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NORTHERN ARIZONA UNIVERSITY

School of Forestry

Strategic Plan

A Working Document for 1996 - 2000

COLLEGE OF ECOSYSTEM SCIENCE AND MANAGEMENT

EXECUTIVE SUMMARY

The School of Forestry is unique among this nation's 47 accredited professional forestry programs. Since 1971, NAU has been the national leader in interdisciplinary systems-oriented forestry education.

The fundamental educational mission of the School 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.

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 a transdisciplinary approach and multiple resource knowledge to ecosystem studies. In Parks and Recreation Management, we emphasize human:nature interactions.

Our scholarship mission features these integrative approaches to advance knowledge in ecosystem science and management and to bring this new knowledge back to the classroom. Our Master of Science and Doctor of Philosophy programs play a special role in carrying out our scholarship objectives.

Our mission includes the development of educational and research activities which bring Native American views to the classroom.

The strategic plan presents 9 goals which are:

To be the leading undergraduate forestry education program in North America.

To continue to be the leading Native American forestry education/research program.

Parks and Recreation will attain a national reputation with its focus on the human:nature interaction.

To increase the number of students applying for admission.

To increase the School's across campus involvement.

To continue to strengthen the School's graduate programs.

To establish a University Forest.

To be a repository of knowledge of ecosystem science and management for the Colorado Plateau.

To produce graduates with high competence in both oral and written communication skills.

The plan describes six areas of strength which are:

Ecological Restoration

Ecosystem Management Planning Systems

Forest Ecosystem Health

Integrated Undergraduate Instruction

Native American Forestry

Parks and Recreation Management

Finally the plan describes in detail mechanisms for implementing and monitoring of the plan and the School's future.

ACKNOWLEDGMENT

The School of Forestry acknowledges both the many hours of effort spent and the careful thought of the Strategic Planning Group in preparing the Plan for the School to consider and refine. The members are listed below:

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Table of Contents

EXECUTIVE SUMMARY..... I

ACKNOWLEDGMENT..... iii

SETTING.....1

 National/Professional.....1

 State/Regional.....2

 The University.....2

HISTORY OF THE SCHOOL.....3

MISSION3

SCHOOL STRENGTHS AND GOALS.....4

 Goals.....4

 Strengths.....4

 Ecological Restoration.....5

 Forest Ecosystem Health.....5

 Ecosystem Management Planning Systems.....6

 Integrated Undergraduate Instruction.....7

 Native American Forestry.....7

 Parks and Recreation.....8

UNDERGRADUATE EDUCATION - PROFESSIONAL FORESTRY DEGREE.....8

 Current status.....8

 Basic philosophy.....8

 Accreditation.....9

 Semester A.....9

 Semester B.....9

 Semester C.....9

 Connections.....10

 The Future.....11

UNDERGRADUATE EDUCATION - PARKS AND RECREATION MANAGEMENT.....11

 Current Status.....11

 Basic philosophy.....12

 Accreditation.....12

 Program Options.....12

 Connections.....12

 The Future.....14

UNDERGRADUATE EDUCATION - ENVIRONMENTAL MANAGEMENT PROGRAM ...	14
Current Status.....	14
GRADUATE EDUCATION	15
Master of Science in Forestry	15
Thesis Option	15
Non-thesis Option	15
Doctor of Philosophy in Forestry	16
Connections.....	16
The Future	17
RESEARCH.....	18
Directions	18
The Bureau of Forestry	19
Connections.....	20
The Future	20
SERVICE.....	21
NATIVE AMERICAN FORESTRY PROGRAM	22
Mission and Scope	22
Setting, Background Factors, and History	22
Undergraduate Teaching	23
Connections.....	23
Current Status.....	23
The Future	24
Graduate Programs - Native American	24
Current Status.....	24
The Future	24
Research Foci	25
Decision Support Systems	25
Ecological Restoration and Ecosystem Health	25
Human Dimensions of Ecosystem Management	25
Connections.....	26
Service.....	26
STAFFING NEEDS.....	26
Faculty.....	26
Professional Support Staff	27
Clerical Staff	28
IMPLEMENTING AND MONITORING THE PLAN	29
Implementation	29

Monitoring31
Plan Revision35

Appendices

- A. University Mission Statement
- B. Native American Forestry Program Five-Year Plan
- C. Parks and Recreation Management Five-Year Plan
- D. Procedures for Selecting New Faculty Positions
- E. Critical Issues Facing the School of Forestry
- F. Strengths/Weaknesses
- G. Additional Unprioritized Faculty Areas of Expertise
 - 1. Fire behavior and management
 - 2. Forest sociologist
 - 3. International forestry
 - 4. Landscape Architect/Environmental Psychologist
 - 5. Non-market economist
 - 6. Traditional ecological knowledge
- H. PEW Roundtable Report

SCHOOL OF FORESTRY STRATEGIC PLAN

SETTING

National/Professional

The School of Forestry at Northern Arizona University is one of 47 accredited professional forestry programs in the United States. The forestry profession, as is the case for all conservation professions, is undergoing significant change. The previous focus on management for the production of wood products has been replaced by a focus on the management for other goods and services. Most recently, the concept of multiresource management has been replaced by ecosystem management where an ecological approach that blends the needs of people and environmental values to sustain our nation's forested ecosystems is the highest priority. Since 1971, NAU has been the national leader in interdisciplinary systems oriented forestry education (see Schultz and Thompson, 1971)¹.

These changes are occurring at a time when the management of our nation's natural resources is a highly controversial and deeply polarized subject. The contentious issues of spotted owls versus old growth, level of grazing fees, reauthorization of the Endangered Species Act, and questions of development versus environmental protection serve as examples. More federal land management plans end up in litigation than do not.

This is the setting for forestry education as we end the 20th century and enter into the 21st century. Many other forestry schools and programs are also debating their future directions (Society of American Foresters 1992)².

The School of Forestry at Northern Arizona University, however, is unique and unparalleled in its approach to the teaching of forestry. The School is the only program in North America that focuses on an interdisciplinary, team-taught immersion curriculum. Our focus on the human-nature interaction in the Parks and Recreation Management major makes it unique as well.

¹Schultz, A.J. and Thompson, W.P. 1971. A new era in environmental education. American Forests. April.

²Anon. 1992. Forest Resource Management in the 21st Century: Will Forestry Education Meet the Challenge? Proceedings of a Oct. 30-Nov. 2, 1991 Symposium. Denver, CO. Society of American Foresters.

State/Region

The School of Forestry is the only accredited forestry program in the Southwest (Arizona and New Mexico and the southern half of California, Utah, and Colorado). Northern Arizona University is also geographically well suited for forestry education. The University is located in the midst of the world's largest continuous ponderosa pine forest. In addition, nowhere else in the United States do forestry students have convenient access to a wider variety of vegetation zones than in northern Arizona.

Given the uniqueness of the teaching philosophy, the location of the mountain campus, and the importance that society places on the environment, Northern Arizona University is in an extraordinary position to be the leading forestry academic institution in the West if not the entire nation.

The University

The School of Forestry is a free standing unit in a new college -- the College of Ecosystem Science and Management, formed in 1996. Unlike many forestry programs, the School of Forestry is not located at a land grant institution. This has both advantages and disadvantages. One advantage is that the School of Forestry has not historically had the strong traditional commodity based orientation associated with many schools of agriculture. This we believe was instrumental in paving the way for the School's present ecosystem sustainability approach. On the negative side, the lack of traditional agriculturally based programs such as entomology, pathology, resource economics and agricultural engineering etc., with their faculty and breadth of academic courses is a disadvantage.

The School, correctly or not, feels that there is a cross-campus perception that the School of Forestry is treated more favorably than many other programs. The new Southwest Forest Science Center appears to be a source of some consternation. We are also concerned that there is lack of understanding that our unique approach to instruction precludes teaching large numbers of undergraduates. On the other hand, the Forestry faculty uniformly believe that we have and still have a University administration who not only understand the importance of the School to the campus mission but also support it.

HISTORY OF THE SCHOOL

The forestry degree program at Northern Arizona University was initiated in 1958 as a Department of Forestry dedicated to the training of professional foresters at the bachelor of science level. Its existence as a department and later as a professional School supported the recharter of Arizona State College to Northern Arizona University in 1966. In 1972, under the leadership of Dean Charles O. Minor, an important and distinguishing change was made within the program. The faculty initiated resource integration in three intensive semesters -- A, B, and C. In these three semesters, of the junior and senior year, students are taught the concepts of ecosystem management. A program in Native American Forestry was added in 1989, and the Park and Recreation Management major joined the School in 1992. A Master of Science degree was initiated in 1969 and the Doctor of Philosophy in 1994. A separate and distinct Department of Geography and Planning joined the School in 1992, which led to the aforementioned College creation in 1996.

MISSION

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.

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 a transdisciplinary approach and multiple resource knowledge to ecosystem studies. In Parks and Recreation Management, we emphasize human:nature interactions.

Our scholarship mission features these integrative approaches to advance knowledge in ecosystem science and management and to bring this new knowledge back to the classroom. Our Master of Science in Forestry and Doctor of Philosophy programs play a special role in carrying out our scholarship objectives.

Our mission includes the development of educational and research activities which bring Native American views to the classroom.

SCHOOL GOALS AND STRENGTHS

Goals

- To be the leading undergraduate forestry education school in North America by maintaining our unique integrated undergraduate curriculum.
- To maintain our status as the leading educational/research academic institution for Native American forestry.
- To have our Parks and Recreation program attain a national reputation based on its focus on the human:nature interaction.
- To significantly increase the number of students applying for the Forestry degree program.
- To increase the School's role in across campus activities. This goal involves:
 - Teaching more non-forestry undergraduates.
 - Maintaining an active role in other graduate programs.
 - Establishing an Environmental Management emphasis within the Environmental Science Program.
- To continue to strengthen the School's graduate programs by:
 - Strengthening the Ph.D. forest management and economics emphasis area.
 - Implementing a new Master of Science graduate degree.
- To establish a University Forest for the purpose of education and research.
- Become a repository of knowledge of ecosystem science and management for the Colorado Plateau.
- To produce graduates with high competence in both oral and written communication skills.

Strengths

Through the years the School of Forestry has developed areas for which it has some measure of national recognition. These are generally areas that the School has deliberately chosen to focus its attention on and/or has concentrated resources. In addition, School faculty have identified several other areas that we believe will become areas of particular strength in the near future. We

want, however, to emphasize that the School is a richly diverse academic unit with faculty working on a wide range of subjects and problem areas. While many of these are also unique and have strength in their own right, they simply are not large enough to be listed as a School strength. Their lack of inclusion as a School strength should in no way diminish their importance to the School's overall program and reputation.

We list and describe six areas of strength as follows:

Ecological Restoration

Ecological restoration is an interdisciplinary conservation discipline, involving not only biology, but also sociology, economics, and policy. Ecological restoration is founded upon fundamental ecological and conservation principles and involves research and management actions designed to restore degraded wildlands. The School of Forestry is already recognized nationally as a leader in ecological restoration as evidenced by reviews in the Society for Ecological Restoration newsletter, and grant awards from NSF, the Department of Interior, and the USDA Forest Service. Graduate student applications in the general area of ecological restoration are steadily increasing, and undergraduates have expressed a great deal of interest in the field.

Because ecological restoration deals not only with restoring degraded ecosystems but also with developing mutually beneficial human:wildland interactions it is fundamental to ecosystem management and sustainable resource development. It seems highly probable that ecological restoration will continue to grow in importance in the conservation professions.

Forest Ecosystem Health

Ecosystem health is currently a goal of forest ecosystem management on most public and some private lands. Definition of forest health is difficult, with definitions depending on human perspective and spatial scale. Definitions of forest ecosystem health include ecosystem resilience, recurrence, persistence, and sustainability, and the production of forest conditions which directly satisfy human needs. The use of forest health as a management objective depends on defining healthy ecosystem conditions, the development of measurement indicators of those conditions, the implementation of monitoring programs, and the integration of forest ecosystem health criteria and monitoring data into forest management planning.

The NAU School of Forestry is a leader in national discussions on defining healthy ecosystem conditions. Forest health concepts are an increasingly important part of the School's curriculum at both the undergraduate and graduate levels. The School also has research and teaching expertise in many basic elements of forest ecosystem health including: wildlife behavior and habitat, soil productivity, nutrient cycling, tree physiology, abiotic environmental stress, vegetation dynamics, biodiversity, conservation biology, ecological restoration, and forest

insects. Many faculty are currently involved in forest health-related research, including several major multi-disciplinary studies funded by external grants. Active research programs that are part of this focus include: insect plant interactions, plant genetic resistance to insects, biology and ecology of insects, insects as agents of ecosystem restoration, silvicultural management of tree resistance to insects, environmental remediation, quantification of pre-settlement forest structure and composition, and effects of ecological restoration treatments on forest ecosystems. Because of the comprehensive nature of forest health, this focus includes research activities which range from local to international in scope.

Ecosystem Management Planning Systems

Ecosystem management planning system research and development entails creating complex computer models which identify alternate management paths aimed at achieving targeted forest ecosystem structures while meeting resource production goals. Alternatively the models may be employed to project the consequences of specified management regimes on future ecosystems and resource flows. They are specifically designed as decision tools which enable managers to investigate the limits and potentials of forest systems and to resolve tradeoffs among conflicting goals. Once decisions have been made, the models produce schedules which spatially and temporally identify the management activities required to systematically work toward achievement of the targeted outcomes. The primary scientific emphasis in this area is operations research and related analytical fields which provide information needed for decision-making. In addition, the research involves the design of input and output procedures which facilitate use of the systems by managers. Ecosystem health criteria, ecosystem simulation models, and other elements of the system are drawn from the research and/or expert opinions of scientists specializing in these areas.

The School has been a leader in planning system development for the past decade. TEAMS (our name for the family of planning systems developed by the School) was the first major advance in ecosystem management planning technology since FORPLAN. While other organizations have subsequently entered the area and developed related technology, we continue to be unique in two respects. First, TEAMS is the only post-FORPLAN model to have been actually used in integrated multiresource forest planning. Different hierarchical versions of the system have been developed and employed in forest-wide planning efforts by the Navajo and Menominee Indian Nations. The Menominee ecological allocation model, which incorporates major advances in planning technology, is currently being employed by the Menominee in strategic and tactical planning. Their adoption of the model is particularly noteworthy because of the prestige enjoyed by the Menominee forestry organization both in Indian Country and the profession at large. The second unique feature in our planning system is its use in education. It serves as the primary instructional and analytical tool in Semester C and has been central to the thesis and dissertation research of several graduate students. Our involvement in real planning efforts has enabled us not only to provide students with state-of-the-art models but also to make planning exercises more realistic.

Integrated Undergraduate Instruction

In the School of Forestry's professional program, undergraduate students take 3 sequential semesters (48 units total) of integrated, immersion, and team-taught instruction. Students learn to understand forest ecosystems in the fall semester of their junior year, the emphasis shifts to management practices and human values of wildlands in the spring semester. In the capstone course (fall of senior year), students collect resource data on a large forest area, use a computer-aided decision support system to develop a management plan for that land, and write a report that comprehensively describes and analyzes how various management alternatives can meet multiple and often conflicting goals. Throughout these 48 units, the instruction integrates across disciplines and across resources.

Our integrated undergraduate teaching insures that our forestry professionals are trained as managers of wildlands, not as producers of narrowly defined commodities. NAU's Forestry Program not only pioneered this approach but is widely recognized as a leader in interdisciplinary teaching. In November 1995, the *High Country News* special issue on "Seeing the forest and the trees" praised NAU's Forestry program "not only because it has plotted the cleanest straightest path toward a new kind of forestry, but also because for years it has encouraged the interdisciplinary thinking needed for scientists to solve real problems."

Native American Forestry

The mission of the Native American Forestry Program is to develop educational and research activities which support Native American tribes in achieving self-determination in the management of their forest ecosystems. Because of the respect for nature held by most Native societies, and because of the closeness of their governments to their publics, this mission has several immediate consequences. Respect for nature means taking ecosystem connections seriously, based on a sense of community with all living beings: ecosystem health is community health; humans cannot feel healthy if their ecosystem is not healthy. Respect for nature means concern for the legacy left for future generations, as far as seven generations from now. This provides a definition of sustainable use of forest ecosystems. Respect means being careful in all management actions.

Our curriculum appeals to native students because it addresses the concerns that arise from respecting nature. Working with tribal leaders on forest ecosystem management means working in a political system with close connections between the people owning and using the forest and those managing it. Ecosystem managers of reservation forests need skills in public communication, coalition building, conflict resolution, and participatory planning. As public managers, they need to understand budgeting, environmental law, and the dynamics of the

federal-Indian relationship. Development of a focus on Native American forestry means supporting empowerment of ecosystem management from a native perspective.

Research with native communities is collaborative, with the communities defining their priorities and needs. The role of faculty and their students in carrying out research is to apply the standards and techniques of the academic community to answering the questions posed by the native community. Collaborative research involves dual consent: consent of the native community on the selection of projects and the eventual publication of the results; and consent of the academic community regarding project feasibility and likelihood of research success.

With a staff of two people, the Native American Forestry Program has achieved increases in student enrollment and graduation, with the average number of Native Americans receiving B.S. degrees being five per year for the last three years. Although the University of Oregon and Colorado State University have support programs, only the University of British Columbia has created a broad program such as ours, beginning in 1995. Our program was the first of its kind in North America and NAU can maintain that leadership position if we take action to do so.

Parks and Recreation Management

American views toward recreation and leisure are changing. Rather than being viewed simply as entertainment, recreation and leisure pursuits are now seen as providing significant and needed benefit to human lives. Recreation, whether in wildland settings or in human communities, whether for commercial aims or not for profit, can be a vehicle for enhancing individual well-being, strengthening community social and economic stability, and protecting the natural environment. Parks and recreation management practitioners and researchers seek to understand, document, plan for, and provide opportunities for such benefits to be realized.

Parks and recreation management is an emerging area of strength within the School of Forestry. This emergence is reflective of changing societal values in resource management, which place increasing emphasis upon amenity values such as recreation and scenic beauty. As an integral part of the School's intensifying focus on ecosystem-level processes and issues, parks and recreation management is uniquely poised to bring to bear the range of social theory and research methods upon looming questions about the role of human dimensions in ecosystem function and management. An active faculty research program provides vital support to this emerging area through broad-ranging efforts to document the benefits of recreation, integrate human dimensions into ecosystem management, and model regional recreation supply and demand.

UNDERGRADUATE EDUCATION--THE PROFESSIONAL FORESTRY DEGREE

Current Status

Basic Philosophy. As noted earlier, the underlying educational philosophy is integrated instruction of students in ecosystem management. This includes a team-teaching total-immersion approach for each professional forestry semester. By complete immersion, we mean that our students will only take forestry courses (a block) excluding taking other subjects in the three semester professional forestry sequence. In contrast, most of the freshman and sophomore years as well as the final semester of the senior year are devoted to course work in other departments.

By the nature of this philosophy and approach, the Forestry program offers neither any options in the forestry major nor a minor.

The manner in which the curriculum is reviewed and changed is another important aspect of our teaching philosophy. The Forestry faculty have adopted an "adaptive curricular design" approach. The subject matter to be covered and the nature of integrative teaching is continuously under review. While Semesters A, B, and C are each under the overall coordination of a single faculty member, the faculty involved each semester are expected to meet frequently to discuss and review both the curriculum and the students' progress and to make adjustments as warranted.

Accreditation. The undergraduate major in Forestry is accredited by the Society of American Foresters (SAF). This 18,000 member professional organization is the only forestry accrediting body in the United States. The School of Forestry was initially accredited in 1968. The School underwent its last on-site review in 1992 and was again accredited for another 10-year period. The accreditation process requires that each school notify the Society of any substantive changes when curricula are altered and that an interim 5-year status report be prepared five years after an on-site visit.

Semester A - FOR 311 (16 credits). Semester A is the first semester in the three-semester sequence of professional instruction and is offered only in the fall semester, inasmuch as it is highly oriented toward field instruction until the middle of November. This is the "practical" semester, and covers basic forestry principles and techniques in ecology, plant identification, silvics, and silviculture, forest measurements, soils, and protection. A grade of C or better or approval of the School of Forestry faculty is required for progression to FOR 312.

Semester B - FOR 312 (16 credits). Semester B is offered only in the spring semester, and presents topics in multiresource management, economics, decision theory, and resource simulation, as well as management principles for timber, range, recreation, wildlife, and watershed resources. Again, a grade of C or better or approval of the forestry faculty is required for advancement to the next professional semester.

Semester C - FOR 421 (16 credits). Semester C, scheduled only in the fall semester, is a writing-intensive "capstone" course. It is designed to allow the students to integrate the technical aspects of forestry presented in FOR 311 with the ecosystem management principles, economics, and decision theory contained in FOR 312, while also expanding on these areas of knowledge. This objective is accomplished through individual student investigation of a realistic ecosystem management situation.

The first five weeks are devoted to field inventory and analysis, and identifying problems on a field laboratory site south of Flagstaff. The class performs these tasks as small crews on a designated portion of the area. The students then compile and individually analyze these data and prepare a professional report based on the parameters assigned to the project for that year. The report presents and justifies recommendations for managing the property for multiple goals utilizing ecosystem management principles. Intensive advice and guidance is given by the Forest Science - C faculty, both in the classroom addressing class assignments and standards and to the individual student as requested for clarification of specific problems.

The reports are submitted for grading three weeks before the end of the semester. Each report is read and graded by a minimum of two Forest Science C faculty; during this period the students investigate the policy and legal implications and procedures associated with implementing their recommendations on forest lands.

Semester A and B underwent a comprehensive review and were substantially redesigned last year as a result of this approach. The principal goals of the evaluation were to examine the effectiveness of the integrated approach. Both committees independently reaffirmed the importance of the team-taught integrated curriculum and modified the courses to improve the effectiveness of the team taught approach by strengthening the integrated systems orientation in the course. The systems approach culminates in a final capstone week in each semester. Semester C has received an annual evaluation and has been changed every year to adapt to changing student populations and an increased emphasis on ecosystem management.

Connections

The professional nature and unique mode of instruction for the Forestry major limits across-campus student access to Forestry 311, 312, and 421. However, other forestry courses are frequently taken by non-forestry majors. These include FOR 101-Forestry Introduction and FOR 250-Arizona Forest and Wildlife. FOR 322 - Environmental Conservation is the program's sole Liberal Studies offering. FOR 403, 404, and 405, Project Learning Tree, Project Wild, and Project Wild Aquatic, are extremely popular one-credit courses frequently taken by education students.

In addition to general student interest, some Forestry courses should be of particular interest to Environmental Science and the proposed Environmental Management program.

We believe that the School of Forestry could attract significant undergraduate FTE credit if that ever became necessary. It would come, however, at a high cost to the existing unique mode of teaching professional forestry.

We are pleased to be able to say that the School of Forestry and the Department of Geography and Public Planning are successfully joint teaching. Geography and Public Planning faculty currently teach a section of FOR 322 - Environmental Conservation, both Fall and Spring semesters. Faculty members from the two academic units teach FOR 525 - Geographic Information Systems, each program on an alternate year basis. The School of Forestry takes pride in this across-department cooperation.

The Future

The School of Forestry proposes giving careful consideration to developing a "4th" semester as part of the accredited forestry degree. In this final semester, students with the guidance of their advisor would define an emphasis area in which to add specialization. This might include public administration, wildlife, tribal resource management, restoration ecology, and recreation, to name a few. This could make our students even more attractive to prospective employers and add to their competitive edge should they desire to pursue a graduate degree. The 12-credit upper division liberal studies University requirement is, however, a major impediment to this concept.

UNDERGRADUATE EDUCATION--PARKS AND RECREATION MANAGEMENT PROGRAM

Current Status

The Parks and Recreation Management Program joined the School of Forestry in 1992. At that time Dean Garrett formed a committee to develop a 5-year plan for the program. The 5-year program plan was completed and approved by the School of Forestry faculty in spring 1993. (A copy of the plan is included in Appendix C.

The 5-year plan included a name change to Parks and Recreation Management (PRM) (formerly Recreation and Leisure Services) along with significant curriculum changes to accommodate its new home in the School of Forestry. Those changes were approved by School of Forestry and NAU curriculum committees in early 1995 and by the Arizona Board of Regents in May 1995. Changes in the PRM program are expected to continue as PRM refines its academic programs and defines its place in ever-more integrated School of Forestry and College of Ecosystem Science and Management programs.

Basic philosophy. The PRM program's mission centers on providing high quality educational opportunities for students in the areas of community/commercial recreation, outdoor/environmental leadership, and forest recreation management. Underlying these three emphasis areas is the personal interest and commitment among PRM faculty to make students aware of the importance of the natural environment in parks and recreation management. Understanding the relationships between humans and nature is a key component of the PRM program, as many of the personal and societal benefits of recreation and leisure are facilitated through nature and natural settings. We will continue to stress the vital role of nature and its conservation as part of the PRM curriculum.

Accreditation. NAU's PRM program was designed with the possibility of accreditation through the National Recreation and Park Association (NRPA), the professional organization authorized to accredit park and recreation programs in institutions of higher education. The prospect of accreditation with NRPA, including the advantages and disadvantages of accreditation, were discussed by PRM faculty and are presented in the 5-year plan.

The PRM faculty decided to pursue accreditation and the application process has been initiated. The goal is to have the program accredited by Fall 1997.

Program Options. The PRM program has undergone considerable philosophical and programmatic change since coming to the School of Forestry. A belief in the vital role of nature and its conservation are strongly evident in the revised PRM program. The management of recreation, whether in wildland settings or in human communities, whether for commercial aims or not for profit, can often best be done by keeping nature as the central focus or theme.

The PRM program has a 27-hour core course program, including a 12 hour internship, that all PRM students must take. The core is divided into lower and upper division courses that are designed to conceptually build upon one another. In addition to the PRM core, students elect to specialize in one of three emphasis areas: 1) community/commercial recreation; 2) outdoor/environmental leadership; or 3) forest recreation management (see Appendix C for emphasis area requirements). Students have a fourth option to design and pursue an individualized recreation program subject to approval of at least three recreation faculty.

PRM also offers a 21-hour minor for students in other programs who wish to minor in PRM.

Connections

In Forestry and Across Campus. The PRM undergraduate curriculum was designed to take advantage of course offerings in the School of Forestry as well as across the NAU campus. Students in the forest recreation emphasis area must take FOR 311 (Semester A) along with

elective courses from forestry, political science, geography, and anthropology. The outdoor/environmental leadership emphasis area includes elective courses in forestry, environmental science, geography, and political science. Community/commercial recreation students must select from courses in political science, planning, hotel/restaurant management, and geography.

Students from other majors routinely take PRM courses in program planning (PRM 374), research methods (PRM 447), and interpretation (PRM 360). Between 5 and 10% of the students in these courses, on average, are non-majors.

The PRM student organization (R.E.A.L. Association) is active in university and community projects such as homecoming and recycling efforts. The club also periodically sponsors on-campus workshops and meetings on relevant parks and recreation management issues.

Regional. Important connections with regional professionals in the PRM field are fostered and strengthened through the student internship program. All PRM students are required to take a 12 hour internship to gain work experience in the PRM field. Faculty work closely with employers in the public and private sectors to design and provide meaningful work experiences for PRM students and internships often result in permanent jobs for students. This close contact with recreation providers throughout the region helps keep faculty apprised of current happenings, needed employee skills, and job opportunities in the PRM field.

PRM, in cooperation with the Arizona Park and Recreation Association, worked to establish the Arizona Rural and Tribal Recreation Project to be housed in PRM at NAU. The goal of this project is to provide recreational development assistance to Arizona's rural communities. The new hire in community/commercial recreation is expected to assume a lead role in this project.

PRM faculty frequently invite public and private recreation providers to give guest lectures and host field trips for on-site learning opportunities.

Professional. PRM faculty are active in their profession. They attend local, regional, and national meetings of the parks and recreation profession. Each year PRM hosts a district conference of the Arizona Parks and Recreation Association at the NAU campus. Faculty also attend and participate in professional meetings of forestry and natural resource professionals.

Research interests among PRM faculty are multi-disciplinary and reach beyond parks and recreation management to include broader issues related to humans and the natural environment. Faculty are doing research for a variety of clients across the Colorado Plateau including the U.S. Forest Service, Bureau of Land Management, National Park Service, National Biological Service, and Arizona State Parks. PRM faculty also regularly conduct research and publish jointly with scientists at other institutions.

The Future

The PRM 5-year plan includes three specific recommendations for future direction of the PRM program:

1. Do a 5-year evaluation of the PRM program in 2000 to look at the new undergraduate program implemented in Fall 1995;
2. Move to have the PRM program accredited by NRPA (discussed above); and
3. Strengthen the community/commercial emphasis area by hiring a tenure-track faculty to teach and do research in this area. This would lessen the need to rely on part-time faculty and strengthen the undergraduate and graduate course offerings in PRM and the School of Forestry. The role of recreation in rural settings is expected to be a focus of this emphasis area as it is throughout the PRM program.

PRM will continue to emphasize the human-nature connections in the PRM curriculum and look for ways to increase that contribution to the School of Forestry and the College. This includes the potential of offering a new Forestry and PRM team-taught undergraduate course, "Humans and Nature," that introduces students to concepts related to the human-nature relationship. PRM initiated a course in Environmental Leadership in spring 1995. This course is intended to serve the college.

PRM faculty are beginning to work with Native American tribes to develop rural recreation program to provide activities that benefit tribal youth.

The issue of PRM moving from a program to departmental status was raised and discussed as part of the 5-year planning process. To capitalize upon existing interdisciplinary synergisms the PRM program intends to remain within the School of Forestry. There is no plan now or in the foreseeable future for the PRM program to move to become a department.

UNDERGRADUATE EDUCATION - ENVIRONMENTAL MANAGEMENT PROGRAM

Current Status

Dean Patton appointed a committee, Spring semester 1995, to review the possibilities for cooperation in an undergraduate major in environmental management between Environmental Sciences and the College. That committee now has a draft document in review for a proposed new major.

The School's basic philosophy with this major is to open the expertise of our faculty to other students and degree programs. We strongly believe that there will be a strong student interest in such an interdisciplinary major.

GRADUATE EDUCATION

The underlying philosophy of the School's graduate programs is to prepare students for public or private resource management or a related career in research and education. The emphasis is on the problems and opportunities associated with integrated multiresource management of forest ecosystems.

The School's graduate programs are greatly enhanced by our excellent ecological and computer laboratories, and a small full-time staff of research professionals. Our teaching programs are further strengthened by the presence of a U.S. Forest Service Rocky Mountain Forest and Range Experiment Station research unit also located in the Southwest Forest Science Complex, and the USDI Colorado Plateau Research Station located on the Northern Arizona University Campus.

Master of Science in Forestry

Non-thesis option

This is a terminal degree with the goal of preparing individuals for careers as land managers in contrast to careers in research or education. It was designed to accommodate both recent graduates and practicing professionals with career interests in ecosystem management and who wish to increase their effectiveness in dealing with ecosystem problems. The non-thesis degree incorporates multiresource concepts, analytical tools, and communication skills. The program emphasizes rigorous analysis of forest ecosystem problems and opportunities. This degree normally requires two calendar years of academic work. In addition to regular course work, students are required to prepare and orally present a professional paper on a subject related to forest ecosystem management.

Thesis option

This traditional thesis option is an individually tailored program of study requiring two calendar years of academic work. It is designed to give students experience in carrying out the kind of research they desire to do in their professional careers. For the thesis, students are expected to demonstrate their ability to work independently on a problem, their wide familiarity with the literature in their field, and their command of the techniques and principles of research. Another objective is to have students develop the ability to form valid generalizations from data. In addition to a written thesis, students must pass a final oral defense of their thesis.

The Doctor of Philosophy in Forestry

This is the terminal degree in the profession of forestry. Its goal is to prepare individuals for a career in research and/or education. The Ph.D. program has three emphasis areas: ecosystem science, forest management sciences and economics, and forest social science. Students are expected to demonstrate their skill in generating original ideas, a considerable command of the scientific literature, and skill at designing, analyzing, and interpreting research. Students must also have skill in scientific writing, including publication of research results in major professional journals and to have basic skills in teaching. Candidates are expected to be self-motivated and to largely direct their own research program with the advice and counsel of the major professor and dissertation committee. The goal of the dissertation is the generation of new knowledge. The program includes both comprehensive written and oral examinations designed to establish an individual's breadth and depth of subjects within the larger field of forestry. Students must also demonstrate reading competency in a foreign language.

Connections

Our graduate programs have maintained cooperative working relations with institutions from the local to the international level. We will continue to strengthen existing relations and develop new ones as appropriate.

At the College and University level, our graduate courses provide support for other academic units. We have strong relationships with Biology, Sociology, Political Science, Public Administration, Geography, and Mathematics. The School offers a graduate level sampling course (STA 575) through the Mathematics department, and is exploring the appointment of the instructor to adjunct status in Mathematics. We will continue to support Mathematics in the appointment of a faculty member with a specialty in Operations Research, and work towards establishing a means for providing statistical consulting services by Mathematics for our graduate students. The School is currently offering two graduate level economics courses that are designed to attract and serve the needs of Political Science and Public Administration graduate students. Several of our policy and recreation graduate courses also serve the needs of Political Science and Public Administration graduate students. Most of our graduate courses in ecosystem science serve needs of graduate students in biology. We will continue to strive to develop graduate courses that reach out to other academic units, while serving the needs of our students and non-degree seeking professionals. This course development approach recognizes that in addition to serving other programs, attracting a disciplinary diverse group of students improves graduate courses for our students. Our working relationships within our College is evidenced by the teaching of Forestry courses by Geography faculty, the team teaching of Research Methods which serves both programs, and the cross support of graduate students in both Forestry and

Geography with funding and serving on thesis committees. We will continue to cooperate on the development of courses that serve both programs.

At the national and regional levels, we have developed a cooperative relationship with the USDA Forest Service and the Colorado Plateau Center. Having the Rocky Mountain Forest and Range Experiment Station (RMS) housed in the same building as the School has facilitated active participation of RMS scientists in our graduate programs. These scientists have provided graduate support and have served on thesis committees. We will continue to work to expand the participation of these scientists in the support of our graduate programs.

At the international level, we have established a cooperative relationship with the University of Sao Paulo - Piracicaba. One of the faculty at University of Sao Paulo has been appointed Adjunct Professor at the School, and similar status is being pursued by one of our faculty. We have maintained strong ties with the international community through graduate student recruitment and the operation of a Peace Corp's office within the School. The office has been managed by a funded graduate student whom has served in the Peace Corp.

The Future

Our graduate programs are reviewed on a regular basis to ensure that they are fulfilling the mission of the School. Continuing review occurs in the Graduate Studies Committee; and comprehensive review occurs through committees formed for said purpose.

In the Master's program there are two areas which will undergo comprehensive review in the next two years: the Master of Science in Forestry (non-thesis option) and the offering of a new Master of Science program in the School. The non-thesis option will be evaluated for conversion into a Masters of Forestry (MF) degree. The second review will examine the option of expanding our program to include a Master of Science in addition to the Master of Science in Forestry. The Master of Science would not be a pure forestry degree, and would allow increased flexibility for those students who wish to specialize in a forestry related discipline. The degree program could also serve as the Master's program for the Parks and Recreation Management Program and the proposed Environmental Management Program as these areas develop.

We will continue the implementation and strengthening of our Ph.D. program. Several new courses are being developed to expand the offerings in core and breadth requirements. In the biology area, courses are being developed in Ecological Restoration, Conservation Biology, Ecosystem Science and Management, and Landscape Ecology. Courses in Ecological Economics, Special Topics in Parks and Recreation Management, Parks and Recreation Management Systems, Wildlife Population Ecology, and International Forestry are being developed. The School will continue cooperating with other academic units on the development of campus expertise in Operations Research and Economics. The strengthening of these areas on campus is essential to the success of the forest management sciences and economics emphasis

areas of our Ph.D. program. We have received permission from Provost Connell to begin the process of developing the capability to receive and offer graduate level courses through Interactive Instructional Television (IITV) to strengthen our Ph.D. Program. The courses under consideration for IITV include Resource Economics I and II from University of Arizona (UA AEC 576 and 577) and International Trade Theory from Arizona State University (ASU ENC 536). Over the next two years we plan to bring the concept of IITV course offerings to fruition.

RESEARCH

Directions

The faculty research program of the School of Forestry strongly supports the mission in both undergraduate and graduate education, and in interdisciplinary, team-conducted research focused on ecosystem management. The research mission of the School is to improve understanding of natural ecosystems and the practice of forestry and park and recreation management, broadly defined. Forest ecosystems include biological, physical, social, and political components. The focus of scholarly endeavor within the School of Forestry may be on one or more of these components or on the interaction between and among the components. Much research within the School is designed to produce results that can be quickly brought into the classroom. Also, in accordance with the overall mission of the University, forestry and parks and recreation management research at NAU tends to emphasize the Colorado Plateau region and rural Arizona. In particular, research activities supporting university-wide objectives such as contributing to the education and development of Native Americans is encouraged. The general focus is not intended to restrict faculty members from pursuing a wide range of research interests that will contribute to an improved understanding of forest ecosystems and the practice of forestry, either within or outside the Southwest. In the broadest terms, research activities within the School should emphasize the faculty role as a reservoir of expertise for the citizens of Arizona and the world.

The School identified six mission research objectives for the period 1990-1995. These are:

1. Ecosystem processes
2. Resource function and linkages
3. Ecosystem linkages and interactions
4. Social-political-technological research
5. Incorporating economics and social information in decision analysis
6. Integrating Native American values with the current technology of ecosystem management

The School's research activities are guided by a faculty committee. The Mission Research Board is responsible for recommending to the Chair the approval of proposals and the allocation of

Mission Research funds and research staff support according to policy, and for proposing Mission Research direction.

The School of Forestry research program is obviously strengthened and enhanced by having a strong graduate program. In Fall Semester 1995, there were 41 students pursuing Master of Science in Forestry degrees and 12 Doctor of Philosophy graduate students.

Bureau of Forestry

In the late 1960's the president of Northern Arizona University created four research divisions on the campus. One of these divisions was the Bureau of Forestry Research. In keeping with the integrated approach to undergraduate education, the School in 1985 developed an integrated, interdisciplinary research and development program in ecosystem management. At that same time, major state funding increases were secured from the Arizona state legislature for implementation of the new ecosystem research and graduate academic efforts under the Bureau of Forestry Research. The level of funding in FY 1995 slightly exceeds \$180,000.

The Bureau of Forestry was again reviewed in 1991 and was reauthorized for continuation. The specific research objectives of the Bureau as summarized in the 1991 Sunset Review are:

1. Study ecosystem processes necessary to develop response functions for important forest biota and resources.
2. Establish linkages among resources and response functions to determine important resource interactions.
3. Develop multiresource interrelationships through systems analysis and simulation.
4. Investigate changing social attitudes and economic values regarding forestry and forest management, including economic tradeoffs inherent in multiresource forest management.
5. Develop decision support system models that assess long term trends in forest ecosystem structure as well as economic supply and demand for forest resource outputs.
6. Develop an understanding of the role and value of Native American philosophies and knowledge of natural resources for improved forest management science.

The allocation of funding under the Bureau of Forestry is decided by the Chair after considering recommendations from the School's Mission Research Board. Proposals may be submitted to the Mission Research Board on the initiative of individual faculty members or teams, or the Board may periodically circulate requests for proposals which identify specific areas of research, and

with concurrence of the Chair, need to be addressed in order to maximize progress on ecosystem management.

In academic year 1995/96, the Bureau of Forestry funded 7 Master of Science students with stipends of \$10,500; each with an additional \$3,500 in research support funds.

Connections

The School has strong research linkages with business administration, mathematics, chemistry, biology, geology, engineering, computer sciences, and social sciences. Faculty from these other University departments serve as co-investigators on research projects and on graduate student committees. The presence of a USDA Forest Service Rocky Mountain Experiment Station research unit in the Southwest Forest Science Complex is also a strong asset.

The School's research program is funded by a wide variety of federal and private land management and conservation agencies/organizations/companies. Funds are routinely obtained by organizations such as the U.S. Forest Service, Park Service, Bureau of Land Management, Environmental Protection Agency, National Biological Survey, International Tropical Timber Organization Project, U.S. Fish and Wildlife Service, Stone Container, and the National Science Foundation. Annual extramural funding normally exceeds \$1,000,000.

As is the case for teaching, the School has unusually strong research ties with the Department of Geography and Public Planning.

The Future

We strongly believe that the research function of the School of Forestry will continue to grow and gain in national stature. The unique focus on ecosystems, excellent facilities in the Southwest Forest Science Complex and strong connections with state-private-federal land/resource management agencies and organizations form an extremely strong foundation to build upon. The School needs, however, to be alert to continued decreases in federal research monies and increased emphasis on targeted research program areas. Both potentially could seriously and negatively impact research in the long term.

SERVICE

By Service, the School of Forestry refers exclusively to work that draws upon one's professional expertise and is an outgrowth of one's academic discipline. We expect that service will do one or more of the following:

1. Train others in the discipline or area of expertise.
2. Aggregate and interpret knowledge so as to make it understandable and useful.
3. Disseminate the knowledge to the appropriate user or audience.
4. Create new knowledge.

The School of Forestry does not have the formal extension or continuing education role that many land-grant institutions have. The School, however, does provide continuing education through workshops and short courses. For example the School has sponsored for more than ten years, jointly with Utah State University and Colorado State University, a silviculture short course for practicing forestry professionals. Three weeks of the ten-week silviculturist certification are held biannually at the School.

As part of our public service role, the management tools and techniques developed through our research are demonstrated and utilized in workshops and short courses. They are also made available to ecosystem managers, most often through cooperative research projects with managing agencies where, for example, managers provide data and expertise to develop and refine management decision models, thereby learning to utilize analytical tools and procedures. The School's on-going project with the Menominee Tribal Enterprises on an ecological allocation model serves as one example. The highly successful conference on "Adaptive Ecosystem Restoration and Management" held at Northern Arizona University June 6-8, 1995 is another example.

The School's faculty provide another important professional service that is often not fully recognized. Faculty are frequently sought to assist federal land management agencies in assessing aspects of, or assisting in the preparation, of management plans for public lands. For example faculty were funded by the U.S. Forest Service for a study "Assessing racial and ethnic minority use on the Tonto National Forest." This same agency also funded a study on visitor use on the Kaibab National Forest. This work is often instrumental in plotting the future for our region's and nation's public lands.

NATIVE AMERICAN FORESTRY PROGRAM

Mission and Scope

The program develops educational and research activities which support Native American tribes in achieving self-determination in the management of their forest ecosystems.

Because native world views support ecosystem management, this mission is an integral part of the overall mission of the School of Forestry.

Setting, Background Factors, and History

Tribes are increasing their control of forestry programs. As they do so, some tribes are consolidating all natural resource activities into a single interdisciplinary department; for example, the San Carlos and Navajo Tribes. Others have kept forestry departments separate, such as the Salish and Kootenai and the Menominee.

One might anticipate that tribes will increasingly insist on close cooperation among the divisions that they inherit from the BIA, EPA, and so forth, because tribal leaders recognize ecosystem connections. But the inherited independent (hence, rivalry-inducing) structures are supported by federal policy and will probably survive.

The federal government currently is reducing funding, and is not as a consequence appropriating funds for the "National Indian Forest Resources Management Act." This act included a provision for supporting education which figured in the Native American Forestry Program strategy. The NSF funding for the undergraduate support program will probably end August 31, 1996. Chris Atine's Native American Forestry Program Advocate salary is being supported at \$12,000 NSF and \$20,000 School of Forestry funds at the present time.

Our achievement of moderately high levels of graduation of Native students has improved our reputation with tribes. We have shown the ability to meet our main mission, education.

We have developed good working relationships with the following tribes on many separate areas of research which are currently in process or under development:

Menominee:	Application of TEAMS
San Carlos:	Ecological Restoration (several projects)
Colville:	Ecological Restoration
Navajo:	Value Orientations

These current projects are but a small portion of the total amount of research that has been completed for Indian tribes over the last twenty years at Northern Arizona University. There is a

good possibility that the success of TEAMS at Menominee will interest other tribes in using TEAMS for their long-term vegetation management plans.

The long-term political consequences of BIA domination of tribal forest management must be recognized. Because the BIA used "professional judgement" as a justification for their management decisions, many of which caused changes in reservation forests that were not consistent with tribal values, there is a deep distrust of both professional forestry and of science among tribes. In addition, because some university-based forestry professionals agreed with the outlook of the BIA, university-based science is also viewed with skepticism. As a consequence, we in universities cannot expect to receive "trust" from tribes anytime soon. The political reality is that we must be very careful in obtaining tribal consent to research projects, and in communicating well with tribes regarding the purposes and nature of scientific research conducted on their lands and forests.

Undergraduate Teaching

The Native American program is not parallel to the other listed undergraduate programs, in that there is no curriculum or degree. Nor is it aiming in that direction. The desire, which corresponds to tribal desires, is for Native students to receive the same degree as all other forestry students receive.

Current Status

The Semester A, B, C system has worked well with native students.

The use of a student advocate has shown itself to be a key part of retaining native students. All faculty members have communicated quickly and well with the advocate in addressing student problems when they arise. An issue is full utilization of the position--(see Connections section). The student advocate has administered a program of hiring tutors as needed and as available for Native American undergraduates. We have developed an excellent network of Native American mentors for our students. Most of the mentors are graduates of NAU, and include all of our Native American graduate students.

The program had a series of lectures on Native culture and learning styles in 1990-91; it may be time to repeat the series or to address the issue in another format, given changes in the current composition of faculty.

Connections

The idea of environmental management as an undergraduate option is appealing. Interest among native students could be high for this major. The College of Engineering has an "Institute for Tribal Environmental Professionals" which runs training courses on EPA topics, and which could

be connected to undergraduate training. The EPA has been active in recognizing tribal sovereignty.

The Future

The addition of an emphasis area or focus or Semester D is a good idea. One such area could be Native American perspectives. There are appropriate courses in other departments, and we could add a course, "Multicultural Perspectives on Ecosystem Management." Such an emphasis area should be shown on transcripts, but there is no need for a separate degree.

The possibility of filling all of the tribal forestry positions in Arizona-New Mexico tribes has to be faced. It has occurred for the Navajo Tribe, where there are more trained foresters than positions. It is a long way off at White Mountain. It will occur soon at San Carlos and other smaller tribal departments. There are many non-forestry positions, however, that could well be filled by our graduates, given the integrated nature of our curriculum. We need to address "marketing" issues in accurately describing what our training provides.

Graduate Programs - Native American

Current Status

As with the undergraduate program, all Native Americans meet the same professional requirements as other students. The Native American Program supports students; it does not have a separate curriculum. We currently have had a total of six Native Americans enrolled as graduate students. Two have completed their M.S. degrees. One, a student at the University of Idaho, has nearly completed her thesis. Another, Victoria Yazzie, is also close to completion.

These students have been jointly funded by the Ford Foundation and by other sources, primarily Mission Research matches to the Ford monies. Tribes have also supported the students, through cooperative programs, direct salary support, and in-kind support.

The Future

The Ford Foundation has indicated continued support for our graduate program, as long as there is a match from Tribes and from NAU. We need to negotiate the arrangement for future students in the current grant application.

Enrollment of one or more Native Americans as candidates for a Ph.D. should be a goal.

Research Foci

Decision Support Systems

The Menominee Tribe has proved to be the ideal client for TEAMS. Building on our success there, which should be clear in about 6-12 months, we may have the opportunity to expand generally our decision support work. One good option is to expand the menu of models from the current versions of TEAMS to others that members of the faculty like and would be willing to utilize with tribes that are interested. We are including further work with Menominee in our application to the Ford Foundation this fall.

Although the decision support system constructed for the Navajo was not completed, due to a change in administration at the Navajo Forestry Department, we intend to keep the system available as one of the ways to approach an even-aged planning program. P.J. Daugherty, forestry faculty member, and a graduate student are nearing completion of a study of value orientations in relation to the Navajo planning effort that will provide useful insights into our relationship with the Navajo Nation.

Ecological Restoration and Forest Health

We are building a relationship with the San Carlos Tribe, based primarily on the good experiences their graduates had when at NAU. In November 1995 we sent a proposal to the Ford Foundation requesting support for two or more projects to be carried out by Native American master's students. These are a study to be directed by Assistant Professor Thomas Kolb on oak regeneration and establishment, and a study with Professor Maratha Lee on recreation opportunity spectrum.

Other projects in the talking stage are not precluded, namely studies on the effect of fire on forest understory and mountain meadow restoration.

Human Dimensions of Ecosystem Management

Since Native American world views are known for not drawing a sharp distinction between man and the natural world, it should be expected that the Native American program could contribute in the area of human-nature interactions. We have not realized this possibility as yet in our research program. One or more of the San Carlos projects may address this.

Professor Trospen's Pew grant will support research on the connections between traditional native institutions and sound ecosystem management. His starting point was covered in the lecture on the Kwakiutl potlatch last spring.

Connections

Several other subject areas are potentially relevant to ours: cultural geography, public planning, economics, anthropology.

Service

The Native American Forestry Program has an active service component. For example, the Director of the program has served on the planning committee of the National Indian Policy Center, including a one-year leave of absence from NAU in order to serve as Acting Director of the Center.

Also, the Director and other members of the faculty have participated in annual symposia of the Intertribal Timber Council, as panel participants and as full-session speakers. Our Dean served on the Indian Forest Management Assessment Team, which completed an important national study of management on reservations.

Because our TEAMS decision support system has been designed for application, the program of development of TEAMS has supported both the Navajo and Menominee Tribes in their consideration of long-term ecosystem management policy.

STAFFING NEEDS

Faculty/Teaching

The School of Forestry faculty have been reviewing future faculty and other staff needs since the Faculty retreat in late August 1995. Early in the Semester the Faculty made several critical decisions regarding hiring priorities. The first of these was that the School's highest priority was in the area of *Silviculture*; and the Faculty charged the Chair with proceeding to fill this position as soon as possible. This position was rated as the highest priority for two principal reasons. The first is because of its centrality in forestry education. Forestry simply could not be taught without this subject matter. Second, the School's two faculty members with extensive training and experience in the silviculture area both will have retired after the 1995/96 academic year. If this position were not filled by that time the School would have a significant void in its teaching and research capabilities.

The second important decision made by the faculty was to establish a Planning Group charging it with preparing a five-year plan for the future. This was to include a staffing plan. The Strategic Planning Group began its deliberation by considering the immediate teaching needs of the School; that is, needs in addition to the silviculture position discussed above.

These deliberations led the Faculty to unanimously recommend that new faculty and staff be hired in the following three critical areas:

1. *Community/Commercial Recreation*
2. *Wildlife Habitat Management*
3. *Research Specialist*

These three positions all fill important and immediate roles in teaching portions of the professional forestry degree, i.e., Semesters A, B, and C. Separate justifications for each have been prepared by the School's Chair and are included with the position description/request for each.

Filling of these positions would still leave the School with sufficient funds to hire an additional two faculty positions. Having responded to the immediate short-term teaching needs, the faculty saw these positions as opportunities to creatively build upon the future.

It became clear, however, during these discussions that the School needed a set of criteria and procedures to assist in both identifying future faculty needs and then prioritizing these needs. These were established and a set of criteria to be used in evaluating individual faculty positions and procedures for prioritizing new positions are given in Appendix D. Both were approved by the Faculty as a whole.

Using the process just described, the School of Forestry Faculty identified and then prioritized an additional six faculty needs. Three more positions were identified as future needs that should not be considered for filling at this particular time. Two additional positions were thereby selected and they are:

Forest ecosystem health
Silvicultural operations

Descriptions of the remaining identified areas of faculty need are given unprioritized in Appendix G.

Professional Support Staff

The faculty recently reviewed and made recommendations as to the School's professional research support staff (May 12, 1995 Committee Report). The faculty approved the recommendations of that report with the following exceptions:

1. Senior Applications Systems Analyst - under duties the "Visual aid support (e.g., 35 mm slides, graphics, and overheads) and production for faculty and associated grad student and faculty training" was changed to: "Visual aid support."

In addition, the responsibilities on the "production of presentation output" was changed to "training of presentation output."

2. The Senior Research Specialist position was altered to a Research Specialist as discussed earlier with duties as described in the position description as reviewed and approved by the faculty at their December 13, 1995 Faculty meeting.

No additional immediate needs were identified.

Clerical Staff

The faculty do not identify additional needs at this point in time.

IMPLEMENTING, MONITORING, AND UPDATING THE PLAN

Implementation

The School of Forestry Strategic Plan summarizes the current direction and plans for the future direction over the next five years. As the strategic plan is a living document, the current direction and much of the future direction is currently being implemented. To have successful implementation of any plan, three interrelated components must be in place: responsibility, authority, and accountability. Someone or some group must be assigned the responsibility of implementing a course of action. They must be given the authority to obtain the resources to carry out the task. And they must be held accountable for the success of the implementation. The absence of any one of these components can lead to the failure of implementation.

In order to continue successful implementation of this strategic plan, this section will specify individuals and groups who have the responsibility and authority, and will be held accountable for current and future tasks in the plan. Many of these tasks are currently being accomplished by committees as detailed in the "University, School, and Department Standing and Ad Hoc Committees Policy, Membership, and Procedures Manual," August, 1994. These responsibilities will be briefly discussed. The focus of this section will be on those current and future tasks that require changes or additional effort.

Overall Responsibility

The School's chair has the overall responsibility for implementing, monitoring, and updating the strategic plan. The authority for these tasks is granted by the School's Faculty. The Chair will ensure that responsibility for tasks is delegated, authority is granted, and accountability procedures are in place. The Chair will monitor the plan's implementation and initiate revisions and updates as indicated by the monitoring results. The annual performance evaluation of the Chair will provide for accountability. Specific questions regarding the Chair's role in implementing, monitoring, and updating the strategic plan should be included in the evaluation form.

Undergraduate Education – The professional forestry degree. The School's innovative teaching approach requires ongoing review and evaluation to ensure it continues to meet the goals of providing an integrated education while meeting professional standards. The overall responsibility for the undergraduate curriculum rests with the curriculum committee. This committee has the responsibility to review current curriculum and recommend changes to the faculty at large. To ensure integration in our team-taught professional courses, Semesters A, B, and C, the faculty have adopted an adaptive curriculum design approach. This approach involves an ad hoc committee of faculty participating in each course. The committee reviews and revises the curriculum as needed. As detailed above, this process has resulted in the major reorganization of Semesters A and B in the 1994-1995 academic year. While this approach has proved effective in maintaining the quality within each course, there is

currently a lack of formal coordination between courses. The Chair needs to establish a procedure for ensuring that the adaptive curriculum design approach works across courses and semesters.

The School of Forestry proposes giving careful consideration to developing a fourth semester as part of the accredited forestry degree. The Chair needs to establish an ad hoc committee to begin developing the proposal for the fourth semester to forward to the faculty. The committee needs to define the emphasis areas to be offered and the procedures for establishing new courses. The committee must also address the University's current 12-credit upper division liberal studies requirement which provides a major impediment to this concept.

Undergraduate Education – Parks and Recreation Management (PRM) Program. The Program's Director has overall responsibility for the review and revision of the undergraduate curriculum. The program has just initiated a new curriculum in 1995, and proposes a review of the new curriculum in 2000. The Director has the responsibility to ensure that this review is conducted. NAU's PRM program was designed with the possibility of accreditation through the National Recreation and Park Association, the professional organization authorized to accredit park and recreation programs in institutions of higher education. The PRM faculty decided to pursue accreditation and the application process has been initiated. The goal is to have the program accredited by Fall 1997. The program wishes to strengthen the community/commercial emphasis area by hiring a tenure-track faculty to teach and do research in this area. This position has been approved by the Faculty, and a search committee has been established to complete this task. The School's Chair should oversee the Director's administration of the PRM program.

Undergraduate Education – Environmental Management Program. A committee was established to review the possibilities for cooperation between the College of Ecosystem Science and Management and Environmental Sciences in order to develop an undergraduate major in environmental management. The School of Forestry plans to continue to be an active participant in this cooperative endeavor. The committee now has a draft document in review for a proposed new major. The Chair should act on the document recommendations as appropriate and assure that the program moves forward.

Graduate Education – Master Programs. The Graduate Studies Committee has the ongoing responsibility to review graduate programs and recommend changes to the faculty. Two areas will undergo comprehensive review in the next two years: the Master of Science in Forestry (non-thesis option) and the offering of a new Master of Science program in the School. The graduate studies committee needs to evaluate the possibility and desirability of converting the non-thesis option into a Masters of Forestry (MF) degree. The committee should forward a recommendation to the faculty. A second review is needed to examine the option of expanding our program to include a general Master of Science in addition to the Master of Science in Forestry. The School's Chair needs to establish an ad hoc committee to examine this option. This option

represents a new endeavor in our graduate program, and the proposal for a degree with increased flexibility needs to be developed by an interdisciplinary committee. **Graduate Education – Doctor of Philosophy in Forestry.** This degree program was implemented in 1994, the Graduate Studies Committee has the ongoing responsibility to review the program and its curriculum. The three emphasis areas are in place. The forest management sciences and economics emphasis area of our Ph.D. program needs strengthening to ensure success. The School will continue cooperating with other academic units on the development of campus expertise in operations research and economics. The Chair needs to continue to work for the appointment of a faculty member in Mathematics with a specialty in operations research. The School needs to begin the process of developing the capability to receive and offer graduate level courses through Interactive Instructional Television (IITV). Over the next two years we plan to bring the concept of IITV course offerings to fruition. The Chair needs to take the lead in initiating this process.

Research. The responsibility, authority and accountability for research rests with all faculty with a research appointment. Ongoing research work needs to be continued to maintain the success of our program. The School's Chair need to ensure that there are accountability procedures in place to complement the evaluation of faculty's contribution to research. The accountability procedures could involve a change in the appointment allocation to research (e.g., change from 50 % research to 25% or from 25 % to 50%) based on specified performance criteria.

Native American Forestry Program. The Program's Director has overall responsibility for the continued success of the program. He is responsible for contacts with tribes regarding research and service projects. Faculty are strongly urged to coordinate with the Director in development of such activities. In consultation with other faculty, the Director seeks funding for research projects and for support of students. The Director assists the faculty in understanding native culture and learning styles. He supervises the Student Advocate, who is responsible for coordinating the activities of the School in support of high retention rates for Native students. The program's first five-year plan covered 1990-1995. A major future task is planning for the period 1996-2001.

Staffing Needs. This plan includes a new procedure for evaluating and updating faculty/teaching needs. The faculty have used this procedure to establish hiring priorities, and has recommended the hiring of five new faculty members, and committees are or are being established to initiate searches. The plan also includes a recommendation for hiring a new Research Specialist, and a search committee has been established to implement its recommendation. The plan also incorporates faculty-adopted recommendations as to the School's professional research support staff. Included in these recommendations is a new procedure for allocating staff time to individual faculty. The Chair needs to take steps to ensure that modifications required by the changes are implemented.

Monitoring

The School of Forestry Strategic Plan requires ongoing monitoring to ensure the School is moving towards its goals. Monitoring is also required to ensure successful implementation, to provide a basis for accountability, and to recognize changes that require plan revisions and updating. The School's Chair has the overall responsibility for monitoring the strategic plan implementation and success. If monitoring is to provide information on how well the School is meeting its goals and implementing the Plan's future direction, goal and evaluation criteria are needed.

Goal Criteria

The Strategic Plan has established eight goals for the School of Forestry. The following section will reiterate the goals and specify criteria for measuring goal accomplishment.

Goal: To be the leading undergraduate forestry education school in North America by maintaining our unique integrated undergraduate curriculum.

Criteria:

- **Success of our students in the forestry profession; percent of students that receive jobs upon graduation.**
- **School's ranking in national evaluations.**

Goal: To maintain our status as the leading educational/research academic institution for Native American forestry.

Criteria:

- **Number of Native Americans receiving undergraduate degrees.**
- **Amount of Native American content in the forestry curriculum.**
- **Number of Native Americans attaining advanced degrees.**
- **Number of School alumni holding professional positions in Native American communities.**
- **Number of collaborative projects with Native American communities.**

Goal: To have our Parks and Recreation program attain a national reputation based on its focus on human:nature interaction.

Criteria:

- **Attainment of accreditation through the National Recreation and Park Association.**
- **Success of our students in the profession; percent of students that receive jobs upon graduation.**
- **Program's ranking in national evaluations.**

Goal: To significantly increase the number of students applying for the Forestry degree program.

Criteria:

- **Number of undergraduate students applying to the program, and average grade point average of students entering program**

Goal: To increase the School's role in across campus activities. This goal involves: teaching more non-forestry undergraduates, maintaining an active role in other graduate programs, and establishing an Environmental Management emphasis within the Environmental Science Program.

Criteria:

- Number of non-forestry undergraduate students enrolling in classes.
- Number of undergraduate classes available to non-forestry undergraduate students.
- Number of non-forestry graduate students enrolling in classes.
- Number of cross-listed courses and courses in other departments taught by School Faculty.
- Number of outside thesis committees served by School Faculty.
- Formal proposal for the establishment of an Environmental Management emphasis.
- Establishment of Environmental Management emphasis.

Goal: Continue to strengthen the School's graduate programs by implementing a new Master of Science graduate degree, and strengthening the Ph.D. forest management and economics emphasis area.

Criteria:

- A Department of Mathematics position in operations research.
- Interactive Instructional Television course offerings in economics from U of A and/or ASU.
- Recommendation on the conversion of Non-thesis degree to Master of Forestry (MF) degree.
- Committee established for proposing a new Master of Science graduate degree.
- Proposal for establishment of a new Master of Science graduate degree.

Goal: Establish a University Forest for the purpose of education and research. Become a repository of knowledge of ecosystem science and management for the Colorado Plateau.

Criteria:

- Proposal for establishment of a University Forest.
- Existence of a University Forest.
- Plan for repository of knowledge of ecosystem science and management for the Colorado Plateau.
- Recognition by the University of formal repository.

Goal: To produce graduates with high competence in both oral and written communication skills.

Criteria:

- Quality of oral and writing skills as measured by performance in capstone courses. Review and evaluation of writing skills should be conducted by

faculty and the writing teaching assistant. Evaluation of oral presentation skills should be conducted by the faculty.

Criteria for Evaluating Implementation

The strategic plan specifies tasks that are required for meeting our goals. The following section specifies criteria for measuring plan implementation. These criteria primarily track accomplishment, and overlap with the goal criteria. The overlapping criteria are included in this section for completeness and clarity, and are grouped under implementation categories.

Overall Responsibility

- Annual monitoring reports documenting task accomplishment and recommended changes to the plan (see Revision Calendar below).
- Inclusion of questions regarding plan implementation, monitoring, and revision in Chair's performance evaluation.

Undergraduate Education – The professional forestry degree

- The adaptive curriculum design approach can be monitored and evaluated by creating an annual teaching portfolio for each semester. The teaching portfolio should document course content of the professional semesters A, B, and C. At a minimum, the teaching portfolio will contain the schedule for the course and copies of all syllabi used in the course. The course coordinator will be responsible for preparing the teaching portfolio. The coordinator may include any teaching innovations, special projects, and annual review of the course.
 - Development of a procedure which coordinates the adaptive curriculum design approach across courses and semesters. The teaching portfolios described above can serve as a starting point for curriculum coordination.
 - Formal proposal for a fourth semester as part of the accredited forestry degree. The proposal should address emphasis areas and new courses. The committee should also address the University's 12-credit upper division liberal studies requirement.

Undergraduate Education – Parks and Recreation Management (PRM) Program

- Appointment of a tenure-track faculty to teach and do research in the community/commercial emphasis area.
- Attainment of accreditation through the National Recreation and Park Association, with target date of Fall 1997.
- Report on the effectiveness of the newly established curriculum in the year 2000.

Undergraduate Education – Environmental Management Program

- Formal proposal for the establishment of an Environmental Management emphasis.
- Establishment of Environmental Management emphasis.

Graduate Education – Master Programs

- **Recommendation on the conversion of Non-thesis degree to Master of Forestry (MF) degree.**
- **Committee established for proposing a new Master of Science graduate degree.**
- **Proposal for establishment of a new Master of Science graduate degree.**

Graduate Education – Doctor of Philosophy in Forestry

- **Number of new graduate courses taught in the School.**
- **A Department of Mathematics position in operations research.**
- **Interactive Instructional Television course offerings in economics from U of A and/or ASU.**

Research

- **Dollar amount research grants obtained.**
- **Number of research publications.**
- **Establishment of research endowments.**
- **Establishment of accountability procedures to complement faculty evaluations.**

Native American Forestry Program

- **Number of collaborative research projects with Native American communities.**
- **Dollar amount of funding for research projects with Native American communities.**
- **Dollar amount of funding for support of Native American students.**
- **Retention rate for Native American students.**
- **Five-year plan revision for the period 1996-2001.**

Staffing Needs

- **Number of faculty/teaching staff hired.**
- **Number of professional staff hired.**
- **Establishment of procedures for allocating professional staff time to faculty members.**
- **Annual report on professional staff time allocation.**

Plan Revision

The School of Forestry Strategic Plan is a living document, and as such the plan is never completed. As the plan must be approved by the School's faculty at large, at some point in time a document is presented for approval. The document represents a vision, frozen at a point in time, of where the School is and where it plans to go. In order to remain a living document, the plan must adapt to new challenges and changing needs of the School, College, and University. This section of the plan defines the procedures for updating and revising the plan.

We anticipate four types of plan revisions:

- **The first type of plan revision begins as soon as the plan document is completed. This type of plan revision addresses weakness recognized in the process of developing the plan, and should occur immediately after approval of the plan.**
- **At the end of the each year, ongoing monitoring must be summarized into an annual monitoring report. The annual monitoring report along with newly recognized directions, challenges, or needs must be reviewed by the faculty and incorporated into the plan document. Depending on the monitoring results and magnitude of changes the incorporation may consist of an addendum to the plan or a major revision.**
- **Whenever actions or circumstances require a change that needs to be addressed outside the annual review.**
- **When recognition of indicators of change necessitate the abandonment of incremental planning in favor of a comprehensive revision of the plan.**

This five-year strategic plan is a result of this final type of plan revision. The following sections will detail procedures for each type of plan revision.

Immediate Revision Needs

In the process of developing and reviewing the plan, the Strategic Planning Committee has recognized areas of the plan that requires additional work. The first area is the development of a stronger vision for the future. While the plan presents a strong picture of where the School has been, where we are now, and tasks we need to accomplish to move forward, the plan lacks a strong vision for the future. The kernel of our vision is contained in our Goals and Strengths and in our Research Foci statements. This vision needs to be focused and strengthened. The Strategic Planning Committee see this area as the highest priority for plan revision, and has assumed the responsibility to accomplish this revision over the next several months. Faculty input is encouraged.

The School of Forestry now exists within the College of Ecosystem Science and Management. The strategic plan does not adequately address the relationship of the School to the College and other units within the college. Issues of cooperation and resource sharing needs to be addressed. The relation of our strategic plan to a College plan, and our input into the College plan also needs resolution.

The implementation section of the plan lacks a budget. In a major way, the budget determines the authority the School has to implement the plan. The plan recommends the undertaking of new tasks. New tasks require new resources or a reallocation of existing resources. A budget / resource analysis will allow us to see opportunities for

reallocation, and direct our efforts at obtaining new resources and endowments. The Strategic Planning Committee will also begin work on these revisions immediately.

Annual Monitoring Report and Updating the Plan

The Five-Year Strategic Plan can also be viewed as a one-year plan with a rolling five-year planning horizon. The plan specifies tasks needed for goal accomplishment, and goal and evaluation criteria for measuring success. The School's Chair is responsible for ensuring that tasks are undertaken and results monitored. A annual report of accomplishments and needed changes to plan will be prepared for faculty review. When approved the report becomes part of the five-year plan as an addendum. The report should include an analysis of actions / circumstances that require plan revision. As appropriate, and at least every five years, the report should include an analysis of indicators of change which can trigger comprehensive plan revision. The Chair is responsible for recommending comprehensive plan revision when warranted by indicators of change.

Actions / Circumstances Which Require Plan Revision

This type of revision covers a wide range of causes for plan changes. A faculty member can at any time recognize a new direction, challenge, or need that the School should address. At this point the faculty member should meet with the Chair and discuss drafting a plan revision. This type of revision is built into the School's procedure for evaluating faculty staffing needs. At any time, one or more faculty may define a position to be incorporated in the plan under staffing needs. A second case of this type of revision occurs with a change in circumstance. This change could be the departure of a faculty member, an opportunity for a new program, attaining a new position, or new direction from the Dean or University Administration. When this type of change occurs the Chair will initiate the appropriate action to address the change. This type of revision is also built into the School's procedure for evaluating faculty staffing needs. Upon a change in faculty or the opportunity for a new faculty position, staffing needs identified in the plan will be reviewed by faculty and modified as. A period of time will be allowed for development and evaluation of new staffing needs. The positions will be ranked by the faculty and positions not filled will be incorporated into the plan as non prioritized staffing needs. Faculty members are primarily responsible for ensuring this type of continuous plan revision is accomplished.

Indicators of Change and Comprehensive Plan Revision

This five-year strategic plan document is the result of a comprehensive plan revision resulting from the recognition of significant changes in the School, University, higher education, and the forestry profession. The School's faculty has changed significantly over the past five years. The School implemented a new Ph.D. degree program. The College of Ecosystem Science and Management was being defined, accompanied by a change in Dean and a new Chair. The new University President brought a new vision and new challenges to the campus. The PEW foundation held a round table on higher

education needs (Appendix H). The forestry profession was embracing ecosystem management as a new paradigm. Ecosystem health and ecological restorations emerged as significant forestry issues and as strengths of our School. These indicators of change necessitated a comprehensive plan revision. The particular trigger mechanism that initiated the process is less important than the sum of the changes occurring. The monitoring of the plan requires identification of indicators of changes that can trigger a comprehensive plan revision.

The following is a list of indicators of change that should be monitored:

- **Changes in the composition of faculty: the addition of new faculty members can lead to significant changes in the vision, strengths and foci of the School**
- **Paradigm shifts in the profession can lead to new opportunities, and can require changes in the direction of the School.**
- **Changes in the amount or composition of undergraduate enrollment. The Native American Forestry Program has changed the composition of our student population, leading to changes in the way we teach.**
- **Changes in the employment opportunities for our graduates.**
- **Changes in the University or College mission.**
- **Changes in higher education trends.**
- **New issues moving to the forefront of the profession.**

Revision Calendar

The following specifies dates for completion of revisions and annual monitoring reports.

May 15, 1996 Report on immediate plan revisions, including a revised vision statement, goals and strengths, and research foci.

May 15, 1997 First annual monitoring report and revisions submitted to faculty for review.

May 15, 1998 Second annual monitoring report and revisions submitted to faculty for review.

May 15, 1999 Third annual monitoring report and revisions submitted to faculty for review.

May 15, 2000 **Fourth annual monitoring report and revisions submitted to faculty for review.**

May 15, 2001 **Fifth annual monitoring report and revisions. Unless already undertaken, this report will include an analysis of indicators of change with a recommendation on the need for a comprehensive plan revision. The faculty will review the analysis and decide if a comprehensive revision should be undertaken.**

APPENDIX D

Proposed Procedures for Selecting New Faculty

- 1. Chair will inform faculty when any new position is available.**
- 2. Faculty will review previously unprioritized identified needs as given in "Strategic Plan."**
- 3. Chair will ask faculty to identify any new "needs"**
 - a. Needs should include a justification, a listing of the proposed teaching assignment, proposed teaching/research/service time appointment, and research area.**
- 4. Chair will distribute "Criteria for Prioritizing New Faculty Positions" form.**
- 5. Faculty fill out "Criteria" form ranking the positions from highest to lowest.**
- 6. Chair compiles responses and reports back to Faculty.**
- 7. Faculty and Chair review results and transmit recommendations to the Dean.**
- 8. Unfilled needs are again put unprioritized into Strategic Plan.**

APPENDIX E

As an initial step in the strategic planning process, the Faculty identified in August of 1995 what they saw as the critical issues facing the School. The outcome of this effort follows:

GENERAL

Enhancing and maintaining NAU forestry's reputation as a leader in interdisciplinary, systems approaches in ecosystem management education, research, and service.

Accountability: internally, to the University, Regents, and legislature.

Assuming that the national trends in higher education are approaching Arizona quickly, how can we respond imaginatively and usefully to the Regents' current desire for more accountability?

A need to set Departmental direction, i.e., where do we want to be in five years? This has major implications for filling vacant faculty positions.

Maintaining/improving budgets: research, operating and salaries.

Help faculty, staff, and students identify unique opportunities for leadership in these times of transition in natural resources professions.

There appears to be a trend toward local participation in land-use management decisions that accompanies a shift toward ecosystem management. How are we going to prepare our students to be productive workers in this new job market?

The changing focus/nature of forestry/natural resource management (e.g., foresters perceived as "bad guys," environmental movement).

Given the continued growth in critical knowledge of ecological and management science, we should consider the possibility of a three-year professional program, modeled on our current two-year undergraduate program, that would culminate in a non-thesis MSF degree. This would replace our current BSF, and would utilize existing resources and faculty. Students could be recruited from a variety of bachelors programs, provided they had completed a certain minimum of science and mathematics courses.

How can we successfully offer a range of courses and degrees when most faculty are not obligated to work three months each year?

To achieve a better philosophical and topical integration of disciplines within the Department and College i.e., enhanced collegiality.

Respect for teachers and a general lack of discipline among undergraduate students (particularly in lower division and liberal studies courses) is becoming a very serious problem. What can we do to turn this trend around?

Maintain and enhance our resource base for teaching and research. "Sharing" of resources should be done carefully with an eye toward enhancing our functional role within the University. There should be a quid pro quo (e.g. our relationship with the Geography Department.)

UNIVERSITY AS A WHOLE

Our current President wants to break down the barriers that have developed at NAU between colleges. How can we develop opportunity from this desire?

Development of service courses to meet University needs.

The need to increase course offerings and service to other programs on campus.

Providing educational and other services to the University community (such as how are we going to fit into the 3-year degree program, etc.).

To achieve greater intra-campus and inter-departmental collaboration in teaching and research, especially in teaching.

Improved cooperative effort with University of Arizona.

Establish strong links with other departments and colleges within NAU and at our "sister" institutions.

FACULTY AND STAFF

Faculty community: faculty roles and corporate rights and responsibilities.

Faculty development: expectations, evaluation, growth, challenges, mentoring.

To hire new faculty based on expertise needed to accommodate anticipated trends in resource management over the next 10 years.

Salary levels need to be increased to retain good faculty.

The complete termination of faculty hiring procedures that result in 11th hour announcements, interviews of candidates in the summer, and unclear weighting procedures among the committee, faculty at large, Department Chair, and Dean in the final candidate selection and job offer.

Institutionalizing procedures for replacing faculty on sabbaticals, leaves, medical disability, etc. that avoid scheduling headaches or selection of mediocre substitutes.

To achieve interdepartmental (and College) parity with regard to teaching loads of individuals.

UNDERGRADUATE PROGRAM

To better evaluate the effectiveness of teaching and advising activities, and to develop mechanisms to respond to evaluation results in ways that are positive for faculty and programs.

If we continue to revise the content and emphases of our curriculum, as suggested elsewhere, and as we should, we will continue to feel pressure from within the Department to eliminate the format of our undergraduate delivery system. This should be avoided. We have the one program nationally that attempts to mimic the ecological and managerial world our graduates will occupy. Faculty should be rewarded for the effort it takes to work as a team toward common instructional goal.

We need a better way to evaluate teaching effectiveness than simple student evaluations and to standardize this process across disciplines within the School and the University.

Ensuring that our educational programs keep pace with the changing forestry profession.

Alternative delivery modes to accommodate changing student populations.

We must structure our curriculum to be more relevant to the emerging issues of forestry today and for the future. We should place greater instructional emphasis on:

- a. setting management objectives that are politically viable, as well as technically sound.**
- b. developing socially adaptive management strategies.**
- c. building flexible leadership skills for a variety of tasks and situations.**

Undergraduate forestry curriculum: content, format, relevance, importance.

Implementation of new teaching load guidelines.

While addressing point above, how do we maintain our presently unique undergraduate curriculum in forestry.

Either make undergraduate courses (Semesters A, B, C, & ?) truly team taught or develop individual courses to deliver material.

Shrinking budgets, both Federal and State. From my perspective, this is in specific relation to our desire to keep current with technology (and also with regard to keeping "our" jobs).

GRADUATE PROGRAM

Strengthening our PhD program.

We must design and offer a second master's degree. Our MSF is traditional in that it attempts to guarantee its holder the requisite skills of a traditional practicing forester, as well as research skills. We also should offer a master of science (MS) degree that capitalizes on a more diverse undergraduate preparation, particularly in the social sciences.

We need to revisit our graduate program admissions standards and procedures to assure admission of only qualified students.

Establishment of a strong, nationally recognized Ph.D. Program.

Change curriculum so our courses build on each other – stop teaching "introductory" graduate courses.

In spite of years of planning and discussion about creating a unique approach to graduate study, emphasizing integration of social and management sciences with ecological studies, we have launched a Ph.D. program, that is much like any other; concentration and specialization instead of generalization, depth as opposed to breadth. Today we need a science of ecology that is humanistic as well as biocentric; we should graduate people of science who can generalize, and who understand and can link diverse concepts from the social and biological sciences, who can view issues from perspectives. With our unique undergraduate program heritage as guide, we could produce a needed applied management science and graduate the scientists to deliver it.

The development of a Ph.D. program with well planned emphasis areas (ecology, management, and socioeconomic aspects of forestry) with adequate supporting courses across campus.

SPECIFIC PROGRAMS

We need to continue to pursue the Parks and Recreation Management 5-year Program plan, including the hiring of a commercial recreation faculty member.

Now that we have developed a solid Native American constituency, and while the University's leadership is committed to the inclusion of Native Americans in the University's mission, what future do we want to develop for the Native American Forestry Program?

Broaden integration of the Native American Forestry Program into the School of Forestry, especially in the areas of:

**advisement
course curricula
research**

We are about to complete the first actual technology transfer of a decision support system, in our work with the Menominee Tribe. What is the future of our developed capacity in TEAMS and similar ecosystem planning systems?

RESEARCH

Developing research program that is responsive to changing times.

Appointment of a research specialist (full-time) in support of laboratory and field analytical equipment.

SERVICE

How do we address the forest health debate?

Role of Forestry School in enhancing image of forestry in Arizona – Extension role?

Aid our alumni in getting jobs and promotions so they can contribute to the redefinition of the profession.

PHYSICAL PLANT

Dealing with space (laboratory, other work, graduate students, classrooms).

APPENDIX F

School Strengths/Weaknesses

As a second step in the development of the Strategic Plan, the Faculty were asked to identify programs/areas where the School either already had or could/should attain a national ranking within the next 5 to 10 years. They were also asked to identify School/University/Regional strengths and weaknesses. Their responses are given below:

SCHOOL FOCI

Management of Native American owned ecosystems - II

Native American Forestry Program

Ecosystem restoration

Human:wildland recreation III

Ecological restoration

Restoration ecology - IIIIIII

Forest health - III

Ecological indicators

Forest ecosystem function

Ecosystem Management - IIIIIII

Integrated undergraduate instruction - III

Integrating human dimensions into ecosystem management

Forest management sciences and economics

Forest social sciences

Wildlife habitat management

High quality research in several areas

SCHOOL STRENGTHS

Native American Forestry Program

**Relatively good financial support especially for research
Faculty well balanced between ecology and social science**

GIS expertise

Emphasis in multiresource management - II

Good support for MS and Ph.D. assistantships

Nationally recognized faculty

Location

Existing reputation for systems approaches - II

Knowledgeable faculty - II

Research programs in place - III

Links with programs such as geography and recreation - III

Links with natural resource agencies

Recognition as a major center for ecological restoration of forest ecosystems

**Strong interest in reestablishing healthy human:wildland interactions by
key faculty**

Backing by University - II

Precedence

Critical mass of faculty in areas of strength - III

Strong interest of graduate students in our areas of strength

Diversity of faculty

Forest ecology expertise

Young and thoughtful faculty

SCHOOL WEAKNESSES

**Inability to offer degrees other than forestry, etc. - need environmental
management major**

Potential lack of faculty in silviculture

Lack of faculty in wildlife

More faculty than needed in hydrology and recreation

Lack of adequate faculty in P&RM - I

**Failure to implement Ph.D. emphasis area in forest management sciences
and economics**

Some hostility from other parts of the campus

Too small

Dwindling number of Native American forestry jobs

Need for more social science for ecosystem management

Faculty becoming more specialized and research oriented

**Lack of integration of School foci in undergraduate teaching,
especially Semester C**

Cost of programs

Narrow faculty backgrounds and experience

Status quo frame of mind by some faculty - II

Poor relationships with biology and geology
Declining resources – space and money - II
Linkages with Native Americans
Lack of faculty expertise in tree and forest diseases - II
Lack of faculty and interest in developing mensurational techniques to support ecosystem management
Production oriented research staff
Secretarial/student help support staff for individual faculty

UNIVERSITY STRENGTHS

Emphasis on quality undergraduate education
Student body
Biological science faculty
Presidential leadership
University willingness to endorse/promote research areas that can cut across colleges and departments
Only academic forestry program in Arizona
Location - III
Emphasis on rural and wildland issues - III
Reputation for rural focus
Ability to attract media attention
Support of the administration - IIIII
Interest of other departments in ecological restoration paradigm
Strengths in human ecology, wildland ecology, and wildland environmental education - II
Return of portion of grant overhead
University's commitment to Native American programs

UNIVERSITY WEAKNESSES

Low pay scale
High teaching loads
Strength in mathematics and economics
Weak graduate programs - II
Too college-centered
Isolation of Forestry within University
Unclear relationship to environmental science/biology
Perception that NAU is a 4th rate research institution - II
Impression by other academic units that School is "fair-haired" child - II
Lack of support academically across campus - II
Budget constraints
Library resources - IIII
Immature administration
Lack of appreciation for research
Push to increase "body counts"

Lack of understanding of School mission by other academic units - II
Focus on undergraduate education
No agriculture/horticulture support
Lack of state support for higher education

REGIONAL STRENGTHS

Diversity of management options – USFS, tribes, NPS
Largely public land base
Human diversity
Association to tribal forestry
Varied vegetation types/ecosystems - IIIII
There are legitimate forest management in the SW region
High need for an educational, research and service program to help bridge gap between rural and urban people and people and nature
Long history of ecological restoration thinking - II
Reputation for leadership in balanced wildland resource management
One of few schools with natural resources reputation - IIIII
Linkages with U of A/ASU
Large land base
Strong governmental contacts
Alumni base
Recognition by the public
Our ecosystems including both human and biophysical elements are as good as any other ecosystems - II
Issues of the region are our issues
Good congressional support

REGIONAL WEAKNESSES

Lack of forest products industry
Low density/low political influence, rural population
Heavy dependence on federal funding
Low commercial value of timberland - II
Lack of national exposure because of limited forest resources - II
Intellectual isolation including lack of inclusion of ASU/U of A - II
Competition with U of A/ASU - II
Isolation from other regions - III
Environmental zealots imposing their view on the entire region

**Socioeconomic and demographic characteristics of region promote
academic weakness**

Off the major East/West power base for federal dollars

Weak rural high schools

Rural conservatism

APPENDIX H
PEW ROUNDTABLE REPORT