



13th Biennial Conference of Science and Management on the Colorado Plateau & Southwest Region

October 5-8, 2015

High Country Conference Center, Northern Arizona University

Detailed Schedule

Monday, October 5, 2015

Clients' Day

Side Meetings: CESUs Meetings (8:00 AM–5:00 PM; invited; Ponderosa, Aspen, Walnut, Agassiz)

Workshops: Fighting drought with fire: can forest management increase resistance to drought? Identifying information gaps for adapting to a hotter, drier future – Organizers: Phillip van Mantgem, U.S. Geological Survey, Redwood Field Station, and Donald Falk, University of Arizona, School of Natural Resource (**Free, but limited to 20 participants, contact pvanmantgem@usgs.gov**) (3 PM, Fremont)

1:00–5:30 PM Registration (High Country Conference Center lobby)

5:30–7:00 PM Opening Reception at the 1899 Bar and Grill patio, 307 W. Dupont Ave. Free parking in the High Country Conference Center garage. Please validate your ticket before leaving. (Appetizers and no-host bar)

7:00–8:30 PM Keynote Speaker: Curt Stager, author of *Deep Future* and more recently *Your Atomic Self*, will give us the long-term view of climate change impacts in his talk, which is titled **“Climate Whiplash: What Happens After Global Warming?” (Admission is free and the public is welcome)** – Prochnow Auditorium, 326 W. Dupont Avenue (next door to the reception)

Tuesday, October 6, 2015

DAY 1

Humphreys

7:00–8:00 AM Registration

7:00–8:00 AM Morning Refreshments

8:00–8:15 AM Official Welcome: James Coleman, Provost, Northern Arizona University; and David Lytle, Director, Southwest Biological Science Center, U.S. Geological Survey

8:15–9:00 AM Keynote Speaker: Michelle Mack, Department of Biological Sciences, Northern Arizona University

9:00–9:30 AM Break

**Fire and Adaptive Management in a Changing Environment – Invited Session
Humphreys**

Tuesday, 9:30–11:30 AM

Moderators: Zander Evans, Jim Youtz, Shaula Hedwall, and Barbara Satink Wolfson, Southwest Fire Science Consortium

- 9:30–9:45 FUNCTIONAL CHANGES ASSOCIATED WITH FIRE REGIME DISRUPTION IN A MIXED CONIFER FOREST OF ARIZONA. **HUFFMAN, D.W.**, R.T Strahan, A.J. Sánchez Meador, and D.C. Laughlin
- 9:45–10:00 HRV IN A CHANGING WORLD: IS THE CONCEPT OF HISTORICAL RANGE AND VARIATION STILL RELEVANT? **KEANE, R.E.**
- 10:00–10:15 ADAPTIVE SILVICULTURE: HOW DO WE RESPOND TO A CHANGING CLIMATE? **BATTAGLIA, M.**, K. Moser, L. Asherin, and L. Nagel
- 10:15–10:30 MANAGING THE PINO FIRE FOR RESOURCE BENEFIT. **CARRIL, D.**
- 10:30–10:45 FACILITATING BENEFICIAL FIRE WITHIN A SUPPRESSION STRATEGY: THE SLIDE FIRE. **MORFIN, V.**
- 10:45–11:00 DATA DRIVING DECISIONS ABOUT FIRE MANAGEMENT. **LUSHER, J.**, and D. Uberuaga
- 11:00–11:15 THE CONSTANT FLUX OF ADAPTIVE MANAGEMENT AT A LANDSCAPE SCALE. Pacheco, A.M., and **J.E. DAWSON**
- 11:15–11:30 THE IMPORTANCE OF MONITORING THE IMPACTS OF WILDFIRE IN A CHANGING CLIMATE. **INIGUEZ, J.**, S. Hedwall, A. Evans, and B. Satink Wolfson

**Developing Usable Science Micro-Workshop: How Do Scientists And Managers Work Together To Coproduce Knowledge Used To Support Management Activities? – Invited Interactive Discussion
Doyle**

Tuesday, 9:30–11:30 AM

Organizers: Tamara Wall, Western Regional Climate Center, Desert Research Institute; Alison Meadow, Institute of the Environment, University of Arizona; and Alex Horganic, University of Arizona

PANELISTS:

Kathy Jacobs, Director, Center for Climate Adaptation Science and Solutions, University of Arizona

Connie Woodhouse, Professor, School of Geography and Development and Faculty Coordinator, Graduate Certificate in Connecting Science and Decision Making, University of Arizona

Mike Crimmins, Associate Professor and Extension Specialist, Department of Soil Water and Environmental Science, University of Arizona,

Chris Guiterman, Laboratory of Tree-Ring Research, University of Arizona

The Cooperative Ecosystem Studies Units: Their Impact on the Colorado Plateau and Beyond – Special Session

Rees

Tuesday, 9:30–11:30 AM

Moderators: Todd Chaudhry, Colorado Plateau Cooperative Ecosystem Studies Unit, National Park Service; and Sallie Hejl, Desert Southwest Cooperative Ecosystem Studies Unit, National Park Service

- 9:30–9:45 LOOKING BACK AND SCANNING THE HORIZON: FOSTERING A CULTURE OF COOPERATION AND COLLABORATION FOR PUBLIC TRUST SCIENCE AND STEWARDSHIP. **FISH, T.E.**, T. Ferguson, and C. Shinault
- 9:45–10:00 RECENT DEVELOPMENTS AT THREE WESTERN CESUS: AN UPDATE FROM THE COLORADO PLATEAU, DESERT SOUTHWEST AND ROCKY MOUNTAIN CESU DIRECTORS. **ALLEN, J.A.**, S. Marsh, and L. Gerloff
- 10:00–10:15 CULTURAL RESOURCE MANAGEMENT AND STUDENT SUCCESS ON THE COLORADO PLATEAU. **DOWNUM, C.E.**
- 10:15–10:30 INTERGOVERNMENTAL INTERNSHIP COOPERATIVE: PARTNERING FOR YOUTH CAREER DEVELOPMENT, DIVERSITY, AND MAKING A DIFFERENCE ON THE GROUND. **EASTEP, B.T.**, B. Raper, and P. Roelandt
- 10:30–10:45 PARTNERING TO PRESERVE HISTORY: A COLLABORATIVE APPROACH TO ADMINISTRATIVE HISTORIES. **RODGERS, J.E.**, and K.R. Bertram
- 10:45–11:00 ASSESSING THE SUSCEPTIBILITY OF RAINBOW BRIDGE TO AIRCRAFT-INDUCED VIBRATIONS. **DOYLE, S.L.**, J.R. Moore, G.R. Stanley, J.R. Wood, E.E. Stanfield, and T. Tucker
- 11:00–11:15 COOPERATIVE ECOSYSTEM STUDIES UNITS SUPPORT FISHERIES MANAGEMENT PLANNING AT GRAND CANYON NATIONAL PARK. **HEALY, B.**, C.P. Paukert, and W.E. Pine, III
- 11:15–11:30 DISCUSSION

Genetic and Genomic Approaches for Mitigating Impacts of Climate Change and Exotic Species Invasion on Wildlands – Invited Session

Agassiz

Tuesday, 9:30 AM – 3:00 PM

Moderators: Gery Allan and Thomas Whitham, Department of Biological Sciences, Northern Arizona University

- 9:30–9:45 GENETIC AND GENOMIC APPLICATIONS TO INVESTIGATING THE IMPACTS OF CLIMATE CHANGE AND EXOTIC SPECIES INVASION IN RIPARIAN ECOSYSTEMS. **ALLAN G.J.**
- 9:45–10:00 REDUCING THE RISK OF CLIMATE CHANGE MITIGATION STRATEGIES WITH GENETICS-BASED SPECIES DISTRIBUTION MODELS. **BOTHWELL, H.**, S.A. Woolbright, E.I. Hersch-Green, L.M. Evans, G.J. Allan, T.G. Whitham
- 10:00–10:30 INTEGRATING COMPLEX ADAPTIVE PATTERNS AND LEVELS OF INBREEDING IN PONDEROSA PINE TO REFINE SPECIES VULNERABILITY ASSESSMENTS AND SEED TRANSFER GUIDELINES FOR REFORESTATION. **MAHALOVICH, M.F.**, W.K. Moser, R.T. Graham, and M. J. Kimsey
- 10:30–11:00 HOST TREE GENETICS INFLUENCES FUNGAL COMMUNITIES AND DROUGHT TOLERANCE IN PINYON PINE. **GEHRING, C.**, L. Flores-Rentería, A. Krohn, A. Patterson, A. Whipple, and T.G. Whitham
- 11:00–11:30 GENETIC VARIATION IN ADAPTIVE TRAITS OF SOUTHWESTERN WHITE PINE: EARLY RESULTS. **WARING, K.M.**, A. Wipple, B.A. Goodrich, T. Kolb, R. Sniezko, J.J. Jacobs, M.L. Fairweather, T. Steadman, and J. DaBell
- 11:30–1:00 **LUNCH**

- 1:00–1:30 PLANT ALLOCATION STRATEGIES AND MORTALITY OF TAMARIX SPP. IN RESPONSE TO A SPECIALIST HERBIVORE (*DIORHABDA CARINULATA*). **HULTINE, K.R.**, K. Acharya, D.W. Bean, S.E. Bush, C.M. D’Antonio, T.L. Dudley, S.D. Fehlberg, K.C. Grady
- 1:30–2:00 NATIVE GRASS SEEDLINGS DIFFER GREATLY IN ESTABLISHMENT ABILITY IN DRY, INVADDED FIELD SITES. **LEGER, B.**, and D.Z. Atwater
- 2:00–2:15 THE ROLE OF MYCORRHIZAE AND SOIL ORGANISM COMMUNITIES IN RESTORING A NATIVE GRASS, *BOUTELOUA GRACILIS*, IN THE FACE OF A DYNAMIC CLIMATES AND EXOTIC SPECIES INVASION. **REMKE, M.J.**, M. Bowker, and N.C. Johnson
- 2:15–2:45 GENOMICS OF RIPARIAN SPECIES IN A DESERT LANDSCAPE. **CUSHMAN, S.**, G. Allen, T. Max, and T. G. Whitham
- 2:45–3:00 USING THE SOUTHWEST EXPERIMENTAL GARDEN ARRAY (SEGA) TO IDENTIFY PLANT GENOTYPES AND POPULATIONS THAT CAN SURVIVE FUTURE CLIMATES. **WHITHAM, T.**, A.V. Whipple, G.W. Koch, P.G. Flikkema, S.A. Cushman, K.C. Grady

Water and Climate Change – General Session

Fremont

Tuesday, 9:30–11:30 AM

Moderators: Carolyn Kimball, Landscape Conservation Initiative, Northern Arizona University

- 9:30–9:45 ENHANCING THE RESILIENCE OF RIPARIAN/WETLAND ECOSYSTEMS IN LIGHT OF CLIMATE CHANGE. **BREIBART, A.**
- 9:45–10:00 LINKING FOREST LANDSCAPE MANAGEMENT AND CLIMATE CHANGE TO THE CONSERVATION OF RIPARIAN HABITAT IN THE GRAND CANYON: PART I. VEGETATION MODELING. **FLATLEY, W.T.**, F.C. O’Donnell, P.Z. Fulé, and A.E. Springer
- 10:00–10:15 LINKING FOREST LANDSCAPE MANAGEMENT AND CLIMATE CHANGE TO THE CONSERVATION OF RIPARIAN HABITAT IN THE GRAND CANYON: PART II. HYDROLOGIC MODELING. **O’DONNELL, F.C.**, W.T. Flatley, A.E. Springer, and P.Z. Fulé
- 10:15–10:30 THE LAST 30,000 YEARS OF CLIMATE AND VEGETATION CHANGE ACROSS NORTHERN ARIZONA RECONSTRUCTED FROM HIGH ELEVATION FOSSIL RECORDS IN THE GRAND CANYON. **COLE, K.L.**, and R.S. Anderson
- 10:30–10:45 USING HYDROLOGIC LANDSCAPE CLASSIFICATION TO EVALUATE THE HYDROLOGIC EFFECTS OF CLIMATE IN THE SOUTHWESTERN UNITED STATES. **JONES, CHAS**, Scott Leibowitz, Keith Sawicz, Randy Comeleo, Laurel Stratton, and P.J. Wigington
- 10:45–11:00 REGULATORY ROLE OF PURSHIA TRIDENTATA IN SPATIAL BIOGEOCHEMISTRY PATTERNS IN MESA VERDE’S PIÑON-JUNIPER WOODLANDS. **FLOYD, M. L.**, S.C. Reed, C. Roybal, and S. Davis
- 11:00–11:15 MICROBIAL DIVERSITY OF EXTREME ARID REGIONS OF THE ATACAMA DESERT, CHILE. **CALIFF, K. J.**, J.W. Neilson, and J.G. Caporaso
- 11:15–11:30 PRESTORING FOR CLIMATE CHANGE: IDENTIFYING WINDOWS OF OPPORTUNITY FOR RESTORATION TO MINIMIZE LOSS OF BIODIVERSITY AND ECOSYSTEM FUNCTIONING. **BUTTERFIELD, B.J.**, C.M. Roybal, S.M. Munson, and T.E. Wood

Lunch
Humphreys
11:30 AM – 1:00 PM

Lunch will be provided for conference participants

Lunchtime Forum: USGS Southwest Biological Science Center Manager Communications Forum (**Free and open to all participants, Ponderosa**)
Organizers: John Bradford, Mike Duniway, and Seth Munson, Southwest Biological Science Center, U.S. Geological Survey

Revisiting Science and Adaptive Management in the Federal Colorado River Programs and Other Streams and Rivers of the Southwest (Part 1) – Special Session

Humphreys

Tuesday, 1:00 PM – 5:15 PM

Moderators: Theodore Melis and Scott Vanderkooi, Southwest Biological Science Center, U.S. Geological Survey

- 1:00–1:20 ADAPTING GLEN CANYON DAM OPERATIONS TO EVOLVING COLORADO RIVER RESOURCE OBJECTIVES. **CRAWFORD, M.**
- 1:20–1:40 COLORADO RIVER DRYING: LESSONS FROM TWO DROUGHTS. **UDALL, B.**
- 1:40–2:00 CONSEQUENCES OF AN ALTERED THERMAL REGIME FOR COLORADO RIVER NATIVE FISHES IN GRAND CANYON. **WARD, D.L.**, and R. Morton-Starner
- 12:00–2:20 POPULATION DYNAMICS OF HUMPBACK CHUB THAT SPAWN IN THE LITTLE COLORADO RIVER: DRIVERS AND THEIR IMPLICATIONS FOR MANAGEMENT. **YACKULIC, C.B.**
- 2:20–2:40 USING ENVIRONMENTAL COVARIATES TO PREDICT GROWTH IN TWO CONTRASTING ENVIRONMENTS: A GROWTH ASSESSMENT OF AN ENDANGERED DESERT FISH. **DZUL, M.C.**, and C.B. Yackulic
- 2:40–3:00 THE GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM. **VANDERKOOI, S.**
- 3:00–3:15 **BREAK**
- 3:15–3:35 BENEFITS AND RISKS OF TEMPERATURE MODIFICATION AT GLEN CANYON DAM TO FISHES OF THE COLORADO RIVER THROUGH THE GRAND CANYON. **VALDEZ, R.A.**, and D.W. Speas
- 3:35–3:55 WATERSHED-SCALE ASSESSMENT OF NATIVE FISH SURVIVAL RELATED TO FIRE, FLOODING, AND NONNATIVE SPECIES IN A GRAND CANYON TRIBUTARY. **HEALY, B.**, E. Gdula, and B. Tobin,
- 3:55–4:15 ECOLOGY AND MANAGEMENT OF RAZORBACK SUCKER IN THE SAN JUAN RIVER. **FRANSSEN, N.R.**, and S.L. Durst
- 4:15–4:35 ECOLOGY AND MANAGEMENT OF COLORADO PIKEMINNOW IN THE SAN JUAN RIVER. **DURST, S.L.**, and N.R. Franssen
- 4:35–4:55 THE SAN JUAN RIVER RECOVERY MANAGEMENT AND PLANNING. **WHITMORE, S.B.**
- 4:55–5:15 LARVAL TRIGGERED SPRING RELEASES FROM FLAMING GORGE RESERVOIR ASSIST IN RECOVERY OF ENDANGERED RAZORBACK SUCKER (*XYRAUCHEN TEXANUS*) IN THE GREEN RIVER, UTAH. **CHART, T.E.**, K. Bestgen, M.T. Jones, D. Speas, and M. Breen

Applying Traditional Ecological Knowledge in Resource Management Programs on the Colorado Plateau – Invited Session

Doyle

Tuesday, 1:00 PM – 5:15 PM

Moderators: Helen Fairley, Grand Canyon Monitoring and Research Center, U.S. Geological Survey; and Erik Nielsen, School of Earth Sciences and Environmental Sustainability, Northern Arizona University

- 1:00–1:05 WELCOME AND INTRODUCTION
- 1:05–1:25 TEK APPLICATIONS IN INDIAN FORESTRY: A MODEL FOR FOREST STEWARDSHIP AND SUSTAINABILITY. **HOAGLAND, S. J.**
- 1:25–1:45 INTEGRATING TRADITIONAL ECOLOGICAL KNOWLEDGE IN WATERSHED RESTORATION AT CANYON DE CHELLY NATIONAL MONUMENT, CHINLE, AZ. **NIELSEN, E.A.**
- 1:45–2:05 APPROACHES TO INTEGRATING HUALAPAI TEK IN CULTURAL RESOURCES MONITORING ALONG THE COLORADO RIVER IN GRAND CANYON. **BUNGART, P.**, L. Jackson-Kelly, C. Cannon, and B. Jackson
- 2:05–2:25 CULTURAL ADAPTATIONS TO CLIMATE CHANGE: NAVAJO PRACTICES OF ANIMAL GRAZING AND ANIMAL HUSBANDRY ON THE NAVAJO NATION. **BEN, D.**
- 2:40–2:45 HISTORICAL PREDATOR CONTROL EFFORTS AND APACHE KNOWLEDGE OF GRAY WOLVES IN ARIZONA. **RINKEVICH, S.E.**
- 2:45–3:00 QUESTIONS AND ANSWERS

- 3:00–3:15 **BREAK**

- 3:15–3:45 LOOKING TO OUR PAST, WORKING TOGETHER FOR OUR FUTURE: HOPI TRIBE/KAIBAB NATIONAL FOREST PARTNERSHIP ON LAND MANAGEMENT. **LYNDON, M.**, and J. Nicholas
- 3:45–4:05 DAM-INDUCED CHANGES TO RIPARIAN ECOSYSTEMS AND ASSOCIATED TRADITIONAL CULTURAL VALUES: RESULTS OF A PILOT STUDY DOWNSTREAM OF GLEN CANYON DAM, ARIZONA. **FAIRLEY, H. C.**
- 4:05–4:25 A FOREST SERVICE SENIOR LEADER’S PERSPECTIVE: HOW SOUTHERN PAIUTE TRADITIONAL ECOLOGICAL KNOWLEDGE HAS BEEN A FOUNDATION FOR LAND MANAGEMENT DECISIONS. **BULLETT, A. S.**
- 4:25–5:15 PANEL DISCUSSION (All speakers)

Fire Ecology – General Session

Fremont

Tuesday, 1:00 PM – 3:00 PM

Moderator: Larissa Yocom, School of Forestry, Northern Arizona University

- 1:00–1:15 BRIDGING THE GAP: SCIENCE AND ART COLLABORATIVES FOR MORE HOLISTIC COMMUNICATION. **KIMBALL, C.K.**, C.H. Haffey, K.A. Aitchison, A. Thode, B. Satink-Wolfson, and T. Sis

- 1:15–1:30 SUCCESSIONAL PATTERNS IN NORTHERN NEW MEXICO MIXED CONIFER FORESTS FOLLOWING RECENT HIGH-SEVERITY FIRES. **NANNI, R.**, C. Haffey, and C.D. Allen
- 1:30–1:45 FUTURE FOREST PERSISTENCE IN A CHANGING CLIMATE: HOW CLIMATE DRIVES PONDEROSA PINE SEEDLING EMERGENCE AND ESTABLISHMENT IN THE SOUTHWESTERN UNITED STATES. **PETRIE, MD**, J.B. Bradford, and R.M. Hubbard
- 1:45–2:00 RESTORING AND MAINTAINING RESILIENCY WITHIN THE FIRE ADAPTED PONDEROSA PINE ECOYSTEM AT GRAND CANYON NATIONAL PARK. **ROBINSON, D.**
- 2:00–2:15 BAT OCCUPANCY IN A PATCHY POST-WILDFIRE LANDSCAPE. **STARBUCK, C.A.**, E.H. Saunders, and C.L. Chambers
- 2:15–2:30 FIRE BURN SEVERITY MAPPING ON THE SAN CARLOS APACHE RESERVATION. **WU, Z.**, B. Middleton, J. Vogel, D. Dye
- 2:30 RESOLVING POST-FIRE DEBRIS FLOW RESPONSE IN RANGELANDS OF THE WESTERN US. **GIBBLE, K.T.**, J.L. Pierce, and E. Lindquist

**Collaborative Environmental Research in the Southwest: Examples from the Field
Agassiz**

Tuesday, 3:15 PM – 5:15 PM

Moderators: Daniel Ferguson, Institute of the Environment, University of Arizona; and Chris Guiterman, Laboratory of Tree-Ring Research, University of Arizona

- 3:15–3:25 SESSION INTRODUCTION: COLLABORATIVE ENVIRONMENTAL RESEARCH IN THE SOUTHWEST. **FERGUSON, D.**
- 3:25–3:45 USE-INSPIRED HYDROCLIMATIC RESEARCH IN THE UPPER COLORADO RIVER BASIN. **WOODHOUSE, C.**, A. Csank, G. Pederson, S. McAfee, G. McCabe, and S. Gray
- 3:45–4:05 DEVELOPING SUMMER SEASON PRECIPITATION MONITORING STRATEGIES FOR ARIZONA RANCHERS AND RANGE MANAGERS TO MANAGE DROUGHT RISK. **CRIMMINS, M.A.**
- 4:05–4:25 CLIMATE SENSITIVITY OF NAVAJO FORESTS: USE-INSPIRED RESEARCH TO GUIDE TRIBAL FOREST MANAGEMENT. **GUI TERMAN, C.H.**, A.C. Becenti Sr., E.Q. Margolis, and T.W. Swetnam
- 4:25–4:45 LESSONS LEARNED FROM EVALUATING USE-INSPIRED RESEARCH PROJECTS. **MEADOW, A.**
- 4:45–5:15 FACILITATED DISCUSSION WITH SPEAKERS AND SESSION PARTICIPANTS

Small Unmanned Aerial Vehicles (UAVs) for Science in the Southwest: Impetus, Coordination, and Potential Risks

Fremont

Tuesday, 3:15 PM – 5:15 PM

Moderator: Michael W. Shafer, Department of Mechanical Engineering, Northern Arizona University

- 3:15–3:30 THE U.S. GEOLOGICAL SURVEY’S DEVELOPING SUAS PROGRAM AND PHOTOGRAMMETRIC MODELING UNDER THE CURRENT FAA REGULATORY ENVIRONMENT. **DEBENEDETTO, G.**, and J. Vogel
- 3:30–3:45 REMOTE SENSING APPLICATIONS AT NAU WITH UAV IMAGERY. **SANKEY, T.**

- 3:45–4:00 ISSUES FACING THE U.S. FOREST SERVICE IN THE USE OF SMALL UNMANNED AIRCRAFT SYSTEMS FOR NATURAL RESOURCE AND WILDFIRE MISSIONS. **DAMSGAARD, K.**
- 4:00–4:15 MEASURING FOREST STRUCTURAL CHARACTERISTICS: RESTORATION TREATMENT EFFECTS ON SNOWPACK IN NORTHERN ARIZONA. **DONALD, J.**
- 4:15–5:15 PANEL DISCUSSION

Poster Session

1899 Bar and Grill ballroom and patio

Tuesday, 5:30–7:30 PM

Poster Session: 1899 Bar and Grill ballroom and patio (307 W. Dupont Ave.). Free parking in the High Country Conference Center garage. Please validate your ticket before leaving.

Presenters: Posters should be set up between 4:00 PM and 5:30 PM or by special arrangement.

Wednesday, October 7, 2015

DAY 2

Humphreys

7:00–8:00 AM Morning Refreshments

Revisiting Science and Adaptive Management in the Federal Colorado River Programs and Other Streams and Rivers of the Southwest (Part 2) – Special Session

Humphreys

Wednesday, 8:00 AM – 3:15 PM

Moderators: Theodore Melis and Scott Vanderkooi, U.S. Geological Survey, Southwest Biological Science Center

- 8:00–8:20 REPRODUCTION, ABUNDANCE, AND RECRUITMENT DYNAMICS OF YOUNG COLORADO PIKEMINNOW IN THE GREEN RIVER BASIN, UTAH AND COLORADO, 1979–2012. **BESTGEN, K.R.**, and A.A. Hill
- 8:20–8:40 USE OF PASSIVE INTEGRATED TRANSPONDER TECHNOLOGY IN RECOVERY OF ENDANGERED FISH IN THE UPPER COLORADO AND SAN JUAN RIVER BASINS. **SPEAS, D.**, P. MacKinnon, M. McKinstry, and K. McAbee
- 8:40–9:00 ENDANGERED RAZORBACK SUCKER (*XYRAUCHEN TEXANUS*) OCCUPYING LAKE POWELL, A RESEARCH PROJECT TO DETERMINE HOW THESE FISH USE THIS IMPOUNDMENT AND HOW THESE FISH MAY CONTRIBUTE TOWARDS THE RECOVERY OF THIS ENDEMIC LARGE BODIED COLORADO RIVER FISH. **FRANCIS, T.A.**, B.A. Hines, B.J. Schleicher, D.S. Elverud, and D.W. Ryden
- 9:00–9:20 U.S. GEOLOGICAL SURVEY RESPONSE TO THE GOLD KING MINE RELEASE. **HORTON, R.J.**

- 9:20–9:40 LITTLE BUGS, BIG DATA, AND GRAND CANYON: LIGHT TRAPPING BY RIVER RAFTERS YIELDS INSIGHTS INTO COLORADO RIVER AQUATIC INSECT DYNAMICS. **KENNEDY, T.A.**, J.D. Muehlbauer, C.B. Yackulic, D.A. Lytle, E.W. Kortenhoeven, A.N. Metcalfe
- 9:40–10:00 MERCURY AND SELENIUM ACCUMULATION IN THE COLORADO RIVER FOOD WEB, GRAND CANYON, USA. **WALTERS, D.M.**, E. Rosi-Marshall, T.A. Kennedy, W.F. Cross, and C.V. Baxter
- 10:00–10:15 **BREAK**
- 10:15–10:35 USING BIOENERGETIC MODELS TO DETERMINE HOW WATER TEMPERATURE AND FOOD CONSUMPTION INFLUENCE *ONCORHYNCHUS MYKISS* AND *SALMO TRUTTA* GROWTH IN WESTERN U.S. TAILWATERS. **DIBBLE, K.L.**, C.B. Yackulic, and T. Kennedy
- 10:35–10:55 MOVEMENT, ABUNDANCE, SURVIVAL AND GROWTH OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) IN THE COLORADO RIVER IN GRAND CANYON. **YARD, M.D.**, and J. Korman
- 10:55–11:15 PREY SIZE AND AVAILABILITY LIMITS MAXIMUM SIZE OF RAINBOW TROUT IN A LARGE TAILWATER: INSIGHTS FROM A DRIFT-FORAGING BIOENERGETICS MODEL. **DODRILL, M.J.**, C.B. Yackulic, T.A. Kennedy, and J.W. Hayes
- 11:15–11:35 RIVER REGULATION AFFECTS REPRODUCTION, EARLY GROWTH, AND SUPPRESSION STRATEGIES FOR INVASIVE SMALLMOUTH BASS IN THE UPPER COLORADO RIVER BASIN. **BESTGEN, K.R.**, and A.A. Hill
- 11:35–11:55 AN OVERVIEW OF INVASIVE PREDATORY FISH CONTROL IN THE UPPER COLORADO AND GREEN RIVER SUBBASINS. **CHART, T.E.**, and K. McAbee
- 11:55–12:15 MANAGEMENT OF A TAILWATER TROUT FISHERY DOWNSTREAM OF GLEN CANYON DAM. **ROGERS, R.S.**, and J.F. Hamill
- 12:15–1:15 **LUNCH**
- 1:15–1:35 CAN A RIVER BE RESTORED AFTER A CENTURY OF DISTURBANCE? LESSONS FROM FOSSIL CREEK. **MARKS, J.C.**, B.J. Koch, K. Adams, Z.G. Compson, M. O’Neil, D. Peterson, K. Gibson, and B. Hungate
- 1:35–1:55 ECOSYSTEM RECOVERY FOLLOWING FLOW RESTORATION IN FOSSIL CREEK, ARIZONA. **KOCH, B.J.**, C.A. Gibson, Z.G. Compson, B.A. Hungate, J.C. Marks
- 1:55–2:15 THE OPPORTUNE EXTRACTION MODEL (OEM) PROTECTING RESOURCES AND CAPTURING FLOOD FLOWS: HOW IT WORKS. **CAROTHERS, S.W.**, C. Finch, and W.C. Leibfried
- 2:15–2:35 USING CONCEPTUAL ECOLOGICAL MODELS AS A FRAMEWORK TO GUIDE DECISION MAKING FOR THE LCR MSCP. **KOKOS, S.R.**, D.P. Braun, R.S. Unnasch, and C.J.W. McClure
- 2:35–2:55 THE LOWER COLORADO RIVER MULTI-SPECIES CONSERVATION PROGRAM: SUCCESSES AND CHALLENGES AFTER TEN YEARS OF IMPLEMENTATION. **SWETT, J.**
- 2:55–3:15 SCIENCE-POLICY INTERACTION AND THE MINUTE 319 ENVIRONMENTAL FLOWS TO THE COLORADO RIVER DELTA. **FLESSA, K.W.**

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Biological Soil Crusts (Biocrusts) of the Southwest: Emerging Ecological Insights and Resource Management Solutions – Invited Session

Agassiz

Wednesday, 8:00 AM – 5:15 PM

Organizers: Carrie Havrilla, University of Colorado; Ana Giraldo, Arizona State University; and Chris Ives, Kristina Young, Matthew Bowker, Northern Arizona University

- 8:00–8:20 INTRODUCTION TO SPECIAL SESSION. **BOWKER, M.**
- 8:20–9:00 INTRODUCTION TO THEME I: BIOLOGICAL INTERACTIONS IN SOIL CRUST ECOSYSTEMS. **BELNAP, J.**
- 9:00–9:20 SOIL FUNGI BENEFIT BOTH PLANTS AND BIOCRUST IN ARID LANDS: A TEST OF THE FUNGAL LOOP HYPOTHESIS. **DETTWEILER-ROBINSON, E.**, J. Rudgers, and B. Sinsabaugh
- 9:20–9:40 DISCOVERING METABOLIC WEBS WITHIN BIOLOGICAL SOIL CRUSTS USING EXOMETABOLOMICS. Swenson, T., R. Baran, E.L. Brodie, R. Lau, J. Mayberry-Lewis, U. Nunes da Rocha, B.P. Bowen, U. Karaoz, H. Cadillo-Quiroz, F. Garcia-Pichel, **T.R.**
- NORTHERN**
- 9:40–10:00 BACTERIA INCREASE ARID LAND SOIL SURFACE TEMPERATURE THROUGH THE PRODUCTION OF SUNSCREENS. **COURADEAU, E.**, U. Karaoz, H.C. Lim, U. Nunes da Rocha, T. Northern, E. Brodie, F. Garcia-Pichel
- 10:00–10:15 **BREAK**
- 10:15–10:35 DO BIOCRUST DIFFERENTIALLY INFLUENCE NATIVE AND NON-NATIVE GRASS ESTABLISHMENT? **MCINTYRE, C.L.**, S. Archer, and J. Belnap
- 10:35–10:55 THE ROLE OF BIOCRUSTS IN REGULATING DRYLAND PLANT COMMUNITIES AND EXOTIC PLANT INVASIBILITY. **HAVRILLA, C.**, and N.N. Barger
- 10:55–11:15 INTRODUCTION TO THEME II: UNDERSTANDING, MODELING AND RESTORING THEIR FUNCTION IN ECOSYSTEMS. **BARGER, N.**
- 11:15–11:35 NURSING THE BIOLOGICAL SOIL CRUST RESTORATION: CYANOBACTERIA ISOLATION, LAB CULTIVATION, SCALING UP AND INOCULUM CONDITIONING. **GIRALDO SILVA, A.**, C. Nelson, N. Barger, and F. Garcia-Pichel
- 11:35–11:55 KEY FACTORS CONTROLLING THE GROWTH OF BIOLOGICAL SOIL CRUSTS: TOWARDS A PROTOCOL TO PRODUCE BIOCRUSTS IN GREENHOUSE FACILITIES. **VELASCO AYUSO, S.**, C. Tucker, and S. Ferrenberg
- 11:55–12:15 RESTORING THE LIVING SKIN OF THE EARTH: PROGRESS IN BIOCRUST RESTORATION IN THE GREAT BASIN AND CHIHUAHUAN DESERTS. **ANTONINKA, A.**, M.A. Bowker, N. Barger, S. Reed, J. Belnap, K. Doherty
- 12:15–1:15 **LUNCH**
- 1:15–1:35 EVALUATING FIELD SUCCESS OF BIOLOGICAL SOIL CRUST RESTORATION USING LAB AND GREENHOUSE GROWN INOCULA AND BEST DELIVERY PRACTICES. **FAIST, A.**, N.N. Barger, M.C. Duniway, S.C. Reed, M.A. Bowker, F. Garcia-Pichel, and J. Belnap
- 1:35–1:55 USING BIOLOGICAL SOIL CRUST FOR SOIL STABILIZATION AND RESTORATION. **YOUNG, K.E.**, M.A. Bowker, S.C. Reed, M.C. Duniway, and J. Belnap
- 1:55–2:15 RAPID CULTIVATION OF N-FIXING LICHENS AND BIOCRUSTS FOR REHABILITATION OF DRYLANDS. **BOWKER, M.**, A.J. Antoninka, S.C. Reed, K.D. Doherty, J. Belnap, N.N. Barger

- 2:15–2:35 SOURCE POPULATION, ORGANIC MATTER AND OVERWINTERING GOVERN ARID LAND MOSS ESTABLISHMENT. **CONDON, L.**, and D.A. Pyke
- 2:35–2:55 FIRE MOSS AS A TOOL FOR POST-WILDFIRE ECOSYSTEM RESTORATION. **IVES, C.I.**
- 2:55–3:15 INTRODUCTION TO THEME III: RESPONSES TO CLIMATE CHANGE: WHAT TO EXPECT FOR FUTURE BIOCRUST STURCTURE AND FUNCTION? **GARCIA-PICHEL, F.**

- 3:15–3:30 **BREAK**

- 3:30–3:50 INCORPORATING GLOBAL CHANGE EFFECTS ON BIOLOGICAL SOIL CRUSTS INTO MODELING EFFORTS. **REED, S.**, C. Tucker, S. Ferrenberg
- 3:50–4:10 CLIMATE CHANGE AND PHYSICAL DISTURBANCES CAUSE SIMILAR COMMUNITY SHIFTS IN BIOLOGICAL SOIL CRUSTS. **FERRENBURG, S.**, S.C. Reed, and J. Belnap
- 4:10–4:30 BIOCRUSTS OF GRAND STAIRCASE - ESCALANTE NATIONAL MONUMENT: PAST, PREDICTED, AND PRESENT BIOCRUST COVER. **DEROULHAC, D.**
- 4:30–5:15 DISCUSSION

Collaborative Approaches to Restoration for Multiple Ecosystem Services – Special Session

Doyle

Wednesday, 8:00 AM – 10:00 AM

Organizers: Mark Brunson, Utah State University; and Dave Bastian, Utah Conservation Corps

- 8:00–8:20 ENHANCING ECOSYSTEM SERVICES THROUGH COLLABORATIVE RESTORATION: PROCESSES AND OUTCOMES. **BRUNSON, M.W.**
- 8:20–8:40 PULASKIS TO PLOWSHARES: CREATING OUR FUTURE LEADERS THROUGH YOUR CONSERVATION PROJECTS. **BASTIAN, D.**
- 8:40–9:00 WELL NOW WHAT? CONNECTING THE PAST, PRESENT AND FUTURE THROUGH NATIONAL SERVICE. **HOWE, R.**
- 9:00–9:20 ENGAGING DIVERSE, LOCAL YOUTH AND YOUNG ADULTS IN STEWARDSHIP AND ENVIRONMENTAL EDUCATION. **DESLAURIERS, J.**
- 9:20–9:40 INCREASING VALUES IN CONSERVATION WORK: THE ESCALANTE RIVER WATERSHED PROJECT AS A CONSERVATION LABORATORY. **WAGGONER, K.**
- 9:40–10:00 BUILDING ADVOCATES FOR THE COLORADO PLATEAU THROUGH COLLABORATIVE, HANDS-ON SERVICE LEARNING PROJECTS. **THOMPSON, E.**

Applied Concepts in Conservation Biology – Invited Session

Fremont

Wednesday, 8:00 AM – 10:00 AM

Moderators: Carlos Carroll, Society for Conservation Biology, North American Section; and Ed Grumbine, Grand Canyon Trust

- 8:00–8:20 INNOVATIVE TECHNIQUES FOR WEAKENING CHEATGRASS-WILDFIRE FEEDBACKS IN THE COLORADO PLATEAU AND GREAT BASIN. **PORENSKY L.M.**, E.A. Leger, B.L. Perryman, M.D. Madsen, M. Williamson

- 8:20–8:40 HOW CAN EXPERIMENTAL GARDENS IMPROVE CONSERVATION KNOWLEDGE AND PRACTICE? **WHIPPLE, A.V.**, M. Remke, L. Flores-Rentería, H. Cooper, K. Haskins, K. Waring, C.A. Gehring, and T. G. Whitham
- 8:40–9:00 USE OF CAMERA TRAPS AND CITIZEN SCIENTISTS TO MEASURE AND MONITOR PATTERNS OF WILDLIFE HABITAT OCCUPANCY ON THE KAIBAB PLATEAU, NORTHERN ARIZONA. **HOLM, J.R.**, and Brett G. Dickson
- 9:00–9:20 STRENGTHENING ADAPTIVE CAPACITY AT A LANDSCAPE SCALE: DEVELOPING CLIMATE ADAPTATION ACTIONS ON THE NORTH RIM RANCHES IN NORTHERN ARIZONA. **HOGLANDER, C.**
- 9:20–9:40 SCIENCE-BASED LAND-USE PLANNING AND BROAD COMMUNITY SUPPORT LEADS TO AN INTEGRATED APPROACH TO PROTECTING THE SONORAN DESERT IN PIMA COUNTY, ARIZONA. **KENNEDY, K.R.**
- 9:40–10:00 DISCOVERING COMMON GROUND IN CLIMATE CHANGE IMPACTS AND ADAPTATION: LESSONS FROM THE ASIAN HIGHLANDS AND THE SOUTHERN COLORADO PLATEAU. **GRUMBINE, R.E.**

Diverse Approaches to Incorporating Global Change into Landscape-Level Conservation – Invited Session

Fremont

Wednesday, 10:15 AM – 12:15 PM

Moderators: Clare Aslan, Landscape Conservation Initiative, Northern Arizona University; Carlos Carroll, Society for Conservation Biology, North American Section; and Paul Beier, School of Forestry, Northern Arizona University

- 10:15–10:30 CONSERVING NATURE’S STAGE. **BEIER, P.**
- 10:30–10:45 ABIOTIC SURROGATES CAN PRIORITIZE SITES FOR SPECIES REPRESENTATION WHEN YOU DON’T KNOW WHERE SPECIES ARE. **ALBUQUERQUE, F.**, and P. Beier
- 10:45–11:00 TOO BIG TO MEASURE: RETHINKING CONSERVATION MEASURES IN THE LANDSCAPE CONSERVATION COOPERATIVES. **PETERSEN, B.**
- 11:00–11:15 SYSTEMATIC CONSERVATION PLANNING FOR CLIMATE RESILIENCE: INTEGRATING COARSE AND FINE-FILTER CONSERVATION TARGETS. **CARROLL, C.**
- 11:15–11:30 INTEGRATING MULTIPLE STAKEHOLDERS AND JURISDICTIONS INTO THE GREATER GRAND CANYON LANDSCAPE ASSESSMENT. **RUNDALL, J.**, S. Stortz, T. Sisk, T. Chaudhry, C. Aslan
- 11:30–11:45 IMPACTS OF ROADS ON GENE FLOW AND GENETIC DIVERSITY OF TWO KANGAROO RAT SPECIES. **JARVIS, K.J.**, B.G. Dickson, P. Beier, S.A. Cushman, and J.A. Wilder
- 11:45–12:00 DEVELOPMENT OF TRANSBOUNDARY LAND USE AND COVER MODELS TO INFORM CONSERVATION PLANNING EFFORTS IN THE SOUTHWEST. **THEOBALD, D.M.**

Animal Ecology – General Session

Doyle

Wednesday, 10:15 AM – 12:15 PM

Moderator: Faith Walker, School of Forestry and Center for Microbial Genetics and Genomics, Northern Arizona University

- 10:15–10:30 TWO THOUSAND YEARS ON THE COLORADO PLATEAU: SPOTTED BAT GENETIC DIVERSITY REVEALED BY CONTEMPORARY, HISTORICAL, AND ANCIENT DNA. Walker, F.M., C.J. Sobek, D.E. Sanchez, R.C. Fleischman, J.T. Foster, and **C.L. CHAMBERS**
- 10:30–10:45 BATS AS DRIVERS OF BACTERIAL BIODIVERSITY ACROSS MULTIPLE TROPHIC LEVELS OF SUBTERRANEAN BIOMES. Fofanov, V., C.M. Hepp, **D.E. SANCHEZ**, C.J. Sobek, C.L. Chambers, and F.M. Walker
- 10:45–11:00 STASIS AND CHANGE IN HOLOCENE SMALL MAMMAL DIVERSITY DURING A PERIOD OF ARIDIFICATION IN SOUTHEASTERN UTAH. **STEGNER, M.A.**
- 11:00–11:15 DESERT BIGHORN SHEEP IN THE BIG DITCH. **HOLTON, B.**, C. Epps, R. Monello, and K. Ironside
- 11:15–11:30 THE IMPORTANCE OF RECURSIVE MOVEMENTS IN IDENTIFYING BEHAVIORS FOR A FOOD CACHING PREDATOR, PUMA CONCOLOR. **IRONSIDE, K.E.**, D. Mattson, T. Theimer, B. Jansen, B. Holton, T. Arundel, M. Peters, and T. Edwards, Jr.
- 11:30–11:45 ASSASSIN BUG (HEMIPTERA: REDUVIIDAE) DIVERSITY AND BIOGEOGRAPHY IN THE COLORADO RIVER BASIN, WITH AN EMPHASIS ON THE COLORADO PLATEAU ECOREGION, SOUTHWEST USA. **CHAVEZ, J.L.**, and L.E. Stevens
- 11:45–12:00 INFLUENCES OF THE TAMARISK LEAF BEETLE (*DIORHABDA CARINULATA*) ON BIRDS ALONG THE DOLORES RIVER IN SOUTHWEST COLORADO. **VAN RIPER III, C.**, S.L. Puckett, A.J. Darrah, and H.F. Greeney
- 12:00–12:15 COMPARISON OF ARTHROPOD COMMUNITIES IN TWO BLACKBRUSH HABITATS, UNIVERSITY OF UTAH RIO MESA FIELD STATION, SOUTHEASTERN UTAH. **GRAHAM, T. B.**

**Understanding Climate Resiliency Planning and Actions in the Southwest – Special Interactive Session
Rees**

Wednesday, 10:15 AM – 11:00 AM
Facilitator: Tamara Wall, Desert Research Institute

This is a special interactive session. Decision makers and planners across all sectors—water management, natural resources, energy, agriculture, transportation, human health—are to share their “micro” stories of experiences they have had trying to understand and plan for climate-driven events. For example, extended drought, floods, heat events, or wildfires as well as more gradual changes such as shifts in precipitation cycles or temperatures.

**Toward the Future: Renewable Energy, Adaptive Management, Policy, and Education – General
Session**

Rees
Wednesday, 1:15 AM – 3:15 PM

Moderator: Dominique Bain, School of Earth Science and Environmental Sustainability, Northern Arizona University

- 1:15–1:30 INFORMING RENEWABLE ENERGY DEVELOPMENT DECISIONS WITH LANDSCAPE BIODIVERSITY MEASURES. **THOMAS, K.A.**, C.J. Jarchow, P. Jamwal, T.R. Arundel, and A. Borens
- 1:30–1:45 ENVIRONMENTAL AND HEALTH BENEFITS OF UTILIZING WOODY BIOMASS FOR ELECTRICITY GENERATION IN ARIZONA. **HUANG, C.-H.**, and B. Bagdon
- 1:45–2:00 CARBON DIOXIDE REGULATION AND POWER PLANTS ON THE PLATEAU: ARIZONA’S RESPONSE TO THE ENVIRONMENTAL PROTECTION AGENCY’S CLEAN POWER PLAN. **WADSACK, K.**, and D. Bain
- 2:00–2:15 HOW THE MINUTE 319 ENVIRONMENTAL FLOWS AFFECTED THE ESTABLISHMENT OF RIPARIAN VEGETATION IN THE COLORADO RIVER DELTA, MEXICO. **GOMEZ-SAPIENS, M.**, P. Shafroth, E. Lundgren, K. Flessa, E.P. Glenn
- 2:15–2:45 BASELINE SOUNDSCAPE CONDITIONS IN THE GRAND STAIRCASE-ESCALANTE NATIONAL MONUMENT. **MACE, B.L.**, S. Clements, A. Vittum-Jones, L. Reynolds, J. Anderson, L. Gale, and E. Brown
- 2:45–3:00 THE BOSQUE ECOSYSTEM MONITORING PROGRAM: HOW YOUNG CITIZEN SCIENTISTS ARE CONTRIBUTING TO THE RIO GRANDE’S HEALTH. **KRUSE, A.**
- 3:00–3:15 MULTI-DISCIPLINARY APPROACHES TO CLIMATE CHANGE COMMUNICATION. **MARTINEZ, T.**

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**Landscape-Scale Monitoring of Dryland Vegetation for Science and Management – Invited Session
Fremont**

Wednesday, 1:15 AM – 5:30 PM

Moderator: Seth Munson, Southwest Biological Science Center, U.S. Geological Survey; and Miguel Villarreal, Western Geographic Science Center, U.S. Geological Survey

- 1:15–1:35 THE U.S. MARINE CORPS VERSUS THE SAHARA MUSTARD. **MALUSA, J.**
- 1:35–1:55 REPEATED LANDSCAPE-SCALE TREATMENTS FOLLOWING FIRE SUPPRESS A NON-NATIVE ANNUAL GRASS AND PROMOTE RECOVERY OF NATIVE PERENNIAL VEGETATION. **LONG, A. L.**, S.M. Munson, C. Decker, K.A. Johnson, K. Walsh, and M. Miller
- 1:55–2:15 MULTISCALED APPROACHES TO SOUTHWESTERN ARID LANDS VEGETATION MONITORING, MODELING, AND MANAGEMENT. **SESNIE, S.E.**, L.J. Zackmann, B.G. Dickson, E. Yurcich, Jill M. Rundall, and L. Johnson
- 2:15–2:35 APPLICATION OF BLM’S ASSESSMENT, INVENTORY AND MONITORING STRATEGY FOR MULTI-SCALE LAND HEALTH ASSESSMENT ON GRAND STAIRCASE-ESCALANTE NATIONAL MONUMENT, UTAH. **MILLER, K.H.**, S.E. McCord, E. Kachergis, and L.J. Zachmann
- 2:35–2:55 AN INTEGRATED MULTI-PLATFORM APPROACH FOR ASSESSING BRUSH MANAGEMENT CONSERVATION EFFORTS IN SEMIARID RANGELANDS. **HOLIFIELD COLLINS, C.**
- 2:55–3:15 VEGETATION MONITORING USING LIDAR AND HIGH RESOLUTION IMAGERY ON THE BARRY M. GOLDWATER RANGE, ARIZONA. **BLACK, C.W.**
- 3:15–3:30 **BREAK**

- 3:30–3:50 MONITORING VEGETATION RECOVERY AT RIVER RESTORATION SITES WITH SMALL UNMANNED AERIAL SYSTEMS AND LIDAR. **NORMAN L.M.**, and N.R. Wilson
- 3:50–4:10 THE ECOLOGICAL FOOTPRINT OF DROUGHT LEGACIES ACROSS PLANT COMMUNITIES ON THE NORTHERN COLORADO PLATEAU USING REMOTE SENSING. **BUNTING, E.**, S. Munson, M. Villarreal, and D. Thoma
- 4:10–4:30 HIGH FREQUENCY VEGETATION MONITORING FOR DYNAMIC TIMES IN SEMIARID RANGELANDS. **THOMA, D.**, K.M. Irvine, S. Munson, E. Bunting, and D. Witwicky
- 4:30–4:50 MAPPING INVASIVE BUFFELGRASS IN SOUTHERN ARIZONA USING THE TEMPORAL DYNAMICS OF LANDSCAPE GREENNESS RESPONSE TO PRECIPITATION. Wallace, C.S.A., **J.J. WALKER**, and J.F. Weltzin
- 4:50–5:10 DEVELOPING LANDSCAPE CHANGE SCENARIOS FROM LONG-TERM MONITORING DATABASES. **SOULARD, C.E.**, M.L. Villarreal, S.M. Munson, E.L. Bunting, B.M. Sleeter, and T.S. Wilson
- 5:10–5:30 CHARACTERIZING REMOTE SENSING SHRUBLAND COMPONENTS IN THE MOJAVE DESERT. **XIAN, G.**, and C. Homer

Conservation in a World of Novel Ecosystems: Approaches, Attitudes, and Case Studies from Across the Globe with Application to the Colorado Plateau – Invited Session

Doyle

Wednesday, 1:15 AM – 3:15 PM

Moderator: Clare Aslan, Conservation Science Partners and Landscape Conservation Initiative, Northern Arizona University; and Cari Kimball, Matthew Millar, and Sasha Stortz, Landscape Conservation Initiative, Northern Arizona University

- 1:15–1:30 DEFINITION, EXAMPLES, AND GLOBAL EXTENT OF NOVEL ECOSYSTEMS. **BEIER, P.**
- 1:30–1:45 ESTIMATING PRESCRIBED FIRE EFFECTS ON SEMIDESERT VEGETATION COMPOSITION AND STRUCTURE USING A 30-YEAR LANDSAT DERIVED FIRE HISTORY DATA. **YURCICH, E.**, S.E. Sesnie, and T.D. Sisk
- 1:45–2:00 CONSERVATION CONSEQUENCES OF RAPID COMMUNITY EVOLUTION IN RESPONSE TO CLIMATE CHANGE AND INVASIVE SPECIES. **WHITHAM, T.G.**, C.A. Gehring, K.C. Grady, D.S. Smith, S.M. Shuster, and G.J. Allan
- 2:00–2:15 INVESTIGATING THE EFFECTS OF BIOCONTROL OF AN INVASIVE SPECIES ON RIPARIAN BIRD COMMUNITIES. Foster, J.T., M.J. Johnson, **S.M. MAHONEY**, T.C. Theimer T.C.
- 2:15–2:30 NOVEL ECOSYSTEMS IN NORTHERN NEW MEXICO. **HAFFEY, C.**, and C.D. Allen,
- 2:30–2:45 THE CALIFORNIA CONDOR IN A NOVEL ECOSYSTEM: COMPLEXITIES FROM A TO Z. **PARISH, C.**
- 2:45–3:00 NOVEL ECOSYSTEMS ARE STRUCTURED BY NOVEL INTERACTIONS: THE ROLE OF NON-NATIVE SPECIES IN POLLINATION. **ASLAN, C.E.**
- 3:00–3:15 LINKING THEORY AND PRACTICE WHILE NAVIGATING ECOSYSTEM CHANGE IN THE SOUTHWEST. **SISK, T.D.**

**Uranium Mining and the Grand Canyon – Special Session
Humphreys**

Wednesday, 3:30 PM – 5:50 PM

Moderators: Donald Bills, Arizona Water Science Center, U.S. Geological Survey; and Jo Ellen Hinck, Columbia Environmental Research Center, U.S. Geological Survey

- 3:30–3:50 DUST EMISSIONS FROM URANIUM MINES IN THE GRAND CANYON REGION. **DUNIWAY, M.C.**, J.E. Hinck, and K. Walton-Day
- 3:50–4:10 BIOAVAILABILITY OF URANIUM TO AQUATIC INVERTEBRATES: HOW MODELING CAN HELP TO UNDERSTAND U BIOACCUMULATION. **CROTEAU, M.-N.**, C.C. Fuller, and D.J. Cain
- 4:10–4:30 HABITAT USE BY BATS AT AND NEAR URANIUM MINES WITHIN THE GRAND CANYON NATIONAL PARK REGION. **VALDEZ, E.**
- 4:30–4:50 CHEMICAL AND RADIOCHEMICAL CHARACTERIZATION IN BIOTA AT THE CANYON URANIUM MINE, KAIBAB NATIONAL FOREST, COCONINO COUNTY, ARIZONA. **HINCK, J.E.**, W. Brumbaugh, D. Cleveland, and G. Linder
- 4:50–5:10 VARIATION IN SURFACE GAMMA RADIATION AROUND BRECCIA-PIPE URANIUM DEPOSITS BEFORE, DURING, AND AFTER MINING IN THE GRAND CANYON, ARIZONA REGION. **WALTON-DAY, K.**, and D. Naftz
- 5:10–5:30 GEOCHEMISTRY OF SPRINGS IN SNAKE GULCH, AZ COMPARED WITH THE GEOCHEMISTRY OF THE RECLAIMED PIGEON MINE. **BEISNER, K.**, N. Paretti, D. Naftz, D. Bills, F. Tillman, and K. Walton-Day
- 5:30–5:50 MONITORING AND EVALUATION OF THE EFFECTS OF NATURAL, LEGACY, AND CURRENT URANIUM MINING WATER RESOURCES IN THE GRAND CANYON REGION OF NORTHERN ARIZONA. **BILLS, D.J.**, J. Macy, and F. Tillman

NOTE: Extended questions and answer will follow this session (Ponderosa)

Nonnative Species – General Session

Doyle

Wednesday, 3:30 PM – 5:30 PM

Moderator: Barbara Ralston, U.S. Geological Survey, Office of Science Quality and Integrity

- 3:30–3:45 MAPPING WEEDS ON ANCESTRAL LANDS: A COLLABORATIVE PILOT PROGRAM ENGAGING NAVAJO AND HOPI YOUNG ADULTS. **PYROOZ, N.**, C. Robles, and A. Ciocco
- 3:45–4:00 OVERGRAZING BY BISON DESTABILIZES SOIL AND DIMINISHES PLANT GROWTH IN GRAND CANYON NATIONAL PARK. **WAN, H.Y.**, T.D. Sisk, T.D. and R.L. Sanford, Jr.
- 4:00–4:15 QUAGGA MUSSEL CONTAINMENT AT GLEN CANYON NATIONAL RECREATION AREA. **ALLEN, C.R.**
- 4:15–4:30 QUAGGA MUSSELS IN LAKE POWELL. **ANDERSON, G.M.**, and J.M. Murchie
- 4:30–4:45 REMOVAL OF NONNATIVE FISH SPECIES FROM DISCONNECTED BACKWATERS. **FINNEGAN, A.D.**
- 4:45–5:00 CONDITIONING HATCHERY-REARED FISH TO RECOGNIZE NON-NATIVE PREDATORS. **O’NEILL, M.W.**, W.T. Stewart, and A. Finnegan
- 5:00–5:15 LIMESTONE SPRINGS PROVIDE A POSSIBLE REFUGE FOR NATIVE SPECIES FROM NON-NATIVE CRAYFISH. **WATTS, S.W.**, C.A. Drost, and J.E. Lovich

5:30 – 7:30 **Fires of Change art exhibition and reception at the Coconino Center for the Arts.**
Hosted by the NAU Landscape Conservation Initiative, Southwest Fire Science Consortium, and Flagstaff Arts Council. **(Admission and reception free to conference participants and shuttle provided.)**

Thursday, October 8, 2015

DAY 3

AM Departure Colorado River Fieldtrip (Open to all participants with additional fee)
7:00–8:00 AM Morning Refreshments (**Humphreys**)

Preparing for, Identifying, and Responding to Climate Change Impacts at Archaeological Sites within National Parks and Monuments in Arizona – Special Session

Agassiz

Thursday, 8:00 AM – 10:00 AM

Moderators: Organizers: Erin Gearty, Flagstaff Area National Monuments, National Park Service; and Nicole Arendt, Flagstaff Area National Monuments, National Park Service

- 8:00–8:15 DEVELOPING A SERVICE-WIDE APPROACH TO UNDERSTANDING CLIMATE CHANGE-RELATED CULTURAL RESOURCE IMPACTS AT NATIONAL PARK SERVICE UNITS. **GUEBARD, M.C.**
- 8:15–8:30 CLIMATE CHANGE VULNERABILITY AND RISK ASSESSMENT FRAMEWORK FOR CULTURAL RESOURCES IN THE NATIONAL PARK SERVICE’S INTERMOUNTAIN REGION VANISHING TREASURES PROGRAM. **JEFFERY, R.B.**
- 8:30–8:45 DESIGNING A MONITORING PROGRAM TO INFORM ADAPTIVE MANAGEMENT OF CULTURAL RESOURCES IN THE CONTEXT OF A CHANGING CLIMATE: AN EXAMPLE FROM GLEN AND GRAND CANYONS, ARIZONA. **FAIRLEY, H.**, B. Collins, J. Sankey, and J. Caster
- 8:45–9:00 TRACKING PATTERNS OF CLIMATE CHANGE IMPACTS TO ARCHAEOLOGICAL SITES AT FLAGSTAFF AREA NATIONAL MONUMENTS. **ARENDR, N.M.**
- 9:00–9:15 USING MONITORING DATA AND PREDICTIVE MODELING TO IDENTIFY, ASSESS, AND RESPOND TO CLIMATE CHANGE IMPACTS TO ARCHEOLOGICAL SITES AT FLAGSTAFF AREA NATIONAL MONUMENTS. **GEARTY, E.**
- 9:15–9:30 EXPLORING OPPORTUNITIES FOR COLLABORATION, RESEARCH, AND CLIMATE CHANGE VULNERABILITY ASSESSMENT ON PLANTS TRADITIONALLY HARVESTED WITHIN FLAGSTAFF AREA NATIONAL MONUMENTS BY CULTURALLY AND HISTORICALLY AFFILIATED TRIBES. **HUFFER, D.**
- 9:30–9:45 ASSESSING CLIMATE CHANGE IMPACTS TO CULTURAL RESOURCES IN A GEOMORPHICALLY DIVERSE ENVIRONMENT IN PETRIFIED FOREST NATIONAL PARK. **SCHOTT, A.**, and W. Reitze
- 9:45–10:00 DISCUSSION

Forests in the Oven: Implications of “Hotter Drought” for Forest Ecosystems and Their Management in the Southwestern U.S. – Invited Session

Humphreys

Thursday, 8:00 AM – 12:15 PM

Organizers: Carolyn A.F. Enquist, Southwest Climate Science Center, U.S. Geological Survey; David D. Breshears, School of Natural Resources and the Environment, University of Arizona; Stephen T. Jackson, Southwest Climate Science Center, U.S. Geological Survey; and Teresa R. Krause, Southwest Climate Science Center, U.S. Geological Survey

- 8:00–8:15 SESSION OVERVIEW AND INTRODUCTION. **ENQUIST, C.A.F.**, and S.T. Jackson
- 8:15–8:30 RECENT INSIGHTS ON TREE DIE-OFF FROM HOTTER DROUGHT. **BRESHEARS, D.D.**, H.D. Adams, C.D. Allen, G.A. Barron-Gafford, J.B. Bradford, N.S. Cobb, E.S. Garcia, T.E. Huxman, D.J. Law, N.G. McDowell, K.X. Ruthrof, S.R. Saleska, S.C. Stark, A.L.S. Swann, and J.C. Villegas
- 8:30–8:45 A SYNTHESIS OF CONTRASTING EVIDENCE AND PERSPECTIVES ON GLOBAL VULNERABILITY TO TREE MORTALITY AND FOREST DIE-OFF FROM HOTTER DROUGHT IN THE ANTHROPOCENE. **ALLEN, C.D.**, D.D. Breshears, and N.G. McDowell
- 8:45–9:00 CLIMATE CHANGE, DROUGHT, AND TREE MORTALITY IN THE SOUTHWESTERN US. **BRADFORD, J.B.**, D.M. Bell, and W.K. Lauenroth
- 9:00–9:15 BARK BEETLES, OUTBREAKS, AND DROUGHT: CAUSES OF WIDESPREAD TREE MORTALITY IN THE SOUTHWEST. **HICKE, J.A.**, W.R.L. Anderegg, C.D. Allen, and N.L. Stephenson
- 9:15–9:30 FROM RESTORATION TO RESILIENCE ECOLOGY: WILL INTERACTIONS OF LANDSCAPE DISTURBANCE AND CLIMATE CHANGE TRIGGER RAPID ECOSYSTEM SHIFTS? **FALK, D.A.**
- 9:30–10:00 FACILITATED PANEL-AUDIENCE DISCUSSION

- 10:00–10:15 **Break**

- 10:15–10:30 HOT DROUGHTS AND LESSONS FOR THE NEW ERA OF FOREST MANAGEMENT. **STEPHENSON, N.L.**, and A.J. Das
- 10:30–10:45 INSIGHT INTO PRE- AND POST-FIRE MANAGEMENT IN THE FACE OF CLIMATE CHANGE. **FULÉ, P.Z.**, A. Azpeleta-Tarancón, and K. Shive
- 10:45–11:00 DOES PRESCRIBED FIRE PROMOTE FOREST RESISTANCE TO DROUGHT? **VAN MANTGEM, P.J.**, A. Caprio, N.L. Stephenson, and A.J. Das
- 11:00–11:15 RESPONSES OF WILDLIFE HABITAT TO CLIMATE VARIABILITY AND FIRE IN SAGEBRUSH SHRUBSTEPPE AND PINYON AND JUNIPER WOODLANDS. **FLEISHMAN, E.**, and D.S. Dobkin
- 11:15–11:30 EFFECTS OF CLIMATE VARIABILITY AND ACCELERATED FOREST THINNING ON WATERSHED-SCALE RUNOFF IN SOUTHWESTERN USA PONDEROSA PINE FORESTS. **ROBLES, M.D.**, R.M. Marshall, F. O’Donnell, E.B. Smith, J.A. Haney, and D.F. Gori
- 11:30–11:45 SPEAKER TBD OR FACILITATED DISCUSSION
- 11:45–12:10 FACILITATED PANEL-AUDIENCE DISCUSSION
- 11:45–12:10 WRAP UP AND CLOSING REMARKS

Plant Ecology – General Session
Fremont

Thursday, 8:00 AM – 12:15 PM

Moderator: Todd Wojtowicz, Department of Biological Sciences, Northern Arizona University

- 8:00–8:15 DIRECT EFFECTS OF SEASONAL PRECIPITATION AND TEMPERATURE ON THE DEMOGRAPHY OF TWO DOMINANT BUNCHGRASSES IN NORTHERN ARIZONA. **DOWLING, H.E.**, R.T. Strahan, D.C. Laughlin, J.D. Bakker, and M.M. Moore
- 8:15–8:30 SEASONAL PRECIPITATION AND WARMING EFFECTS ON THE NATIVE GRASS, PLEURAPHIS JAMESII, ON THE COLORADO PLATEAU. **RUTHERFORD, W.A.**, S.C. Reed, S. Ferrenberg, and J. Belnap
- 8:30–8:45 SENSITIVITIES OF DOMINANT PLANTS TO CHRONIC DROUGHT IN THE COLORADO PLATEAU. **HOOVER, D.**, M. Duniway, and J. Belnap
- 8:45–9:00 WOODLAND RECOVERY FOLLOWING DROUGHT-INDUCED TREE MORTALITY ACROSS AN ENVIRONMENTAL STRESS GRADIENT. **REDMOND, M.D.**, N.S. Cobb, M.J. Clifford, and N.N. Barger
- 9:00–9:15 NUTRIENT ADDITION CHANGE NITROGEN FIXATION RATES OF COLORADO PLATEAU SOIL CRUST. **ROYBAL, C.M.**, and S.C. Reed
- 9:15–9:30 A FUNCTIONAL TRAIT-BASED MODEL PREDICTS DIFFERENT RATES OF GERMINATION AND ESTABLISHMENT AMONG GRASS SPECIES UNDER EXPERIMENTALLY-CONTROLLED LIGHT AND SOIL CONDITIONS. **STRAHAN, R.T.**, D.C. Laughlin, and M.M. Moore
- 9:30–9:45 IDENTIFYING DEGRADED GRASSLANDS AND RELATED DRIVERS IN PARK LANDS GRAZED BY LIVESTOCK. **WITWICKI, D.L.**, M.E. Miller, and M.W. Van Scoyoc
- 9:45–10:00 AN UPWARD SHIFT OF ENGELMANN SPRUCE IN SPARSE OLD-GROWTH FORESTS ON THE PINALEÑO MOUNTAINS IN THE AMERICAN SOUTHWEST. **TRUETTNER, C.M.**, K.L. Cole, R.S. Anderson, R. D'Andrea, Z. Jarrad, M. Peters, N.S. Cobb
- 10:00–10:15 **Break**
- 10:15–10:30 FINE-SCALE FOREST PATTERNS AND LANDSCAPE ECOLOGY OF POWELL PLATEAU, GRAND CANYON NATIONAL PARK. **SÁNCHEZ MEADOR, A.J.**, T.Z. Wasserman, M.T. Stoddard, and J.P. Roccaforte
- 10:30–10:45 A NATIONAL BIOMASS ESSENTIAL CLIMATE VARIABLE (ECV): ARE WE THERE YET? **WU, Z.**, J. Stoker, D. Dennis, B. Middleton, J. Vogel, M. Velasco
- 10:45–11:00 LEAF LITTER MORPHOLOGY INFLUENCES MOISTURE DYNAMICS AND PREDATOR ABUNDANCE: IMPLICATIONS FOR DECOMPOSITION AND FIRE. **WOJTOWICZ, T.**, Z.G. Compson, T.G. Whitham, and C.A. Gehring

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Conservation Management and Planning – General Session

Doyle

Thursday, 8:00 AM – 12:15 PM

Moderator: Matthew Johnson, Colorado Plateau Research Station, Northern Arizona University

- 8:00–8:15 SPECIES FROM FECES: A TOOL FOR GENETICALLY IDENTIFYING BATS. **WALKER, F.M.**, C.H.D. Williamson, D.E. Sanchez, C.J. Sobek, C.L. Chambers
- 8:15–8:30 A METHODOLOGY FOR USING LIDAR DATA TO MODEL MEXICAN SPOTTED OWL (*STRIX OCCIDENTALIS LUCIDA*) NESTING/ROOSTING HABITAT ON THE NORTH RIM OF GRAND CANYON NATIONAL PARK. **GDULA, E.**, and G. Holm

- 8:30–8:45 PROJECTING EFFECTS OF CLIMATE AND HABITAT FRAGMENTATION ON BIRD AND REPTILE RANGES IN WESTERN USA. **HATTEN, J.R.**, J.T. Giermakowski, M.J. Johnson, J.A. Holmes, E.M. Nowak, K. Ironside, C. van Riper III, M. Peters, C. Truettner, and K.L. Cole
- 8:45–9:00 ASSESSING UNGULATES' ROLE IN RIPARIAN HUMMOCKING ON THREE NATIONAL FORESTS IN SOUTHERN UTAH. **SMITH, C.W.**
- 9:00–9:15 VEGETATION STRUCTURE CONDITIONS ACROSS THE COLORADO PLATEAU USING LANDFIRE: DEPARTURE FROM REFERENCE CONDITIONS. **SWATY, R.L.**, K. Blankenship, S. Hagen, J. Patton, and J. Smith
- 9:15–9:30 ESTIMATING LANDSCAPE RESISTANCE FROM HABITAT SUITABILITY. **KEELEY, A.T.K.**, P. Beier, and J. Gagnon
- 9:30–9:45 OPTIMIZING PONDEROSA PINE FOREST MANAGEMENT REGIMES TO MAXIMIZE THE PRODUCTION OF MULTIPLE ECOSYSTEM SERVICES. **BAGDON, B.**, and C.-H. Huang
- 9:45–10:00 THE ROLE OF COLLABORATION IN SCIENCE-BASED DECISION-MAKING IN THE USDA FOREST SERVICE'S COLLABORATIVE FOREST LANDSCAPE RESTORATION PROGRAM. **COLAVITO, M.**
- 10:00–10:15 **Break**
- 10:15–10:30 THE FINGERS HAVE IT: THE CASE FOR PLEISTOCENE MAMMOTH PETROGLYPHS NEAR BLUFF, UTAH, USA. **MALOTKI, E.**
- 10:30–10:45 SUSTAINABILITY AND THE ARCHAEOLOGICAL EXAMPLE: WATER CONSERVATION STRATEGIES OF PREHISTORIC GROUPS IN THE SOUTHWEST. Berry, S.P., and **N.M. ARENDT**
- 10:45–11:00 RESTORING HEISER SPRING AT WUPATKI NATIONAL MONUMENT. **WHITEFIELD, M.P.**

Current Research on Rock Art from the Southern Colorado Plateau – Special Session

Agassiz

Thursday, 10:15 AM – 12:15 PM

Moderators: Kimberly Spurr, Museum of Northern Arizona

- 10:15–10:30 FULFILLING OUR MISSION: DOCUMENTATION, PUBLIC INTERPRETATION, AND PRESERVATION OF PETROGLYPHS AT HORSESHOE MESA (WS834), WUPATKI NATIONAL MONUMENT, ARIZONA. **BALDWIN, L.**, and K. Spurr
- 10:30–10:45 WEATHERING PATTERNS OF ROCK ART PANELS AT HORSESHOE MESA, WUPATKI NATIONAL MONUMENT, ARIZONA. **ANDERSON, K.C.**
- 10:45–11:00 PETROGLYPH ELEMENT DISTRIBUTION AND PATTERNS AT HORSESHOE MESA (WS834), WUPATKI NATIONAL MONUMENT, ARIZONA. **PURCELL, D.E.**, and K.C. Spurr
- 11:00–11:15 NEW EVIDENCE FOR CALENDRIAL PETROGLYPHS AT HORSESHOE MESA (WS834), WUPATKI NATIONAL MONUMENT, ARIZONA. **PURCELL, D.E.**
- 11:15–11:30 SYNOPSIS OF RECENT ROCK ART RESEARCH AT PETRIFIED FOREST NATIONAL PARK, ARIZONA. **REITZE, W.**
- 11:30–11:45 TESTING FOUR LOW-COST PETROGLYPH SKETCHING METHODS AT PETRIFIED FOREST NATIONAL PARK, ARIZONA. **LOHMAN, N.E.**
- 11:45–12:00 MODERN APPROACHES TO ROCK ART DOCUMENTATION. **BILLO, E.B.**, and R.K. Mark
- 12:00–12:15 QUESTIONS & ANSWERS

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Conference Adjourns – **THANK YOU!!!**