

2025

**17th Biennial Conference of
Science & Management
for the Colorado Plateau &
Southwest Region**
Flagstaff • Arizona • USA
September 8–10



Agenda & Program





17th Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region

September 8–10, 2025

duBois Center, Northern Arizona University, Flagstaff, Arizona

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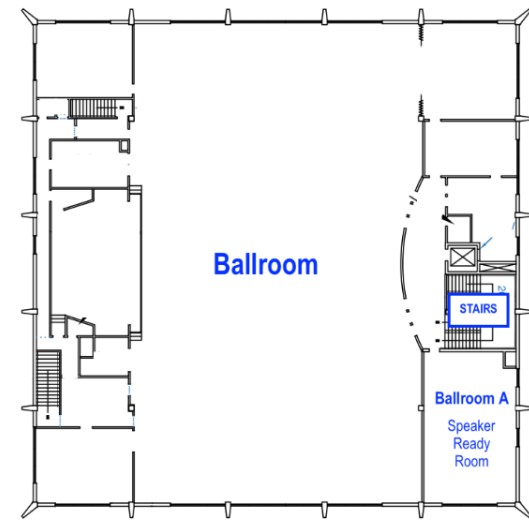
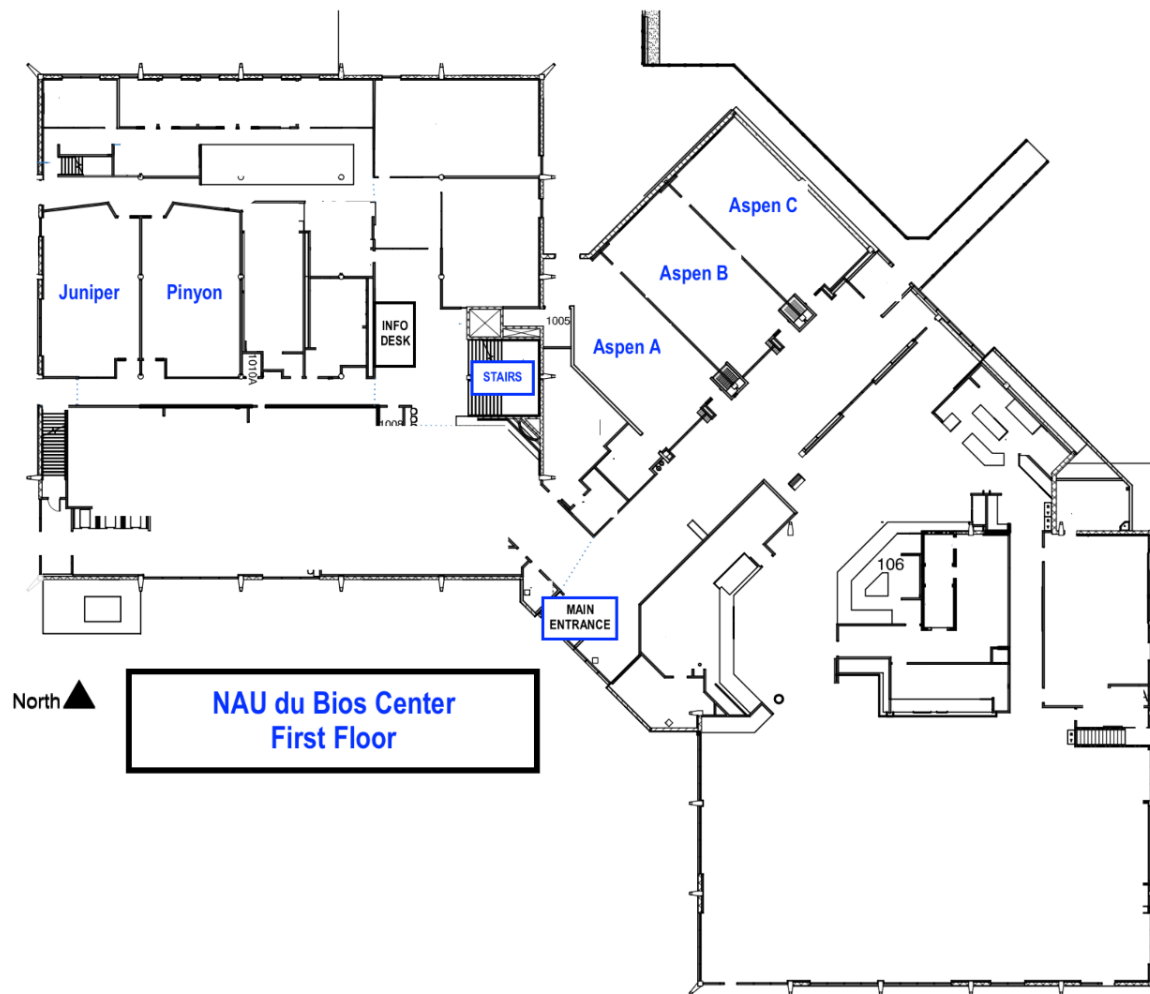
17th Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region
At-A-Glance Program

Time	Aspen A	Aspen B	Aspen C	Juniper	Pinyon	Ballroom	Ballroom A
Monday, Sept. 8, 2025							
CLIENTS' DAY & REGISTRATION: du Bois Center Ballroom (9 AM to 4 PM)							
8 AM to 4 PM	FIELDTRIP: Ecological Changes around the San Francisco Peaks Revealed by Modern Repeats of Historical Photographs – Please meet in front of du Bois (Vankat)						
9:00 AM to 12:00 PM			WORKSHOP: Venomous Reptile Ecology Awareness and Safe Handling Training (Nowak)				Speaker-ready Room
10:00 AM to 12:00 PM	Desert Southwest CESU Meeting (By invitation)	Colorado Plateau CESU Meeting (By invitation)					Speaker-ready Room
12:00 to 3:00 PM		CESU Joint Meeting (By invitation)					Speaker-ready Room
1:00 to 4:00 PM				WORKSHOP: Leveraging TWIG: An Open-Access Geodatabase to Analyze Wildfire and Fuel Treatment Interactions (Franko)	WORKSHOP: Python for Ecologists: Diversifying Skills in Open-source Programming Languages to Advance Interdisciplinary Collaborations (Khan et al.)		Speaker-ready Room

Time	Aspen A	Aspen B	Aspen C	Juniper	Pinyon	Ballroom	Ballroom A
Tuesday, Sept. 9, 2025							
7 to 8 AM	REGISTRATION & MORNING REFRESHMENTS: du Bois Center Ballroom						Speaker-ready Room
8 to 9 AM	WELCOME & SCIENCE KEYNOTE ADDRESS: Park Williams, du Bois Center Ballroom						Speaker-ready Room
9 to 9:30 AM	BREAK: du Bois Ballroom						Speaker-ready Room
9:30 to 11:30	CONTRIBUTED: Conservation Management & Planning	Biological soil crusts of the Colorado Plateau (Smith et al.)	Ecology and Management of Pinyon-Juniper Woodlands in the US Southwest (Rodman & Thiele)	Anticipating the Future of Western Ecosystems (Pletcher & Shriver)	Invertebrate Science and Conservation in the Southwest (Thomas)		Speaker-ready Room
11:30 AM to 1 PM	BUFFET LUNCH: du Bois Ballroom						Speaker-ready Room
11:30 AM to 1 PM	WORKSHOP: Using open-source PhenoCam imagery and data to monitor vegetation change in drylands and beyond (Zimmerman et al) – Juniper						Speaker-ready Room
1 to 3 PM	Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region (Beisner et al.)	Part 1: Assessing Water Scarcity through Evapotranspiration and Plant Adaptations in the Colorado River Basin and Plateau (Nagler et al.)	Ecology and Management of Pinyon-Juniper Woodlands in the US Southwest (Rodman & Thiele) cont.	Infrastructure and Innovation for Ecological Restoration: Dryland Restoration with Plants or Biocrusts (Jech et al.)	Understanding the Ecological Impacts of Climate Change on Colorado Plateau Drylands Using Field-Based Approaches (Blais et al.)		Speaker-ready Room
1:00 to 1:15 PM	BREAK: du Bois Ballroom						Speaker-ready Room

3:15 to 5:15 PM	Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region (Beisner et al.)(cont.)	Part II: Restoration within Riparian Corridors: Integrative Science and Monitoring (Nagler et al.)	Ecology and Management of Pinyon-Juniper Woodlands in the US Southwest (Rodman & Thiele) cont.	Threats and Solutions for Colorado Plateau Working Landscapes (Brunson)	Wood For Life: a partnership supporting forest restoration through firewood distribution to local Tribes and communities (vonHedemann)		Speaker-ready Room
5:30 to 7:00 PM	CONFERENCE RECEPTION: 1899 Bar & Grill Ballroom & Patio - 307 W. Dupont Ave., Flagstaff, AZ - Parking in High Country Conference Center parking garage is available (please note there is an hourly fee) (Appetizers & no-host bar)						
7:00 to 8:30 PM	EVENING KEYNOTE SPEAKER: Robin Wall Kimmerer, author of <i>Braiding Sweetgrass</i> , Prochnow Auditorium -- Parking in High Country Conference Center parking garage is available (please note there is an hourly fee)						
Time	Aspen A	Aspen B	Aspen C	Juniper	Pinyon	Ballroom	Ballroom A
Wednesday, Sept. 10, 2025							
7 to 8 AM	REGISTRATION & MORNING REFRESHMENTS: du Bois Ballroom						Speaker-ready Room
8 to 10 AM	Fire, Water and Forest Through Indigenous and Western Sciences (Yazzie & Garrod)	Leveraging Large Ecological Datasets for Data-Informed Decision-Making (Degan et al.)	CONTRIBUTED: Plant Ecology Dynamics	Fight or Flight? Deciding between Mitigation and Adaptation in a Hotter, Drier Landscape (Driscoll & Godaire)			Speaker-ready Room
10:00 to 10:15 AM	BREAK: du Bois Ballroom						Speaker-ready Room
10:15 AM to 12:15 PM	Celebrating Fire Ecology and Management in the Southwest (McCormick)	Predictive Modeling for River Management (Palmquist et al.)	Genetic Approaches in Understanding and Mitigating Climate Change (Whitham)	Restoration of Madrean Oak Woodlands: Integrating Socio-ecological Systems to Support Traditional Acorn Harvest (Souther & Aslan)			Speaker-ready Room

12:15 to 1:15 PM	BUFFET LUNCH: du Bois Ballroom						Speaker-ready Room
12:15 to 1:15 PM	WORKSHOP: Collecting Environmental Data for NASA: How to Engage Your Community by Collecting Tree and Landcover Data with NASA's Mobile App (Keany et al) – Juniper						Speaker-ready Room
1:15 to 3:15 PM	Exploring Spokes of the Fire Adapted Communities Wheel across the Southwest (Brant & Krasilovsky)	Predictive Modeling for River Management (Palmquist et al.) cont.	Interdisciplinary Approaches to Resilient Human-Wildlife Coexistence (Keany et al.)	Management Relevant Adaptation Science in the Southwest (LeRoy)	CONTRIBUTED: Aquatic Ecosystems and Science Communication		Speaker-ready Room
3:15 to 3:30 PM	BREAK: du Bois Ballroom						Speaker-ready Room
Time	Aspen A	Aspen B	Aspen C	Juniper	Pinyon	Ballroom	Ballroom A
3:30 to 5:30 PM	Fire and forest restoration social science in the Southwest (vonHedemann)	Predictive Modeling for River Management (Palmquist et al.)	CONTRIBUTED: Dryland Restoration Strategies	CONTRIBUTED: Climate Drivers and Impacts	Geologic Studies on, under, and off the Colorado Plateau (Brennan & Porter)		
6:00 to 8:00 PM	POSTER SESSION & CELEBRATORY RECEPTION: Mother Road Brewery (Appetizers & complimentary beverages) CONFERENCE WILL PROVIDE SHUTTLE from du Bois to Mother Road and back						
ADJOURN: Thank you and safe travels!							



Monday, September 8, 2025 – Client's Day

Registration and Speaker Ready Room

8:00-3:00 PM Registration and Speaker Ready Room (Ballroom A)

Meetings

10:00 AM-12:00 PM Colorado Plateau CESU Meeting (by invitation, Aspen A)

10:00 AM-12:00 PM Desert Southwest CESU Meeting (by invitation, Aspen B)

12:00-1:00 PM CESU lunch (by invitation, du Bois Ballroom)

1:00-3:00 PM Joint CESU Meeting (by invitation, Aspen A/B)

Workshops

9:00–12:00 PM **Venomous reptile ecology awareness and safe handling training** – This workshop is intended to help participants learn how to safely handle venomous reptiles in a controlled, carefully supervised environment. The lecture section will be followed by a hands-on demonstration and class participation in supervised handling of non-venomous and venomous snakes, using snake-safe tongs and snake-proof holding containers. Participants will be provided handout materials that reinforce training concepts and additional resources for living safely with venomous reptiles. **Organizer:** Erika Nowak, Northern Arizona University, School of Earth and Sustainability & Center for Adaptable Western Landscapes (Fee: \$40, **Aspen C**).

1:00–4:00 PM **Leveraging TWIG: An Open-Access Geodatabase to Analyze Wildfire and Fuel Treatment Interactions**—This workshop aims to enhance data-driven decision-making in wildfire and fuel treatment management. The workshop equips participants with tools to integrate TWIG into management workflows, enhancing resource planning, and wildfire mitigation strategies. Participants will learn how to analyze treatment outcomes using real-world case studies, including the 2020 Mangum Fire in Northern Arizona, fostering data-driven insights tailored to specific landscapes. The workshop guides participants in using TWIG outputs—such as statistical analyses and spatial data—to support long-term conservation planning and adaptive management. **Organizer:** Aidan Franko (Free, **Juniper**)

1:00–4:00 PM **Python for Ecologists: Diversifying skills in open-source programming languages to advance interdisciplinary collaborations**—The course aims to deliver Python coding tutorials and reference material to attendees through a simple computing environment that requires minimal setup. While installation of Python and associated packages will not be required for the tutorial, the course will provide guidance on how to set up Python on personal laptops. By the end of the course, attendees will have a working understanding of Python tools that are relevant for temporal and spatial data analysis and visualization. Attendees will also learn how to use the collaborative coding environment of Google Colab. Organizer: Anam Khan; Marlee York; Brandon Strange; Rohan Boone (Free, **Pinyon**)

Field Trips

8:00 - 4:00 PM **Ecological Changes around the San Francisco Peaks Revealed by Modern Repeats of Historical Photographs** – Join ecologist John L. Vankat on a full-day field trip exploring ecological change in the San Francisco Peaks region through

repeat photography. Participants will visit nine historical photopoints, comparing 19th-century landscape images with present-day views to understand shifts in forest density, fire history, and grassland loss. This immersive experience will offer valuable insight for land managers, researchers, and students interested in long-term ecosystem change. The all-day tour involves light hiking (~2 miles) and visual analysis of century-long transformations in this iconic high-elevation landscape.

Organizer: John L. Vankat (Fee \$35). **Meet at 7:45 AM out front of the du Bois Center.**

Tuesday, September 9, 2025

Registration and Speaker Ready Room

7:00-8:00 AM	Morning Refreshments (du Bois Ballroom)
7:00-5:00 PM	Registration (du Bois Ballroom)
7:00-5:00 PM	Speaker Ready Room (Ballroom A)

Science Keynote Speaker: Dr. Park Williams – du Bois Ballroom

8:00-9:00 AM	Over the past four decades annual wildfire area in the western US has more than tripled, driven largely by a 10-fold increase in annual forest-fire area. Forest fires have become not only larger, but also more severe, and the explosive rise in western US forest-fire activity has occurred despite humanity's best efforts to suppress it. Atmospheric warming and drying, driven largely by human-caused climate change, has played a major role in promoting the increasingly large and severe fires, though natural ocean-atmosphere variability, fuel characteristics, human ignitions, and firefighting have also been important. This talk will use observations and modeling to assess how climate change, natural variability, and fuel dynamics have interacted to drive increasingly (du Bois Ballroom)
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Break (9:00-9:30 AM, du Bois Ballroom)

Invited and Contributed Talks

Contributed: Conservation Management and Planning

Tuesday, 9:30-11:30 AM (**Aspen A**)

Moderator: Ariel Leonard, USDA

9:30-9:45 AM	Towards forest management prescriptions to improve wildfire resilience and snowmelt water availability for forest health, fuels moisture, and water resources. BIEDERMAN, J.A. , P.D. Broxton, R. Dwivedi, J.K. Pearl, B.M. Svoma, J.M. Leonard, J. Kurzweil, C.J. Devine, T. Sankey, W.J.D. Van Leeuwen, S. Dymond, and M.D. Robles
9:45-10:00 AM	Quantifying vegetation state transition probabilities following fire and drought in the Upper Colorado River Basin. SEVERSON, J.P. , T.B.B. Bishop, A.C. Knight, T.W. Nauman, B.E. McNellis, M.L. Villarreal, S.C. Reed, K.E. Young, M. Brunson, and M.C. Duniway
10:00-10:15 AM	The Mogollon Highlands ecoregion: a previously neglected center of ecological diversity and high conservation value. FLEISCHNER, T.L. , D.A. DellaSala, and M.L. Floyd
10:15-10:30 AM	Early warning of climate and wildfire risk in the southwestern US. NORTON, C.L. , D.A. Falk, F.J. Triepke, R. Mitchell, and A. Lien

- 10:30-10:45 AM Crop water productivity utilizing field measurements and satellite remote sensing: a case study of irrigated cotton in the Central Valley of California. **FOLEY, D.**
- 10:45-11:00 AM Grazing as a climate adaptation tool leads to regional tradeoffs between fire and vegetation outcomes in sagebrush ecosystems. **HOLDREGE, M.C.**, D.R. Schlaepfer, K.A. Palmquist, W.K. Lauenroth, G. Bedrosian, A.V. Kumar, J.C. Tull, and J.B. Bradford
- 11:00-11:15 AM Mapping stinknet (*Oncosiphon pilulifer*) using harmonized Landsat and Sentinel data in southern Arizona's Sonoran Desert. **BROWN E.**, A. Erlich, B. Malmgren, M. Murray, and S. Harman
- 11:15-11:30 AM Identifying areas of high restoration potential following Utah Juniper (*Juniperus osteosperma*) encroachment. K. Crone-Willis, J. Dueweke, B. Leech, S. Oumarou Wate, S. Harman; presented by **A. CLAYTON**

Biological Soil Crusts of the Colorado Plateau

Tuesday, 9:30-11:30 AM (Aspen B)

Moderator: William Smith, Associate Professor, University of Arizona; Sasha Reed, Research Ecologist, U.S. Geological Survey; Miguel Villarreal, Research Geographer, U.S. Geological Survey; Stefanie Herrmann, Research Scientist, University of Arizona

- 9:30-9:45 AM New advances in biocrust science: how technology is helping us understand, scale, and restore these foundational communities like never before. **REED, S.C.**, M. Villarreal, S. Herrmann, and W.K. Smith
- 9:45-10:00 AM CrustNet: Global determinants of biodiversity in biocrusts, and outcomes for ecosystem function, resistance and resilience. **BOWKER, M.A.**, S. Jech, A. Darrouzet-Nardi, J. Ceja-Navarro, S.C. Reed, and A.J. Antoninka
- 10:00-10:15 AM Developing a multiscale hyperspectral Framework to Characterize biocrusts on the Colorado Plateau. **HERRMANN, S.M.**, W.K. Smith, R.F. Kokaly, M. Villarreal, and S.C. Reed
- 10:15-10:30 AM Biocrusts in a changing world: insights from climate and disturbance experiments. **LAURIA, C.M.**, A.J. Howell, E. Grote, M.L. Phillips, B. Smith, M. Villarreal, and S.C. Reed
- 10:30-10:45 AM Exploring links between biocrusts and dryland plant community composition. **HAVRILLA, C.A.**, J. Bacovcin, C. McIntyre, and M.L. Villarreal
- 10:45-11:00 AM Biocrust mosses and cyanobacteria show distinct carbon uptake responses to variations in precipitation amount and frequency. **YOUNG, K.E.**, O. Sala, C. Tucker, A. Darrouzet-Nardi, R. Finger-Higgins, M. Starbuck, and S.C. Reed
- 11:00-11:15 AM Hoofprints in time: seasonal grazing timing and biocrust cover in drought-stressed rangelands. **BISHOP, T.B.B.**, S. Wilson, L. Zeller, T. McCoy, P. Reeves, A. Knight, G. Tyree, R. Finger-Higgins, and M.C. Duniway
- 11:15-11:30 AM Discussion on Biological Soil Crusts of the Colorado Plateau

Part I: Ecology and Management of Pinyon-Juniper Woodlands in the U.S. Southwest

Session 1: Historical and recent changes in Pinyon-Juniper

Session 2: Management to promote resilience to drought

Tuesday, 9:30-11:30 AM (Aspen C)

Moderators: Kyle Rodman, Research Scientist, Ecological Restoration Institute, Northern Arizona University; Danika Thiele, Research Associate, Ecological Restoration Institute, Northern Arizona University

- 9:30-9:45 AM Assessing the state and trend of pinyon-juniper woodlands in the Southwest. **WITT, W.**
- 9:45-10:00 AM Positive drought feedbacks increase tree mortality risk in dry woodlands of the US Southwest. **RODMAN, K.C.**, M.D. Redmond, K.J. Wilkerson, A.P. Wion, D.W. Huffman, A.J. Antoninka, M. Barrera, and N.S. Cobb
- 10:00-10:15 AM Drivers of juniper dieback and resprouting in Northern Arizona following a global change-type drought. **BYERLY, S.N.**, J.B. Bradford, B.J. Butterfield, G.W. Koch, and C.A. Gehring
- 10:15-10:30 AM Management implications of recent changes in pinyon-juniper woodland complexity. **HUFFMAN, D.W.**, J.E. Crouse, K.C. Rodman, R.J. Pedersen, and J.D. Springer
- 10:30-10:45 AM Adaptive silviculture for drought resilience of pinyon-juniper woodlands in southwestern Colorado. **REDMOND, M.D.**
- 10:45-11:00 AM Pinus edulis radial growth increases following high-intensity silvicultural thinning. **REVENIS, G.G.**, K. Ramsey, A. Urza, P. Weisberg, and M. Redmond
- 11:00-11:15 AM Impacts of climate and stand structure on singleleaf pinyon pine seed production. **SYSKINE, Y.V.**, D. Macias, R. Frederick, A. Magruder, and M.D. Redmond
- 11:15-11:30 AM Multi-scale density-dieback relationships inform woodland management. **RAMSEY, K.**, A. Urza³, M. Redmond, and P. Weisberg

Anticipating the Future of Western Ecosystems

Tuesday, 9:30-11:30 AM (Juniper)

Moderator: Elise Pletcher, Graduate Research Assistant, University of Nevada-Reno; Robert Shriver, University of Nevada-Reno

- 9:30-9:45 AM Predicting landscape-scale vegetation structure and biomass under diverging global change scenarios. **STEARS, A.E.**, D.R. Schlaepfer, and J.B. Bradford
- 9:45-10:00 AM Climate-growth relationships from tree rings show no overall benefit of warming for a keystone and threatened high-elevation pine. **MARTINEZ, C.** and M.K. Evans
- 10:00-10:15 AM A glimpse into the past: using historical satellite and aerial imagery to anticipate woodland population dynamics in the western US. **PLETCHER, E.**, M. Shawcroft, S. Filippelli, P. Williams, J. Vogeler, and R.K. Shriver
- 10:15-10:30 AM Capacity and limitations of drone-based monitoring for plant population dynamics in sagebrush steppe. **CAUGHLIN, T.T.**, A. Zaiats, J. Cruz, J. Clare, and D. Delparte
- 10:30-10:45 AM Ecological forecasts to support post-fire restoration seeding of perennial grasses. **SIEGMUND, G.**, D.R. Schlaepfer, L.D. Bennion, M.I. Jeffries, A. Stears, A.B. Simler-Williamson, D.S. Pilliod, and J.B. Bradford
- 10:45-11:00 AM Community-climate disequilibrium impacts the productivity of western US rangelands. **STEMKOVSKI, M.**, J. Bradford, K. Clark-Wolf, L. Dee, K. Dobson, A. Felton, T. Gonçalves-Souza, G. Hooker, L. Johnson, A. Lynch, M. Morales, B. Osborne, M. Pastore, M. Pinsky, P. Reich, C. Rollinson, Y. Song, N. Ward, K. Zhu, and P. Adler
- 11:00-11:30 AM Discussion on Anticipating the Future of Western Ecosystems

Invertebrate Science and Conservation in the Southwest

Tuesday, 9:30-11:30 AM (Pinyon)

Moderator: **Kathryn Thomas**, Ecologist, USGS Southwest Biological Science Center

- 9:30-9:45 AM A tiny moth and an iconic desert tree: Investigating the eastern Joshua tree and its specialist pollinator. **THOMAS, K.A.** and M.K. Busby
- 9:45-10:00 AM Shedding light on the southwest spring firefly: innovations in survey methods and ecological investigations in Arizona. **LAURA, R.E.**, M. Bogan, K.L. Prudic, and R.J. Steidl
- 10:00-10:15 AM The desert pallid bee and its nectar plants predicted to respond positively to a warming climate in the southwest desert. **CRUZ, T.M.P.** and K.L. Prudic
- 10:15-10:30 AM Monarch (*Danaus plexippus*) and queen (*Danaus gilippus*) larval survival on western milkweed (*Asclepias*) species. **MELKONOFF, N.A.**, K.V. Pegram, K.L. Prudic, and K.R. Hultine
- 10:30-10:45 AM More than monarchs: Insect community ecology on four species of milkweed. **PEGRAM, K.V.**, N.A. Melkonoff, and H.C.E. Ivester
- 10:45-11:00 AM Spatial and temporal variation in pollinator habitat quality on northern Arizona rangelands. **ASLAN, C.E.**, O. Steinmetz, E. Stevenson, S. Colombo, and S. Southern
- 11:00-11:15 AM Botanical gardens as local hotspots for butterfly pollinators in the arid southwest. **PRUDIC, K.L.**, E.R. Zylstra, N. Melkonoff, and J.C. Oliver
- 11:15-11:30 AM Land snails and slugs in the context of management and protection of natural areas. **DROST, C.A.**

Buffet Lunch (11:30-1:00PM, du Bois Ballroom)

Workshop

- 11:30–1:00 PM **Using open-source PhenoCam imagery and data to monitor vegetation change in drylands and beyond**—This workshop will introduce how open-source data from the PhenoCam Network can be used to study vegetation change through time in diverse ecosystems, with an emphasis on ecosystems in drylands. With 900+ cameras across North America and the greater globe, including 50+ cameras across the Colorado Plateau and Southwest Region, PhenoCam uses timelapse photographs captured by standard digital cameras for continuous and automated vegetation monitoring. Images are captured every half-hour, from sunrise to sunset, and uploaded to the PhenoCam website for viewing in near real-time. PhenoCam automatically processes the images for a metric of vegetation greenness, which is displayed on the website and made publicly available for download as a standardized data product. **Organizers:** Darby Bergl, Ph.D. Candidate, Northern Arizona University, The Center for Ecosystem Science and Society; Jacob Blais, Graduate Research Assistant, Northern Arizona University; Mostafa Javadian, Postdoctoral Scholar, Northern Arizona University; Oscar Zimmerman, Graduate Student, Northern Arizona University; Andrew Richardson, Northern Arizona University (Free, **Juniper**).

Invited and Contributed Sessions

Part I: Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region

Tuesday, 1:00-3:00 PM (Aspen A)

Moderators: Kimberly Beisner, Hydrologist, U.S. Geological Survey; Fred Tillman, U.S. Geological Survey; Katie Walton-Day, Research Hydrologist, U.S. Geological Survey; Jo Ellen Hinck, Science Coordinator, U.S. Geological Survey

- 1:00-1:20 PM Lidar characterization of caves and underground rivers in the Grand Canyon. **LASALA, B.**, T. Tsagaan Sankey, M. Nebel, A.E. Springer, and J.D. Palmer
- 1:20-1:40 PM Dye tracing below the North Rim of Grand Canyon National Park reveals continued evidence of spatiotemporal heterogeneity of the groundwater system. **CHAMBLESS, H.E.**
- 1:40-2:00 PM Analysis of storm pulses and associated precipitation events in North Rim Springs, Grand Canyon National Park. **LOOPE, G**
- 2:00-2:20 PM Hydrogeologic perspective on uranium mining near Grand Canyon informed by regional hydrotectonic studies. **CROSSEY L.** and K. Karlstrom
- 2:20-2:40 PM Subsurface migration of treated wastewater effluent along the South Rim of Grand Canyon National Park, Arizona, USA. **BEISNER, K.R.**, N.V. Paretti, J.R. Cederberg, S.P. Mavor, and R.S. Crow
- 2:40-3:00 PM Discussion on Part I: Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region

Part 1: Assessing Water Scarcity through Evapotranspiration and Plant Adaptations in the Colorado River Basin and Plateau

Tuesday, 1:00-3:00 PM (Aspen B)

Moderators: Pamela Nagler, Research Physical Scientist, Southwest Biological Science Center; Emily Palmquist, Research Biologist, USGS Grand Canyon Monitoring and Research Center; Martha Gomez-Sapiens, Researcher Scientist IV, University of Arizona

- 1:00-1:15 PM A synthesis of dryland riparian plant community water needs. **PALMQUIST, E.C.**, P. Nagler, K. Ogle, C. DiMartini, and J. B. Sankey
- 1:15-1:30 PM Comparison of estimated plant water availability and vegetation health to inform forecast ensembles of a groundwater flow model. **WILDERMUTH, L.**, P. Nagler, E. Rodriguez Burgueño, A. Rosas, G. Sánchez, A. Salcedo Peredia, R. Real Rangel, and J. Castillo Tapia
- 1:30-1:45 PM Seasonal dynamics of groundwater, vegetation, and moisture supply and demand in the Upper San Pedro watershed. **BROMLEY, F.**
- 1:45-2:00 PM Contrasting sensitivity to vapor pressure deficit between *E. angustifolia* and *P. fremontii* in Southern Utah. **SENFT, R.M.**, B.G Winn, S.E. Bush, K.R. Hultine, and L.M.T Aparecido
- 2:00-2:15 PM Status of riparian corridor health in the US-Mexico transboundary region. **JIMENEZ-HERNANDEZ, E.**, K. Didan, A. Barreto-Munoz, J.N. Duberstein, and P. Nagler
- 2:15-2:30 PM Landsat-derived rainfed and irrigated-area product for Conterminous United States (CONUS) for the nominal year 2020: A study of irrigated and rainfed areas at the state, and

county level for the CONUS. **TELUGUNTLA, P.**, P. S. Thenkabail, A. Oliphant, I. Aneece, D. Foley, R. McCormick, and J. Lawton

- 2:30-2:45 PM Water use and habitat health across arid and semiarid biomes. **NAGLER, P.**, E. Jimenez-Hernandez, S. Edo, A. Barreto-Muñoz, J. Duberstein, and K. Didan
- 2:45-3:00 PM Hybrid oaks are more sensitive to environmental stressors than their non-hybrid parents. **APARECIDO, L.M.T.**, R.S. Freitas, and S. Hinnert

Part II: Ecology and Management of Pinyon-Juniper Woodlands in the U.S. Southwest

Session 3: Conservation of PJ and biodiversity

Session 4: Plant-Soil Interactions in PJ

Tuesday, 1:00-3:00 PM (Aspen C)

Moderators: Kyle Rodman, Research Scientist, Ecological Restoration Institute, Northern Arizona University; Danika Thiele, Research Associate, Ecological Restoration Institute, Northern Arizona University

- 1:00-1:15 PM Cracking the nut: forecasting and hindcasting multicentury records of piñon pine masting. **WION, A.P.**
- 1:15-1:30 PM The relationship between Pinyon Jay abundance and pinyon pine seed availability in the Southwest USA is lagged and dependent on climate and habitat context. **MILLER-TER KUILE, A.**, A. Wion, K. Rodman, K. Ogle, and J.S. Sanderlin
- 1:30-1:45 PM The perils of precedent: pinyon jay conservation in pinyon-juniper woodlands. **BOONE, J.D.**
- 1:45-2:00 PM Pinyon-juniper shrublands: overlooked and undercut. **POPEJOY, M.A.**
- 2:00-2:15 PM Mycorrhizal fungal responses to drought in pinyon-juniper woodlands over time: implications for host plant survival and fungal diversity. **GEHRING, C.A.**, K. Morris, A.V. Whipple, and S.C. Chischilly
- 2:15-2:30 PM Integration of plant–soil feedbacks with resilience theory for piñon-juniper woodlands under drought. **TAYLOR, M.D.**, D.L. Taylor, J.A. Rudgers, and C. Gehring
- 2:30-2:45 PM Recovery of *Pinus edulis* post-fire: biotic and abiotic drivers of tree seedlings establishment. **WOOLET, J.N.**, C. Stevens-Rumann, C. Havrilla, and C. Gehring
- 2:45-3:00 PM Getting by with a little help from their friends: Nurse shrubs and live soil inoculum improve tree seedling replanting success in a post-wildfire landscape. **TRIMBER, G.M.** and C.A. Gehring

Infrastructure and Innovation for Ecological Restoration: Dryland restoration with plants or biocrusts

Tuesday, 1:00-3:00 PM (Juniper)

Moderators: Sierra Jech, Postdoctoral Scholar, Northern Arizona University; Keven Griffen, PhD Student, School of Forestry, Northern Arizona University; Anita Antoninka, Associate Research Professor, Northern Arizona University; Matt Bowker, Northern Arizona University

- 1:00-1:15 PM Introduction to infrastructure and innovation for ecological restoration with biocrusts. **GRIFFEN, K.**, S. Jech, A. Antoninka, and M. Bowker
- 1:15-1:30 PM Colorado Plateau native plant materials production and use: challenges and opportunities. **DOHRENWEND, K.**

- 1:30-1:45 PM Plant based restoration and seed increase needs for the Navajo Nation. **LENCIONI, S.** and J. Mike
- 1:45-2:00 PM Investigating irrigation and fertilizer effects on native seed production. **HARVEY, A.**, L. Holeski, K. Haubensak, C. Aslan, and A. Whipple
- 2:00-2:15 PM Using moisture sensor data to improve understanding of water availability in dryland restoration contexts. **DARROUZET-NARDI, A.**, L. Dacey, M. Hoellrich, N. Pietrasiak, and K. Young
- 2:15-2:30 PM Magic carpets, bedraggled area rugs, and crust capsules: Biocrust restoration materials development. **GIBSON, K.S.**, L. Bailey, A. Antoninka, and M.A. Bowker
- 2:30-2:45 PM Investigating extracellular polymeric substances for reclamation and radionuclide treatment on an abandoned uranium mine in Cameron, AZ. **SAVILLE, E.G.**, J. Ingram, A. Antoninka, and J. Torkelson
- 2:45-3:00 PM The effect of encapsulating fire mosses in dissolvable capsules on fire moss establishment success. **COVINGTON, B.**, M. Bowker, A. Antoninka, and P. Fulé

Understanding the Ecological Impacts of Climate Change on Colorado Plateau Drylands Using Field-Based Approaches

Tuesday, 1:00-3:00 PM (Pinyon)

Moderators: Jacob Blais, Graduate Research Assistant, Northern Arizona University; Mostafa Javadian Postdoctoral Scholar, Northern Arizona University; Andrew Richardson, School of Informatics, Computing, and Cyber Systems, Northern Arizona University

- 1:00-1:15 PM Resin-based defenses in *Pinus edulis* are only reduced after long-term drought. **PELTIER, D.M.P.**, S.C. Malone, C.D. McIntire, R.A. Thompson, S. Pinzon-Navarro, K.A. Pereverzeva, A.D. Richardson, N.G. McDowell, H.D. Adams, M.S. Carbone, W.T. Pockman, and A.M. Trowbridge
- 1:15-1:30 PM Primary production responses to extreme changes in North American monsoon precipitation move up an elevation gradient through time. **MUNSON, S.M.**, J.B. Bradford, B.J. Butterfield, and J.R. Gremer
- 1:30-1:45 PM Implications of delayed monsoon onset on carbon cycle dynamics in Southwestern grasslands. **BROWN, R.F.**, T.J. Ohlert, M.T. Patton, and S.L. Collins
- 1:45-2:00 PM Small organisms, big impacts: Monitoring biocrust carbon cycling in response to drought and disturbance. **LAURIA, C.M.**, **K.G. GRIFFEN**, R. L. Vath, T. Lignol, A. J. Howell, E.E. Grote, J. Hupp, A.A. Antoninka, M.A. Bowker, and S.C. Reed
- 2:00-2:15 PM FLUXNET's new data platform: early results from dryland ecosystems. **MOORE, D.J.P.**
- 2:15-2:30 PM Experimental evidence of a biocrust degradation - climate warming amplification feedback. **SMITH, W.K.**, S.C. Reed, M.L. Villarreal, C.M. Lauria, W.A. Rutherford, S.M. Herrmann, V.M. Scholl, A.J. Howell, M.Javadian, F.Zhang, M.A. Burgess, R.F. Kokaly, and B. Poulter
- 2:30-2:45 PM Seasonal Drivers of Carbon Flux Variability in Southwestern Ecosystems. **DEVAN, M.R.** and M.E. Litvak
- 2:45-3:00 PM Sub-Alpine Canopy and Wood Growth Phenology in Aspen and Mixed Conifer Forests. **SIMONPIETRI, A.T.**, A.D. Richardson, M. Berkelhammer, C.J. Still, and M.S. Carbone

Part II: Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region

Tuesday, 3:15-5:15 PM (Aspen A)

Moderators: Kimberly Beisner, Hydrologist, U.S. Geological Survey; Fred Tillman, U.S. Geological Survey; Katie Walton-Day, Research Hydrologist, U.S. Geological Survey; Jo Ellen Hinck, Science Coordinator, U.S. Geological Survey

- 3:15-3:35 PM Gamma radiation and soil concentrations of U, As, Cu, and Mo during mining and reclamation of breccia-pipe U deposits, Arizona, USA. **WALTON-DAY, K.**, C.R Bern, and S.L. Qi
- 3:35-3:55 PM Culturally important plant species at the Pinyon Plain uranium mine. **HINCK, J.E.** and C. Tilousi
- 3:55-4:15 PM Preserving indigenous ancestral knowledge from the Grand Canyon through legacy leader development. **TILOUSI, C.**
- 4:15-4:35 PM Bridging landscapes: exploring the intersection of art, science, people, and the Grand Canyon. **SIEBERS, B.**
- 4:35-4:55 PM Innovate, excite, connect: creating outreach solutions to expand research audiences. **COONEY, K.**
- 4:55-5:15 PM Discussion on Part II: Research Advancing Natural Resource Knowledge and Science Communication in the Grand Canyon Region

Part II: Restoration within Riparian Corridors: Integrative Science and Monitoring

Tuesday, 3:15-5:15 PM (Aspen B)

Moderators: Pamela Nagler, Research Physical Scientist, Southwest Biological Science Center; Emily Palmquist, Research Biologist, USGS Grand Canyon Monitoring and Research Center; Martha Gomez-Sapiens, Researcher Scientist IV, University of Arizona

- 3:15-3:30 PM Short and long term changes to riparian habitat and avifauna due to tamarisk beetles (*Diorhabda spp.*) herbivory and the necessity of urgent restoration. **JOHNSON, M.J.**, S. Mahoney, A. Stalke, Z. Ozsoy, and K. Hultine
- 3:30-3:45 PM Multi-scale vegetation response to Minute 323 in-channel flows: Insights from Sentinel-2 and Landsat imagery. **GÓMEZ SAPIENS, Martha M.**, P. Nagler, A. Meléndez, and E. Jiménez Hernández
- 3:45-4:00 PM Enhancing vegetation monitoring for conservation area management: Remote sensing applications at Palo Verde Ecological Reserve, Lower Colorado River. **TRETO, V.**
- 4:00-4:15 PM Adapting avian monitoring for large-scale native restoration on the Lower Colorado River using Motus and Autonomous Recording Units Technology. **DODGE, C.**
- 4:15-4:30 PM Southwestern Willow Flycatcher status and habitat restoration efforts along the Virgin River in Utah. **EDWARDS, C.N.**
- 4:30-4:45 PM Landscape-scale drought assessment and reporting for the Bureau of Land Management. **SCOTT, J.A.**
- 4:45-5:00 PM A web-based decision support tool for planning and prioritizing riparian restoration. **SHAFROTH, P.B.**, L.G. Perry, T. Wible, C. Holmquist-Johnson, and M. Korsa

5:00-5:15 PM Discussion on Part II: Restoration within Riparian Corridors: Integrative Science and Monitoring

Part III: Ecology and Management of Pinyon-Juniper Woodlands in the US Southwest

Session 5: Collaboratives and Partnerships to Support Conservation

Session 6: Emerging Technologies and Looking Forward

Tuesday, 3:15-5:15 PM (Aspen C)

Moderators: Kyle Rodman, Research Scientist, Ecological Restoration Institute, Northern Arizona University; Danika Thiele, Research Associate, Ecological Restoration Institute, Northern Arizona University

- 3:15-3:30 PM Collaborative post-fire restoration of singleleaf pinyon pine on a cultural landscape. **URZA, A.K.**, H. Reid, R. Jones, and P.J. Weisberg
- 3:30-3:45 PM Data back: Indigenous-led, community-based monitoring of pinyon-juniper woodlands. **MACIAS, D.**, T. Gusite, B. Adkins, A. Bacocho, M. Bengochia, J. Beidl, P. B. Burrow, R. Jones, W. Nabahe, E. Sage, H. Stone, Y. Syskine, A. Urza, A. Weber, and M. Redmond
- 3:45-4:00 PM The Pinyon-Juniper Project: Toward a conservation strategy for the biome. **HAYES, T.**, M. McIntosh, A. Olsen, and A. Leighton
- 4:00-4:15 PM State-and-transition models and ecological site groups for PJ fire and fuel management. **BISHOP, T.B.B.**, M.C. Duniway, J.P. Severson, A.C. Knight, T.W. Nauman, B.E. McNellis, M.L. Villarreal, S.C. Reed, K.E. Young, and M. Brunson
- 4:15-4:30 PM Advancing fuels assessments in pinyon-juniper woodlands using terrestrial laser scanning (TLS). **DREHER, M.** and **A.J. SANCHEZ MEADOR**
- 4:30-4:45 PM Tools for understanding genetic variation in pinyon pines and their application to ecology and management. **WHIPPLE, A.V.**
- 4:45-5:00 PM Looking to the past to anticipate the future of pinyon-juniper woodlands: A demographic perspective. **SHRIVER, R.K.**
- 5:00-5:15 PM Shifts in suitability of pinyon-juniper communities: A climate adaptation framework for range-wide management of arid woodland resources. **NOEL, A.N.**, D.R. Schlaepfer, I.P. Barrett, M.C. Duniway, J. Norris, C.T. Domschke, B.J. Butterfield, M.C. Swan, K. Hartwig, M.R. Crist, and J.B. Bradford

Threats and Solutions for Colorado Plateau Working Landscapes

Tuesday, 3:15-5:15 PM (Juniper)

Moderators: Mark Brunson, Science Director, The Nature Conservancy's Canyonlands Research Center

- 3:15-3:30 PM The Canyonlands Research Center: Seeking evidence-based solutions for the Colorado Plateau in a changing climate. **BRUNSON, M.**, M. Redd, and K Redd
- 3:30-3:45 PM Drivers of Colorado Plateau rangeland health. **STEGNER, M.A.**, A.C. Knight, M. Redd, M. Miller, M. Van Scoyoc, R. Mann, and M.C. Duniway
- 3:45-4:00 PM Droughting megadroughts: Lessons learned from almost two decades of Climate change experiments on the Colorado Plateau. **FINGER-HIGGINS R.**, E. Geiger, A. Knight, C. Lauria, D. Hoover, T. B. Bishop, S. Reed, and M. Duniway

- 4:00-4:15 PM Understanding mechanisms of big sagebrush (*Artemisia tridentata*) survival and growth to promote its management under current and future climate conditions in the Colorado Plateau. **DAY, J.D.** and K.E. Veblen
- 4:15-4:30 PM Climate adaptive restoration techniques using biocrust sods. **ANTONINKA, A.**, C. Tucker, S. Jech, M. Bowker, and S. Reed
- 4:30-4:45 PM Trends in low-tech process-based stream restoration outcomes in western rangelands. **SCAMARDO, J.E.**
- 4:45-5:00 PM Managing rangelands in a changing climate: Using a heritage cattle breed to maintain ecosystem function under livestock production. **STAHL, M.K.**, K.E. Veblen, T. Avgar, M.C. Duniway, J.J. Villalba, S.C. Reed, E.T. Thacker, M. Garcia, and M. Redd
- 5:00-5:15 PM Discussion on Threats and Solutions for Colorado Plateau Working Landscapes

Wood For Life: A Partnership Supporting Forest Restoration Through Firewood Distribution to Local Tribes and Communities

Tuesday, 3:15-5:15 PM (Juniper)

Moderators: Niki vonHedemann, Human Dimensions Specialist, Ecological Restoration Institute, Northern Arizona University

- 3:15-3:30 PM Keeper of the fireplace: Fire in the darkness. **ANTHONY, L.**
- 3:30-3:45 PM **Wood For Life: A Forest Service Perspective.** **CASH, A.**, J. Dahlin, M. Nabel, and J. Daugherty
- 3:45-4:00 PM The National Forest Foundation's support of Wood For Life. **ETSITTY, S.**, S.D. Stortz, and C. Kim
- 4:00-4:15 PM Diné Bá'ádeit'í: Tribal wood bank support. **MEYERS, A.J.**
- 4:15-4:30 PM A needs assessment for northern Arizona's Wood For Life partnership: assessing firewood need and local capacity. **VONHEDEMANN, N.**, J. Martin, A. Franko, M. Fowler, and T. Kee
- 4:30-4:45 PM Using a social-ecological systems framework to examine wood bank establishment and management. **NELSON, J.L.** and K.W. Jones
- 4:45-5:15 PM Discussion on Wood for Life

Conference Reception

- 5:30-7:00 PM 1899 Bar & Grill Ballroom and Patio (307 W. Dupont Ave)
Parking in High Country Conference Center parking garage (please note there is a fee) .
Appetizers and no-host bar.

Evening Keynote Speaker: Dr. Robin Wall Kimmerer

- 7:00-8:30 PM Robin Wall Kimmerer is a mother, scientist, decorated professor, and enrolled member of the Citizen Potawatomi Nation. She is the author of *The Serviceberry: Abundance and Reciprocity in the Natural World*, *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*, and *Gathering Moss: A Natural and Cultural History of Mosses*. She lives in Syracuse, New York, where she is a SUNY Distinguished Teaching Professor of Environmental Biology, and the founder and director of the Center for

Native Peoples and the Environment. (Prochnow Auditorium, Building 30, University Union)
Free and open to the public. Live streaming on NAU YouTube. [Public Keynote Speaker: Robin Wall Kimmerer](#)

Wednesday, September 10, 2025

Registration and Speaker Ready Room

7:00-8:00 AM	Morning Refreshments (du Bois Ballroom)
7:00-5:00 PM	Registration (du Bois Ballroom)
7:00-5:00 PM	Speaker Ready Room (Ballroom A)

Invited and Contributed Sessions

Fire, Water, and Forest Through Indigenous and Western Sciences

Wednesday, 8:00-10:00 AM (Aspen A)

Moderators: Jaime Yazzie, Research Coordinator, Sr., Southwestern Mountains Climate Resilience Center, NAU; Connor Carpenter, Graduate Research Assistant, Southwestern Mountains Climate Resilience Center

8:00-8:15 AM	Models, monsoons and tree rings: Assessing the reliability of the CMIP6 at the regional scale. FELIX, S. , D. Feldman, P. Fulé, K. Williams, and W. Flatley
8:15-8:30 AM	Radial growth and water use during the spring growing season (April -June) in restored vs. control ponderosa pine forests, Arizona. CARPENTER, C.W. , S.F. Dymond, J.O. Yazzie, P.Z. Fulé, A.T. Simonpietri, and M.S. Carbone
8:30-8:45 AM	Integrating datasets for vegetation mapping and mortality controls. WILLIAMS, K.H. and N. Falco
8:45-9:00 AM	Diné College Land Grant Office and Northern Arizona University (NAU School of Forestry) collaboration. NEZTSOSIE, B. , P.Z. Fulé, B. Litson, and D. Skaltsas
9:00-9:15 AM	Collaborative fire science with tribes and pueblos in the Southwest. MCCORMICK, M.L. and A.Thode
9:15-9:30AM	Advancing an indigenous forestry professorship: Position development and indigenous faculty recruitment at Northern Arizona University. RAMOS, S.C. , P.Z. Fulé and J.O. Yazzie
9:30-9:45 AM	From forests to classrooms: A collaborative model for climate resilience and indigenous knowledges. HERDER, D.
9:45-10:00 AM	Indigenous ways of doing: Knowledge systems rooted in community and culture. COOLEY, N.

Leveraging Large Ecological Datasets for Data-Informed Decision-Making

Wednesday, 8:00-10:00 AM (Aspen B)

Moderators: Eva Deegan, Northern Arizona University; Alicia Formanack, Graduate Student, Northern Arizona University; Ana Miller-ter Kuile, Assistant Research Professor, Northern Arizona University

- 8:00-8:15 AM When does climate matter for tree growth? **PELTIER, D.M.P** and K. Ogle
- 8:15-8:30 AM Identifying and quantifying effects of extreme climate on tree growth at multiple scales. **FORMANACK, A.M.**, D. Peltier, M.E.K. Evans, R.J. DeRose, J. Shaw, J.J. Barber, and K. Ogle
- 8:30-8:45 AM Vegetation change in two iconic national parks in Arizona: Developing statistical modeling approaches for complex monitoring designs. **OGLE, K.**, M. Swan, E.S. Deegan, A.T. Miller-ter-Kuile, and E. Palmquist
- 8:45-9:00 AM Assessing environmental drivers of C3/C4 grass species occurrence in national parks across the western United States. **DEEGAN, E.S.**, K. Ogle, A.T. Miller-ter-Kuile, M. Swan, E. Palmquist, C. Livensperger, C. McIntyre, and D. Witwicki
- 9:00-9:15 AM Collaborations between monitoring programs and external scientists lead to land management relevant science. **PALMQUIST, E.C.**
- 9:15-9:30AM Broad-scale assessment of bird biodiversity exposure to future high severity fire: a management prioritization tool. **NORMAN, K.**
- 9:30-9:45 AM Using functional ecology to monitor the ecological integrity of bird communities in the Western USA given past, present, and future forest management. **MILLER-TER KUILE, A.**, J.S. Sanderlin, J. Ayers, H.E. Chmura, M. Ditmer, M. Dressen, J. Dudley, J.D. Golding, J. Helm, G.M. Jones, R. Kirby, K.E.A. Norman, Z.L. Steel, S. Sawyer, and V. Stein Foster
- 9:45-10:00 AM Discussion on Leveraging Large Ecological Datasets for Data-Informed Decision-Making

Contributed: Plant Ecology Dynamics

Wednesday, 8:00-10:00 AM (Aspen C)

Moderators: Erika LaPlante, PhD Candidate, Northern Arizona University

- 8:00-8:15 AM Spectral landscape ecology of a foundation tree species. **SEELEY, M.M.**, B.C. Wiebe, G.P. Asner, S.A. Cushman, J.A. Abraham, H.F. Cooper, C.A. Gehring, K.R. Hultine, G.J. Allan, T.G. Whitham, and C.E. Doughty
- 8:15-8:30 AM Migratory hummingbirds as drivers of genetic connectivity in isolated populations of crimson monkeyflower (*Mimulus verbenaceus*). **WEISS, M.** and L. Holeski
- 8:30-8:45 AM The pollination and reproductive biology of two endemic cacti of northern Arizona (*Pediocactus peeblesianus* var. *fickeiseniae* and *P. paradinei*). **STEINMETZ, O.A.**, C.E. Aslan, S. Souther, and K. Phillips
- 8:45-9:00 AM Assessing quaking aspen (*Populus tremuloides*) extent, health, and mortality in northern Arizona using earth observations. I. Morso, L. Collins, **M. COX**, M. Schwan, and J. Zugarek
- 9:00-9:15 AM Pinyon pine seedlings acclimate to high elevation climate. **KANTORIS, H.R.** and A.V. Whipple
- 9:15-9:30AM Piñon pines and climate stress: comparing responses of Border piñon and Mogollon Highlands piñon to recent hot dry decades. **FLOYD, M. L.**, S.L. Haire, D.P. Hanna, M.L. Villarreal, H.M. Poulos, and A.M. Barton
- 9:30-9:45 AM Leveraging seasonal tree-ring growth to assess species climate adaptations to water stress. **TODD, E.R.**, A. Azpeleta Tarancón, A.B. Stan, and P.Z. Fulé

9:45-10:00 AM Discussion on Plant Ecology Dynamics

Fight or Flight? Deciding between Mitigation and Adaptation in a Hotter, Drier Landscape

Wednesday, 8:00-10:00 AM (Juniper)

Moderators: Jessica Driscoll, Program Officer, U.S. Geological Survey; Jeanne Godaire, Senior Scientist, U.S. Geological Survey

- 8:00-8:15 AM The Colorado River Basin's Millennium Drought: A few dry decades or the new normal? **BRICE B.**, A. Putman, E. Jachens, P. Longley, B. Pulver, and S. Sanborn
- 8:15-8:30 AM The United States Drought Monitor: Then, now, and the future. Encapsulating the gold standard of drought monitoring. **FUCHS, B.A.**
- 8:30-8:45 AM Challenges in drought assessment: Priority actions & research needs. **LISONBEE J.**
- 8:45-9:00 AM Discussion Break
- 9:00-9:15 AM OpenET data support for adaptation and mitigation across the Colorado River Basin. **LARSEN, S.**
- 9:15-9:30AM WaterSMART drought response program: Advancing drought resilience in the western United States. **LOOPER, S.**
- 9:30-9:45 AM Navajo Nation's efforts to address drought and other climate concerns. **JOHN, J.**
- 9:45-10:00 AM Tribal engagement & adaptation planning through the Southwest Climate Adaptation Science Center. **NAHA, C.**

Break (10:00-10:15 AM, du Bois Ballroom)

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Celebrating Fire Ecology and Management in the Southwest

Wednesday, 10:15-12:15 PM (Aspen A)

Moderators: Molly McCormick, Program Manager, Southwest Fire Science Consortium

- 10:15-10:30 AM Fire science in action: New fire and fuels resources for the Southwest. **MCCORMICK, M.L.** and A.Thode
- 10:30-10:45 AM The evolution of managed wildfires in the Southwestern US. **INIGUEZ, J.**
- 10:45-11:00 AM A new monitoring program for adaptive management of prescribed fire and natural ignitions managed for objectives other than full suppression (OTFS) in Northern Arizona. **WOOLLEY, T.**
- 11:00-11:15 AM A framework for moving from static risk to seasonal strategy in 4FRI and CFR. **AYRES, G.A.**, T. Hoecker, J. Peeler, N. Hemming-Schroeder, A. Thode, and C. O'Connor
- 11:15-11:30 AM Vapor pressure deficit as an indicator for fire danger in wildland fire management. **LEIENDECKER, A.**
- 11:30-11:45 AM Wildfire risk reduction across the natural and built environments: Local solutions and long-term strategies. **CHAPMAN, N.**

- 11:45-12:00 AM Sonoran Desert adaptation to altered fire regime. **ROWE, H.I.**, K. Rodman, A. Mahood, A.J. Antoninka, and M. Bowker
- 12:00-12:15 PM Arizona Wildfire Initiative: Community resilience, workforce development and education and science communication to support wildfire in Arizona. **THODE, A**

Part I: Predictive Modeling for River Management

Wednesday, 10:15-12:15 PM (Aspen B)

Moderators: Emily Palmquist, Research Biologist, USGS Grand Canyon Monitoring and Research Center; Charles Yackulic, Research Statistician, US Geological Survey; Drew Eppehimer, Research Fish Biologist, U.S. Geological Survey; Paul Grams, U.S. Geological Survey; Joel Sankey, U.S. Geological Survey; Shannon Sartain; Hydrologist, USGS Grand Canyon Monitoring and Research Center

- 10:15-10:30 AM Implications of flow management on biogeomorphic feedbacks on the Green River, Utah. **MCCLURE, C.M.**, J.M. Friedman, E.R. Skaggs, C.L. Holmquist-Johnson, K.D. Enns, D.W. Perkins, L. Gommermann, and R.R. Morrison
- 10:30-10:45 AM Forecasting non-native smallmouth bass responses to future hydrologic conditions in the upper Colorado River basin. **BRUCKERHOFF, L.A.**, C.B. Yackulic, D.E. Eppehimer, N.D. Bransky, and J. Furby
- 10:45-11:00 AM Predictive modeling of fluvial-aeolian responses to basin-scale and site-specific Colorado River management in Grand Canyon. **KELLEY, M.M.**, J.B. Sankey, A. Kasprak, A.E. East, N. Cohn, H. Failey, and J. Caster
- 11:00-11:15 AM Daily fluctuating flows affect riparian plant species distributions from local to regional scales. **BUTTERFIELD, B.J.** and E.C. Palmquist
- 11:15-11:30 AM Quantifying overlap in river drying and fish density to inform drought refuge management for an endangered minnow. **ARCHDEACON, T.P.**, M.E. Bedwell Boro, and C.B. Yackulic
- 11:30-11:45 AM A river in need of irrigating: Optimal spatiotemporal allocation of environmental water. **DONOVAN, P.**
- 11:45-12:00 AM Integrating hydraulic analyses and population models to estimate effects of floodplain restoration on the endangered Rio Grande Silvery Minnow. **STOWE, E.S.**, A.E. Harris, D.D. Hernandez-Abrams, T.P. Archdeacon, C.B. Yackulic, and S.K. McKay
- 12:00-12:15 PM Using dynamic programming with deep reinforcement learning to inform hatchery supplementation strategies for Rio Grande Silvery Minnow. **YOON, H.S.**, C.B. Yackulic, T. Archdeacon, M. Osborne, T. Turner, A.J. Lawson, C. Wagnon, and K.C. Pregler

Genetic Approaches in Understanding and Mitigating Climate Change

Wednesday, 10:15-12:15 PM (Aspen C)

Moderators: Thomas Whitham, Regents' Professor, Northern Arizona University

- 10:15-10:30 AM Leaf hyperspectral reflectance predicts morphological traits, hybrid status, and sex of foundation trees. **CORBIN, J.P.M.**, R. Best, G. Allen, and T. G. Whitham
- 10:30-10:45 AM Tradeoffs between homeothermic leaf cooling and hydraulic safety in a widely distributed warm desert riparian tree species, *Populus fremontii*. **KOEPKE, D.F.**, B.C. Posch, S.E. Bush, A. Schuessler, L.L.D. Anderegg, K.L. Kerr, and K.R. Hultine

- 10:45-11:00 AM Comparing climate change with the Black Death: Evolutionary events with long-term legacies. **WHITHAM, T.G.** and S.M. Shuster
- 11:00-11:15 AM Succession as community evolution. **SHUSTER, S.M.** and T.G. Whitham
- 11:15-11:30 AM Combined effects of climate change and insect damage on Fremont cottonwood leaves and their consumers. **BEST, R.J.**, C.W. Asmussen, H.F. Cooper, A.R. Keith, M. Eisenring, R.L. Lindroth, G.J. Allan, and T.G. Whitham
- 11:30-11:45 AM Climate means drive trait plasticity more than climate variation or predictability in Fremont cottonwood. **COOPER, H.F.**, Allan, G.J., Eisenring, M., Lindroth, R.L., Gehring, C.A., Hultine, K.R., Whitham, T.G., and R.J. Best
- 11:45-12:00 AM Fungal colonization modulates trait plasticity in cottonwood cross types during drought. **BOCK, B.**, E.Schaefer, and C.A. Gehring
- 12:00-12:15 PM Discussion on Genetic Approaches in Understanding and Mitigating Climate Change

Restoration of Madrean Oak Woodlands: Integrating Socio-Ecological Systems to Support Traditional Acorn Harvest

Wednesday, 10:15-12:15 PM (Juniper)

Moderators: Sara Souther, Assistant Professor, Northern Arizona University; Clare Aslan, Associate Professor, Northern Arizona University

- 10:15-10:30 AM Madrean oak woodlands and savannas: Coupled human-ecological systems. **SOUTHER, S.**
- 10:30-10:45 AM An overview of the Emory oak socio-ecological system: Cultural significance of Emory oaks. **LYNDON, N.**, B. McCabe, L. Evans, and L. Pinal
- 10:45-11:00 AM Advancing understanding of dynamics and resilience in socio-ecological systems. **VAUGHN, A.**, S. Souther, C. Aslan, and D. Stuart
- 11:00-11:15 AM Global change effects on demography and disease dynamics of Emory oak. **NICHOLSON, L.** and S. Souther
- 11:15-11:30 AM Exploring climate and competition impacts on Emory oak growth. **CHISCHILLY, S.**, A.B. Stan, P.Z. Fulé, and S. Souther
- 11:30-11:45 AM Population genomics of *Quercus emoryi*: Disentangling fragmentation, genetic connectivity, hybridization and climate resilience. **ZACOUR DEL GIUDICE, L.** and A. Whipple
- 11:45-12:00 AM Restoring traditional fire regimes in Emory oak woodlands. **THODE, A.**, C. Aslan, and **S. SOUTHER**
- 12:00-12:15 PM Cultural revitalization through restoration of traditional plants and gathering areas. **DUWYENIE, E.** and A. Jackson

Buffet Lunch (12:15-1:15 PM, du Bois Ballroom)

Workshop

- 12:15-1:15 PM **Collecting Environmental Data for NASA: How to Engage Your Community by Collecting Tree and Landcover Data with NASA's Mobile App**—This workshop will give participants an overview of an interactive mobile app on NASA's Environmental Citizen Science Platform. Participants will learn what data are being collected, and how those data are utilized by environmental scientists globally regarding forest health and conservation. The workshop will also demonstrate how the mobile app is being used by local and indigenous communities both globally and locally in Northern Arizona to understand terrestrial carbon and land cover changes over time. Finally, we will walk through how to download the mobile app and use it in real time to collect data on tree size and species. **Organizers:** Jenna Keany, Postdoctoral Scholar, Northern Arizona University; Duan Biggs, Olajos Goslow Chair of Environmental Science and Policy, Northern Arizona University; Chris Doughty, School of Informatics, Computing, and Cyber Systems, Northern Arizona University (Free, **Juniper**).

Invited and Contributed Sessions

Exploring Spokes of the Fire Adapted Communities Wheel Across the Southwest

Wednesday, 1:15-3:15 PM (Aspen A)

Moderators: Cole Brant, Student, Northern Arizona University; Eytan Krasilovsky, Deputy Director, Forest Stewards Guild

- 1:15-1:30 PM Community wildfire mitigation in the greater Santa Fe fireshed. **KRASILOVSKY, E.**
- 1:30-1:45 PM Partnerships and community engagement in and around Santa Fe communities. **CHAVARRIA, P.**
- 1:45-2:00 PM Understanding household adaptation to smoke from wildfires and forest management above and below the Mogollon Rim. **EDGELEY, C.M.**
- 2:00-2:15 PM Exploring gaps in resident mitigation education programs across Arizona. **BRANT C.** and C.M. Edgeley
- 2:15-2:30 PM Community adaptation to wildfire and post-fire flood risk: lessons from Northern Arizona. **BUSCO, A.** and C.M. Edgeley
- 2:30-2:45 PM Connecting wildfire recovery and resilience: insights from six fires in the Southwestern United States. **CARUOLO, C.** and C.M. Edgeley
- 2:45-3:00 PM How innovative regulations, policy, and plans can support a more fire adapted community. **CHAPMAN, N.**
- 3:00-3:15 PM Discussion on Exploring Spokes of the Fire Adapted Communities Wheel Across the Southwest

Part II: Predictive Modeling for River Management

Wednesday, 1:15-3:15 PM (Aspen B)

Moderators: Emily Palmquist, Research Biologist, USGS Grand Canyon Monitoring and Research Center; Charles Yackulic, Research Statistician, US Geological Survey; Drew Eppehimer, Research Fish Biologist, U.S. Geological Survey; Paul Grams, U.S. Geological Survey; Joel Sankey, U.S. Geological Survey; Shannon Sartain; Hydrologist, USGS Grand Canyon Monitoring and Research Center

- 1:15-1:30 PM Combining physical captures and antenna detections to estimate endangered Klamath sucker abundance. **DZUL, M.C.**, J. R. Krause, and B. Hayes

- 1:30-1:45 PM Quantifying the effects of mechanical removal on population dynamics of invasive Channel Catfish (*Ictalurus punctatus*). Litmer, A.R., T.E Walsworth, and **C.A. PENNOCK**
- 1:45-2:00 PM Characterize uncertainty and data limitations in predicting seasonal reservoir release temperatures. **MIHALEVICH, B.A.**, B.R. Deemer, and C.B. Yackulic
- 2:00-2:15 PM A cool mix: causal inference, adaptive management and environmental flows. **YACKULIC, C.B.**, D.E. Eppehimer, L.A. Bruckerhoff, K.E. Behn, B.R. Deemer, K.L. Dibble, M. Dzul, L.E. Hansen, B.D. Healy, B.J. Miller, J. Korman, J. Arnold, C. Clancy, S. Favrot, D. Rogowski, K. Shollenberger, and L. Tennant
- 2:15-2:30 PM Forecasting decadal scale Smallmouth Bass invasion dynamics to identify critical uncertainties and inform management and water policy. **EPPEHIMER, D.E.**, C.B. Yackulic, B.D. Healy, and L.A. Bruckerhoff
- 2:30-2:45 PM Forecasting impacts of invasive smallmouth bass on native fishes of the Colorado River basin. **DUSKEY, E.**, C.B. Yackulic, M. Dzul, D. Eppehimer, and L. Bruckerhoff
- 2:45-3:00 PM Rainbow trout growth across western U.S. tailwaters is determined by temperature and prey: implications for future management. **SCHOLL, E.**, T. Kennedy, M. Dodrill, M. Ford, R. Zuellig, D. Carlisle, D. Kowalski, and C. Yackulic
- 3:00-3:15 PM Discussion on Predictive Modeling for River Management

Interdisciplinary Approaches to Resilient Human-wildlife Coexistence

Wednesday, 1:15-3:15 PM (Aspen C)

Moderators: Jenna Keany, Postdoctoral Scholar, Northern Arizona University; Emily Renn, Doctoral Student, Northern Arizona University; Duan Biggs, Olajos Goslow Chair of Environmental Science and Policy, Northern Arizona University

- 1:15-1:30 PM Expanding conservation knowledge: lessons from the Endangered Species Act. **GRADY, M.J.** and C. Barton
- 1:30-1:45 PM Social-ecological interactions and rangeland management: A systematic literature review. **NYAUMA, V.C.**, A. de Vos, D. Biggs, and A. Haw
- 1:45-2:00 PM Coexistence strategies with wildlife shaped by social contexts. **JAYASINGHE, A.D.**, G.L. Burns, D. Biggs, and J. Nalau
- 2:00-2:15 PM Lessons from 25 years of Mexican wolf coexistence programs. **RENN, E.J.**, D. Biggs, and M. Gonzalez
- 2:15-2:30 PM Community science reveals spatiotemporal patterns of avian diversity and distribution. **WASHIM, M.** and D. Biggs
- 2:30-2:45 PM Mobile apps for wildlife conservation and community engagement. **KEANY, J.M.**, C.E. Doughty, and D. Biggs
- 2:45-3:00 PM Can community science help foster human wildlife coexistence? **BIGGS, D.**, L. Isidore, and A. Brackowski
- 3:00-3:15 PM Discussion on Interdisciplinary Approaches to Resilient Human-wildlife Coexistence

Management Relevant Adaptation Science in the Southwest

Wednesday, 1:15-3:15 PM (Juniper)

Moderators: Sarah LeRoy, Research Coordinator, USGS-Southwest Climate Adaptation Science Center; Stefan Tangen, Research Coordinator, US Geological Survey, North Central Climate Adaptation Science Center

- 1:15-1:30 PM Determining successful management and restoration strategies for pinyon-juniper communities in the face of changing climate and wildfire. **REED, S.**, M. Phillips, C. Lauria, J. Bradford, G. Trimber, T. Spector, R. Rondeau, A. Howell, E. Grote, B. Robinson, B. Osborne, A. Noel, and K. Gehring
- 1:30-1:45 PM Mapping *Tamarix* and native riparian vegetation to monitor response to hydro-climatological conditions. **PETRAKIS, R.E.**, L.M. Norman, and B. Hooke
- 1:45-2:00 PM Ute Mountain Ute climate change adaptation planning. **ROBINSON, B.**, B.W. Miller, and S.G. Tangen
- 2:00-2:15 PM Creating a decision support tool for setting sustainable raptor take limits under future environmental nonstationarity. **VENNUM, C.R.**, M.J. Eaton, P.E. Howell, B.A. Millsap, E.R. Bjerre, I. Rangwala, O.J. Robinson, and A.J. Lawson
- 2:15-2:30 PM Custom climate reports – a tool to improve land management activities. **MCKELLAR, T.T.** and M.A. Crimmins
- 2:30-2:45 PM Informing climate adaptation decisions in western drylands. **BRADFORD, J.B.**, D.R. Schlaepfer, M.C. Holdrege, A.R. Noel, G-F. Siegmund, and A.E. Stears
- 2:45-3:15 PM Discussion on Management Relevant Adaptation Science in the Southwest

Contributed: Aquatic Ecosystems and Science Communication

Wednesday, 1:15-3:15 PM (Pinyon)

Moderators: Matthew Weiss, PhD Student, Northern Arizona University

- 1:15-1:30 PM Declining water levels of Lake Powell and Lake Mead have caused rapid geomorphic changes at their deltas. **SARTAIN, S.L.**, P. Grams, M. Kaplinski, R. Tusso, K. Chapman, E. Mueller, and M. DeHoff
- 1:30-1:45 PM Changed seasonality and forcings of peak annual floods in ephemeral channels at Flagstaff, Northern Arizona, USA. **SCHIEFER, E.** and E. Schenk
- 1:45-2:00 PM Hydrologic variability influences steelhead outmigration patterns in California's Central Valley. **EHLO, C.A.**, B. Mahardja, and J.A. Israel
- 2:00-2:15 PM Discussion Break
- 2:15-2:30 PM Data visualization for nonprofits and public lands. **GRANT, J.B.**
- 2:30-2:45 PM The power of place: Honoring Havasupai Gardens through art and language. **KRAUS, C.**, E. Shalla, C. Tilousi, J. Uqualla, and J. Balsom
- 2:45-3:00 PM Informing sustainable tourism in Utah's national parks. **GOONAN, K.A.** and S. Liu
- 3:00-3:15 PM Discussion on Aquatic Ecosystems and Science Communication

Break (3:15-3:30 PM, du Bois Ballroom)

Fire and Forest Restoration Social Science in the Southwest

Wednesday, 3:30-5:30 PM (Aspen A)

Moderators: Niki vonHedemann, Human Dimensions Specialist, Ecological Restoration Institute, Northern Arizona University

- 3:30-3:45 PM Applied social science for decision-making: Examples and lessons learned from the Southwest. **COLAVITO, M.M.**
- 3:45-4:00 PM Broadening engagement in the Collaborative Forest Landscape Restoration Program (CLFRP). **VONHEDEMANN, N.**, S. Devenport, T. Beeton, H. O'Reilly, M. Colavito, C. Huayhuaca, T. Teel, A. Snitker, T. Cheng, and M. Roberts
- 4:00-4:15 PM Resident perceptions of smoke from prescribed fire: A case study of two Flagstaff, Arizona neighborhoods. **DEVENPORT, S.E.**, C.M. Edgeley, M.M. Colavito, and N. vonHedemann
- 4:15-4:30 PM Enforcement as a wildfire prevention tool: public and professional perceptions of stage restrictions in the U.S. Southwest. **EDGELEY, C.**, W. DeGrandpre, G. Kohler, A. Busco, and M. Rangel-Lynch
- 4:30-4:45 PM Documenting perceptions of resilience after wildfires across social and ecological contexts: Lessons learned from four workshops in the Southwest. **CARUOLO, C.**, C. Aslan, C. Edgeley, A. Thode, S. Souther, E. Zander, A. Youberg, C. Stropki, M. Andrews, and S. Gilb
- 4:45-5:00 PM Bucking the suppression status quo: incentives to shift the management paradigm on natural ignitions. **FRANZ, S.** and C. Edgeley
- 5:00-5:15 PM Beyond Places and Assets: Reframing Valuation in Quantitative Wildfire Risk Assessments (QWRAs) to Capture Stakeholder Perceptions and Values. **O'MARA T.M.** and M.M. Colavito
- 5:15-5:30 PM Challenges, opportunities, and applications of a regional landscape analysis. **RADONIC, L.**, M. Nelson, and E. Gentilhomme

Part III: Predictive Modeling for River Management

Wednesday, 3:30-5:30 PM (Aspen B)

Moderators: Emily Palmquist, Research Biologist, USGS Grand Canyon Monitoring and Research Center; Charles Yackulic, Research Statistician, US Geological Survey; Drew Eppehimer, Research Fish Biologist, U.S. Geological Survey; Paul Grams, U.S. Geological Survey; Joel Sankey, U.S. Geological Survey; Shannon Sartain; Hydrologist, USGS Grand Canyon Monitoring and Research Center

- 3:30-3:45 PM Management willing and the creek don't rise: Assessing uncertain futures in Colorado River reservoirs on inundated cultural and paleontological resources. **CASTER, J.**, J.B. Sankey, H. Fairley, A. Schott, D. Conlin, D. Morgan, and P. Wilson
- 3:45-4:00 PM Modeling the Influence of Changing Reservoir Levels on Mineral Dust Emissions at Lake Powell and Lake Mead. **FISCHELLA, M.R.**, J.B. Sankey, J. Caster, D.V. Malia, R.F. Kokaly, A.E. East, A. Kasprak, B.R. Deemer, and E. Byerley
- 4:00-4:15 PM Reservoir operations for sustainable sand management in the Colorado River in Grand Canyon. **SALTER, G.**, D.J. Topping, J. Wang, J.C. Schmidt, C.B. Yackulic, L.S. Bair, E.R. Mueller, and P.E. Grams

- 4:15-4:30 PM Balancing Native Species Management, Downstream Water Delivery, and Energy Generation in a Changing Climate. **BAIR, L.S.**, J. Wang, D. Eppehimer, J.C. Schmidt, and C.B. Yackulic
- 4:30-4:45 PM Constructed value of information to prioritize critical uncertainties. **LAWSON, A.J.**
- 4:45-5:00 PM Rapid structured decision making for delta smelt freshwater outflow management. **HEALY, B.D.**, C.C. Phillis, and B. Mahardja
- 5:00-5:15 PM Exploring uncertainty surrounding freshwater flow management decision making for the controversial Delta Smelt. **MAHARDJA, B.**, W.E. Smith, B.D. Healy, C. Koizumi, M.L. Nobriga, S. Acuña, B. Crawford, K.K. Arend, and M.C. Runge
- 5:15-5:30 PM Discussion on Predictive Modeling for River Management

Contributed: Dryland Restoration Strategies

Wednesday, 3:30-5:30 PM (Aspen C)

Moderators: Kristina Young, Research Ecologist, USDA Agricultural Research Service (ARS)

- 3:30-3:45 PM RestoreNet: a field trial network to improve restoration outcomes across environmental gradients. **SHRIVER L.C.**, S.A. Costanzo, H.L. Farrell, C.A. Havrilla, K.R. Balazs, B.J. Butterfield, E.S. Gornish, A.M. Faist, L.Larios, H.I. Rowe, S.C. Reed, M.C. Duniway, C.A. Gehring, R.N. Corwin, E.Swartz, M. Garbowski, K.M. Laushman, M.L. McCormick, and S.M. Munson
- 3:45-4:00 PM Differences between germination and seedling traits of wild-grown plants and their farm-grown descendants. **ROYBAL C.** and R.Massatti
- 4:00-4:15 PM Seed pellet composition and amendments improve seedling emergence and inform restoration approaches in drylands. **SWARTZ, E.H.**, B. Caldwell, and C.A. Havrilla
- 4:15-4:30 PM Using biochar as a soil amendment in wildland forests and agricultural settings in northern Arizona. **GHOSH, D.**, P. Friederici, and H.S. Han
- 4:30-4:45 PM Soil surface modifications can improve dryland reclamation following energy development. **ECKHOFF, K.**, R.Mann, G. Penn, R. Finger-Higgins, J. Bradford, S. Munson, S.Reed, M. Villarreal, R. Reisor, K. Sadlier, and M. C. Duniway
- 4:45-5:00 PM Subcrusts are a preeminent source of soil biocrust resilience. **SCOTT, B.** and F. Garcia-Pichel
- 5:00-5:15 PM Mycorrhizal soil inoculum along a grazing disturbance gradient in dryland systems. **CORWIN, R.N.**, L.C. Shriver, S.A. Costanzo, L. Eisele-Yocum, C.A. Havrilla, E.S. Gornish, S.M. Munson, and C.A. Gehring
- 5:15-5:30 PM Harvester ant ecology: how ants may affect and be used in restoration of drylands. **UHEY, D.A.**, R.A. Hofstetter, S. Vissa, C.A. Gehring, M.M. Moore, and K.A. Haubensak

Climate Drivers and Impacts

Wednesday, 3:30-5:30 PM (Juniper)

Moderators: Sneha Vissa, Assistant Teaching Professor, Northern Arizona University

- 3:30-3:45 PM Drivers of extreme carbon sources and sinks across diverse ecosystems in the western USA. **YORK, M.**, B. Strange, A. Khan, D. Peltier, J.J. Barber, and K. Ogle
- 3:45-4:00 PM Unsettled grounds: process-based forward simulations of soil carbon flux under steady-state and transient assumptions in Southwestern US. **SARUTA, V.**, D. Schlaepfer, J. Bradford, J. Barber, and K. Ogle
- 4:00-4:15 PM Hide and Seek: Can Biocrust Buffer the Effects of Climate Change on Soil Microarthropods Across an Elevation Gradient? **TRIMINGHAM, C.E.**, A.J. Antoninka, M.A. Bowker, D. Uhey, K. Gibson, and K. Doherty
- 4:15-4:30 PM Ecological drought projections to inform long-term land management and climate adaptation. **SCHLAEPFER D.R.**, A. Stears, N. Persley, Z.H. Hoylman, E.S. Krueger, T.E. Ochsner, and J.B. Bradford
- 4:30-4:45 PM Precipitation from tropical cyclones stimulates disproportionately higher productivity across ecosystems in the southwestern USA. **STRANGE, B.**, D. Peltier, N. Parazoo³, and K. Ogle
- 4:45-5:00 PM Quantifying the effects of key climate variables on the probability of extreme growth in trees. **FORMANACK, A.M.**, D. Peltier, J.J. Barber, and K. Ogle
- 5:00-5:15 PM Morning-shifted water use coincides with amplified afternoon heat and dryness across western U.S. ecosystems. **WIEBE, B.C.**, J.L. Diehl, Z.A. Pierrat, J.B. Fisher, G.R. Goldsmith, and C.E. Doughty
- 5:15-5:30 PM Discussion on Climate Drivers and Impacts

Geologic Studies On, Under, and Off the Colorado Plateau

Wednesday, 3:30-4:45 PM (Pinyon)

Moderators: Kelsey Brennan, Geologist, U.S. Geological Survey; Ryan Porter, Associate Professor, Northern Arizona University; Casey Tierney, Assistant Teaching Professor, Northern Arizona University

- 3:30-3:45 PM Mapping the Subsurface beneath the San Francisco Volcanic Field Using Seismic Data. **PORTER, R.**, E. Kiser, and M. Reid
- 3:45-4:00 PM Catastrophic (unpredictable) Grand Canyon geologic hazards from Colorado River blockages caused by landslides and lava dams, and their paleolakes. **KARLSTROM, K.** and L. Crossey
- 4:00-4:15 PM Advancing paleontological research, science communication, and resource conservation at Grand Canyon National Park. **MILLER A.E.**
- 4:15-4:30 PM Precursor to the Ancient Super Volcanoes of Southern Colorado: Assessing the Petrogenesis and Crustal Evolution of the Pre-Caldera Conejos Lavas at the Platoro Caldera Complex. **AMUNDSEN, B.** and Tierney, C.
- 4:30-4:45 PM Discussion on Geologic Studies On, Under, and Off the Colorado Plateau

Poster Session and Celebratory Reception

Wednesday, September 10, 2025, 6:00-8:00 PM,
Poster Chair: Mostafa Javadian, Postdoctoral Scholar, Northern Arizona University

Location and Parking: 7 S Mikes Pike St, Flagstaff, AZ, City of Flagstaff street parking (requires payment at kiosks) & **free shuttle from du Bois to and from Mother Road**

Presenters: Please hang your posters at Mother Road between 4:45 and 5:45 PM on Wednesday. Conference staff will be available to assist you. Posters can also be dropped off with conference staff by special arrangement.

1. Assessing management strategies to develop an Integrated Pest Management system for an invasive insect in aspen. **ACHARYA, A.**, J. Bledsoe, C. Crouch, A. Grady, E. McCarty, M. Nabel, M. Price, J. Ouzts, K. Norrgard, and K.M. Waring
2. Do native microbial symbiont communities improve Fremont cottonwood (*Populus fremontii*) photosynthesis and thermal tolerance in hot environments? **ALBOR, S.A.** and K.R. Hultine
3. Microclimate and Competition Effects on Seedling Establishment in Post-Fire Mixed-Conifer Forests of the Sierra Nevada. **BANKSTON, T.Z.** and Redmond, M.D.
4. Piloting laser scanning for estimating understory biomass and aerial cover in pinyon-juniper woodlands of northern Arizona. **BEINE, N.**, A.J. Sánchez Meador, D.W. Huffman, and S.M. Munson
5. Collaborative Conservation in a Time of Uncertainty: Adapting for Change. **BEREND, K.**
6. Assessing early effectiveness of silvicultural treatments in quaking aspen exclosures affected by oystershell scale. **BLEDSON, J.**, C. Crouch, A. Acharya, M. Nabel, A. Grady, N. Wilhelmi, and K.M. Waring
7. Analyzing white pine growth in the Southwest. **CAHUEQUE, M.** and K. Waring
8. From river to rim: Nutrient selection in diets of reproductive female bats within Grand Canyon National Park. **CIARRACHI, S.G.**, F.M. Walker and J.T. Foster
9. Effects of changes in fuel structure on potential fire behavior in pinyon-juniper woodlands. **CREBBIN, R.**, D.W. Huffman, A.J. Sánchez Meador, and C.M. Hoffman
10. Impacts of Powerline Rights-of-Way in Three Arizona Plant communities. **CRUZ, G.** and Aslan, C. E.
11. Understanding climate impacts on cone production and the need for comprehensive pinyon jay population monitoring in the Dinétah (Navajo Nation). **CURLEY, A.T.**, A. Whipple, P. Henrich, and S. Chischilly
12. Identifying *Phragmites australis* subspecies using genetic markers. **DAMON, B.**, E. Palmquist, and R. Best
13. Assessing environmental drivers of C3/C4 grass species occurrence in national parks across the western United States. **DEEGAN, E.S.**, K. Ogle, A.T. Miller-ter-Kuile, M. Swan, E. Palmquist, C. Livensperger, C. McIntyre, and D. Witwicki

14. Drought and historic overgrazing limit biocrust and perennial grass recovery in a temperate grassland. **DUNIWAY M.C.**, R. Finger-Higgins, A. Knight, K.M. Quinn, E. Geiger, and J. Belnap
15. Natural tracers differentiate how baseflow and snowmelt conditions affect the Grand Canyon's water supply **GALIT, H.R.** and A. Springer
16. Alpine bumble bee (*Bombus* spp.) communities of the La Sal Mountains, Utah. **GRAHAM, T.B.**
17. *Phacelia alba*: A native plant and its pollinators' response post fire. **HASTINGS, T., H. VIELSTICH**, and J. Grant
18. Expanded Conceptual Risk Framework for Uranium Mining in Grand Canyon Watershed—Inclusion of the Havasupai Tribe Perspective. C. Tilousi and **J.E. HINCK**
19. Direct effects of precipitation and temperature on populations of three grama grass species in central Arizona semi-arid desert grasslands. **HORN, C.J.**, M.M. Moore, D.H. Atkins, K.C. Rodman, J.S. Jenness, and J.M. Leonard
20. Satellite remote sensing and AI-based data processing for groundwater prediction in desert regions of the southern United States. **JANG, M.** and I. Kim
21. Physiological responses of pinyon pine (*Pinus edulis*) to drought and elevated CO₂ in a changing climate **KEYONNIE, B.** and A.V. Whipple
22. Ecosystem recovery from acute water stress across the western United States. **KHAN, A.M.**, D. Peltier and K. Ogle
23. Dominant perennial grass (*Pleuraphis jamesii*) exhibits flexible responses to changes in precipitation seasonality. **KNIGHT, A.**, D.L. Hoover, A. Pfennigwerth, R. Massatti, R. Finger-Higgins, and M.C. Duniway
24. Designing Field Safety Curriculum for Early Career Biologists: A Graduate Student–Led Initiative. **LAPLANTE, E.R.** and A.J. Harvey
25. Comparing Elemental Signatures Between Fossilized and Live Biocrust in Sedona. **MALDONADO, M.**, C.E. Doughty, and M.A. Bowker
26. Effects of Drought and Grazing Timing on Rangeland Plant Cover. **MCCOY, T.K.**, T.B.B. Bishop, G. Tyree, R. Finger-Higgins, A.C. Knight, S.L. Wilson, L.A. Zeller, A.A. Malloy, P.F. Reeves, and M.C. Duniway
27. Following the water tanker to interrogate real-estate development and groundwater policy in Northern Arizona. **PINO, C.**, L. Radonic, M. Nelson, T. Cook, and E. Gentilhomme
28. Fuel treatment impacts on post-fire vegetation in Gambel oak shrublands: a case study from northern Utah. **PRESCOTT, A.E.**, L.L. Yocom, and E.M. LaMalfa
29. Landscape settlement patterns on southern Cedar Mesa, Utah. **PURCELL, D.E.** and J. Burns
30. Microclimate Responses to Thinning in Pinyon-Juniper Woodlands. **RAMSEY, K.**, A. Urza, M. Redmond, G. Revenis, and P. Weisberg
31. Take your science from the journal to the field: Preview of a skill-building workshop on coproduction and actionable science for early career scientists. Dietrich, E.I., L.N. Bailey, J.X. Ryan, **S.C. REED**, S.K. Carter, and W.H. Farmer

32. Biological soil crust recovery following heavy disturbance in the Mojave desert. **REEVES, P.**, R. Finger-Higgins, A. Knight, K. Griffen, N. Dombrowski, J. Perkins, K. Young, and M. Duniway
33. Assessing fuels near power lines and their susceptibility to fire using several remote sensing techniques. **SANDERSON, A.R.**, P.Z. Fulé, and F. Hardin
34. Bridging Landscapes: Exploring the Intersection of Art, Science, People, and the Grand Canyon. **SIEBERS, B.**
35. Place-Based Geoscience Education in Kinłani (Diné Bikéyah–Hopitutskwa) Using the Paleoclimate Reconstruction Storehouse (PReSto): Activating STEM Identity and Teaching Confidence through łeezh (Dust). **TELLES, F.T.**, S. Semken, and M. Nelson
36. How long do shrub communities require to recover after severe disturbance? **TERRY, T.** and P. Adler
37. webDART: A web application for evaluating effectiveness of land treatments. **TYREE, G.L.** and M. Duniway
38. Assessing pollinator response to different grazing intensity from the Kaibab Plateau Bison Herd in Arizona. **WOODY, S.R.**
39. Arbuscular Mycorrhizal (AM) Fungi within Traditional vs. Non-Traditional Maize Fields. **YAZZIE, K.T.**, J.O. Scherer, N.C. Johnson, and C.A. Gehring

Honoring Charles van Riper III

1943-2025

**Visionary founder and
unflagging supporter of
the Biennial Conference
and
Coeditor of all
Conference Proceedings**



“We hope that the public and private land stewards in Arizona, Utah, Colorado and New Mexico, and in particular managers of our National Parks, US Forest Service, Fish and Wildlife Service, Bureau of Reclamation, and tribal lands, will be able to utilize the ideas and concepts presented here to launch efforts toward enhanced management and stewardship of their lands.” *Charles van Riper & Mark Sogge*

