasen**. 2012. Assessing growth and mortality of bristlecone pine infected by western spruce dwarf mistletoe using dendroecology. *Forest Science* 58: 366-376.
- Springer, J.D., **P.Z. Fulé**, and D.W. Huffman. 2012. Long-term Responses of *Penstemon clutei* (Sunset Crater Beardtongue) to Root Trenching and Prescribed Fire: Clues for Population Persistence. *Calochortiana* 1: 164-171.
- Stevens-Rumann, C.S., C.H. Seig, and **M.E. Hunter**. 2012. Ten years after wildfires: How does varying tree mortality impact fire hazard and forest resiliency? *Forest Ecology and Management* 267: 199-208.
- Sullivan, B.W., S. Dore, M.C. Montes-Helu, **T.E. Kolb**, and S.C. Hart. 2012. Pulse emissions of carbon dioxide during snowmelt at a high-elevation site in northern Arizona, USA. *Arctic, Antarctic, and Alpine Research* 44:247-254.

- van Wagtenonk, J.W., KA van Wagtenonk, and **A.E. Thode**. 2012. Factors associated with the severity of intersecting fires in Yosemite National Park, California, USA. *Fire Ecology* 8: 11-32.
- Waring, K.M.** and B.A. Goodrich. 2012. Artificial Regeneration of Five-Needle Pines of Western North America: A Survey of Current Practices and Future Needs. *Tree Planters' Notes* 55: 55-71.
- Yocom, L.L., and **P.Z. Fulé**. 2012. Human and climate influences on frequent fire in a high-elevation tropical forest. *Journal of Applied Ecology* doi: 10.1111/j.1365-2664.2012.02216.x.
- Yturralde, K.M. and **R.W. Hofstetter**. 2012. Efficacy of commercially available ultrasonic pest repellent devices to affect behavior of bed bugs, *Cimex lectularius*. *Journal of Economic Entomology* 105: 2107-2114.
- Zegler, T.J., **M.M. Moore**, M.L. Fairweather, K.B. Ireland, and **P.Z. Fulé**. 2012. *Populus trremuloides* mortality near the southwestern edge of its range. *Forest Ecology and Management* 282: 196-207.

## 2011

- Abella, S.R., C.W. Denton, D.G. Brewer, W.A. Robbie, R.W. Steinke, and **W.W. Covington**. 2011. Using a Terrestrial Ecosystem Survey to Estimate the Historical Density of Ponderosa Pine Trees. Research Note RMRS-RN-45, USDA Forest Service, Rocky Mountain Research Station, Ft. Collins, CO. 9 pp.
- Bayless, T.A. and **P. Beier**. 2011. Occurrence and Habitat Characteristics of Burrowing Owl Nests in Gunnison's Prairie Dog Colonies of Northeastern Arizona. *Journal of the Arizona-Nevada Academy of Science* 42: 65-74.
- Beier, P.**, WD Spencer, R Baldwin, and B McRae. 2011. Toward best practices for developing regional connectivity maps. *Conservation Biology* 25: 879-892.
- Bickford, I.N., **P.Z. Fule**, **T.E. Kolb**. 2011. Growth sensitivity to drought of co-occurring *Pinus* *spp.* along an elevation gradient in northern Mexico. *Western North American Naturalist* 71:338-348.
- Chambers, C.L.**, M.J. Herder, K. Yusuda, D.J. Mikesic, **S.M. Dewhurst**, W.M. Masters, D. Vleck. 2011. Roosts and home ranges of spotted bats (*Euderma maculatum*) in northern Arizona. *Canadian Journal of Zoology* 89: 1256-1267.
- Davis, T.S. and **R.W. Hofstetter**. 2011. Oleoresin chemistry mediates oviposition behavior and fecundity of a tree-killing bark beetle. *Journal of Chemical Ecology* 37: 1177-1183
- Davis, T.S. and **R.W. Hofstetter**. 2011. Reciprocal interactions between the bark-beetle associated yeast *Ogataea pini* and host plant phytochemistry. *Mycologia* doi:10.3852/11-083.
- Davis, T.S., **R.W. Hofstetter**, J.T. Foster, N.E. Foote and P. Keim. 2011. Interactions between the yeast *Ogataea pini* and filamentous fungi associated with the western pine beetle. *Microbial Ecology* 61: 626-634.
- Davis, T., K. Jarvis, K. Parise and **R. Hofstetter**. 2011. Oleoresin exudation rate increases and viscosity declines following a fire event in a ponderosa pine ecosystem. *Journal of the Arizona-Nevada Academy of Science* 43:6-11.

- Evans, L.M., **R.W. Hofstetter**, M.P. Ayres, and K.D. Klepzig. 2011. Temperature alters the relative abundance and population growth rates of species within the *Dendroctonus frontalis* (Coleoptera: Curculionidae) community. *Environmental Entomology* 40: 824-834.
- Falk, D.A., E.K. Heyerdahl, P.M. Brown, C. Farris, **P.Z. Fulé**, D. McKenzie, T.W. Swetnam, A.H. Taylor, and M.L. Van Horne. 2011. Multiscale controls of historical forest fire regimes: New insights from fire-scar networks. *Frontiers in Ecology and the Environment* DOI:10.1890/100052.
- Fierke, M.K., D. Nowak, and **R.W. Hofstetter**. 2011. Chapter 9: Forest Health Monitoring. In Castello, J. and S. Teale eds.), Using the Baseline Mortality Concept in Forest Health. SUNY College of Environmental Science and Forestry. Cambridge University Press.
- Fulé, P.Z.**, M. Ramos-Gómez, C. Cortés-Montañó, and A.M. Miller. 2011. Fire regime in a Mexican forest under indigenous resource management. *Ecological Applications* 21: 764–775.
- Ganey, J.L. and **C.L. Chambers**. 2011. A reconnaissance of small mammal communities in Garland and Government Prairies, Arizona. *Western North American Naturalist* 71: 151-157.
- Gaylord, M.L.**, **R.W. Hofstetter**, **T.E. Kolb**, and **M.R. Wagner**. 2011. Limited response of ponderosa pine bole defenses to wounding and fungi. *Tree Physiology* 31: 428-437.
- Grady, K.C., S.M. Ferrier, **T.E. Kolb**, S.C. Hart, G.J. Allen, T.G. Whitham. 2011. Genetic variation in productivity of foundation riparian species at the edge of their distribution: implications for restoration and assisted migration in a warming climate. *Global Change Biology*. DOI: 10.1111/j.1365-2486.2011.02524.x.
- Hallett, J.T., J. Díaz-Calvo, J. Villa-Castillo and **M.R. Wagner**. 2011. Teak plantations: Economic bonanza or environmental disaster? *Journal of Forestry* 109: 288-292.
- Hoffman, C.M., C.H. Sieg, J.D. McMillan, and **P.Z. Fulé**. 2011. Fuel loadings five years after a bark beetle outbreak in Southwestern USA ponderosa pine forests. *International Journal of Wildland Fire* <http://dx.doi.org/10.1071/WF11019>.
- Hofstetter, R.W.** and **M.R. Wagner**. 2011. Carbon, bark beetles and biofuels (Commentary). *Journal of Forestry* 109: 245-246.
- Huang, C.**, and Sorensen C. 2011. The Economic Value of Selling Carbon Credits from Restored Forests: A Case Study from the Navajo Nation's Tribal Forests. *Western Journal of Applied Forestry* 26(1): 37-45.
- Hunter, M.E.**, J.M. Iniguez, and L.B. Lentile. 2011. Short- and long-term effects on fuels, forest structure and wildfire potential from prescribed fire and resource benefit fire in southwestern forests, USA. *Fire Ecology* 7: 108-121.
- Hulcr, J., A.S. Adams, K.F. Raffa, **R.W. Hofstetter**, K.D. Klepzig, and C.R. Currie. 2011. Presence and diversity of *Streptomyces* in *Dendroctonus* and sympatric bark beetle galleries across North America. *Microbial Ecology* 61: 759-768.
- Hurteau, M.D., M.T. Stoddard, **P.Z. Fulé**. 2011. The carbon costs of mitigating high-severity wildfire in southwestern ponderosa pine. *Global Change Biology* 17: 1516-1521.
- Kattge, J., S. Díaz, S. Lavorel, I. C. Prentice, P. Leadley, G. Bönsch, E. Garnier, M. Westoby, P. B. Reich, I. J. Wright, J. H. C. Cornelissen, C. Violle, S. P. Harrison, P. M. v. Bodegom, M. Reichstein, N. A. Soudzilovskaia, D. Ackerly, M. Anand, O. K. Atkin, M. Bahn, T. R. Baker, D. Baldocchi, R. Bekker, C. Blanco, B. Blonder, W. Bond, R. Bradstock, D. E. Bunker, F. Casanoves, J. Cavender-Bares, J. Chambers, F. S. Chapin, J. Chave, D.

- Coomes, W. K. Cornwell, J. M. Craine, B. H. Dobrin, W. Durka, J. Elser, B. J. Enquist, G. Esser, M. Estiarte, W. F. Fagan, J. Fang, F. Fernández, A. Fidelis, B. Finegan, O. Flores, H. Ford, D. Frank, G. T. Freschet, N. M. Fyllas, R. Gallagher, W. Green, A. G. Gutierrez, T. Hickler, S. Higgins, J. G. Hodgson, A. Jalili, S. Jansen, C. Joly, A. J. Kerkhoff, D. Kirkup, K. Kitajima, M. Kleyer, S. Klotz, J. M. H. Knops, K. Kramer, I. Kühn, H. Kurokawa, **D. Laughlin**, T. D. Lee, M. Leishman, F. Lens, T. Lenz, S.L. Lewis, J. Lloyd, J. Llusià, F. Louault, S. Ma, M. D. Mahecha, P. Manning, T. Massad, B. Medlyn, J. Messier, A. Moles, S. Müller, K. Nadrowski, S. Naeem, Ü. Niinemets, S. Nöllert, A. Nüske, R. Ogaya, J. Oleksyn, V. G. Onipchenko, Y. Onoda, J. Ordoñez, G. Overbeck, W. A. Ozinga, S. Patiño, S. Paula, J. G. Pausas, J. Peñuelas, O. L. Phillips, V. Pillar, H. Poorter, L. Poorter, P. Poschlod, R. Proulx, A. Rammig, S. Reinsch, B. Reu, L. Sack, B. Salgado, J. Sardans, A. Siefert, S. Shiodera, B. Shipley, E. Sosinski, J.-F. Soussana, E. Swaine, N. G. Swenson, K. Thompson, P. Thornton, M. Waldram, E. Weiher, M. White, S. J. Wright, S. Zaehle, A. E. Zanne and C. Wirth. 2011. TRY – a global database of plant traits. *Global Change Biology* 17: 2905-2935.
- Kim, Y.-S.**, and E. E. Hjerpe. 2011. Chapter 14: Merging Economics and Ecology in Ecological Restoration Projects. Pages 191- 206 in D. Egan, E. Hjerpe, and J. Abrams (eds), *Integrating Nature and Culture: Exploring the Human Dimensions of Ecological Restoration*. Island Press, Washington, DC.
- Laughlin, D.C.** 2011. Nitrification is linked to leaf traits rather than functional diversity. *Journal of Ecology*. 99: 1091-1099.
- Laughlin, D.C., P.Z. Fulé**, D.W. Huffman, J. Crouse, and E. Laliberte. 2011. Climatic constraints on trait-based forest assembly. *Journal of Ecology*. doi: 10.1111/j.1365-2745.2011.01885.x.
- Laughlin, D.C., M.M. Moore**, and **P.Z. Fulé**. 2011. A century of increasing pine density and associated shifts in understory plant strategies. *Ecology* 92:556-561.
- Lee, X., M. Goulden, D.Y. Hollinger, A. Barr, T.A. Black, G. Bohrer, R. Bracho, B. Drake, A. Goldstein, L. Gu, G. Katul, **T. Kolb**, B.E. Law, H. Margolis, T. Meyers, R. Monson, W. Munger, R. Oren, K. Tha Paw U, A.D. Richardson, H.P. Schmid, R. Staebler, S. Wofsy, L. Zhao. 2011. Observed increase in local cooling effect of deforestation at higher latitudes. *Nature* 479: 384-387.
- Mathiasen, R. L.** 2011. Morphological comparisons of white fir and red fir dwarf mistletoes in the Sierra Nevada and southern Cascade Mountains. *Madroño* 58: 101-105.
- Mathiasen, R. L.** 2011. Susceptibility of conifers to three dwarf mistletoes in the Klamath-Siskiyou Mountains. *Western Journal of Applied Forestry* 26: 13-18.
- McGlone, C.M., C.H. Sieg, **T.E. Kolb**. 2011. Invasion resistance and persistence: established plants win, even with disturbance and high propagule pressure. *Biological Invasions* 13: 291–304.
- Peppin, D.L., **P.Z. Fulé**, C. Hull Sieg, J.L. Beyers, **M.E. Hunter**, and P.R. Robichaud. 2011. Recent trends in post-wildfire seeding in western U.S. forests: costs and seed mixes. *International Journal of Wildland Fire* 20: 702-708.
- Perez-Verdin, G., J.J. Navar-Chaidez, R. Silva-Flores, and **Y.-S. Kim**. 2011. The value of water under different altitude and moisture scenarios: A review of willingness-to-pay studies in Mexico. *Modern Economy* 2: 769-779.
- Sánchez Meador, A.J., **P.F. Parysow**, and **M.M. Moore**. 2011. A new method for delineating tree patches and assessing spatial reference conditions of ponderosa pine forests in northern Arizona. *Restoration Ecology* 19: 490-499.



- Shiple, B., **D.C. Laughlin**, G. Sonniér, R. Otfinowski. 2011. A strong test of the maximum entropy model of trait-based community assembly. *Ecology* 92: 507-517.
- Smith, L., **R. Mathiasen**, and **R. Hofstetter**. 2011. Biomass of witches' brooms caused by Douglas-fir dwarf mistletoe in northern Arizona. *Journal of the Arizona-Nevada Academy of Science* 43: 40-47.
- Sorensen, C.D, **A.J. Finkral**, **T.E. Kolb**, **C.H. Huang**. 2011. Short- and long-term effects of thinning and fire on carbon stocks in ponderosa pine stands in northern Arizona. *Forest Ecology and Management* 261:460-472.
- Stoddard, M.T., C.M. McGlone, **P.Z. Fulé**, D.C. Laughlin, and M.L. Daniels. 2011. Native plants dominate understory vegetation following ponderosa pine forest restoration treatments. *Western North American Naturalist* 71: 206-214.
- Thode, A.**, Jan W. van Wagendonk, Jay D. Miller, and James F. Quinn. 2011. Quantifying the fire regime distributions for severity in Yosemite National Park, California, USA. *International Journal of Wildland Fire* 20: 223-239.
- Villanueva Díaz, J., J. Cerano P., D.W. Stahle, B.H. Luckman, M.D. Therrell, M.K. Cleaveland, and **P.Z. Fulé**. 2011. La dendrocronología y reconstrucciones paleoclimáticas en el norte-centro de México (Chapter III). Pages 47-72 in M. Caballero B. Ortega Guerrero (compilers), Escenarios de cambio climático: Registros del Cuaternario en América Latina I. Universidad Nacional Autónoma de México.
- Wu, T., **Y.-S. Kim**, and M. Hurteau. 2011. Investing in Natural Capital: Using Economic Incentives to Overcome Barriers to Forest Restoration. *Restoration Ecology* 19: 441-445
- Wu, T., M.A. Petriello, and **Y.-S. Kim**. 2011. Shifting baseline syndrome as a barrier to ecological restoration in the American Southwest. *Ecological Restoration* 29: 213-215.
- Zhang, H., L.E. DeWald, **T.E. Kolb**, D.F. Koepke. 2011. Genetic variation in ecophysiological and survival responses to drought in two native grasses: *Koeleria macrantha* and *Elymus elymoides*. *Western North American Naturalist* 71: 25-32.

## 2010

- Amiro, B.D., A.G. Barr, J.G. Barr, T.A. Black, R. Bracho, M. Brown, J. Chen, K.L. Clark, K.J. Davis, A.R. Desai, S. Dore, V. Engel, J.D. Fuentes, A.H. Goldstein, M.L. Goulden, **T.E. Kolb**, M.B. Lavigne, B.E. Law, H.A. Margolis, T. Martin, J.H. McCoughey, L. Misson, M. Montes-Helu, A. Noormets, J.T. Randerson, G. Starr, J. Xiao. 2010. Ecosystem carbon fluxes after disturbance in forests of North America. *Journal of Geophysical Research* 115, G00K02, DOI 10.1029/2010JG001390.
- Bakker, J.D., F. Rudebusch, and **M.M. Moore**. 2010. Effects of long-term livestock grazing and habitat on understory vegetation. *Western North American Naturalist* 70:334-344.
- Beier, P.**, and B. Brost. 2010. Use of land facets in planning for climate change: conserving the arenas not the actors. *Conservation Biology* 24: DOI: 10.1111/j.1523-1739.2009.01422.x.
- Beier, P.**, S.P.D. Riley, and R.M. Sauvajot. 2010. Mountain lions. Pages 177-189 in Gehrt, S.D., S.P.D. Riley, and B.L. Cypher, (eds.), *Urban Carnivores: Ecology, Conflict, and Conservation*. Johns Hopkins University Press, Baltimore, Maryland.
- Bridgeland, W.T., **P. Beier**, **T.E. Kolb**, T.G. Whitham. 2010. A conditional trophic cascade: birds benefit faster growing trees with strong links between predators and plants. *Ecology* 91: 73-84.

- Cerano Paredes, J., J. Villanueva D., P.Z. **Fulé**. 2010. Reconstrucción de incendios y su relación con el clima para la reserva Cerro El Mohinora, Chihuahua. *Revista Mexicana de Ciencias Forestales* 1(1): 89-103.
- Davis, T.S., **R.W. Hofstetter**, K.D. Klepzig, J.T. Foster, and P. Keim. 2010. Interactions between multiple fungi isolated from two bark beetles, *Dendroctonus brevicornis* and *Dendroctonus frontalis* (Coleoptera: Curculionidae). *Journal of Yeast and Fungal Research* 1: 118-126.
- Diggins, C., P.Z. **Fulé**, J.P. Kaye, and **W.W. Covington**. 2010. Future climate affects management strategies for maintaining forest restoration treatments. *International Journal of Wildland Fire* 19: 903–913.
- Dore, S., **T.E. Kolb**, M. Montes-Helu, S.E. Eckert, B.W. Sullivan, B.A. Hungate, J.P. Kaye, S.C. Hart, G.W. Koch, **A. Finkral**. 2010. Carbon and water fluxes from ponderosa pine forests disturbed by wildfire and thinning. *Ecological Applications*: 20(3): 663-683.
- Fischer, M.J., **K.M. Waring**, **R.W. Hofstetter**, **T.E. Kolb**. 2010. Ponderosa pine characteristics associated with attack by the roundheaded pine beetle. *Forest Science* 56: 473-483.
- Friggens, M., and **P. Beier**. 2010. Anthropogenic disturbance and the risk of flea-borne disease transmission. *Oecologia* 164: 809-820.
- Fulé, P.Z.** 2010. Wildfire Ecology and Management at Grand Canyon, USA: Tree-ring applications in forest fire history and modeling. Pages 365-381 in Stoffel, M., M. Bollschweiler, D. R. Butler, B. H. Luckman (editors), *Tree-Ring Reconstructions in Natural Hazards Research*, Springer Science + Business Media B.V., Dordrecht.
- Gaylord, M.L., R.W. Hofstetter, and M.R. Wagner**. 2010. Impacts of silvicultural thinning treatments on bark beetle trap captures and tree attacks during low bark beetle populations in ponderosa pine forests of northern Arizona. *Journal of Economic Entomology* 103(5): 1693-1703.
- Gonzalez, P., G.P. Asner, J.J. Battles, M.A. Lefsky, **K.M. Waring** and M. Palace. 2010. Forest carbon densities and uncertainties from Lidar, Quickbird, and field measurements in California. *Remote Sensing of Environment* 114: 1561-1575.
- Hofstetter, R.W.** 2010. Chapter 11: Mutualists and Phoronts of the Southern Pine Beetle. In *Southern Pine Beetle Encyclopedia* (K.D. Klepzig & R. Coulson, eds.). Forest Encyclopedia Network (FEN) USDA Forest Service. <<http://forestencyclopedia.net/>> and hardcopy.
- Huang, C., and Sorensen C. 2010. Exploring the Potential of Obtaining Carbon Credits for Restoration Activities on Navajo Tribal Forest Lands. Working Papers in Southwestern Ponderosa Pine Restoration, Ecological Restoration Institute, Flagstaff, Arizona.
- Hultine, K.R., J. Belnap, C. van Riper III, J.R. Ehleringer, P.E. Dennison, **M.E. Lee**, P.L. Nagler, K.A. Snyder, S.M. Uselman, and J.B. West. 2010. Tamarisk biocontrol in the western United States: Ecological and societal implications. *Frontiers in Ecology and the Environment* 8: 467-474.
- Johnson, T.D., **T.E. Kolb**, A.L. Medina. 2010. Do riparian plant community characteristics differ between Tamarix (L.) invaded and non-invaded sites on the upper Verde River? *Biological Invasions* 12: 2487-2497.
- Kalies, E.L., **C.L. Chambers**, and **W.W. Covington**. 2010. Wildlife responses to thinning and burning treatments in southwestern conifer forests: a meta-analysis. *Forest Ecology and Management* 259: 333-342.

- Kane, J.M., **T.E. Kolb**. 2010. Importance of resin ducts in reducing ponderosa pine mortality following bark beetle attack. *Oecologia* 164: 601–609.
- Kim, Y.-S.** 2010. Ecological Restoration as Economic Stimulus: A Regional Analysis. Ecological Restoration Institute, Northern Arizona University. *ERI–Issues in Forest Restoration*, 20p.
- Klepzig, K.D. and **R.W. Hofstetter**. 2010. Chapter 10: From Attack to Emergence: Interactions between southern pine beetle, mites, microbes and trees. *In Southern Pine Beetle Encyclopedia* (K.D. Klepzig & R. Coulson, eds.). Forest Encyclopedia Network (FEN) USDA Forest Service. <<http://forestencyclopedia.net/>> and hardcopy.
- Koepke, D., **T.E. Kolb**, H.D. Adams. 2010. Variation in woody plant mortality and dieback from severe drought among soils, plant functional groups, and species within a northern Arizona ecotone. *Oecologia* 163: 1079-1090.
- Krauss, K.W., D.R. Cahoon, **J.A. Allen**, J.C. Lynch, N.C. Cormier and K.C. Ewel. 2010. Surface elevation change and susceptibility of different mangrove zones to sea-level rise on Pacific high islands of Micronesia. *Ecosystems* 13: 129-143.
- Laughlin, D.C.**, J.J. Leppert, **M.M. Moore**, and C.H. Sieg. 2010. A multi-trait test of the leaf-height-seed plant strategy scheme with 133 species from a pine forest flora. *Functional Ecology* 24: 493-501.
- Laughlin, D.C.**, S.C. Hart, J.P. Kaye, and **M.M. Moore**. 2010. Evidence for indirect effects of plant diversity and composition on net nitrification. *Plant and Soil* 330: 435-445.
- Mathiasen, R. L.** 2010. First report of white fir dwarf mistletoe (*Arceuthobium abietinum* f. sp. *concoloris*) on Mexican spruce (*Picea mexicana*) in northern Mexico. *Plant Disease* 94: 635.
- Mathiasen, R.L.**, and C.M. Daugherty. 2010. First report of limber pine dwarf mistletoe (*Arceuthobium cyanocarpum*) on sugar pine (*Pinus lambertiana*) from California. *Plant Disease* 94: 134.
- Mathiasen, R. L.**, and C. M. Daugherty. 2010. Susceptibility of Brewer spruce (*Picea breweriana*) to dwarf mistletoes (*Arceuthobium* spp., Viscaceae). *Northwest Science* 84: 295-301.
- Ogbaharya, D. and **A. Tecele**. 2010. Comparative analysis of community-based natural resources management in Eritrea and Ethiopia. *Journal of East African Studies* 4: 490-509.
- O’Hara, K.L., A. Youngblood, and **K.M. Waring**. 2010. Maturity selection vs. improvement selection: Lessons from a Mid-20<sup>th</sup> Century controversy in the silviculture of ponderosa pine. *Journal of Forestry* 108: 97-407.
- Peppin, D.P., **P.Z. Fulé**, C.H. Sieg, J.L. Beyers, and **M.E. Hunter**. 2010. Post-wildfire seeding in forests of the western United States: An evidence-based review. *Forest Ecology and Management* 260: 573–586.
- Peppin, D.P., **P.Z. Fulé**, J.C. Lynn, A.L. Mottek-Lucas, and C.H. Sieg. 2010. Market perceptions and opportunities for native plant production on the southern Colorado Plateau. *Restoration Ecology* 18(S1): 113–124.
- Poff, B., D. Neary, and **A. Tecele**. 2010. Fire and fire surrogate treatment impacts on soil moisture condition in southwestern ponderosa pine forests. Pages 121-129 in C. Van Riper III, B.F. Wakeling and T.D. Sisk (eds.), *The Colorado Plateau IV: Shaping Conservation through Science and Management*. University of Arizona Press, Tucson, AZ.
- Poff, B. **A Tecele**, D.G. Neary, and B. Geils. 2010. Compromise programming in forest management. *Journal of the Arizona-Nevada Academy of Science* 42: 44-60.

- Quinonez, S., and **R. Mathiasen**. 2010. First report of *Arceuthobium blumeri* on *Pinus ayacahuite* and *A. globosum* subsp. *globosum* on *Pinus durangensis* from Sinaloa, Mexico. *Plant Disease* 94: 377.
- Roccaforte, J.P., **P.Z. Fulé**, and **W.W. Covington**. 2010. Monitoring landscape-scale ponderosa pine restoration treatment implementation and effectiveness. *Restoration Ecology* 18(6): 820–833.
- Sánchez Meador, A.J., and **M.M. Moore**. 2010. Lessons from long-term studies of harvest methods in southwestern ponderosa pine-Gambel oak forests on the Fort Valley Experimental Forest, Arizona, U.S.A. *Forest Ecology and Management* 260:193-206.
- Scudieri, C., C. Sieg, S. Haase, **A. Thode** and S. Sackett. 2010. Understory vegetation response after 30 years of interval prescribed burning in two ponderosa pine sites in northern Arizona. *Forest Ecology and Management* 260: 2134-2142.
- Sisk, T.D., C. Albano, E. Aumack, E.J. Bernstein, T.E. Crews, B.G. Dickson, S. Fluck, M. McMaster, A.S. Rogers, S.S. Rosenstock, D. Schlosberg, R. Sieg, and **A. Thode**. 2010. Integrating restoration and conservation objectives at the landscape scale: the Kane and Two Mile Ranch project. Pages 45-66 in C. Van Riper III, B.F. Wakeling and T.D. Sisk (eds.), *The Colorado Plateau IV: Shaping Conservation Through Science and Management*. University of Arizona Press, Tucson, AZ.
- Stella, K.A., C.H. Sieg, and **P.Z. Fulé**. 2010. Minimal effectiveness of native and non-native seeding following three high-severity wildfires. *International Journal of Wildland Fire* 19: 746–758.
- Sullivan, B.W., S. Dore, **T.E. Kolb**, S.C. Hart, M.C. Montes-Helu. 2010. Evaluation of methods for estimating soil carbon dioxide efflux across a gradient of forest disturbance. *Global Change Biology* 16: 2449-2460.
- Sullivan, B.W., **T.E. Kolb**, S.C. Hart, J.P. Kaye, B.A. Hungate, S. Dore, M. Montes-Helu. 2010. Wildfire reduces carbon dioxide efflux and increases methane uptake in ponderosa pine forest soils of the southwestern USA. *Biogeochemistry*: DOI 10.1007/s10533-010-9499-1.
- Teclé, A.** 2010. Sustainability management of natural resources in an era of global climate change. Pages 419-433 in R.A. Reck (ed.), *Climate Change and Sustainable Development*. Linton Atlantic Books, Ltd., Cambridge, UK.
- Yi, C., D. Ricciuto, X. Xu, R. Li, J. Wolbeck, X. Xu, M. Nilsson, L. Aires, J. Albertson, C. Ammann, M. Altaf Arain, A. de Araujo, M. Aubinet, M. Aurela, Z. Barcza, A. Barr, P. Berbigier, J. Beringer, C. Bernhofer, A. Black, P. Bolstad, F. Bosveld, M. Broadmeadow, N. Buchmann, S. Burns, P. Cellier, J. Chen, J. Chen, P. Ciais, R. Clement, B. Cook, P. Curtis, B. Dail, E. Dellwik, N. Delpierre, A. Desai, H. Dolman, S. Dore, D. Dragoni, B. Drake, E. Dufrêne, A. Dunn, J. Elbers, W. Eugster, M. Falk, C. Feigenwinter, L. Flanagan, T. Foken, J. Frank, J. Fuhrer, D. Gianelle, A. Goldstein, M. Goulden, A. Granier, T. Grünwald, L. Gu, H. Guo, A. Hammerle, S. Han, N. Hanan, L. Haszpra, B. Heinesch, C. Helfter, D. Hendriks, L. Hutley, A. Ibrom, C. Jacobs, T. Johansson, M. Jongen, G. Katul, G. Kiely, K. Klumpp, A. Knohl, **T. Kolb**, W. Kutsch, P. Lafleur, T. Laurila, R. Leuning, A. Lindroth, H. Liu, B. Loubet, G. Manca, M. Marek, H. Margolis, T. Martin, W. Massman, R. Matamala, G. Matteucci, H. McCaughey, L. Merbold, T. Meyers, M. Migliavacca, F. Miglietta, L. Misson, M. Mölder, J. Moncrieff, R. Monson, L. Montagnani, M. Montes-Helu, E. Moors, C. Moureaux, M. Mukelabai, J. Munger, M. Myklebust, Z. Nagy, A. Noormets, W. Oechel, R. Oren, S. Pallardy, K. Paw U, J. Pereira, K. Pilegaard, K. Pintér, C. Pio, G. Pita, T. Powell, S. Rambal, J. Randerson, C. von

Randow, C. Rebmann, J. Rinne, F. Rossi, N. Roulet, R. Ryel, J. Sagerfors, N. Saigusa, M. Sanz, G. Mugnozza, H. Schmid, G. Seufert, M. Siqueira, J. Soussana, G. Starr, M. Sutton, J. Tenhunen, Z. Tuba, J. Tuovinen, R. Valentini, C. Vogel, J. Wang, S. Wang, W. Wang, L. Welp, X. Wen, S. Wharton, M. Wilkinson, C. Williams, S. Wofsy, G. Wohlfahrt, S. Yamamoto, G. Yu, R. Zampedri, B. Zhao, X. Zhao. 2010. Climate control of terrestrial carbon exchange across biomes and continents. *Environmental Research Letters* 5:03400. DOI 10.1088/1748-9326/5/3/034007.

Yocom, L.L., **Fulé, P.Z.**, Brown, P.M., Cerano, J., Villanueva-Díaz, J., Falk, D.A., Cornejo-Oviedo, E. 2010. El Niño-Southern Oscillation effect on a fire regime in northeastern Mexico has changed over time. *Ecology* 91(6): 1660-1671.

## 2009

**Beier, P.** 2009. Cougars and conservation planning. Pages 177-189 in Hornocker, M. and S. Negri, (eds.), *Cougar Ecology and Conservation*. University of Chicago Press.

**Beier, P.**, D.R. Majka, and S.L. Newell. 2009. Uncertainty analysis of least-cost modeling for designing wildlife linkages. *Ecological Applications* 19: 2067-2077.

Bell, D.M., **P.F. Parysow**, and **M.M. Moore**. 2009. Assessing the representativeness of the oldest permanent inventory plots in northern Arizona ponderosa pine forests. *Restoration Ecology* 17:369-377.

Boerner, R.E.J., J. Huang, and **S.C. Hart**. 2009. Impacts of fire and fire surrogate treatments on ecosystem nitrogen storage patterns: similarities and differences between forests of eastern and western North America. *Canadian Journal of Forest Research* 38: 3056-3070.

Cerano Paredes, J., J. Villanueva Díaz, **P.Z. Fulé**, J.G. Arreola Ávila, I. Sánchez Cohen, and R. D. Valdez Cepeda. 2009. Reconstrucción de 350 años de precipitación para el suroeste de Chihuahua, México. *Madera y Bosques* 15: 27-44.

Collins, B., J. Miller, **A. Thode**, M. Kelly, J. van Wagendonk and S. Stephens. 2009. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. *Ecosystems* 12: 114-128.

Currie, W.S., M.E. Harmon, I.C. Burke, **S.C. Hart**, and W.L. Silver. 2009. Cross-biome transplants of plant litter show decomposition models extend to a broader climatic range but lose predictability at the decadal time scale. *Global Change Biology* DOI: 10.1111/j.1365-2486.2009.02086.x

Davis, T.S. and **R.W. Hofstetter**. 2009. The effects of gallery density and ratio on the fitness and fecundity of two sympatric bark beetles. *Environmental Entomology* 38: 639-650.

**Fulé, P.Z.**, J.E. Korb, and R. Wu. 2009. Changes in forest structure of a dry mixed conifer forest, southwestern Colorado USA. *Forest Ecology and Management* 258: 1200–1210.

Harmon, M.E., W.L. Silver, B. Fasth, H. Chen, I.C. Burke, W.J. Parton, **S.C. Hart**, W.S. Currie, and LIDET. 2009. Long-term patterns of mass loss during the decomposition of leaf and fine root litter: an intersite comparison. *Global Change Biology* 15: 1320-1338.

Hayes, C.J., **R.W. Hofstetter**, T.E. DeGomez, and **M.R. Wagner**. 2009. Effect of sunlight exposure and log size on pine engraver (*Coleoptera*: Curculionidae) reproduction in ponderosa pine slash in northern Arizona. *Agriculture and Forest Entomology* 11: 341-350.

- Hofstetter, R.W.**, J.C. Moser, and R. McGuire. 2009. Observations of the mite *Schizosthetus lyriformis* (Acari: Parasitidae) preying on bark beetle eggs and larvae. *Entomological News* 120: 453-456.
- Huang, C.** 2009. Economics of northern bobwhite and timber management in the southeastern United States. *Journal of Wildlife Management* 73: 1355-1361.
- Huffman, D.W., **P.Z. Fulé**, K.M. Pearson, and J.E. Crouse. 2009. A comparison of fire hazard mitigation alternatives in pinyon-juniper woodlands of Arizona. *Forest Ecology and Management* 257: 628–635.
- Johnson, T.D., **T.E. Kolb**, A.L. Medina. 2009. Do riparian plant community characteristics differ between *Tamarix* (L.) invaded and non-invaded sites on the upper Verde River? *Biological Invasions* DOI 10.1007/s10530-009-9658-2.
- Kobziar, L.N., M.E. Rocca, C.A. Dicus, C. Hoffman, N. Sugihara, **A.E. Thode**, J.M. Varner, and P. Morgan. 2009. Challenges to educating the next generation of wildland fire professionals in the U.S. *Journal of Forestry* 107: 339-345.
- Laughlin, D.C., and **M.M. Moore**. 2009. Climate-induced temporal variation in the productivity diversity relationship. *Oikos* 118: 897-902.
- Lutz J., J. van Wagtendonk, **A. Thode**, J. Miller, J. Franklin. 2009. Climate, lightning ignitions, and fire severity in Yosemite National Park, California, USA. *International Journal of Wildland Fire* 18: 765–774.
- Mathiasen, R. L.** 2009. Comparative susceptibility of conifers to knobcone pine dwarf mistletoe. *Western North American Naturalist* 69: 42-48.
- Mathiasen, R. L.**, and C. M. Daugherty. 2009. Additional morphological measurements of *Arceuthobium siskiyouense* and *A. monticola* (Viscaceae). *Journal of the Botanical Research Institute of Texas* 3: 741-749.
- Mathiasen, R. L.**, and C. M. Daugherty. 2009. *Arceuthobium abietinum* subspecies *wiensii*, a new subspecies of fir dwarf mistletoe (Viscaceae) from northern California and southern Oregon. *Madroño* 56: 118-126.
- Mathiasen, R. L.**, and C. M Daugherty. 2009. First report of mountain hemlock dwarf mistletoe (*Arceuthobium tsugense* subsp. *mertensiana*) on sugar pine (*Pinus lambertiana*) from Oregon. *Plant Disease* 93: 321.
- Mathiasen, R. L.**, C. M. Daugherty, and B. P. Reif. 2009. *Arceuthobium rubrum* (Viscaceae) in Mexico. *Madroño* 56: 99-103.
- Miller, J.D., H. Safford, M. Crimmins, and **A.E. Thode**. 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. *Ecosystems* 12: 16-32.
- Montes-Helu, M., **T.E. Kolb**, S. Dore, B. Sullivan, S. Hart, G. Koch, B. Hungate. 2009. Persistent effects of fire-induced vegetation change on energy partitioning and evapotranspiration in ponderosa pine forests. *Agricultural and Forest Meteorology* 149: 491-500.
- Painter, M.L., **C.L. Chambers**, M.S. Siders, R.R. Doucett, and J.O. Whittaker, Jr. 2009. Diet of spotted bats (*Euderma maculatum*) in Arizona as indicated by fecal analysis and stable isotopes. *Canadian Journal of Zoology* 87: 865-875.
- Perez-Verdin, J.C. Hernandez-Diaz, M.A. Marquez-Linares, and **A. Teclé**. 2009. Aplicacion de tenicas multicriterio en el Manejo Integral Forestal en Durango, Mexico. *Madera y Bosques* 15: 27-46.

- Perez-Verdin, G., **Y-S. Kim**, **D. Hospodarsky**, and **A. Teclé**. 2009. Factors driving deforestation in common-pool resources in northern Mexico. *Journal of Environmental Management* 90: 331-340.
- Pope, T.L., W.M. Block, and **P. Beier**. 2009. Prescribed fire effects on wintering, bark-foraging birds in northern Arizona. *Journal of Wildlife Management* 73: 695-700.
- Raffa, K.F., B. Aukema, B.J. Bentz, A. Carroll, N. Erbilgin, D.A. Herms, J.A. Hicke, **R.W. Hofstetter**, S. Katovich, B.S. Lindgren, J. Logan, W. Mattson, A.S. Munson, D.J. Robinson, D.L. Six, P.C. Tobin, P.A. Thowsend and K.F. Wallin. 2009. A literal use of “Forest Health” safeguards against misuse and misapplication. *Journal of Forestry* 107: 276-277.
- Roccaforte, J.P., **P.Z. Fulé**, and **W.W. Covington**. 2009. Monitoring landscape-scale ponderosa pine restoration treatment implementation and effectiveness. Restoration Ecology DOI: 10.1111/j.1526-100X.2008.00508.x.
- Roman, M.O., C.B. Schaaf, C.E. Woodcock, A.H. Strahler, R.H. Braswell, P. Curtis, K.J. Davis, D. Dragoni, M.L. Goulden, D. Hollinger, **T.E. Kolb**, T.P. Meyers, J.W. Munger, A. Richardson, T.B. Wilson, and S.C. Wofsy. 2009. The MODIS (Collection V005) BRDF/albedo product: Assessment of spatial representativeness over forested landscapes. *Remote Sensing of Environment* 113: 2476-2498.
- Sanchez-Martinex, G. and **M.R. Wagner**. 2009. Host preference and attack pattern of *Dendroctonus rhizophagus* (Coleoptera: Curculionidae: Scolytinae): A bark beetle specialist on pine regeneration. *Environmental Entomology*: 38: 1-8.
- Sánchez Meador, A.J., **M.M. Moore**, J.D. Bakker, and **P.F. Parysow**. 2009. 108 years of change in spatial pattern following selective harvest of a ponderosa pine stand in northern Arizona. *Journal of Vegetation Science* 20:79-90.
- Scott, J. M. and **R. L. Mathiasen**. 2009. Bristlecone pine dwarf mistletoe: *Arceuthobium microcarpum* subsp. *aristatae* (Viscaceae), a new subspecies of western spruce dwarf mistletoe from northern Arizona. *Journal of the Botanical Research Institute of Texas* 3: 13-22.
- Solvesky, B.G. and **C.L. Chambers**. 2009. Roosts of Allen’s lappet-browed bat in northern Arizona. *Journal of Wildlife Management* 73: 677-682.
- Thompson, R.L., **C.L. Chambers**, and B.C. McComb. 2009. Home range and habitat of western red-backed voles in the Oregon Cascades. *Northwest Science* 83: 46-56.
- van Mantgem, P.J., N. L. Stephenson, J. C. Byrne, L. D. Daniels, J. F. Franklin, **P. Z. Fulé**, M. E. Harmon, A. J. Larson, J. M. Smith, A. H. Taylor, and T. T. Veblen. 2009. Widespread increase of tree mortality rates in the western United States. *Science* 323: 521-524.
- Villanueva, D.J., **P. Z. Fulé**, J. Cerano Paredes, J. Estrada Avalos, I. Sánchez C. 2009. Reconstrucción de precipitación estacional para el barlovento de la Sierra Madre Occidental con anillos de crecimiento de *Pseudotsuga menziesii* (Mirb.) Franco. *Ciencia Forestal en México* 34 (105): 37-69.
- Wagner, M.R.** 2009. Are wood-based biofuels good for world forestry? (Commentary). *Journal of Forestry* 107: 387.
- Waring, K.M.** and K.L. O’Hara. 2009. Stand development and tree growth response to sugar pine mortality in Sierran mixed-conifer forests. *Northwest Science* 83: 89-100.
- Waring, K.M.**, D.M. Reboletti, L.A. Mork, **C. Huang**, **R.W. Hofstetter**, A.M. Garcia, **P.Z. Fulé**, and T.S. Davis. 2009. Modeling the impacts of two bark beetle species under a

warming climate in the southwestern USA: ecological and economic consequences. *Environmental Management* 44: 824-835.

Wu, T., and **Y.-S. Kim**. 2009. Environmental Markets: Concentrate on Criteria (Letter). *Science*: 326.

## **2008**

- Adair, E.C., W.J. Parton, S.L. DelGrosso, W.L. Silver, S.A. Hall, M.E. Harmon, and **S.C. Hart**. 2008. A simple three-pool model accurately describes patterns of long term, global decomposition in the Long Term Intersite Decomposition Experiment Team (LIDET) data set. *Global Change Biology* 14: 2636-2660.
- Alstad, K.P., S.C Hart, J.L. Horton, **T.E. Kolb**. 2008. Application of tree-ring isotopic analyses to reconstruct historic water-use of riparian trees. *Ecological Applications* 18: 421-437.
- Bakker, J.D., A.J. Sánchez Meador, **P.Z. Fulé**, D.W. Huffman, and M.M. Moore. 2008. 'Growing trees backwards': description of a stand reconstruction model. Pages 136-147 in Olberding, S. D., and Moore, M. M. (tech coords.), Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Bakker, J. D., **M. M. Moore**, and D. C. Laughlin. 2008. The Hill Plots: A rare long-term vegetation study. Pages 148-157 in Olberding, S. D., and Moore, M. M. (tech coords.), Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Battles, J.J., T. Robards, A. Das, **K. Waring**, J.K. Gilles, G. Biging, and F. Schurr. 2008. Climate change impacts on forest growth and tree mortality: a data-driven modeling study in the mixed-conifer forest of the Sierra Nevada, California. *Climatic Change* 87 (Suppl. 1): S193-S213.
- Beier, P.**, D. Majka, and W. Spencer. 2008. Forks in the road: choices in procedures for designing wildlife linkages. *Conservation Biology* 22: 836-851.
- Beier, P.**, E.C. Rogan, M.F. Ingraldi, and S.S. Rosentock. 2008. Does forest structure affect reproduction of northern goshawks in ponderosa pine forests? *Journal of Applied Ecology* 45: 342-350.
- Bosu, P.P. and **M.R. Wagner**. 2008. Anatomical and nutritional factors associated with the susceptibility of elms (*Ulmus spp*) to the elm leaf beetle *Pyrrhalia luteola* Miller (Coleoptera: Chrysomelidae). *Economic Entomology* 101: 944-954.
- Breece, C.R., **T.E. Kolb**, B.G. Dickson, J.D. McMillin, K.M. Clancy. 2008. Prescribed fire effects on bark beetle activity and tree mortality in southwestern ponderosa pine forests. *Forest Ecology and Management* 255: 119-128.
- Chambers, C.L.**, and R.R. Doucett. 2008. Diet of the Mogollon vole as indicated by stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ). *Western North American Naturalist* 68: 153-160.
- Chancellor, W.W., D.W. Huffman, and **M.M. Moore**. 2008. Characteristics of buckbrush shrubs exposed to herbivores after seven years of protection. Pages 171-175 in Olberding, S. D., and Moore, M. M. (tech coords.), Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ.



- Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Corbett, R.J., M., **C.L.**, and M. Herder. 2008. Roosts and activity areas of *Nyctinomops macrotis* in northern Arizona. *Acta Chiropterologica* 10: 323-329.
- Crouse, J.E., **M.M. Moore**, and **P.Z. Fulé**. 2008. Revisiting Pearson's climate and forest type studies on the Fort Valley Experimental Forest. Pages 176-187 in Olberding, S. D., and Moore, M. M. (tech coords.) , Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- DeBlois, B.P., **A.J. Finkral**, A.J. Sánchez Meador, and **M.M. Moore**. 2008. Early thinning experiments established by the Fort Valley Experimental Forest. Pages 197-203 in Olberding, S.D. and M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-53CD, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- DeGomez, T.E., C.J. Hayes, J.A. Anhold, J.D. McMillan and **M.R. Wagner**. 2008. Using verbenone and non-host volatiles to prevent *Ips* bark beetle colonization of ponderosa pine slash. *Arthropod Management Tests* 33:H3: 2005-2006.
- Dijkstra, P., C.M. LaViolette, J.S. Coyle, R.R. Doucett, E. Schwartz, **S.C. Hart**, and B.A. Hungate. 2008. <sup>15</sup>N enrichment as an integrator of the effects of C and N on microbial metabolism and ecosystem function. *Ecology Letters* 11: 389-397.
- Dodge, R.S., **P.Z. Fulé**, and C.H. Sieg. 2008. Dalmatian toadflax (*Linaria dalmatica*) response to wildfire in a southwestern forest. *Ecoscience* 15: 213-222.
- Dore, S., **T.E. Kolb**, M., Montes-Helu, B.W. Sullivan, W.D. Winslow, S.C. Hart, J.P. Kaye, G.W. Koch, B.A. Hungate. 2008. Long-term impact of a stand-replacing fire on ecosystem CO<sub>2</sub> exchange of ponderosa pine forests. *Global Change Biology* 14: 1-20.
- Dyer, J.H., A.J. Sánchez Meador, **M.M. Moore**, and J.D. Bakker. 2008. Forest structure and tree recruitment changes on a permanent historical Cinder Hills plot over a 130-Year Period. Pages 214-221 in Olberding, S. D., and Moore, M. M. (tech coords.) , Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Evans, A.M. and **A.J. Finkral**. 2009. From renewable energy to fire risk reduction: a synthesis of biomass harvesting and utilization case studies in U.S. forests. *Global Change Biology – Bioenergy* 1: 211-219.
- Finkral, A.J.** and A.M. Evans. 2008. The effect of a restoration thinning on carbon stocks in a ponderosa pine forest. *Forest Ecology and Management* 255: 2743-2750.
- Fischer, M.J., **K.M. Waring**, **R.W. Hofstetter**, **T.E. Kolb**. 2008. The resin composition of ponderosa pine (*Pinus ponderosa*) attacked by the roundheaded pine beetle (*Dendroctonus adjunctus*) (Coleoptera: Curculionidae, Scolytinae). Pages 245-251 in: S.D. Olberding, M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Fulé, P.Z.** 2008. Does it make sense to restore wildland fire in changing climate? *Restoration Ecology* 16: 526-531.

- Fulé, P.Z.**, M. Ribas, E. Gutiérrez, R. Vallejo, and M.W. Kaye. 2008. Forest structure and fire history in an old *Pinus nigra* forest, eastern Spain. *Forest Ecology and Management* 255: 1234-1242.
- Gaylord, M.L., K.K. Williams, **R.W. Hofstetter**, J.D. McMillan, T.E. DeGomez, and **M.R. Wagner**. 2008. Influence of temperature on spring flight initiation for southwestern ponderosa pine bark beetles (Coleoptera: Scolytidae) *Environmental Entomology* 37: 57-69.
- Hjerpe, E.E. and **Y-S. Kim**. 2008. Economic impacts of national forest fuels reduction programs in the Southwest. *Journal of Forestry* 106: 311-316.
- Hofstetter, R.W.**, Z. Chen, M.L. Gaylord, J.D. McMillan, and **M.R. Wagner**. 2008. Synergistic effects of  $\alpha$ -pinene and exo-brevicomin on pine bark beetles and associated insects in Arizona. *Journal of Applied Entomology* 132: 387-397.
- Huffman, D.W., and **M.M. Moore**. 2008. Dynamics of buckbrush populations under simulated forest restoration alternatives. Pp. 257-263 221 *in* Olberding, S. D., and Moore, M. M. (tech coords.) , Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Huffman, D.W., **P.Z. Fulé**, K.M. Pearson, and J.E. Crouse. 2008. Fire history of pinyon-juniper woodlands at upper ecotones with ponderosa pine forests in Arizona and New Mexico. *Canadian Journal of Forest Research* 38: 2097-2108.
- Keane, R.E., J.K. Agee, **P.Z. Fulé**, J.E. Keeley, C. Key, S.G. Kitchen, R. Miller, and L.A. Schulte. 2008. Ecological effects of large fires on US landscapes: benefit or catastrophe? *International Journal of Wildland Fire* 17: 696-712.
- Kenaley, S., **R.L. Mathiasen**, and E.J. Harner. 2008. Mortality associated with a bark beetle outbreak in dwarf mistletoe-infested ponderosa pine stands in northern Arizona. *Western Journal of Applied Forestry* 22: 113-120.
- Kerns, B.K., **M.M. Moore**, and S.C. Hart. 2008. Understanding ponderosa pine forest-grassland vegetation dynamics at Fort Valley Experimental Forest using phytolith analysis. Pages 264-270 *in* Olberding, S. D., and Moore, M. M. (tech coords.) , Fort Valley Experimental Forest—A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Korb, J.E., and **P.Z. Fulé**. 2008. Intra and inter-annual vegetation change: implications for long-term research. *Restoration Ecology* 16: 5-11.
- Kolb, T.E.**, N. McDowell. 2008. Tree ecophysiology research at Taylor Woods. Pages 196-202 *in*: S.D. Olberding, M.M. Moore (tech. cords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Kuenzi, A.M., **P.Z. Fulé**, and C.H. Sieg. 2008. Effects of fire severity and prefire stand treatment on plant community recovery after a large wildfire. *Forest Ecology and Management* 255: 855-865.
- Laughlin, D.C., and **P.Z. Fulé**. 2008. Wildland fire effects on understory plant communities in two fire-prone forests. *Canadian Journal of Forest Research* 38: 133-142.
- Laughlin, D.C., J.D. Bakker, M.L. Daniels, **M.M. Moore**, C.A. Casey, and J.D. Springer. 2008. Restoring plant species diversity and community composition in a ponderosa pine-bunchgrass ecosystem. *Plant Ecology* 197: 139-151.

- Lee, M.** and B. Stafford. 2008. Application of OFM on the Red Rock Ranger District of the Coconino National Forest. Pages 229-238 *in* Driver, B.L. (ed.), *Managing to Optimize the Beneficial Outcomes of Recreation*. Venture Publishing, Inc., State College, PA.
- Lynn, J.C., S.S. Rosenstock, and **C.L. Chambers**. 2008. Avian use of desert wildlife water developments as determined by remote videography. *Western North American Naturalist* 68: 107-112.
- Mathiasen, R. L.** 2008. New combinations for *Arceuthobium aureum* (Viscaceae) in Mexico and Central America. *Novon* 18: 501-507.
- Mathiasen, R. L.**, and C. M. Daugherty. 2008. Distribution of red fir (*Abies magnifica* A. Murray) and noble fir (*Abies procera* Rehder) in Oregon based on dwarf mistletoe host specificity. *Northwest Science* 82: 108-119.
- Mathiasen, R. L.**, D. L. Nickrent, D. C. Shaw, and D. M. Watson. 2008. Mistletoes: pathology, systematics, ecology, and management. *Plant Disease* 92: 988-1006.
- Mathiasen, R. L.**, M. S. González, M. González, B. E. Howell, I. L. López, J. Scott, and J. A. Tena. 2008. Distribution of dwarf mistletoes (*Arceuthobium* spp., Viscaceae) in Durango, Mexico. *Madroño* 55: 161-169.
- McComb, B.C., L. Curtis, **C.L. Chambers**, M. Newton, and K. Benston. 2008. Acute toxic hazard evaluations of glyphosate herbicide on terrestrial vertebrates of the Oregon Coast Range. *Environmental Science and Pollution Research* 15: 266-272.
- McDowell, N., W. Pockman, C. Allen, D. Breshears, N. Cobb, **T. Kolb**, J. Plaut, J. Sperry, A. West, D. Williams, E. Yezzer. 2008. Mechanisms of plant survival and mortality during drought: why do some plants survive and others succumb to drought? *New Phytologist Tansley Review*: doi: 10.1111/j.1469-8137.2008.02436.x/.
- McRae, BH, and **P. Beier**. 2008. Circuit theory predicts gene flow in plant and animal populations. *Proceedings National Academy of Sciences* 104: 19885-19890.
- Moore, M.M., W.W. Covington, P.Z. Fule, S.C. Hart, T.E. Kolb, J.N. Mast, S.S. Sackett, and M.R. Wagner**. 2008. Ecological restoration experiments (1992-2007) at the G.A. Pearson Natural Area, Fort Valley Experimental Forest. Pages 209-218 *in*: S.D. Olberding, M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Olberding, S.D., and **M.M. Moore.**, tech coords. 2008. Fort Valley Experimental Forest–A Century of Research 1908-2008. Conference Proceedings; August 7-9, 2008; Flagstaff, AZ. Proceedings RMRS-P-53CD, U.S.D.A. Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 408 p.
- Pearson, H.A., W.P. Clary, **M.M. Moore**, and C.H. Sieg. 2008. Range management research, Fort Valley Experimental Forest. Pp. 68-85 *in*: S.D. Olberding, M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Perez-Verdin, G., **M. Lee**, and D. Chavez. 2008. Planeación de la recreación forestal en áreas naturales protegidas del sur de Durango, Mexico. *Madera y Bosques* 14: 53-67.
- Pureswaran, D.S., **R.W. Hofstetter**, and B. Sullivan. 2008. Attraction of the southern pine beetle, *Dendroctonus frontalis* to pheromone components of the western pine beetle, *Dendroctonus brevicomis* (Coleoptera: Curculionidae: Scolytinae) in an allopatric zone. *Environmental Entomology* 37: 70-78.

- Roccaforte, J.P., **P.Z. Fulé**, and **W.W. Covington**. 2008. Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments. *International Journal of Wildland Fire* 17: 293-303.
- Rosalino, L.M., M.J. Santos, **P. Beier**, and M. Santos-Reis. 2008. Eurasian badger habitat selection in Mediterranean environments: does scale really matter? *Mammalian Biology* 73: 189-198.
- Sabo, K.E., **S.C. Hart**, C.H. Sieg., and J.D. Bailey. 2008. Tradeoffs in overstory and understory aboveground net primary productivity in southwestern ponderosa pine stands. *Forest Science* 54: 408-416.
- Sánchez Meador, A.J., and **M.M. Moore**. 2008. 93 years of stand density and land-use legacy research at the Coulter Ranch study site. Pages 321-330 **in**: S.D. Olberding, M.M. Moore (tech. coords.), Fort Valley Experimental Forest – A Century of Research 1908-2008. Proceedings RMRS-P-55, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Sánchez Meador, A.J., **P.F. Parysow**, and **M.M. Moore**. 2008. Historical stem mapped permanent plots increase precision of reconstructed reference conditions in ponderosa pine forests of northern Arizona. *Restoration Ecology* doi:10.1111/j.1526-100x.2008.00442.x (Sept. 2008).
- Santos, M.J. and **P. Beier**. 2008. Habitat selection by European badgers at multiple spatial scales in Portuguese Mediterranean ecosystems. *Wildlife Research* 35: 835-843.
- Schweitzer, J.A., J.K. Bailey, D.G. Fischer, C.J. LeRoy, E.V. Lonsdorf, T.G. Whitham, and **S.C. Hart**. 2008. Plant-soil microorganism interactions: a heritable relationship between plant genotype and associated soil microorganisms. *Ecology* 89: 773-781.
- Schweitzer, J.A., M.M. Matritch, J.K. Bailey, C.C. LeRoy, D.G. Fischer, B.J. Rehill, R.R. Lindroth, A.E. Hagerman, S.C. Wooley, **S.C. Hart**, and T.G. Whitham. 2008. From genes to ecosystems: The Genetic Basis of Condensed Tannins and Their Role in Nutrient Regulation in a *Populus* Model System. *Ecosystems* 11: 1005-1020.
- Selmants, P.C. and **S.C. Hart**, 2008. Substrate age and tree islands influence carbon and nitrogen dynamics across a retrogressive semiarid chronosequence. *Global Biogeochemical Cycles* DOI:10.1029/2007GB003062.
- Selmants, P.C., **S.C. Hart**, S.I. Boyle, C.A. Gehring, and B.A. Hungate. 2008. Restoration of a ponderosa pine forest increases soil CO<sub>2</sub> efflux more than either water or nitrogen additions. *Journal of Applied Ecology* 45: 913-920.
- Sesnie, S.E., S. Hagell, S. Otterstrom, **C.L. Chambers**, and B.G. Dickson. 2008. SRTM-DEM and Landat ETM+ data for mapping tropical dry forest cover and biodiversity assessment in Nicaragua. *Rev. Geográfica Acadêmica* 2: 53-65.
- Steed, B.E. and **M.R. Wagner**. 2008. Seasonal pheromone response by *Ips pini* (Say) (Coleoptera: Scolytinae) in northern Arizona and western Montana. *Agriculture and Forest Entomology* 10: 189-203.
- Stoddard, M.T., D.W. Huffman, **T. Alcoze**, and **P.Z. Fulé**. 2008. Effects of slash on herbaceous communities in pinyon-juniper woodlands of northern Arizona. *Rangeland Ecology and Management* 61: 485-495.
- Sullivan, B.W., **T.E. Kolb**, S.C. Hart, J.P. Kaye, S. Dore, M.C. Montes-Helu. 2008. Thinning reduces soil carbon dioxide but not methane flux from southwestern USA ponderosa pine forests. *Forest Ecology and Management* 255: 4047-4055.

- Trapp, J.R., **P. Beier**, C. Mack, D.R. Parsons, and P.C. Paquest. 2008. Wolf, *Canis lupus*, den site selection in the Rocky Mountains. *Canadian Field-Naturalist* 122: 49-56.
- Wagner, M.R.**, J.R. Cobbinah, P.P. Bosu. 2008. Forest Entomology in West Tropical Africa: Forest Insects of Ghana, Second Edition. Springer Academic Press, Dordrecht, The Netherlands 244pp.
- Wallin, K.F., **T.E. Kolb**, K.R. Skov, **M.R. Wagner**. 2008. Forest management treatments, tree resistance, and bark beetle resource utilization in ponderosa pine forests of northern Arizona. *Forest Ecology and Management* 255: 3263-3269.
- Waring, K.M.** and K.L. O'Hara. 2008. Redwood/tanoak stand development and response to tanoak mortality caused by *Phytophthora ramorum*. *Forest Ecology and Management* 255: 2650-2658.

## 2007

- Abella, S. R., W. W. Covington, **P. Z. Fulé**, L. B. Lentile, A. J. Sánchez Meador and P. Morgan. 2007. Past, present, and future old growth in frequent-fire conifer forests of the western United States. *Ecology and Society* 12: 16.
- Adaie, E.C., W.J. Parton, Bakker, J.D., and **M.M. Moore**. 2007. Controls on vegetation structure in southwestern ponderosa pine forests, 1941 and 2004. *Ecology* 88:2305-2319.
- Bakker, J.D., and **M.M. Moore**. 2007. Controls on vegetation structure in southwestern ponderosa pine forests, 1941 and 2004. *Ecology* 88:2305-2319.
- Baumgartner, K.H., and **P.Z. Fulé**. 2007. Survival and sprouting responses of Chihuahua pine after the Rodeo-Chediski fire on the Mogollon Rim, Arizona. *Western North American Naturalist* 67: 51-56.
- Binkley, D., T. Sisk, **C. Chambers**, J. Springer, and W. Block. 2007. The role of old-growth forests in frequent-fire landscapes. *Ecology and Society* 12: 18.
- Boerner, R.E.J., J. Huang, and **S.C. Hart**. 2007. Fire, thinning and the carbon economy: Effects of fire and fire surrogate treatments on estimated carbon storage and sequestration rate. *Forest Ecology and Management* 255: 3081-3097.
- Bosu, P.P. and **M.R. Wagner**. 2007. Effects of induced water stress on leaf trichome density and foliar nutrients of three elm (*Ulmus*) species: implications for resistance to the elm leaf beetle. *Environmental Entomology* 36: 595-601.
- Bosu, P.P. and **M.R. Wagner**. 2007. Susceptibility of 32 elm species and hybrids (*Ulmus spp*) to the elm leaf beetle (Coleoptera: Chrysomelidae) under field conditions in Arizona. *Journal of Economic Entomology* 100: 1808-1814.
- Campbell, K.A. and **S.M. Dewhurst**. 2007. A hierarchical simulation-through-optimization approach to forest disturbance modeling. *Ecological Modelling* 202: 281-296.
- Classen, A.T., S.K. Chapman, T.G. Whitham, **S.C. Hart**, and G.W. Koch. 2007. Genetic-based plant resistance and susceptibility traits to herbivory influence needle and root litter nutrient dynamics. *Journal of Ecology* 95: 1181-1194.
- Dickson, B.G. and **P. Beier**. 2007. Quantifying the influence of topographic position on cougar movement in southern California, USA. *Journal of Zoology (London)* 271: 270-277.
- Drury, C.F., **S.C. Hart**, and X.M. Yang. 2007. Nitrification techniques in soil systems. Pages 495-514 in Carter, M.R. (ed.), *Soil Sampling and Methods of Analysis*, 2<sup>nd</sup> edition. Lweis Publishers, Boca Raton, FL.

- Fischer, D.G., **S.C. Hart**, C.J. LeRoy, and T.G. Whitham. 2007. Variation in below-ground carbon fluxes along a *Populus* hybridization gradient. *New Phytologist* 176: 415-425.
- Fox, B.** 2007. I Love Numbers. *Journal of the National Collegiate Honors Council*. 8: 53-54.
- Fox, B.** 2007. Success as an Honors Director: What Does It Take? *Journal of the National Collegiate Honors Council*. 7: 37-39.
- Fulé, P.Z.** and D.C. Laughlin. 2007. Wildland fire effects on forest structure over an altitudinal gradient, Grand Canyon National Park, USA. *Journal of Applied Ecology* 44: 136-146.
- Fulé, P.Z.**, J.P. Roccaforte, and **W.W. Covington**. 2007. Posttreatment tree mortality after forest ecological restoration, Arizona, United States. *Environmental Management* 40: 623-634.
- Frey, B.R., M.S. Ashton, J.J. McKenna, D. Ellum, and **A. Finkral**. 2007. Topographic and temporal patterns in tree seedling establishment, growth, and survival among masting species of southern New England mixed-deciduous forests. *Forest Ecology and Management* 245: 54-63.
- Gaylord, M.L., **T.E. Kolb**, K.F. Wallin, **M.R. Wagner**. 2007. Seasonal dynamics of tree growth, physiology and resin defenses in a northern Arizona ponderosa pine forest. *Canadian Journal of Forest Research* 37: 1173-1183.
- Freeman, J., T.J. Stohlgren, **M.E. Hunter**, P.N. Omi, E.J. Martinson, G.W. Chong, and C.S. Brown. 2007. Rapid assessment of postfire plant invasions in coniferous forests of the western United States. *Ecological Applications* 17: 1656-1665.
- Hjerpe, E.E. and **Y-S. Kim**. 2007. Regional economic impacts of Grand Canyon river runners. *Journal of Environmental Management* 85: 137-149.
- Hoffman, C. **R.L. Mathiasen**, and C. Sieg. 2007. Dwarf mistletoe effects on fuel loading in ponderosa pine forests in northern Arizona. *Canadian Journal of Forest Research* 37: 662-670.
- Hofstetter, R.W.**, T.D. Dempsey, K.D. Klepzig, and M.P. Ayres. 2007. Temperature-dependent affects on mutualistic and phoretic associations. *Community Ecology* 8(1): 47-56.
- Hungate, B.A., **S.C. Hart**, P.C. Selmanns, Si.I. Boyle, and C.A. Gehring. 2007. Soil responses to management, increased precipitation, and added nitrogen in ponderosa pine forests. *Ecological Applications* 17: 1352-1365.
- Hunter, M.E.** 2007. Wildland fire use: an underutilized management option? *Natural Resources Journal* 47: 1-10.
- Hunter, M.E.**, W.D. Shepperd, L.B. Lentile, J. Butler, J.E. Lundquist, M.G. Andreu, and F.W. Smith. 2007. A comprehensive guide to fuels treatment practices for ponderosa pine in the Black Hills, Colorado Front Range, and Southwest. General Technical Report RMRS-GTR-198. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 93p.
- Kaufmann, M. R., D. Binkley, **P. Z. Fulé**, M. Johnson, S. L. Stephens and T. W. Swetnam. 2007. Defining old growth for fire-adapted forests of the western United States. *Ecology and Society* 12: 15.
- Kim, Y-S.**, **S.M. Dewhurst**, and **D.S. Hospodarsky**. 2007. The 2005 planning rule as a teaching tool. *Journal of Forestry* 105: 320-325.
- Kolb, T.E.**, J.K. Agee, **P.Z. Fulé**, N.G. McDowell, K. Pearson, A. Sala, and R.H. Waring. 2007. Perpetuating old ponderosa pine. *Forest Ecology and Management* 249: 141-157.
- Korb, J.E., M.L. Daniels, D.C. Laughlin, and **P.Z. Fulé**. 2007. Understory communities of warm/dry mixed conifer in southwestern Colorado. *Southwestern Naturalist* 52: 493-503.

- Krauss, K.W., B.D. Keeland, **J.A. Allen**, K.C. Ewel and D.J. Johnson. 2007. Effects of season, rainfall, and hydrogeomorphic setting on mangrove tree growth in Micronesia. *Biotropica* 39: 161-170.
- Laughlin, D.C., S.R. Abella, **W.W. Covington**, J.B. Grace. 2007. Species richness and soil properties in a *Pinus ponderosa* forest: a structural equation modeling analysis. *Journal of Vegetation Science* 18: 231-242.
- Martinson, S., M.P. Ayres, and **R.W. Hofstetter**. 2007. Why does longleaf pine have low susceptibility to southern pine beetle? *Canadian Journal of Forest Research* 37: 1966–1977.
- Mathiasen, R.L.** 2007. A new combination for Hawkworth's dwarf mistletoe (Viscaceae). *Novon* 17: 217-221.
- Mathiasen, R.L.** 2007. First report of Durangan dwarf mistletoe, *Arceuthobium vaginatum* subsp. *durangense*, on *Pinus engelmannii* and *Pinus cooperii* in Mexico. *Plant Disease* 91: 1201.
- Mathiasen, R.L.** and C.M. Daugherty. 2007. *Arceuthobium tsugense* subsp. *amabilae*, a new subspecies of hemlock dwarf mistletoe (Viscaceae) from Oregon. *Novon* 17: 222-227.
- Mathiasen, R.L.**, B. Howell, and G. Garnett. 2007. First report of *Arceuthobium aureum* subsp. *aureum* in Mexico. *Plant Disease* 91: 469.
- Mathiasen, R.L.**, C.M. Daugherty, B.E. Howell, J.C. Melgar, and S.E. Sesnie. 2007. New morphological measurements of *Psittacanthus angustifolius* and *Pssitacanthus pinicola* (Loranthaceae). *Madroño* 54: 156-163.
- McDowell, N.G., H. D. Adams, J. D. Bailey, **T.E. Kolb**. 2007. The role of stand density on growth efficiency, leaf area index and resin flow in southwestern ponderosa pine forests. *Canadian Journal of Forest Research* 37: 343-355.
- McRae, B.H. and **P. Beier**. 2007. Circuit theory predicts gene flow in plant and animal populations. *Proceedings of the National Academy of Sciences* 104: 19885-19890.
- Miller, A.M. and **C.L. Chambers**. 2007. Birds of harvested and unharvested pine-oak forests, Chihuahua, Mexico. *Southwestern Naturalist* 52: 271-283.
- Miller, J.D. and **A.E. Thode**. 2007. Quantifying burn severity in a heterogeneous landscape with a relative version of the delta Normalized Burn Ratio (dNBR). *Remote Sensing and the Environment* 109: 66-80.
- Parton, W., W.L. Silver, I.C. Burke, L. Grassens, M.E. Harmon, W.S. Currie, J.Y. King, E.C. Adae, L.A. Brandt, **S.C. Hart**, and B. Fasth. 2007. Global-scale similarities in nitrogen release patterns during long-term decomposition. *Science* 315: 361-364.
- Sánchez-Martínez, G. and **M.R. Wagner**. 2009. Host preference and attack pattern of *Dendroctonus rhizophagus* (Coleoptera: Curculionidae: Scolytinae): a bark beetle specialist on pine regeneration. *Environmental Entomology* 38: 1194-1204.
- Schwartz, E., S. Blasewicz, R. Doucett, B.A. Hungate, **S.C. Hart**, and P. Dijkstra. 2007. Natural abundance  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  of DNA extracted from soil. *Soil Biology and Biochemistry* 39: 3101–3107.
- Simonin, K., **T.E. Kolb**, M. Montes-Helu, G.W. Koch. 2007. The influence of thinning on components of stand water balance in a ponderosa pine forest stand during and after extreme drought. *Agricultural and Forest Meteorology* 143:266-276.
- Stephens, S.S. and **M.R. Wagner**. 2007. Forest plantations and biodiversity: a fresh perspective. *Journal of Forestry* 105: 307-313.

- Strom, B.A., and **P.Z. Fulé**. 2007. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. *International Journal of Wildland Fire* 16: 128-138.
- Teclé, A.** 2007. Sustainable natural resources management in an era of global climate change. *Forum on Public Policy* 3: 443-454.
- Waskiewicz, J.D., **P.Z. Fulé**, and **P. Beier**. 2007. Comparing classification systems for ponderosa pine snags in northern Arizona. *Western Journal of Applied Forestry*: 22: 233-240.
- Wightman, C.S., S.S. Germaine, and **P. Beier**. 2007. Landbird community composition varies among seasons in a heterogeneous ponderosa pine forest. *Journal of Field Ornithology* 78: 184-194.
- Woodcock, T, C. Evans, C. Laxson, R. Tucker, **J. Allen**, J. Mihuc, E. Allen and T. Mihuc. 2008. Land use designation and vegetation community structure in the Adirondack uplands (New York, USA). *Applied Vegetation Science* 11: 509-520.
- Yarbrough, R.F. and **C.L. Chambers**. 2007. Using visual evidence of Mogollon voles (*Microtus mogollonensis*) to predict their presence in northern Arizona. *Southwestern Naturalist* 52: 511-519.

## 2006

- Abella, S.R., **P.Z. Fulé** and **W.W. Covington**. 2006. Diameter caps for thinning southwestern ponderosa pine forests: viewpoints, effects, and tradeoffs. *Journal of Forestry* 104: 407-414.
- Allen, J.A.**, J. Wessman, and D.J. Twedt. 2006. Restoration of understory trees on bottomland hardwood sites (Mississippi). *Ecological Restoration* 24: 111-112.
- Allen, J.A.** and K.W. Krauss. 2006. The influence of propagule flotation longevity and light availability on the establishment of introduced mangrove species in Hawaii. *Pacific Science* 60: 367-376.
- Bakker, J.D., **M.M. Moore**, and **W.W. Covington**. 2006. Long-term vegetation studies in the Southwest. Pages 187-195 in Irland, L.C., A.E. Camp, J.C. Brissette, and Z.R. Donohew (eds.), Long-term silvicultural & ecological studies: results for science and management. Global Institute for Sustainable Forestry, School of Forestry and Environmental Studies, Yale University, New Haven, CT. GISF Research Paper 005.
- Beier, P.** 2006. Effects of artificial night lighting on terrestrial mammals. Pages 19-42 in C. Rich and T. Longcore (eds.), Ecological consequences of artificial night lighting. Island Press, Covelo, California.
- Beier, P.** M.R. Vaughan, M.J Conroy and H. Quigley. 2006. Evaluating scientific inferences about the Florida Panther. *Journal of Wildlife Management* 70: 236-245.
- Beier, P.** and A.I. Tungbani. 2006. Nesting with wasps increases next success of the Red-cheeked Cordon-Bleu. *The Auk* 123: 1022-1037.
- Binkley, D., **M.M. Moore**, W.H. Romme and P. Brown. 2006. Was Aldo Leopold right about the Kaibab Deer Herd? *Ecosystems* 9: 227-241.
- Booth, M.S., J.M. Stark, and **S.C. Hart**. 2006. Soil mixing effects on inorganic nitrogen production and consumption in forest and shrubland soils. *Plant and Soil* 289: 5-15.



- Bosu, P.P., J.R. Cobbinah, J.D. Nichols, E.E. Nkrumah, and **M.R. Wagner**. 2006. Survival and growth of mixed plantations of *Milicia excelsia* and *Terminalia superba* 9 years after planting in Ghana. *Forest Ecology and Management* 233: 352-357.
- Chapman, S., A. Langley, **S.C. Hart** and G.W. Koch. 2006. Plant control of nitrogen cycling: uncorking the microbial bottleneck. *New Phytologist* 169: 27-34.
- Chen, Z., K. Grady, S.S. Stephens, J. Villa-Castillo and **M.R. Wagner**. 2006. Fuel reduction treatments and wildfire influence on carabid and tenebrionid community assemblages in the ponderosa pine forest of northern Arizona. Carabid and tenebrionid beetles as ecological indicators for ponderosa pine forests in northern Arizona: influence of restoration treatments and fire. *Forest Ecology and Management* 225: 168-177.
- Clancy, K.M., A. Chen and **T.E. Kolb**. 2006. Effects of ortet genotype and western spruce budworm defoliation on foliar nutrients in Douglas-fir clones. Pages 36-43 in N. Kamata, A.M. Liebhold, D.T. Quiring and K.M. Clancy (eds.), Proceedings: International Symposium of IUFRO Kanazawa 2003, Forest Insect Population Dynamics and Host Influences, pp. 37-44. Kanazawa University 21<sup>st</sup>-Centruy COE Program, Kakuma, Kanazawa, Ishikawa, Japan.
- Classen, A.T., J.DeMarco, **S.C. Hart**, T.G. Whitham, N.S. Cobb and G.W. Koch. 2006. Impacts of herbivorous insects on decomposer communities during the early stages of primary succession in a semi-arid woodland. *Soil Biology and Biochemistry* 38: 972-982.
- Conroy, M.J., **P. Beier**, H. Quigley and M.R. Vaughan. 2006. Improving the use of science in conservation: lessons from the Florida panther. *Journal of Wildlife Management* 70: 1-7.
- Dickson, B.G. and **P. Beier**. 2006. Quantifying the influence of topographic position on cougar movement in southern California USA. *Journal of Zoology* (London) 271: 270-277.
- Dijkstra, P., A. Ishizu, R. Doucette, **S.C. Hart**, E. Schwartz, O. Menyailo, and B.A. Hungate. 2006. <sup>13</sup>C and <sup>15</sup>N natural abundance of the soil microbial biomass. *Soil Biology and Biochemistry* 38: 3257-3266.
- Dijkstra, P., O.V. Menyailo, R.R. Doucett, **S.C. Hart**, E. Schwartz and B.A. Hungate. 2006. C and N availability affects the <sup>15</sup>N natural abundance of the soil microbial biomass across a cattle manure gradient. *European Journal of Soil Science* 57: 468-475.
- Drury, C.F, **S.C. Hart**, and X.M. Yang. 2006. Nitrification techniques in soil systems. M.R. Carter (ed.), *Soil Sampling and Methods of Analysis*, 2<sup>nd</sup> edition. Lewis Publishers, Boca Raton, FL. In press.
- Fischer, D.G., **S.C. Hart**, B.J. Rehill, R.L. Lindroth, P. Keim and T.G. Whitham. 2006. Hidden belowground response to defense: Do highly defended leaves require more roots? *Oecologia* 149: 668-675.
- Fulé, P.Z.**, T.A. Heinlen and **W.W. Covington**. 2006. Fire histories in ponderosa pine forests of Grand Canyon are well supported: reply to Baker. *International Journal of Wildland Fire* 15: 439-445.
- Fulé, P.Z.**, **W.W. Covington**, M.T. Stoddard and D. Bertolette. 2006. "Minimal-impact" restoration treatments have limited effects on forest structure and fuels at Grand Canyon, USA. *Restoration Ecology* 14: 357-368.
- Garnett, G.N., **C.L. Chambers** and **R.L. Mathiasen**. 2006. Use of witches' brooms by Abert squirrels in ponderosa pine forests. *Wildlife Society Bulletin* 34: 467-472.
- Gaylord, M.L., **T.E. Kolb**, K.F. Wallin and **M.R. Wagner**. 2006. Seasonality and lure preference of bark beetles (*Coleoptera: Scolytinae*) and associates in a northern Arizona ponderosa pine forest. *Environmental Entomology* 35: 37-47.

- Grady, K.S., and **S.C. Hart**. 2006. Long-term influence of thinning, burning, and wildfire on soil processes and properties in southwestern ponderosa pine forests: a retrospective study. *Forest Ecology and Management* 234: 123-135.
- Hart, S.C.** 2006. Potential impacts of climate change on nitrogen transformations and greenhouse gas fluxes in forests: a soil transfer study. *Global Change Biology* 12: 1032-1046.
- Hart, S.C.**, C.A. Gehring, P.C. Selmants and R.J. Deckert. 2006. Carbon and nitrogen elemental and isotopic patterns in macrofungal sporocarps and trees in semi-arid forests of the southwestern USA. *Functional Ecology* 20: 42-51.
- Hart, S.C.**, P.C. Selmants, S. I. Boyle, and S.T. Overby. 2006. Carbon and nitrogen cycling in southwestern ponderosa pine forests. *Forest Science*: 52: 683-693.
- Hedwall, S.J., **C.L. Chambers** and S.S. Rosenstock. 2006. Red squirrel use of dwarf mistletoe-induced witches' brooms in Douglas-fir. *Journal of Wildlife Management* 34: 467-472.
- Hedwall, S.J. and **R.L. Mathiasen**. 2006. Wildlife use of Douglas-fir dwarf mistletoe witches' brooms in the Southwest. *Western North America Naturalist* 66: in press.
- Hjerpe, E.E. and **Y-S. Kim**. 2006. Regional economic impacts of Grand Canyon river runners. *Journal of Environmental Management*: in press.
- Hofstetter, R.W.**, J. Cronin, K.D. Klepzig, J.C. Moser and M.P. Ayres. 2006. Antagonisms, mutualisms and commensalisms affect outbreak dynamics of the southern pine beetle. *Oecologia* 147: 679-691.
- Hofstetter, R.W.**, K.D. Klepzig, J.C. Moser and M.P. Ayres. 2006. Seasonal dynamics of mites and fungi and interactions with southern pine beetle. *Environmental Entomology* 35: 22-30.
- Howell, B., S. Kenaley, and **R. Mathiasen**. 2006. First report of *Psittacanthus macrantherus* on *Pinus devoniana* and *Quercus castanea* in Mexico. *Plant Disease* 90: 1461.
- Jacques, P. and **Ostergren D.M.** 2006. The end of wilderness: conflict and defeat of wilderness in the Grand Canyon. *Review of Policy Research*. 23: 573-587.
- Kenaley, S., B. Howell and **R. Mathiasen**. 2006. First report of *Cladocolea cupulata* on *Pinus douglasiana* and *P. herrerae* in northern Mexico. *Plant Disease* 90: 681.
- Kenaley, Shawn, **R.L. Mathiasen** and Carolyn M. Daugherty. 2006. Selection of dwarf mistletoe-infected ponderosa pines by bark beetles, *Ips* spp. (Coleoptera: Scolytidae), in northern Arizona. *Western North American Naturalist* 66: 279-284.
- Kolb, T.E.**, N. Guerard, **R.W. Hofstetter** and **M.R. Wagner**. 2006. Attack preferences of *Ips pini* on *Pinus ponderosa* in northern Arizona: effects of tree size and bole position. *Agricultural and Forest Entomology* 8: 295-303.
- Krauss, K.W., B.D. Keeland, **J.A. Allen**, K.C. Ewel and D.J. Johnson. 2006. Effects of season, rainfall, and hydrogeomorphic setting on mangrove tree growth in Micronesia. *Biotropica* 39: 161-170.
- Laughlin, D.C. **M.M. Moore**, J.D. Bakker, C.A. Casey, J.D. Springer, **P.Z. Fulé** and **W.W. Covington**. 2006. Assessing targets for the restoration of herbaceous vegetation in ponderosa pine forests. *Restoration Ecology* 14: 548-560.
- Long, J., A. Medina and **A. Teclé**. 2006. Geologic influence on Apache Trout habitat in the White Mountains of Arizona. *Journal of Arizona-Nevada Academy of Science* 38: 88-101.
- Lynn, J.C., **C.L. Chambers** and S.S. Rosenstock. 2006. Use of wildlife water developments by birds in southwest Arizona during migration. *Wildlife Society Bulletin* 34: 592-601.

- Mast, J.N. and **C.L. Chambers**. 2006. Landscape Form, Process, and Function: Coalescing Geographic Frontiers: Integrated Approaches to Examine Snag Dynamics and Bird Use of Burned Versus Unburned Landscapes. *Professional Geographer* 58: 397-405.
- Mathiasen, Robert L.** and C.M. Daugherty. 2006. Additional taxonomic studies of *Arceuthobium pendens* (Viscaceae): a rare dwarf mistletoe from central Mexico. *Madroño* 53: 69-71.
- Mathiasen, R.** and J. Melgar. 2006. First report of *Arceuthobium hondurensense* in Department El Paraiso, Honduras. *Plant Disease* 90: 685.
- Mathiasen, R.L.**, W.K. Olsen and C.B. Edminster. 2006. Site index curves for white fir in the southwestern United States developed using a guide curve method. *Western Journal of Applied Forestry*. 21: 87-93.
- Mathiasen, R.**, A. Sediles, and S. Sesnie. 2006. First report of *Arceuthobium hondurensense* and *Struthanthus deppeanus* in Nicaragua. *Plant Disease* 90: 1458.
- McDowell, N.G., H.D. Adams, J.D. Bailey, M. Hess and **T.E. Kolb**. 2006. Homeostatic maintenance of ponderosa pine gas exchange in response to stand density changes. *Ecological Applications* 16: 1164-1182.
- McDowell, N.G., H.D. Adams, J.D. Bailey and **T.E. Kolb**. 2006. The role of stand density on growth efficiency, leaf area index and resin flow in southwestern ponderosa pine forests. *Canadian Journal of Forest Research* 37: 343-355.
- Moore, M.M.**, C.A. Casey, J.D. Bakker, J.D. Springer, **P.Z. Fulé**, **W.W. Covington** and D.C. Laughlin. 2006. Herbaceous response to restoration treatments in a ponderosa pine forest, 1992-2004. *Rangeland Ecology and Management* 59: 135-144.
- Mullen, R.M., A.E. Springer and **T.E. Kolb**. 2006. Complex effects of prescribed fire on soil-water content in a high-elevation riparian meadow, Arizona. *Restoration Ecology* 14: 242-250.
- Newman, G.S., and **S.C. Hart**. 2006. Nutrient covariance between forest foliage and fine roots. *Forest Ecology and Management* 236: 136-141.
- Noss, R.R., **P. Beier**, **W.W. Covington**, R.E. Grumbine, D.B. Lindenmayer, J.W. Prather, F. Schmiegelow, T.D. Sisk and D.J. Vosick. 2006. Recommendations for integrating restoration ecology and conservation biology in ponderosa pine forests of the Southwestern United States. *Ecological Restoration* 14: 4-10.
- Ostergren, D.M.** 2006. Comparing wilderness restoration and fire policy in three Federal agencies: variations on a theme in Northern Arizona. *Journal of Land, Resources and Environmental Law* 26: 267-\_\_.
- Ostergren, D.M.**, K. A. Lowe, J. B. Abrams and E. J. Ruther. 2006. Public perceptions of forest management in north-central Arizona: The paradox of demanding more involvement but allowing limits to legal action. *Journal of Forestry* 104: 375-382.
- Ort, M.H., D.E. Anderson and **D.M. Ostergren**. 2006. Integrating policy and land management issues into a natural sciences education: teaching environmental sciences on the lower San Juan River, Utah. *Journal of Geoscience Education*. 53: 116-122.
- Pagdee, A., **Y-S. Kim** and **P.J. Daugherty**. 2006. What makes community forest management successful: a meta-study from community forests throughout the world. *Society and Natural Resources* 19: 33-52.
- Parker, T.J., K.A. Clancy and **R.L. Mathiasen**. 2006. Interactions among fire, insects, and pathogens in coniferous forests of the interior western United States and Canada. *Agricultural and Forest Entomology* 8: 167-189.

- Passovoy, M.D. and **P.Z. Fulé**. 2006. Snag and woody debris dynamics following severe wildfires in northern Arizona ponderosa pine forests. *Forest Ecology and Management* 223: 237-246.
- Schweitzer, J.A., J.K. Bailey, R.K. Bangert, **S.C. Hart**, and T.G. Whitham. 2006. The role of plant genetics in determining above- and belowground microbial communities. Pages 107 - 120 in Bailey, M.J., A. K. Lilley, T. M. Timms-Wilson (eds.), *Microbial Ecology of Aerial Plant Surfaces*. CABI Publishing, Oxfordshire, UK.
- Simonin, K., **T.E. Kolb**, M. Montes-Helu and G.W. Koch. 2006. Restoration thinning and the influence of tree size and leaf area to sapwood area ration on *Pinus ponderosa* Laws. *Water Relations. Tree Physiology* 26: 493-503.
- Snider, G., **P.J. Daugherty** and D. Wood. 2006. The irrationality of continued fire suppression: an avoided cost analysis of fire hazard reduction treatments versus no treatment. *Journal of Forestry* 104: 431-437.
- Springer, A.E., M.A. Amentt, **T.E. Kolb** and R.M. Mullen. 2006. Evapotranspiration of two vegetation communities in a high-elevation riparian meadow at Hart Prarie, Arizona. *Water Resources Research* 42: 491-500.
- Stephens, S.S. and **M.R. Wagner**. 2006. Using ant (Hymenoptera: Formicidae) functional groups as bioindicators of forest health in northern Arizona ponderosa pine forests. *Environmental Entomology* 35: 937-949.
- Sugihara, N.G., J.W. van Wagendonk, J. Fites-Kaufmann, K.E. Shaffer, and **A.E. Thode** (eds.), *Fire in California Ecosystems*. University of California Press, Berkeley, CA.
- Thode, A.E.**, J. Kershner, K. Roby, L. Decker, and J. Beyers. 2006. Fire, watershed resources and aquatic ecosystems. Pages 466-480 in N.G. Sugihara, J.W. van Wagendonk, J. Fites-Kaufmann, K.E. Shaffer, and A.E. Thode (eds.), *Fire in California Ecosystems*. University of California Press, Berkeley, CA.
- Tuttle, S.R., **C.L. Chambers** and T.C. Theimer. 2006. Potential effects of modified livestock water troughs on bat use in northern Arizona. *Wildlife Society Bulletin* 34: 602-608.
- Van Horne, M.L. and **P.Z. Fulé**. 2006. Comparing methods of reconstructing fire history using fire scars in a southwestern USA ponderosa pine forest. *Canadian Journal of Forest Research* 36: 855-867.
- Waring, K.M.** and K.L. O'Hara. 2006. Estimating relative error in growth ring analyses of second-growth coast redwood (*Sequoia sempervirens*). *Canadian Journal of Forest Research* 36: 2216-2222.
- Waring, T.D. and **K.M. Waring**. 2006. Mercury levels in trees, shrubs, and grasses growing on mercury contaminated sites in southwestern Montana. *Intermountain Journal of Sciences*: 12(1-2):18-26.
- Whitham, T.G., J.K. Bailey, J.A. Schweizer, S.M. Schuster, R.K. Bangert, C.J. LeRoy, E. Lonsdorf, G.J. Allan, S.P. DiFazio, B.M. Potts, D.G. Fischer, C.A. Ghering, R.L Lindroth, J. Marks, **S.C. Hart**, G.M. Wimp and S.C. Wooley. 2006. A framework for community and ecosystem genetics: from genes to ecosystems. *Nature Reviews Genetics* 7: 510-523.

## 2005

- Adams, H.D. and **T.E. Kolb**. 2005. Tree growth response to drought and temperature along an elevation gradient on a mountain landscape. *Journal of Biogeography* 32: 1629-1640.
- Adjewodah, P., **P. Beier**, M.K. Sam and J.J. Mason. 2005. Elephant crop damage in the Red Volta Valley, northeastern Ghana. *Pachyderm* 38: 39-48.
- Bickford, C., **T.E. Kolb** and B.W. Geils. 2005. Host physiological condition positively affects dwarf mistletoe shoot growth: *Arceuthobium vaginatum* subsp. *cryptopodium* on *Pinus ponderosa*. *Oecologia* 146: 179-189. DOI: 10.1007/s00442-005-0215-0.
- Bosu, P.P., J.R. Cobbinah, E. Frempong, J.D. Nichols and **M.R. Wagner**. 2005. Evaluation in Ghana of indigenous parasitoids of the Iroko (*Milicia*) gall bug, *Phytolyma lata* (Scott) (Homoptera: Psyllidae). *Ghana Journal of Forestry* 15/16: 1-12.
- Boyce, D.A., Jr, P.L. Kennedy, **P. Beier**, M.F. Ingradlidi, S.R. MacVean, M.S. Siders, J.R. Squires and B. Woodbridge. 2005. When are goshawks not there? Is a single visit enough to infer absence? *Journal of Raptor Research* 39: 285-291.
- Boyle, S.I., **S.C. Hart**, J.P. Kaye and M.P. Waldrop. 2005. Restoration and canopy type influence soil microflora in a ponderosa pine forest. *Soil Science Society of America Journal* 69: 1627-1638.
- Chambers, C.L.** and J.N. Mast. 2005. Ponderosa pine snag dynamics and cavity excavation following wildfire in northern Arizona. *Forest Ecology and Management* 216: 227-240.
- Classen, A.T., **S.C. Hart**, T.G. Whitham, N.S. Cobb, and G.W. Koch. 2005. Insect infestations linked to shifts in microclimate: important climate change implications. *Soil Science Society of America Journal*. 69: 2049-2057.
- Cocke, A.E., **P.Z. Fulé** and J.E. Crouse. 2005. Comparison of burn severity assessments using differenced normalized burn ration ( $\Delta$ BNR) and ground data. *International Journal of Wildland Fire* 14: 189-198.
- Cocke, A.E., **P.Z. Fulé** and J.E. Crouse. 2005. Forest change on a steep mountain gradient after extended fire exclusion: San Francisco Peaks, Arizona, USA. *Journal of Applied Ecology* 42: 814-823.
- Cox, G., D.G. Fischer and **S.C. Hart**. 2005. Non-response of native cottonwood trees to water additions during summer drought. *Western North American Naturalist* 65: 175-185.
- Daugherty, C. and **R. Mathiasen**. 2005. First report of *Arceuthobium gillii* on *Pinus engelmannii*. *Plant Disease* 89: 106.
- Desta, A. and **A. Teclé**. 2005. The restoration capabilities of the former Beaver Creek project watersheds. *Hydrology and Water Research In Arizona and the Southwest* 35: 45-52.
- Dickson, B.G., J.S. Jenness and **P. Beier**. 2005. Influence of vegetation, topography, and roads on cougar movement in southern California. *Journal of Wildlife Management* 69: 264-276.
- Fulé, P.Z.**, D. Laughlin and **W.W. Covington**. 2005. Pine-oak forest dynamics five years after ecological restoration treatments. *Forest Ecology and Management* 218: 129-145.
- Fulé, P.Z.**, J. Villanueva-Díaz and M. Ramos-Gómez. 2005. Fire regime in a conservation reserve, Chihuahua, México. *Canadian Journal of Forest Research* 35: 320-330.
- Gatto, A.E., T.G. Grubb and **C.L. Chambers**. 2005. Red-tailed hawk dietary overlap with northern goshawks on the Kaibab Plateau, Arizona. *Journal of Raptor Research* 39: 439-444.
- Griffis-Kyle, K.L. and **P. Beier**. 2005. Migratory strategy and seasonal patterns of bird diversity in relation to forest habitat. *American Midland Naturalist* 153: 436-443.

- Hart, S.C.**, A.T. Classen and R.J. Wright. 2005. Long-term interval burning alters fine root and mycorrhizal dynamics in a ponderosa pine forest. *Journal of Applied Ecology* 42: 752-761.
- Hart, S.C.** and A.C. DiSalvo. 2005. Net primary productivity of a western montane riparian forest: potential influence of stream flow diversion. *Madroño* 52: 79-90.
- Hart, S.C.**, T.H. DeLuca, G.S. Newman, D.M. MacKenzie and S.I. Boyle. 2005. Post-fire vegetative dynamics as drivers of microbial community structure and function in forest soils. *Forest Ecology and Management* 220: 166-184.
- Heinlein, T.A., **M.M. Moore**, **P.Z. Fulé** and **W.W. Covington**. 2005. Fire history of two ponderosa pine – mixed conifer sites: San Francisco Peaks, Arizona, USA. *International Journal of Wildland Fire* 14: 307-320.
- Hofstetter, R.W.**, J Mahfous, K.D. Klepzig and M.P. Ayres. 2005. Effects of tree phytochemistry on the interactions between endophloedic fungi associated with the southern pine beetle. *Journal of Chemical Ecology* 31: 551-572.
- Howell, B., J.C. Melgar and **Robert L. Mathiasen**. 2005. Efecto de *Psittacanthus angustifolius* en el crecimiento de *Pinus oocarpa* en Honduras. *Tatascan* 17: 27-38.
- Huisinga, K.D., D.C. Laughlin, **P.Z. Fulé**, J.D. Springer and C.M. McGlone. 2005. Effects of an intense prescribed fire on ground-flora in mixed conifer forest. *Journal of the Torrey Botanical Society* 132: 590-601.
- Kaye, J.P., **S.C. Hart**, **P.Z. Fulé**, **W.W. Covington**, **M.M. Moore** and M.W. Kaye. 2005. Initial carbon, nitrogen, and phosphorus fluxes following ponderosa pine restoration treatments. *Ecological Applications* 15: 1581-1593.
- Kim, Y-S.** and A. Wells. 2005. The Impacts of Forest Density on Property Values. *Journal of Forestry* 103: 146-151.
- Korb, J.E., J.D. Springer, S.R. Powers and **M.M. Moore**. 2005. Soil seed banks in *Pinus ponderosa* forests in Arizona: Clues to site history and restoration potential. *Applied Vegetation Science* 8: 103-112.
- Laughlin, D.C., J.D. Bakker and **P.Z. Fulé**. 2005. Understorey plant community structure in lower montane and subalpine forests, Grand Canyon National Park, USA. *Journal of Biogeography* 32: 2083-2102.
- Leao, D.S. and **A. Tecle**. 2005. A review of the hydrology in the upper Rio de Flag watershed, Flagstaff, AZ. *Hydrology and Water Resources in Arizona and the Southwest* 35: 34-45.
- Martin, S.L., T.C. Theimer and **P.Z. Fulé**. 2005. Ponderosa pine restoration does not affect turkey roost site use in northern Arizona. *Wildlife Society Bulletin* 33: 859-864.
- Mathiasen, R.L.** and C.M. Daugherty. 2005. Susceptibility of conifers to western hemlock dwarf mistletoe in the Cascade Range of Washington and Oregon. *Western Journal of Applied Forestry* 20: 94-100.
- Mathiasen, R.**, M. Haefeli and N. Marcus. 2005. Southwestern dwarf mistletoe, *Arceuthobium vaginatum* subsp. *cryptopodium* found parasitizing *Picea pungens*. *Plant Disease* 89: 106.
- McRae, B.H., **P. Beier**, L.E. DeWald, L.Y. Huynh and P. Keim. 2005. Habitat barriers limit gene flow and illuminate historical events in a wide-ranging carnivore. *Molecular Ecology* 14: 1965-1977.
- Olberding, S.D., J.E. Mitchell and **M.M. Moore**. 2005. "Doing the best we could with what we had.": USFS Research in the Southwest. *Rangelands* (June 2005): 29-36.

- Ostergren, D.M.** 2005. Making connections: the tactics, art and science of building political support for protected natural areas. Pages 155-168 in J.A. McNeely (ed.), *Friends for life: new partners in support of protected areas*. Gland, Switzerland. IUCN.
- Ostergren, D.M.**, F. I. Solop, and K.K. Hagen. 2005. National Park Service fees: value for the money or a barrier to visitation? *Journal of Park and Recreation Administration* 23: 18-36.
- Ostergren, D.M.** and Ruther, E. J 2005. Public knowledge, opinion and support of forest restoration: a survey of residents in northern Arizona. Pages 25-35 in C. van Riper III and D.J. Mattson (eds.), *The Colorado Plateau II: biophysical, socioeconomic, and cultural research*. University of Arizona Press, Tucson.
- Perez-Verdin, G. and **A. Teclé**. 2005. Stochastic stimulation of wet periods using markov chain models. *Hydrology and Water Resources in Arizona and the Southwest* 35: 60-67.
- Poff, B., D.S. Leao, **A. Teclé** and D. Neary. 2005. Determining watershed boundaries and area using GPS, DEMs, and traditional methods: A comparison. In C. van Riper (ed.), *The Colorado Plateau Cultural, Biological, and Physical Research*. The University of Arizona Press, Tucson, AZ.
- Ruther, E.J and **Ostergren, D.M.** 2005. Attitudes toward and perceptions of mountain lions: A survey of northern Arizona residents. Pages 37-45 in C. van Riper III and D.J. Mattson (eds.), *The Colorado Plateau II: biophysical, socioeconomic, and cultural research*. University of Arizona Press, Tucson.
- Schuster, T.D., N.S. Cobb, T.G. Whitham and **S.C. Hart**. 2005. Relative importance of environmental stress and herbivory in reducing litter fall in a semi-arid woodland. *Ecosystems* 8: 62-72.
- Schweitzer, J.A., J.K. Bailey, **S.C. Hart** and T.G. Whitham. 2005. Nonadditive effects of mixing cottonwood genotypes on litter decomposition and nutrient dynamics. *Ecology* 86: 2834-2840.
- Schweitzer, J.A., J.K. Bailey, **S.C. Hart**, G.M. Wimp, S.K. Chapman and T.G. Whitham. 2005. The interaction of plant genotype and herbivory decelerate leaf litter decomposition and alter nutrient dynamics. *Oikos*. 110: 133-145.
- Selmants, P.C. **S.C. Hart**, S.I. Boyle and J.M. Stark. 2005. Red alder (*Alnus rubra*) alters community-level soil microbial function in conifer forests of the Pacific Northwest, USA. *Soil Biology and Biochemistry* 37: 1860-1868.
- Seymour, G. and **A. Teclé**. 2005. Impact of slash pile size and burning on soil chemical characteristics in ponderosa pine forests. *Journal of the Arizona Nevada Academy of Science* 38: 6-20.
- Sherry, E.E., **S.M. Dewhurst** and M.K. Karjala. 2005. Aboriginal forest planning: lessons from three community pilot projects. *Canadian Journal of Native Studies* 25: 51-91.
- Skov, K.R., **T.E. Kolb** and K.F. Wallin. 2005. Difference in radial growth response to restoration thinning and burning treatments between young and old ponderosa pine in Arizona. *Western Journal of Applied Forestry* 20: 36-43.
- Stephens, S.L. and **P.Z. Fulé**. 2005. Western pine forests with continuing frequent fire regimes: possible reference sites for management. *Journal of Forestry* 103: 357-362.
- Teclé, A.** 2005. The social and ecological costs of damming the Colorado River. *Hydrology and Water Resources in Arizona and the Southwest* 35: 53-59.
- Whitham, T.G., E. Lonsdorf, J.A. Schweitzer, J.K. Bailey, D.G. Fischer, S.M. Schuster, R.L. Lidroth, **S.C. Hart**, G.J. Allan, C.A. Gehring, P. Keim, B.M. Potts, J. Marks, B.J. Rehill,

- S.P. DiFazio, C.J. LeRoy, G.M. Wimp and S. Woolbright. 2005. All effects of a gene on the world: Extended phenotypes, feedbacks, and multi-level selection. *Écoscience* 12: 5-7.
- Wolfson, B.A.S., **T.E. Kolb**, C.H. Sieg and K.M. Clancy. 2005. Effects of post-fire conditions on germination and seedling success of diffuse knapweed in northern Arizona. *Forest Ecology and Management* 216: 342-358.
- Zausen, G.L., **T.E. Kolb**, J.D. Bailey and **M.R. Wagner**. 2005. Long-term impacts of thinning and prescribed burning on ponderosa pine physiology and bark beetle abundance in northern Arizona: A replicated landscape study. *Forest Ecology and Management* 218: 291-305.

## 2004

- Adams, H.D. and **T.E. Kolb**. 2004. Drought response of conifers in ecotone forests of northern Arizona: tree ring growth and leaf  $\delta^{13}\text{C}$ . *Oecologia* 140: 217-225.
- Bernardos, D.A., **C.L. Chambers** and M.J. Rabe. 2004. Selection of Gambel oak roosts by southwestern myotis in ponderosa pine-dominated forests, northern Arizona. *Journal of Wildlife Management* 68: 595-601.
- Clancy, K.M., Z. Chen and **T.E. Kolb**. 2004. Foliar nutrients and induced susceptibility: genetic mechanisms of Douglas-fir resistance to western spruce defoliation. *Canadian Journal of Forest Research* 34: 939-949.
- Desta, A. and **A. Teclé**. 2004. Water balance in Upper Lake Mary, Flagstaff, Arizona. *Hydrology and Water Resources in Arizona and the Southwest* 34: 74-82.
- Fight, R.D., G.L. Pinjuv and **P.J. Daugherty**. 2004. Small-diameter wood processing in the southwestern United States: an economic case study and decision analysis tool. *Forest Prod. J.* 54: 85-89
- Fischer, D.G., **S.C. Hart**, T.G. Whitham and G.D. Martinsen. 2004. Genetic variation in water-use parameters of cottonwoods: ecosystem implications. *Oecologia* 139: 288-297.
- Fisher, M.A. and **P.Z. Fulé**. 2004. Changes in forest vegetation and arbuscular mycorrhizae along a steep elevation gradient in Arizona. *Forest Ecology and Management* 200: 293-311.
- Fulé, P.Z.**, A.E. Cocke, T.A. Heinlein and **W.W. Covington**. 2004. Effects of an intense prescribed forest fire: is it ecological restoration? *Restoration Ecology* 12: 220-230.
- Fulé, P.Z.**, J.E. Crouse, A.E. Cocke, **M.M. Moore** and **W.W. Covington**. 2004. Changes in canopy fuels and potential fire behavior 1880-2040: Grand Canyon, Arizona. *Ecological Modeling* 175:231-248
- Garnett, G. N., **R. L. Mathiasen** and **C.L. Chambers**. 2004. A comparison of wildlife use broomed and unbroomed ponderosa pine trees in northern Arizona. *Western Journal of Applied Forestry* 19: 42-46
- Gildar, C.N., **P.Z. Fulé** and **W.W. Covington**. 2004. Plant community variability in ponderosa pine forest has implications for reference conditions. *Natural Areas Journal* 24: 101-111.
- Hofstetter, R.W.** 2004. Population dynamics and community ecology of the southern pine beetle. Ph.D. Thesis, Dartmouth.
- Howell, B.E. and **R.L. Mathiasen**. 2004. Growth impacts of *Psittacanthus angustifolius* Kuijt on *Pinus oocarpa* Schiede in Honduras. *Forest Ecology and Management* 198: 75-88.



- Huffman, D.W. and **M.M. Moore**. 2004. Responses of Fendler ceanothus to forest thinning, prescribed fire, and drought in an Arizona ponderosa pine forest. *Forest Ecology and Management* 198: 105-115.
- Jenness, J.S., **P. Beier** and J.R. Ganey. 2004. Associations between forest fire and Mexican Spotted Owls. *Forest Science* 50: 765-772
- Jerman, J.L., P.J. Gould and **Fulé, P.Z.** 2004. Slash compression treatments reduced tree mortality from prescribed fire in southwestern ponderosa pine. *Western Journal of Applied Forestry* 19: 149-153.
- Karjala, M.K., E.E. Sherry and **S.M. Dewhurst**. (2004). Criteria and indicators for sustainable forest planning: a framework for recording aboriginal resource and social values. *Forest Policy and Economics* 6: 95-110.
- Klepzig, K.D., J. Flores-Otero, **R.W. Hofstetter** and M.P. Ayres. 2004. Effects of available water on growth and competition of southern pine beetle associated fungi. *Mycological Research* 108: 183-188.
- Kolb, T.E.** 2004. Introduction to the Proceedings of the Fifth Biennial Conference on University Natural Education in Natural Resources. In: **Kolb, T.E.** (compiler), Proceedings of the Fifth Biennial Conference on University Education in Natural Resources. Natural Resources and Environmental Issues, Volume XII, S.J. and Jessie E. Quinney Natural Resources Research Library, Logan, UT. <http://www.cnr.usu.edu/uenr/>
- Leao, D.S. and **A. Teclé**. 2004. Predicting event-based peak discharges resulting from thinning and wildfire for the Upper Rio de Flag watershed, Flagstaff, Arizona. *Hydrology and Water Resources in Arizona and the Southwest* 34: 21-38.
- Mathiasen, R.**, A Flores, H. Miranda and L. Cadio. 2004. First report of *Arceuthobium vaginatum* subsp. *vaginaum* on *Pinus pseudostrobus*. *Plant Disease* 88: 1046.
- Mikesic, D. G. and **C. L. Chambers**. 2004. Return of the (Bat) Mummy. BATS Magazine. Bat Conservation International. 22: 8-11.
- Moore, M. M.**, and D. W. Huffman. 2004. Tree encroachment on meadows of the North Rim, Grand Canyon National Park, Arizona, USA. *Arctic, Antarctic, and Alpine Research* 36: 460-469.
- Moore, M.M.**, DW. Huffman, **Fulé, P.Z.**, **W.W. Covington** and J.E. Crouse. 2004. Comparison of historical and contemporary forest structure and composition on permanent plots in southwestern ponderosa pine forests. *Forest Science* 50: 162-176.
- Muleady-Mecham, N.E., **M.E. Lee** and B.D. Burch. 2004. A public opinion survey on wildland fire in Grand Canyon National Park. *George Wright Society Forum* 21: 12-21.
- Nepyvoda, Vasyl, S. J. Hollenhorst and **D.M. Ostergren**. 2004. Охранительные ограничения как действенный метод охраны природного и исторического наследия в США и перспективы их внедрения в России. (Conservation Restrictions in the USA: Methods for Protecting Nature and Historical Heritage and Potential Application in Russia). *Journal of Eurasian Research* 3: 50-56 at <http://www.americancouncils.org/jer/>.
- Nickrent, D.L., M.A. Garcia, M.P. Martín and **R.L. Mathiasen**. 2004. A phylogeny of all species of *Arceuthobium* (Viscaceae) using nuclear and chloroplast DNA sequences. *American Journal of Botany* 91: 125-138.
- Ostergren, D.M.** 2004. The National Park Service and implementation of the 1964 Wilderness Act: 37 years of competing interests on the Colorado Plateau. Pages 47-62 in Charles van Riper & Kenneth L. Cole. (eds.), The Colorado Plateau: Cultural, Biological and Physical research. The University of Arizona Press, Tuscon.

- Parker, T.J. and **R.L. Mathiasen**. 2004. A comparison of rating systems for dwarf mistletoe-induced witches' brooms in ponderosa pine. *Western Journal of Applied Forestry* 19: 54-59.
- Perez-Verdin, G., **M.E. Lee** and D.J. Chavez. 2004. Planning for outdoor recreation in a protected area in southern Durango, Mexico: Analysis of local residents' perceptions. *Society and Natural Resources* 17: 897-910.
- Poff, B., D. Leao and **A. Teclé**. 2004. Assessing the accuracy of calculating large watershed areas using global positioning system compared to traditional methods of calculating areas. *Hydrology and Water Resources in Arizona and the Southwest* 34.
- Poff, B. and **A. Teclé**. 2004. Multiobjective analysis of the proposed rerouting of the Rio de Flag in Flagstaff, AZ. In Charles van Riper (ed.) *The Colorado Plateau Cultural, Biological, and Physical Research*. The University of Arizona Press, Tucson, AZ.
- Poff, B., A. Desta and **A. Teclé**. 2004. Spatial evaluation of precipitation in two large watersheds in north-central Arizona. *Hydrology and Water Resources in Arizona and the Southwest* 15-20.
- Schweitzer, J.A., J.K. Bailey, B.J. Rehill, G.D. Martinsen, **S.C. Hart**, R.L. Lindroth, P. Keim and T.G. Whitham. 2004. Genetically based trait in a dominant tree affects ecosystem process. *Ecology Letters* 7: 127-134.
- Seymour, G. and **A. Teclé**. 2004. Impact of slash pile size and burning on ponderosa pin forest soil physical characteristics. *Journal of the Arizona-Nevada Academy of Science* 37: 74-82.
- Shaw, D.C., D.A. Watson and **R.L. Mathiasen**. 2004. Comparison of dwarf mistletoe (*Arceuthobium* spp., Viscaceae) in the western United States with mistletoes (*Amyema* spp., Loranthaceae) in Australia – ecological analogs and reciprocal models for ecosystem management. *Australian Journal of Botany* 52: 481-498.
- Skov, K.R., **T.E. Kolb** and K.F. Wallin. 2004. Tree size and drought affect ponderosa pine physiological response to thinning and burning treatments. *Forest Science* 50: 81-91.
- Steed, B.E. and **M.R. Wagner**. 2004. Importance of log size on host selection and reproductive success of *Ips pini* (Say) (Coleoptera:Scolytidae) in ponderosa pine slash of northern Arizona and western Montana. *Journal of Economic Entomology* 97: 436-450.
- Teclé, A.** 2004. Evapotranspiration estimates for Southwestern United States. *Hydrology and Water Resources in Arizona and the Southwest* 34: 57-63.
- Verdin, **G.P.** and **A. Teclé**. 2004. Use of analytic hierarchy process for CONAFOR forest budget allocation in Durango, Mexico. *Hydrology and Water Resources in Arizona and the Southwest* 34: 39-49.
- Wagner, M.R.** and Z. Chen. 2004. Long-term benefits to the growth of ponderosa pines from controlling southwestern pine tip moth (Lepidoptera : Tortricidae) and weeds. *Journal of Economic Entomology* 97: 1972-1977.
- Wallin, K.F., **T.E. Kolb**, K.R. Skov and **M.R. Wagner**. 2004. Seven-year results of the influence of thinning and burning restoration treatments on pre-settlement ponderosa pines at the Gus Pearson Natural Area. *Restoration Ecology* 12: 239-247.

## **APPENDIX J**

### **SAF Document F-Forestry Graduate Employment Summary**

**Document F: Forestry Graduate Employment Summary**

Institution Name: Northern Arizona University Academic Year: 2012-2013

Official Degree Program Title: Forestry

Official Option Title: N/A

<b>Post Graduation Status</b>	<b>NUMBER OF GRADUATES FOR PAST FIVE YEARS</b>										<b>Total Graduates</b>
	<b>Yr: 2008</b>		<b>Yr: 2009</b>		<b>Yr: 2010</b>		<b>Yr: 2011</b>		<b>Yr: 2012</b>		
	<b>#</b>	<b>%</b>	<b>#</b>	<b>%</b>	<b>#</b>	<b>%</b>	<b>#</b>	<b>%</b>	<b>#</b>	<b>%</b>	
<b><i>Employed permanent:</i></b>											
<b><i>Forestry</i></b>	2	17%	4	33%	3	25%	0	0%	3	25%	12
<b><i>Forestry-related</i></b>	0	0%	3	50%	2	33%	1	17%	0	0%	6
<b><i>Other employed</i></b>	0	0%	0	0%	0	0%	0	0%	1	100%	1
<b><i>Employed temporary:</i></b>											
<b><i>Forestry</i></b>	0	0%	0	0%	2	50%	1	25%	1	25%	4
<b><i>Forestry-related</i></b>	0	0%	1	33%	2	67%	0	0%	0	0%	3
<b><i>Other employed</i></b>	1	25%	1	25%	1	25%	0	0%	1	25%	4
<b><i>Graduate Study:</i></b>	0	0%	1	20%	3	60%	0	0%	1	20%	5
<b><i>Unemployed:</i></b>	0	0%	0	0%	0	0%	1	100%	0	0%	1
<b><i>Unknown:</i></b>											
<b>Total Number and Percentage of Graduates</b>	3	8%	10	28%	13	36%	3	8%	7	19%	36

\*Note: Thirty six total respondents of 126 mailed surveys (29%).

## **APPENDIX K**

### **SAF Document G - Student Data Summary**

**Document G: Student Data Summary**

Institution Name: Northern Arizona University Academic Year: 2012-2013

Official Degree Program Title: Forestry

Official Option Title: N/A

STUDENTS ENROLLED	Freshman		Sophomore		Junior		Senior		Total Students	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Current Enrollment	14	61	11	49	18	45	10	30	53	185
Last Year	14	61	11	49	18	45	10	30	53	185
Two Years Ago	13	36	9	20	6	7	2	10	30	73
Three Years Ago	9	18	4	7		7	1	2	14	34

STUDENTS ENROLLED	TOTAL NUMBER OF STUDENTS					
	African Amer	Asian	Caucasian	Hispanic	Native Amer.	Other
Current Enrollment	1	3	185	30	12	7
Last Year	0	3	185	30	12	8
Two Years Ago	0	1	82	9	7	4
Three Years Ago	0	1	42	2	3	0

Projected Total Enrollment for Next Three Years	Year: 2013	Year: 2014	Year: 2015
		256	258

GRADUATING CLASS	TOTAL NUMBER OF GRADUATING STUDENTS							
	Female	Male	Afric. Amer	Asian	Caucasian	Hispanic	Native Amer	Other
Current Graduating Class	8	31	1	4	28	3	2	1
Last Year	5	16	0	0	17	1	2	1
Two Years Ago	3	28	0	0	26	0	4	1
Three Years Ago	3	16	0	0	15	2	0	2

Projected Total Graduates for Next Three Years	Year: 2013	Year: 2014	Year: 2015
		33	44

## **APPENDIX L**

### **Cline Library Report**



## **Cline Library Support for the School of Forestry Undergraduate Program November 2012**

Northern Arizona University's Cline Library is committed to providing a physical environment for intellectual discovery, collaborative research projects, and computing, and an equally rich online learning environment that is fully accessible to students, faculty and staff regardless of location. The library strives to align its efforts to institutional and college initiatives and priorities while responding to the rapidly changing expectations of students and faculty.

A major renovation project currently underway at the library will enrich the student learning experience through the transformation of spaces in which students actively learn, collaborate, and create. A research commons, a 50-60 seat experimental classroom, and a digital media lab will meet the demands of today's students and promote the university's current and future approaches to teaching, learning, and the integration of technology and online content.

At a time when many university libraries are reducing the ways in which staff directly interact with students, Cline Library is committed to efficiently utilizing staff in ways that encourage and support the students who need us, while providing the spaces and tools that allow more self-directed learners to be successful.

The renovations in the library, one of the most heavily used buildings on campus, demonstrate its commitment to providing what students need to successfully meet a variety of learning experiences and coursework requirements and exceed the expectations that move them forward to graduation.

Overview: [Resources](#) | [Services](#) | [Facility](#)  
Support for Forestry: [Students](#) | [Faculty](#) | [Program](#)



## Cline Library Overview

### Resources

- More than 1.2 million volumes, including over 550,000 books and over 123,000 e-books. Other formats include government documents, maps, microforms, sound recordings, films and other media, and bound periodical volumes.
- Access to over 175 databases and to the articles in over 60,000 e-journals and newspapers.
- Special Collections and Archives holds 8 million unique items focused on the Colorado Plateau and Northern Arizona. Over 95,000 are accessible in the online Colorado Plateau Archives ([archive.library.nau.edu](http://archive.library.nau.edu)), which enjoys nearly 6 million visits each year.
- The library website ([nau.edu/library](http://nau.edu/library)) is available both via a standard interface and also a web interface for mobile users.

### Services

- Document delivery service (free to NAU users) borrows or obtains items not in our collections.
- Research assistance and consultations via text, live chat, email, phone or in person.
- Mac and PC laptops available for student checkout.

### Facility

- Open 108.5 hours per week, including until 2 a.m. five nights a week for Fall and Spring semesters.
- Largest computing lab on campus, with robust Wireless N Network available to NAU and public users. Technology-rich media studios and group study rooms available for student checkout. 154 computers available to NAU users. Growing number of energy-saving virtual desktop computers. Assistive technology equipment. Scanners allow users to scan books, microforms and more directly to email, printers, usb and home drives, and other options. Free scans save students money while reducing paper consumption.
- 400-seat Assembly Hall for classes and events.
- Designated spaces for quiet study and computing and silent study.
- Individual study rooms provide focused space for solo study.
- (*Anticipated 2013*) State-of-the-art model 50-60 seat active-learning classroom that doubles as a collaborative area open to students outside of scheduled class times, and Open Studios with expanded programming for digital media creation and editing by individuals and groups.

## **Support for Forestry Students**

The library is committed to helping students develop the research skills they need. The library provides research assistance in person, and via chat, e-mail or phone. Students can contact the library's academic programs librarians directly for focused, in-depth research help, including assistance with advanced search strategies and the use of highly specialized databases. Academic programs librarians also provide guidance in the use of RefWorks, an online bibliographic citation management tool available to all University-affiliated users.

Librarians and archivists help Forestry students learn how to search for and use primary sources. These may be online resources in the library catalog and Colorado Plateau Archives, or physical resources in the Cline Library's Special Collections and Archives. At the library Forestry students can use materials in a variety of formats, from archival materials to microforms, from maps to government documents, and from print to media. Students interested in oral histories can go beyond viewing them to creating their own in our multimedia studios.

Academic programs librarians provide one-on-one research consultations for students at all levels. This could be a quick meeting or a lengthy consultation. Librarians can meet with students online, and students can access library resources regardless of location – even when studying abroad. Examples of recent needs related to undergraduate forestry classes include looking for articles on hazard fuel reduction in the Ponderosa Pine and locating digital versions of environmental assessments for the Four Corners region.

Forestry students can take advantage of library programming, including free programs co-sponsored by the library, such as exhibits in Special Collections and Archives, the Native American and Indigenous film series and the College of Arts and Letters Film Series.

## Support for Forestry Faculty

As teaching and learning methods have evolved, so has the library's approach to proactively providing resources and services in support of courses and programs. Staff across the library partner with faculty in all disciplines to design, deliver, assess and continuously improve an active, 24/7 learning environment that allows students to be self-directed and successfully achieve an instructor's stated student learning outcomes.

The library's academic programs librarians collaborate with Forestry faculty to:

- Design or redesign curriculum at the course or program level
- Integrate library resources and services directly into courses, especially Blackboard Learn course shells
- Design effective research assignments that align library resources, services and activities to specific learning outcomes in a course and make the research experience more productive and successful for students
- Provide content or instruction, either in-person or virtually, to help students develop information-seeking skills that address specific course or program needs, including the effective and appropriate use of information across formats
- Identify relevant resources that support course or programmatic objectives

Some recent examples of collaborations include working with:

- Yeon-Su Kim/FOR255. Librarian, along with instructional technologist from the E-Learning Center, assisted in the development of this online class, including media integration, identification of textbook alternatives, and inclusion of information literacy concepts.
- Rich Hofstetter/FOR499. Librarian identified field guides and other online resources that could be used for field identification during a course trip to the Smoky Mountains in North Carolina.
- Bruce Fox/FOR101. Librarian identified online resources and active learning content related to forestry.

As textbook costs continue to rise, the library is working with the growing number of faculty opting to provide electronic reserves materials instead of requiring their students to purchase expensive textbooks. The library delivers electronic reserves, which can include articles, e-books, and other resources, via Blackboard Learn course shells. Faculty members fill out an online course reserve form; from there the library makes the resources available quickly and takes care of copyright compliance. For the 2012 fiscal year, nearly 1,500 items were digitized for electronic reserves.

Reserves has provided electronic readings for Forestry faculty members, and when necessary, has worked with Document Delivery Services to acquire materials from other institutions to be used in Forestry coursework.

## Support for the Forestry Program

The library's academic programs librarians work with Forestry faculty to ensure that core and emerging subjects, as well as teaching or research methods, are covered in the library collections. Where possible, the library focuses on electronic content that is available to all users 24/7, including e-books, e-journals, streaming media, full-text databases and more.

Due to the cross-disciplinary nature of forestry research, specific library materials for forestry are supplemented by materials in biological sciences, physical sciences, geography, political science and many other subject areas. The depth and breadth in the collection of materials relating to forestry, in combination with the library's emphasis on collecting materials relating to the Colorado Plateau, has made the materials in the areas of the library supporting Forestry programs a particularly strong segment of the library's collection.

Because of the way information providers bundle content in databases, it is not possible to separate out the specific costs of databases or periodicals supporting Forestry research and curricula. Among the key databases used by Forestry students are:

- Biological Sciences (Proquest)
- BioOne Complete
- Environmental Science Collection (Proquest)
- EIS: Digests of Environmental Impact Statements (Proquest)
- Forest Science Database (CABI, CABdirect)
- Forestry Compendium (CABI)
- Plant Science (Proquest)
- Web of Knowledge (Thomson Reuters)

The library also provides access to online reference sources such as the Encyclopedia of Soil Science, Encyclopedia of Water Science, and Birds of North America Online.

The library's subscription to Films on Demand, a source for streaming media, provides access to over 12,000 streaming media titles, primarily documentaries. For example, at present Films on Demand provides 562 titles in its Environmental Science section (including 173 titles in a Natural Resources category) and 1,138 in its Biology section. A subscription to Filmmakers Library Online provides access to over 1,000 documentaries that present points of view and historical and current experiences from diverse cultures and traditions worldwide.

The library offers services for the digitization and delivery of streaming media for class use. Streaming media is one of our fast-growing and well-received services; last year the library made over 1,300 streaming films available for course support. Forestry faculty Yeon-Su Kim and Bruce Fox are users of the library's streaming services.

In addition, the library's media collection includes an extensive collection of DVDs and videocassettes directly related to the Forestry curricula, from documentaries to feature films. Users can also access 81,000 streamed sound recordings through the Naxos and DRAM databases.

Cline Library has struggled to manage a cumulative \$1 million dollar reduction in its capital/acquisition budget since FY2001. Unfortunately, these budget challenges do not allow the library to allocate amounts to departments for monograph purchases. Instead, in recent years the library has made a limited number of monograph purchases focused on items that address specific course needs, and a select number of purchases based on user-driven demand that meet a set of purchase criteria. Examples include:

- *Invasive Species Management: A Handbook of Principles and Techniques* edited by Mick N. Clout and Peter A. Williams
- *Biological Diversity: Frontiers in Measurement and Assessment* edited by Anne Magurran and Brian McGill
- *Mapping Species Distributions: Spatial Inference and Prediction* by Janet Franklin
- *Conifers of the World: The Complete Reference* by James Eckenwalder
- *To Harvest, to Hunt: Stories of Resource Use in the American West* edited by Judy Li
- *Harnessing Farms and Forests in the Low-Carbon Economy: How to Create, Measure and Verify Greenhouse Gas Offsets* edited by Zach Willey and Bill Chameides

In addition, records for over 45,000 electronic book titles that are available for purchase have been loaded in the library's catalog. Users can browse and view these titles, some of which are ultimately purchased for the library's e-book collection.

During FY2011 the library received a significant boost of more than \$700,000 in one-time funding from the President and the Provost. The bulk of these funds were devoted to acquiring, providing access to and maintaining research content for students and faculty. The library purchased book and media items requested by faculty, two journal collections to reduce the need for document delivery of articles, and numerous e-book collections; we also added to our account for user-driven purchases. The library also renewed and expanded access to resources such as JSTOR and Project Muse; extended subscriptions to Films on Demand, Web of Knowledge, Dissertations and Theses Full Text and campus access to *The Chronicle of Higher Education*; and added Journal Citation Reports (JCR).

We are hopeful that future budgets and funding opportunities will bring additional opportunities to further strengthen library collections and access. In the meantime, the library has invested substantially in document delivery services staffing, tools and partnerships in order to effectively borrow or buy content on demand when the University's access to licensed and purchased content fails to meet expressed student and faculty user needs. For the 2012 fiscal year, the library filled over 28,000 requests from University users for books and articles. The library is one of 200 participants in the RAPID ILL resource sharing consortium, whose members provide scanned materials directly to users in an average 24-hour turnaround time.

In recent years, the library has focused on increasing the University's investment in subscription e-content (and leveraged funds for licensed e-content through consortium arrangements) for a net gain in quantity and quality of information available to the NAU community. The library aggressively negotiates with vendor partners to limit cost increases while balancing user needs. In 2011 the library provided users with access to JSTOR collections encompassing 900 journals. With over 120,000 uses of JSTOR during the year, the cost per use was on average only \$.02.

Users may also find Special Collections and Archives materials relevant to Forestry work. For example, the archives include the Arizona Lumber & Timber Company Collection (manuscripts), the Coconino National Forest Collection (photographs) and the African American Pioneers Collection (oral histories). Cline Library's online "Fire on the Plateau" exhibit has been integrated into a number of courses.

The Cline Library is a selective federal depository library with a selection rate of approximately 60% dating back to 1937, providing unique and primary source materials for research in topics pertinent to Forestry research. The U.S. Documents collection has extensive holdings in materials from the Bureau of Land Management, the United States Department of Agriculture, the Rocky Mountain Forest and Range Experiment Station and other pertinent federal and state agencies. The Cline Library also collects Arizona State publications.

The library continues to catalog federal documents that relate to forestry, and recently partnered with the School of Forestry to fully catalog and house many federal government documents that were formerly located in the school. The library continues to expand access to these and other federal documents that relate to the Forestry curriculum through a retrospective cataloging project.

Faculty and others across the University community collaborate with the library to critically evaluate resources of all types, ensuring that funds are focused on resources that closely align with curricular and scholarly needs and honor University priorities. Many of our resource selection decisions are additionally informed by usage metrics, such as cost per use for e-journals and circulation records for print items. The library welcomes opportunities to hear more from faculty and students about how we can best meet their needs.

In addition, the Cline Library is in the process of creating a model 50-60 seat active-learning classroom that we anticipate will be available in 2013. We hope the new space will promote faculty collaboration with our archivists and librarians, and that it will give faculty increased options for designing, using and evaluating a learning environment. We anticipate that students will appreciate a technology-enriched, highly flexible space that will be open to them outside of scheduled class times. We look forward to sharing this space with Forestry students and faculty.

For more information about the Cline Library's facilities, resources, and services, please see the library's website at [nau.edu/library](http://nau.edu/library).