



2025 SRM Annual Meeting

Technical Session Schedule

Monday, February 10th

10:20am-Noon

Producer's Forum: Advancing Regenerative Practices through Holistic Management and Agroecology

Organizer: GLC Committee

Description: Join us for an engaging three-part session designed to provide hands-on insights and practical applications from leading experts in holistic management and regenerative agriculture. This year's Producer's Forum invites attendees to connect with globally renowned pioneers who are reshaping sustainable land management practices. The session will feature open discussions and audience interaction, offering valuable perspectives for ranchers, land managers, and conservationists dedicated to enhancing rangeland health.

1. Holistic Management with Allan Savory and Alejandro Carrillo

This session opens with a discussion between Allan Savory and Alejandro Carrillo, two prominent advocates of holistic land management. They will explore the foundational principles and practical applications of holistic grazing and resource management. Attendees will have the opportunity to engage directly with Savory and Carrillo, discussing strategies to restore ecosystem health, increase productivity, and address the unique challenges of rangeland management through adaptive practices.

2. Regenerative Agriculture with Jon Lundgren

Dr. Jon Lundgren will lead an open conversation on the transformative potential of regenerative agriculture, sharing his research and field experience on how biodiversity and soil health improvements contribute to both economic and ecological resilience. This interactive segment invites attendees to learn about agroecological practices that can reduce input dependency, enhance ecosystem services, and create more sustainable agricultural models.

3. Roundtable Discussion and Networking

The day will conclude with a roundtable discussion, bringing together all speakers for a collaborative conversation on advancing sustainable practices. Attendees will also have the chance to network during a social gathering, fostering connections with peers and experts in the field.

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Ignite: Finding common ground in the Greater Yellowstone Ecosystem: Introducing the Rangeland Collaboratory at the US Sheep Experiment Station

Organizer: Hailey Wilmer, Jonathan Spiess

Description: Rangeland ecosystems can often be places where different social goals for land use come into conflict. For example, in the Intermountain West, disparate land use goals for carnivore and wild sheep conservation and ranching have long led to polarized management contexts. At the US Sheep Experiment Station (USSES), a research ranch located in the Greater Yellowstone Ecosystem, researchers and community partners are seeking to find common ground through collaborative adaptive management. This session will highlight the perspectives of stakeholders and researchers conducting ecological, social, and animal genetics work to co-develop new knowledge for rangeland adaptive capacity in the Intermountain West.

Hailey Wilmer (ARS): Session Introduction

Jonathan Spiess (ARS): Ecological dimensions of collaborative adaptive management in range sheep systems

Carrie Wilson (ARS): Sheep genetics research to support wildlife/livestock coexistence

Lily Fanok (ORISE/ARS): Stakeholder Assessment: Common themes and distinct mental models

John Leavell (Idaho State Department of Ag) Singing the same song: harmonizing for rangeland adaptive management in a changing West.

Will Munger (ARS) Bridging perspectives and methods in rangeland social-ecological systems.

Daniel Anderson (The Common Ground Project): Building common ground across the Greater Yellowstone Ecosystem

Workshop: IYRP 2026 Stakeholder Action-Planning for North America - Part 1 of 2

Organizer: Layne Coppock

10:20-10:25am: Welcome to Part 1 of the Symposium: Layne Coppock

10:25-10:45am: Update on a Documentary Film Project "Stories of American Rangelands": Flavie Audoin

10:45-11:05am: Maximizing Outreach Efforts Through Art: A Western SARE Project Arts-Based Public Education for IYRP 2026: Stephen Bramwell, Lauren Svejcar

11:05-11:25am: IYRP 2026: Increasing Awareness of Grassland Conversion Issues: Bob Broweleit, Suzy Friedman

11:25-11:45am: Introducing Key Canadian Partnerships and NGOs Engaged in the Sustainability of Rangelands: Barry Irving, Amanda Muller

Open Discussion for Part 1: Layne Coppock (moderator)

Workshop: Healthy Lands and Healthy Horses

Organizers: Jessie Hadfield, Laura Snell

Description: Healthy Lands and Healthy Horses is a collaborative project with Extension and BLM professionals. The project includes the creation and dissemination of educational materials as well as facilitating Mustang Camps. Our camp activities provides hands-on, cross-disciplinary experiences to audiences unfamiliar with the controversial topics of wild horses, their management, and rangelands. Workshop attendees will be introduced to the framework of our project, given curriculum samples, and offered opportunity to bring Mustang Camp to their areas. This program can be used as supplemental material for previously established state range camps, horse camps, and other youth events.

Workshop: Rejuvra (indaziflam): come participate in a grass-roots effort to share information on effectiveness and BMPs for controlling exotic annual grasses.

Organizer: Matt Germino

Description: Tools for controlling exotic annual grasses such as cheatgrass are a priority need for semiarid shrub steppe and related habitats, but the large amount of variability in factors such as site management and disturbance history, climate, soils, and time-based factors such as weather can cause considerable variability in effectiveness of trials. Rejuvra, product brand name for indaziflam, is a relatively new herbicide that that appears to provide more years of preemergent inhibition of seedling establishment than other herbicides. Rejuvra is increasingly common and has new clearances to allow its application in many rangelands. A synthesis of its effectiveness is needed. This workshop will follow a structured format in which users can share their experiences with its application and participate in the founding of a network of application specialists and a meta-analysis study of Rejuvra effects. The session organizers will organize the input into a spreadsheet the contains location, habitat type, and many contextual variables, and will guide the development of a summary report and a platform for Rejuvra users to share advice, results, and other communications on its application.

Symposium: Challenges and Opportunities Surrounding Pinyon-Juniper Woodland Management for Improved Rangeland Health and Ecological Resilience - Part 1 of 3

Organizers: Carl Lundblad, Peter Coates, Nicholas Van Lanen

Description: Pinyon-juniper woodlands are complex and widespread ecosystems that exist along a dynamic ecotone with western rangelands including contracting sagebrush ecosystems. Effective management of both woodlands and rangelands requires an improved understanding of how changing climate, disturbance regimes, and land-use practices are expected to affect future ecological integrity and resilience of these systems, with implications for suites of sensitive species, ecosystem services, and human well-being. This session presents contemporary research and scientific expertise in the ecology and management of pinyon-juniper woodlands and sagebrush communities with the goal of advancing a more-holistic approach to conserving these important ecosystems.

10:20 Richard Miller Old growth pinyon-juniper woodlands in the Great Basin and Colorado Plateau: identification, site characteristics, and disturbance regimes

10:40 Miranda Redmond Effects of stand structure and climate on pinyon pine seed production

11:00 Michael Duniway Pinyon-juniper woodlands and savannahs of the Colorado Plateau: Soils, ecological dynamics, and management

11:20 Lea Condon Biological soil crusts in pinyon-juniper woodlands

11:40 Jamie Woollet Exploring the relationship between soil biotic conditions and planted piñon seedling survival in recent and older burned environments

Symposium: USDA-ARS Poisonous Plant Research Lab Presents Poisonous Plants in the Pacific Northwest

Organizer: Clint Stonecipher

Description: Poisonous plants are found throughout rangelands in the western U.S. and the World. They grow within natural and disturbed landscapes consisting of diverse plant communities such as sagebrush steppe, desert shrub, short grass prairies, foothills and mountain rangelands. Poisonous plants cause large economic losses through reduced animal weight gains, reproduction losses, lost grazing opportunities, and animal death. Understanding some of the plants that poison animals on rangelands and how such plants effect animals is beneficial to producers to best understand how to graze such rangelands and reduce animal losses.

10:20-10:40am: Not all Lupines are created equal: Variation in lupine alkaloid profiles across locations.
Presenter: Stephen Lee

10:40-11am: Intermittent grazing to avoid lupine induced crooked calf syndrome. Presenter: Kevin Welch

11-11:20am: Precipitation variability alters plains larkspur (*Delphinium geyeri*) alkaloid profiles and toxicosis risk.
Presenter: Aaron Kersh.

11:20-11:40am: Pine needle/Juniper induced abortions in cattle. Presenter: Daniel Cook

11:40-12:00pm: *Salvia reflexa* (lance-leaf sage) poisoning in cattle. Presenter: Clint Stonecipher

Workshop: Career Leadership Workshop (YPC Workshop) - Part 1 of 4

Organizers: Averi Reynolds, Devii Rao

Description: Session 1: In the session The Neuroscience Behind Effective Leadership you'll learn the definitions of shame and guilt, and why knowing how they show up in the workplace is imperative to your success as leaders who can influence process, procedure and those around. You'll also learn the foundational neuroscience that impacts what emotional position we're operating from which determines whether we're in imposter syndrome mode, or our core leadership skills mode. This session is for everyone. We all can lead from whatever position we hold organizationally.

Contributed Oral Session: Restoration 1

10:20-10:40am: Kirk Davies: Post-fire management decisions have consequences: drill-seeding disturbance and effects of co-seeding introduced bunchgrasses with native bunchgrasses

10:40-11am: Gregor Siegmund: Weather and ecohydrological influences on the outcomes of post-fire restoration seeding

11am-11:20am: Janetta Teichert: Optimizing winterfat establishment: Overcoming physiological challenges through seed coatings

11:20am-11:40am: Fara Brummer: A comparison of post fire aerial seeding and natural regeneration on Great Basin rangelands

11:40am-12:00pm: Lina Aoyama: Effects of post-fire seeding on genetic diversity of bluebunch wheatgrass (*Pseudoroegneria spicata*) populations

Contributed Oral Session: Riparian

10:20am-10:40am: Benjamin Menapace: Assessing trends in channel morphology to improve riparian state and transition models for northern Great Plains intermittent streams

10:40am-11am: John Stables: Influence of grazing management on degraded riparian ecosystems in southeastern North Dakota

11am-11:20am: Grant Simonds: Assessing Long-Term PFC on Public Land Riparian Areas

11:20am-11:40am: Eric Winford: Effects of Low-Tech Process-Based Restoration Approaches on the Hydrology, Geomorphology, and Vegetation of a Rangeland Riparian Complex

11:40am-12:00pm: *OPEN*

Contributed Oral Session: Ecology 1

10:20am-10:40am: David Eduardo Prado-Tarango: Arbuscular mycorrhizal fungi and soil bacteria in *Purshia tridentata* stands in the sagebrush steppe.

10:40am-11am: Hector R. Garduño: Soil Moisture Response to Extreme Drought in Oak Woodland and Open Grassland Ecosystems

11am-11:20am: Landon Neumann: Eastern Red Cedar (*Juniperus Virginiana*) Encroachment Reduces Herbaceous Vegetation

11:20am-11:40am: Remy Sutherland: Quantifying the shifting mosaic: A new tool to efficiently and effectively measure rangeland heterogeneity

11:40am-12:00pm: Janet Prevey: Flora and flames: How does pre-fire vegetation affect post-fire plant invasion in the western United States?

1:20pm-3pm

Producer's Forum: Advancing Regenerative Practices through Holistic Management and Agroecology

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Ignite: A workflow for and case studies of using remotely-sensed data products for land management

Organizer: Sarah McCord

Description: Are you interested in using remotely sensed data, including fractions cover maps (RAP, RCMAP), but not sure how to approach a question? Join this ignite session for an overview of five key questions to consider when using these data. Questions will consider management question, ecological process, key indicators, analysis options, uncertainty, and incorporating additional lines of evidence. In addition, we will present case studies implementing this workflow to assess restoration treatment effectiveness and within a land health assessment.

Tim Assal: What is the management question, ecological proves and key indicators?

Matthew Rigge: How does the ecological process vary over space and time?

Sheri Spiegel: When the cows come home unexpectedly: Rapid AUM assessment using satellite and ground-based methods on desert rangeland

Georgia Harrison: How will I use, analyze, and visualize data?

Brianne Brussee: Using remotely sensed fractional cover data to inform wildlife habitat suitability and management

Sarah McCord: What are my sources of uncertainty and how do I interpret them?

Jake Price: Reliability of digital resources for planning fuels treatments: inferences from two contrasting national parks

Eric Jensen: How can I integrate multiple lines of evidence and other resources to make an interpretation or decision?

Megan Creutzberg: Integrating remote sensing and field-based data to evaluate post-fire treatment effects on public rangelands in Oregon

Scott Morford: Early Adoption of New Scientific Guidance for Managing Woody Encroachment in the Flint Hills, KS, USA

Workshop: Career Leadership Workshop (YPC Workshop) - Part 2 of 4

Organizers: Averi Reynolds, Devii Rao

Description: Session 1: In the session The Neuroscience Behind Effective Leadership you'll learn the definitions of shame and guilt, and why knowing how they show up in the workplace is imperative to your success as leaders who can influence process, procedure and those around. You'll also learn the foundational neuroscience that impacts what emotional position we're operating from which determines whether we're in imposter syndrome mode, or our core leadership skills mode. This session is for everyone. We all can lead from whatever position we hold organizationally.

Workshop: IYRP 2026 Stakeholder Action-Planning for North America - Part 2 of 2

Organizer: Layne Coppock

1:20-1:25pm: Welcome to Part 2 of the Symposium: Layne Coppock

1:25-1:45pm: Moving Forward with Grassland Conservation Socially and Ecologically: The Case of Northern Mexico: David Borré González

1:45-2:05pm: Proclamations: Engaging Local Government with Messaging in Celebration of the 2026 IYRP: Mark Thorne

2:05-2:25pm: SRM/IYRP President's Prize 2026: Section Competition for Most Impactful Range Projects: Layne Coppock

2:25-2:45pm: Building Public Awareness for Global Rangelands via Social Media and the World Cup 2026: Flavie Audoin

2:45-3pm: Open Discussion for Part 2; Synthesis for Parts 1 and 2; Closing Remarks: Layne Coppock (moderator)

Workshop: Evidence-Based Pedagogical Approaches for Rangeland Education - Part 1 of 2

Organizers: Sakina Dixon, X. Ben Wu, Ashley Tanner

Description: This interactive workshop on faculty teaching will begin with a review of key findings from learning science, specifically how people learn and principles for powerful learning processes. Next, effective pedagogical approaches and high-impact learning experiences will be discussed. Following, participants will break out into small groups based on the approaches and high-impact experiences reviewed. Each group will participate in-depth discussions on their topic and brainstorm how these practices could be implemented in their own courses. The workshop will end with participant reflections and a discussion of professional development needs of faculty in rangeland education.

Symposium/Workshop: The science and practice of native seed selection for restoration: Where are we, and what is needed? Part 1 of 2: Symposium

Organizers: Julie Larson, Magda Garbowski, Justin Luong

Description: Selecting appropriate seed for rangeland restoration is an interdisciplinary challenge limited by seed supplies and uncertainty, but the landscape is changing rapidly with new seed selection science, tools, and policies. In this two-part session, we evaluate best practices for seed selection in rangelands. (Symposium) Experts from multiple disciplines will first provide an overview of potential targets for seed selection, from local adaptation to rangeland function, and how these priorities are playing out in practice. (Workshop) Building on this context, participants will engage in group discussions to outline a path forward for the science and practice of seed selection in restoration.

Local ecotypes and ecological restoration: state of the science: Kristina Hufford

Climate matching to guide seed selection and support rangeland restoration: benefits, costs, and unknowns: Rob Massatti

Balancing diverse goals in seed selection for rangeland restoration navigating function, locality and climate: Steven Lee

Challenges to native seed sourcing for restoration in California, as told by restoration practitioners: Sam Ahler

Today's limitations to putting ideal seed sourcing into practice, and perspectives on tomorrow's fixes to the common dilemma of not having the seed you need: Owen Baughman

Symposium: Challenges and Opportunities Surrounding Pinyon-Juniper Woodland Management for Improved Rangeland Health and Ecological Resilience - Part 2 of 3

1:00 Peter Weisberg Trees in rangelands: ecological processes underlying contemporary change in pinyon-juniper woodlands

1:20 Sarah Halperin/Doug Shinneman Pinyon-juniper associated wildlife responses to natural disturbance and climate change – how much do we know?

1:40 Peter Coates Greater sage-grouse and pinyon-juniper: an overview of the science

2:00 Scott Somershoe Pinyon Jay ecology and implications for pinyon-juniper woodland management

2:20 Carl Lundblad Habitat associations and responses to management by pinyon-juniper songbirds in the Eastern Sierra Nevada

Symposium: Process-based management the Science and Application; Part 1 of 4

Organizer: Roy Roath

Science Section

Asking the right questions about ecological processes - Larry Rittenhouse, Colorado State Univ. Professor Emeritus

Understanding succession – Non-linear thinking – Barry Perryman, Univ. Nevada Reno, Professor and Dept. Head

Ecological Process in Reclamations- Mark Paschke, Colorado State Univ., Professor and Endowed Chair

Colonization of Plant Communities- Lisa Rew, Montana State Univ., Professor

Water and Landscapes- Understanding Vegetation and Process Linkages C. Jason Williams, Research Hydrologist – USDA Agricultural Research Service, Southwest Watershed Research Center, Tucson, Arizona; Keirith Snyder, Research Ecologist - USDA Agricultural Research Service, Great Basin Rangelands Research, Reno, Nevada

Contributed Oral Session: Wildlife 1

1:20pm-1:40pm: Grace McAndrews: Understanding Sri Lankan Elephant Presences: Implications of Water Availability & Vegetation Distribution Outside Wasgamuwa National Park

1:40pm-2:00pm: Cory Farnsworth: Upland Game, the Missing Link to Grasshopper Control?---needs to move to later in the week

2:00pm-2:20pm: Courtney Buchanan: Relating gut microbiome composition and life history metrics for pronghorn (*Antilocapra americana*) in the Red Desert, Wyoming

2:20pm-2:40pm: Amy Symstad: Challenges in determining a sustainable bison population size for Badlands National Park

2:40pm-3:00pm: Caleb McKinney: Exploring temporal variability in the scale of effect for a declining ground-nesting bird in an anthropogenically altered landscape.

Contributed Oral Session: Grazing 1

1:20pm-1:40pm: James Muir: Climate & market-flexible, multiple-use native Texas grassland species

1:40pm-2:00pm: Kaylee Wheeler: The nutritional value of native plant diversity for grazing livestock in South Dakota.

2:00pm-2:20pm: Caroline Wade: Effect of grazing management on soil carbon and vegetation diversity and composition in northern temperate grasslands

2:20pm-2:40pm: Trace Stauble: Engineering the Green Wave: Uncovering Defoliation's Effects on Nutritive Value and Herbivore Selection

2:40pm-3:00pm: Amanda Norton: Beef cattle foraging behavior within an adaptive rotational and prescriptive grazing treatment in Wyoming

Contributed Oral Session: Human Dimensions/SES 1

1:20pm-1:40pm: David Matarrita: Land steward amenity migrants: Who are they and what are they about?

1:40pm-2:00pm: Cinthy Veintimilla: More than appreciating nature: The Land Steward Amenity Migrant

2:00pm-2:20pm: John Ritten: Considerations for social LCA for rangeland beef systems in the U.S. Northern Great Plains

2:20pm-2:40pm: Sarah Carter: Coproducing rangeland science on public lands: a practical toolkit for scientists and managers

2:40pm-3:00pm: Zubair Barkat: Land, Legacy, and Livelihood: Beyond Dollars—How Senses of Place Influence Utah Ranchers' Economic Decision Making

Contributed Oral Session: Carbon

1:20pm-1:40pm: Eric Sant: The Effects of Management and Climate on Long-term Soil Organic Carbon

1:40pm-2:00pm: Jocelyn Torres: Characterization of Seasonal Variation in Enteric Methane Emissions of Beef Cows Grazing Native Rangelands in Eastern Oregon

2:00pm-2:20pm: Nicki Nimlos: Are ranchers interested in joining the carbon market? Survey says: maybe.

2:20pm-2:40pm: Maria Iglesias-Thome: Measuring atmospheric carbon fluxes in dryland pastures in Oregon, USA

2:40pm-3:00pm: Nathan Moore: Landscape Heterogeneity and its Influence on Rangeland Soil Carbon

3:20pm-5pm

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Workshop: Survey 123 for Range Implementation monitoring and Range Structural Improvement surveys.

Organizers: Bruce Slice, Kent Ellett

Description: The Forest Service has begun using the ESRI based Survey 123 platform to collect, store, retrieve and share data from day-to-day Range Implementation monitoring and for Range Structural Improvement surveys. These forms can also be shared with permittees, volunteers, and others outside of the agency to assist with data collection.

Symposium/Workshop: The science and practice of native seed selection for restoration: Where are we, and what is needed? Part 2 of 2: Workshop

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Workshop Moderators: Julie Larson, Magda Garbowski, Justin Luong

Symposium: Data systems Integration: Incorporating multiple data streams to better study grazing behavior on rangelands

Organizer: Jameson Brennan

Description: Advances in precision livestock technology, data analytics, and remote sensing has the potential to increase our understanding and management of grazing livestock on the landscape. Although any specific piece of technology requires unique steps for processing and turning data into insights, key to the advancement of precision technology on rangeland systems will likely be the integration of multiple technologies and data streams to better understand animal behavior and inform management decisions. This symposium will highlight current work integrating multiple technologies and sensor platforms to study livestock behavior on extensive rangelands.

3:20-3:35pm: Quantifying and interpreting cattle foraging behavior metrics derived from on-animal sensors in extensive rangelands: David Augustine

3:35-3:50pm: Heart rate monitoring sensors for grazing research in western Nebraska: Mitch Stephenson

3:50-4:05pm: The GainScope: Measuring fine-scale landscape contribution to body-weight gain in steers managed using virtual fencing collars and precision scales in extensive pastures: Ira Parsons

4:05-4:20pm: Coupling precision livestock management (PLM) and emissions measurement technologies to develop sustainable management strategies: EJ Raynor

4:20-4:35pm: Using GPS collars to develop rangeland use preehnotypes in sheep: Andrew Hess

4:35-4:50pm: Estimating Dry Matter Intake with remote sensing and in pasture weigh systems: Jameson Brennan

4:50-5pm: Discussion on Technologies

Symposium: Challenges and Opportunities Surrounding Pinyon-Juniper Woodland Management for Improved Rangeland Health and Ecological Resilience - Part 3 of 3

3:00 Adam Noel Geographic shifts in climate suitability for pinyon-juniper communities: implications for range-wide management of arid woodland resources

3:20 Robert Shriver Looking to the past to anticipate the future of pinyon-juniper woodlands

3:40 Cali Weise Decision support tools for holistic conifer management in the Great Basin

4:00 Nicholas Van Lanen Leveraging landscape- and local-scale habitat relationship models to improve pinyon jay management and conservation

4:20 Andrew Olsen The Pinyon-Juniper Project: toward a conservation strategy for the biome

Symposium: Leveraging geospatial technology for rangeland monitoring

Organizers: Sarah McCord, Lucas Phipps, Matthew Rigge

Description: Rangeland monitoring, long a core tool in rangeland management, has been greatly enhanced by the development of geospatial and remote sensing technologies. In this session, we present examples of leveraging geospatial technologies to improve rangeland monitoring and build upon field monitoring efforts.

Eye in the sky: Evaluating drivers of sagebrush recovery and restoration across the biome with remote sensing data: Bryan Tarbox

Assessing the effect of adaptive grazing on fine scale changes of forage mass using drone data: Humberto Perroto

The Application of State-and-Transition models to remotely sensed vegetation cover datasets: Lucas Phipps

Unlocking opportunities for Adaptive Precision Grazing Management: Santiago Utsumi

Developing a Customizable Climate Report Generation System for Land Managers: Trevor McKellar

Mapping sagebrush and non-native sweetclover from drones to satellites: Aaron Johnston

Symposium: Process-based management the Science and Application; Part 2 of 4

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Understanding succession – Non-linear thinking – Barry Perryman, Univ. Nevada Reno, Professor and Dept. Head

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Contributed Oral Session: Remote Sensing 1

3:20pm-3:40pm: Erika Peirce: Assessing the performance and transferability of satellite-based standing herbaceous biomass models across diverse plant communities

3:40pm-4:00pm: Jesus A. Prieto-Amparan: Monitoring Vegetation Stress at the Teseachi Experimental Ranch using Satellite Data, in northern Mexico

4:00pm-4:20pm: Daniel R Schlaepfer: Soil moisture tools for understanding contemporary and future ecological drought

4:20pm-4:40pm: Mohammed Abdelkreim: Investigation of Seasonal Rangeland changes based on NDVI at West Kordofan, Sudan

4:40pm-5:00pm: Peter Olsoy: Drone-based Measurements of Structural Diversity in Rangelands

Contributed Oral Session: Restoration 2

3:20pm-3:40pm: Alexander Stosich: Nursery production and in-situ establishment methods for *Penstemon albomarginatus*, a rare herbaceous perennial of the Mojave Desert

3:40pm-4:00pm: Damaris Chenoweth: Ring-width chronology of big sagebrush seedlings collected from restored natural gas well pads in southwestern Wyoming

4:00pm-4:20pm: Shaelyn Rainey: Cover crop and seeding rate effects on grassland establishment

4:20pm-4:40pm: Erik Lehnhoff: Investigating harvester ant seed foraging for improving rangeland restoration

4:40pm-5:00pm: Phoebe Ferguson: The effect of mechanical treatment on two-needle piñon establishment in south-central Colorado

Contributed Oral Session: Soil Health

3:20pm-3:40pm: Dan Harmon: Soil Resource Availability: The Journey from Cheatgrass to Perennial Grass Dominance

3:40pm-4:00pm: Kalyn Taylor: Decadal soil health responses to adaptive multipaddock (AMP) rotational grazing vs. traditional season-long grazing in a semiarid rangeland

4:00pm-4:20pm: Ava-Rose Beech: Assessing climate-smart ranching practices on California rangelands: Impacts on soil microbial ecology and drought resilience

4:20pm-4:40pm: Daniel Gomez: Evaluating carbon, nitrogen, and organic matter content in irrigated and non-irrigated pasturelands in Oregon, USA.

4:40-5:00pm: Pedro Afonso Marquezini Leite: Can woody plant encroachment aid in soil recovery on historically degraded rangelands?

Contributed Oral Session: Fire Management/Fuels & Grazing

3:20pm-3:40pm: Scott Shaff: Improving the collection and accessibility of Potential Control Location fuels data for pre-fire planning in Eastern Oregon rangelands

3:40pm-4:00pm: Xavier Jaime: Effect of prescribed fire on plant α - and β -diversity and their spatial pattern on heterogeneous landscapes of mesquite-oak savanna

4:00pm-4:20pm: Jacqueline Ott: Annual brome and native perennial regeneration following prescribed fire in a grassland and grassland-shrubland ecotone

4:20pm-4:40pm: Sofia Koutzoukis: Rapid change in pinyon and juniper expansion and invasive annual grass abundance influences treatment options in Wildfire Crisis Strategy Landscapes dominated by shrublands

4:40pm-5:00pm: Alina Evans: Fuel treatment effects on native plant species and biodiversity in sagebrush ecosystems

Tuesday, February 11th

10:20am-Noon

Ignite: Taking action in the face of uncertainty in rangeland climate adaptation

Organizer: Madelon Case

Description: As we prepare for future climate variability and associated challenges in rangelands (such as invasive species and changing fire regimes), we often see both researchers and land managers grappling with uncertainty: for researchers, how to handle and communicate uncertainty in research efforts; for managers, how to recognize and incorporate uncertainty in decision-making. This Ignite session will pair short talks on research and management/practitioner perspectives on the same climate adaptation challenges, which may illuminate how each of them consider uncertainty in their work and how we can better foster co-production to bridge the science-management divide.

10:20-10:25am: Session organizers: Session overview and introduction

10:25-10:30am: Hailey Wilmer: Working together toward a more meaningful rangeland adaptation science (Part 1)

10:30-10:35am: Daniel Macon: Working together toward a more meaningful rangeland adaptation science (Part 2)

10:35-10:40am: Q&A

10:40-10:45am: Martin Holdrege: Identifying and assessing sources of uncertainty in climate change effects on big sagebrush plant communities

10:45-10:50am: Alex Kumar: Embracing climate change uncertainty to inform management decisions using scenario planning and adaptive management

10:50-10:55am: Q&A

10:55-11am: Shawn O'Neil: Greater sage-grouse and climate change: Retrospective population analysis informs plausible outcomes under future climates

11-11:05am: John Tull: Bridging science and management to incorporate climate change uncertainty in greater sage-grouse conservation

11:05-11:10am: Q&A

11:10-11:15am: Brian Miller: Scenario-based adaptation for resource stewardship in a changing climate

11:15-11:20am: Cami Dixon: Thoughts on integrating future climate projections for managing U.S. Fish and Wildlife Service lands in the Prairie Pothole Region

11:25-11:30am: Q&A

11:30-11:35am: Katie Wollstein: Adaptive institutions for integrated fire management

11:35-11:40am: Bill Moore: Adapting grazing plans to fit producer logistics & new ecological realities

11:40-Noon: Q&A

Workshop: Co-Laboring Block One: Workshop-Principles and Processes: From Collaborative to CoLaborative

Organizers: Linda Poole, Bre Owens, Jared Talley, Kris Hulvey

Full Session Description: Conservation is not preservation, and collaboration is not always fun – but both, particularly when combined, can result in thriving communities living on healthy landscapes through sustained profit that is generated and reinvested via stewardship economies. This year's Co-Laboring in the West sessions (a combination of workshops and symposia) will focus on how we show up in service to each other and a shared vision of healthy rangelands for a sustainable world. Each session will have value as a standalone event, but each addresses different aspects of co-laboring and thus has additive values which culminate in Session 4.

Each participant attending any of the four sessions will receive one workbook with session agendas, speaker bios and contact information, space to record notes during presentations, and a framework to elicit thoughts on their own situation. The workbook will be especially valuable in Session 4, where participants will have the opportunity to self-identify the biggest challenges or opportunities in their communities, then join facilitated small group sessions on topics most pertinent to successful co-laboring in their context.

Organized by The Western Center and Western Landowners Alliance

Workshop Block One: Principles and Processes: From Collaborative to CoLaborative

Description While diverse perspectives and cooperation have the power to inform new group insights and creative solutions, the process is time consuming and requires both humility and courage. We define Co-laboring as the literal act and art of working together, not to be confused with merely working in the same vicinity or working in parallel. It requires understanding how both our physical and mental efforts align to complete a task in unison. It creates space for shared learning and purpose. It builds and sustains trust over time, as we gain shared motive and competency, and continue to show up for each other.

If you lead or participate in a local collaborative or grazing coalition, if you want to start one in your state or region, or if you are just interested in strategies for working more effectively with peers and partners – please join us for this workshop and the whole series of Co-Laboring sessions. Participants will join in dialogue with invited representatives from local, state, and west-wide steward-led organizations, along with working through a set of activities to foster learning together by capitalizing on diverse experiences and shared vision. By reflecting on successes and failures we've encountered along the way, we can identify pathways for success moving forward and strategies for supporting each other through this challenging but rewarding effort.

Session Facilitator: Linda Poole. Featured groups will speak to a shared set of questions, then dialogue on “crucial questions” arising from the audience or other speakers:

- Wallowa Resources (Marci Shreder)
- Altar Valley Conservation Alliance (Sarah King-tentative)
- Idaho (Mark and Wendy Pratt)
- CA Rangeland Conservation Coalition-CA Grazing Lands Coalition (Bre Owens, Alex Carol)
- WY Grazing Lands Coalition (Hannah Fraley)
- Lesser Prairie-Chicken Landowners Alliance (Bret Riley)
- Alianza Agri-Cultura de Taos and Rocky Mountain Farmers Union (Gillian Joyce)
- Shoesole Resource Management Group (Agee Smith, Robin Boies-tentative)
- Headwaters of the Colorado (Meghan Lally O'Toole)
- Ranchers Stewardship Alliance (Angel DeVries)
- ROGER-Results Oriented Grazing for Ecological Resilience (Laura Van Riper)
- Partnerscapes (Jim Stone-tentative)
- SD Soil Health Coalition and SD Sheep Growers Association (Dave Ollali-tentative)

Workshop: Career Leadership Workshop (YPC Workshop) - Part 3 of 4

Organizers: Averi Reynolds, Devii Rao

Description: Session 2: In the session Building Relational Trust to Empower Effective Communication you'll learn the importance of building relational trust as the foundation to effective communication and healthy conflict. You'll learn structures that behavioralize trust and that will increase accountability and make what we perceive as hard conversations tangible and actionable. You'll also learn specific language tools that empower you to engage in conversations from a position of curiosity and connection in service of things that matter.

Workshop: Testing the Boundaries: Virtual Fencing Insights

Organizer: Sarah Noelle, Logan Vandermark

1. Welcome and Introductions: Sarah Noelle and Logan Vandermark

2. Collaborative Efforts with Virtual Fencing: Sarah Noelle, University of Arizona, will discuss the goal of the virtual fencing working group partnership. As well as provide insight into what work related to virtual fencing that the partners have done. The group organically formed in 2021 to further communication and research efforts among entities across the United States.
3. Practical Perspectives on Virtual Fence Implementation – Forum: Logan Vandermark, South Dakota State University Extension, will moderate a panel with producers, researchers, extension, and NGO participants to discuss their experiences with virtual fencing. They will provide perspectives on who should use VF, what does it look like on public lands, what pitfalls are there, and allow attendees to ask their questions about virtual fencing.
 - Jay Kehne – Conservation Northwest (Omak, Washington)
 - William Burnidge – The Nature Conservancy (Golden, Colorado)
 - Mike and Joy Wilson – Beef Cattle producers (Brewster, Washington)
 - Kurt McCormack – Beef Cattle Producer (Heppner, Oregon)
 - Flavie Audoin – University of Arizona (Tucson, Arizona)
 - Kolbie Daley – USFS (Winthrop, Washington)
 - Joel Yelich – University of Idaho (Carmen, Idaho)

Symposium: SageSTEP: Vegetation treatments for sustainable rangelands, fire risk reduction and ecosystem resilience - Part 1 of 3

Organizer: Lisa Ellsworth, Beth Newingham

Description: The Sagebrush Steppe Treatment Evaluation Project (SageSTEP) is a regional experiment evaluating methods for fuel reduction and ecological restoration. Fuel treatments were implemented fifteen years ago at 21 sites either invaded by annual grasses or encroached by pinyon-juniper across the Intermountain West. We have collected annual fuel, vegetation, and climate data, as well as periodic data on soils and higher trophic levels to understand changes in response to treatment, climate, and disturbance. We share a background of the project and the landscape-scale context, provide current research on soil and organismal responses, and present modeling efforts using SageSTEP

10:20am: Introduction: SageSTEP Special Session

10:25am: The past, present, and future of the Sagebrush Steppe Treatment Evaluation Project (SageSTEP): Beth A. Newingham, USDA ARS Great Basin Rangelands Research Unit; James McIver, Oregon State University

10:40am: The Role of Wildfire and Grazing in Pinyon-Juniper and Sagebrush Ecotones: Richard F. Miller, Professor Emeritus, Oregon State University

10:55am: Evaluation of Beetle Responses to Sagebrush Habitat Restoration Treatments: Kirk C. Tonkel, USDA ARS Great Basin Rangelands Research Unit

11:10am: Songbird nest-site selection in burned and unburned sagebrush habitat experiencing conifer expansion: Jessica A. Pletcher, Oregon State University

11:25am: Effects of prescribed fire in the sagebrush-woodland ecotone on sagebrush-obligate songbird nest survival: Vanessa Schroeder, Oregon State University

11:40am: New open-source monitoring tools to improve understanding of birds, bats, and biodiversity in sagebrush and pinyon juniper habitats: Steve E. Hanser, U.S. Geological Survey, Fort Collins Science Center

11:55am: Conclusion

Symposium: Riparian Restoration of Functions and Values - Linking LTPBR, PFC, Adaptive Grazing Management, and Beaver; Part 2 of 2

Organizer: Sherman Swanson

Description: An overview of Maestas, J. D., J. W. Wheaton, N. Bouwes, S. R. Swanson, and M. Dickard. 2023b. Water is life: Importance and management of riparian areas for rangeland wildlife in: L. B. McNew, D. K. Dahlgren, J. L. Beck, editors. Rangeland Wildlife Ecology and Conservation. Springer, Dordrecht, The Netherlands. Also, LTPBR is Low tech Process Based Riparian Restoration and has been widely applied. PFC is Riparian Proper function Condition, the focus of the Bureau of Land Management watershed-focused land health standard as well as management of many private lands, Forest Service lands, etc.

Water is Life: Importance and Management of Rangeland Riparian Areas – Jeremy Maestas

Low-Tech Process Based Restoration – Steve Bennett/Joe Wheaton/Nick Bouwes; Steve works on the Asotin project in WA so may be a good one to speak to both the concept of LTPBR and a case study;

How and why BLM is engaging with LTPBR for riparian restoration across BLM lands -- Alden Shallcross

Rancher's perspective: Bringing Beaver Back to Birch Creek – Jay Wilde, Idaho rancher; Jay's story encompasses grazing, LTPBR, and beaver reintroduction; <https://idrange.org/range-stories/southeast-idaho/restoring-beaver-to-birch-creek/>

Riparian proper functioning conditions the foundation for watershed land health – Sherman Swanson

Principles and strategies for riparian grazing management – Kathryn Dyer

Build it and they will come – Grazing for woodies and beaver will come – Carol Evans

Monitoring success from space – Kurt Fessenmeyer

Having water in a drought – Agee Smith (or some speaker from Washington with a great riparian story)

Changing a Landscape to a Lifescape

Symposium: Understanding the role of grazing management on soil carbon outcomes across diverse grazing landscapes

Organizers: Paige Stanley and Chris Wilson

Description: Soil carbon is a central ecosystem indicator because of its connections to other aspects of healthy rangelands and sustainability, including water cycling, productivity, climate change mitigation and resilience, and profitability. There are surging interests in incentivizing improved grazing management to drive soil carbon sequestration, as evidenced by rapidly developing carbon credit markets. However, despite the larger-than-ever interest in improved grazing for soil carbon sequestration outcomes, little research has measured soil carbon outcomes from improved grazing over time. Our session exhibits presentations from researchers with measured soil carbon outcomes of applied grazing management across diverse grazing ecosystems.

Grazer mobility and effects of grazing on soil carbon sequestration: lessons from open pastoralist systems in Africa: Authors: Mark Ritchie, Soils for the Future, LLC and Utah State University

Implications of Grazing Intensity for Dryland Soil Carbon Storage on the Colorado Plateau: Savannah Adkins

Beyond sequestration: A fresh look at a decade of rangeland carbon monitoring in California: Erika Foster (Point Blue Conservation Science)

The soil organic carbon sequestration potential of time-controlled, rapid-rotation livestock grazing on the Three Creeks Grazing Project in northern Utah : Megan K. Nasto (Working Lands Conservation)

Advancing beef sustainability: long-term impacts of adaptive multipaddock grazing and soil carbon sequestration on beef's carbon footprint in the Midwestern USA: L. Garcia (Michigan State University)

Symposium: Innovative Approaches to Sustainability in Ranching and Rangeland Management – The Culmination of a Five-Year Coordinated Agriculture Project - Part 1 of 2

Organizers: Angus “Skye” Aney, Paige Ramsey

Description: This symposium will provide a multifaceted look at rangeland sustainability in the increasingly warming and drying southwest US. We will begin with a more expansive view of rangeland health and progress to proposing some novel strategies for sustainable ranching. The second half of this symposium will explore new applications for improved decision support, more inclusive outreach to increase effectiveness, and educating the next generation of ranchers, resource managers, and public.

10:20am: Ecosystem Health Beyond Carbon – Dr. Andres Cibils, USDA Southern Plains Climate Hub, Dr. John Wendt, Oklahoma State University

10:20-10:40am: Adaptive Grazing Management in the Information Age – Incorporating Data From Virtual Fence, Remote Sensing, And Ground Measurements – Lara Macon, USDA-ARS Jornada Experimental Range

10:40-11am: Rethinking Sustainability: Can Heritage Cattle Improve Production Across the Supply Chain? – Dr. Matt McIntosh, USDA-ARS Food Systems Research Unit

11am: A Framework for Evaluating Sustainability Indicators – Dr. Sheri Spiegel, USDA-ARS Jornada Experimental Range

Discussion:

11:20-11:40am: Additional Q&A for speakers

11:40-12pm: Audience participatory discussion question: What novel strategies have you seen people applying or doing research on?

Contributed Oral Session: Restoration 3

10:20am-10:40am: Molly Reichenborn: Reducing dryland connectivity alongside herbicide application to restore shrub-encroached grasslands

10:40am-11:00am: Lee Bennion: A site-specific sagebrush establishment model to improve post-fire seeding efficacy in the Great Basin

11:00am-11:20am: Daav Sannerud: Thinning Dense Big Sagebrush to Replenish Herbaceous Understories: Herbaceous Understory Response Three Years After Treatment

11:20am-11:40am: Susan Bainbridge: Post-treatment plant community stability in Wyoming big sage

11:40am-12:00pm: Brian Morra: How do fire and mechanical seeding affect soil water availability for reseeding burned ecosystems?

Contributed Oral Session: Remote Sensing 2

10:20am-10:40am: Sky Gennette: Using UAS and machine learning methods to improve land cover metrics in western landscapes

10:40am-11:00am: Devyn Orr: Identifying burned area trends and predictors of spatiotemporal variation in wildfires in sagebrush rangelands of the Great Basin

11:00am-11:20am: Biquan Zhao: Can geo-analysis enhance forage biomass estimation in extensive grazing lands?

11:20am-11:40am: Madison Muschetto: Application of LiDAR Integrated with Multispectral Imagery for Classifying Wildland Fuels

11:40am-12:00pm: Micah Funk: Application and interpretation of RAP forage production estimates in arid rangelands

Contributed Oral Session: Ecology 2

10:20am-10:40am: Elizabeth La Rue: The linkage of above- and belowground structural diversity with soil function in a shrub-invaded rangeland of the northern Chihuahuan Desert

10:40am-11:00am: Cody Griffin: Tree Encroachment in the Great Plains Restructures Avian Communities

11:00am-11:20am: Danielle Clenet: Low Sagebrush Community Recovery Following Wildfire

11:20am-11:40am: Katherine Pearson: Landscape use and Spatial-Temporal Overlap of Native and Exotic Species in the Southern Cross Timbers and Prairies of Texas

11:40am-12:00pm: Courtney Duchardt: The case for a disturbance triangle: investigating the interactive role of prairie dogs with fire and grazing in North American Great Plains

Contributed Oral Session: Invasive Species

10:20am-10:40am: William Price: Assessing the influence of defoliation on medusahead (*Taeniatherum caput-medusae*) seed production and viability in eastern Oregon

10:40am-11:00am: Kiera Kauffman: Response of the near-ground thermal environment to invasive *Lespedeza cuneata*

11:00am-11:20am: Miranda Mueller: Management of *Bromus tectorum* in western Nebraska

11:20am-11:40am: Adam Soames: Down and Dirty with the Knottiest Weeds: Sterilizing Excavated Soils Contaminated with Knotweed (*Reynoutria*) Propagules using Heat and Anoxia

11:40am-12:00pm: Lisa Jones: Aerial herbicide applications for invasive annual grass and rush skeletonweed (*Chondrilla juncea*) control

1:20pm-3pm

Workshop: Co-Laboring Block Two: Symposium-Risk, Bias, and Accountability in Stewarding Western Rangelands

Description: What does it take to acknowledge and discuss our multi-generational ruts and biases as practitioners of collaboration, science, and stewardship? Working together in the advancement of stewardship (management and conservation) of rangeland systems and rural ranching communities, we bring both valuable knowledge and risky biases. Staying grounded in the situations of people and place mitigates the push and pull inherent to this work.

Healthy rangelands have a high-capacity to support and sustain life or, as James Rogers has stated, a multitude of heartbeats on the range. Managing for healthy rangelands under our current societal context of ever-increasing demands brings even more complexity to already dynamic conditions. This necessitates that we work together, bringing diverse knowledge and experience to collectively understand context and define problems through lenses of rangeland science, ranch profitability and regional economics, along with cultural context at multiple decision-making scales. This holistic approach can inform and sustain adaptive management to meet stewardship goals.

Through a series of cohort dialogues or “fishbowls”, symposium participants will hear peer-to-peer conversations between researchers and between conveners addressing the unique role that each cohort serves in community and rangeland stewardship, and how they traverse risk, bias, and accountability in collaborative efforts.

Session Facilitator: Jared Talley

- 10 min: Introduction to the roundtable discussion
- 25 min: Conveners ‘round the table (Natalie Allio, Gillian Joyce, Dallas Hall Defrees, Laura Van Riper)
- 20 min: Audience engaged discussion
- 25 min: Researchers ‘round the table (Kris Hulvey, Hailey Wilmer, Susan Charnley, Taylor Lindner-tentative)
- 20 min: Audience engaged discussion

Workshop: Career Leadership Workshop (YPC Workshop) - Part 4 of 4

Organizers: Averi Reynolds, Devii Rao

Description: Session 2: In the session Building Relational Trust to Empower Effective Communication you’ll learn the importance of building relational trust as the foundation to effective communication and healthy conflict. You’ll learn structures that behavioralize trust and that will increase accountability and make what we perceive as hard conversations tangible and actionable. You’ll also learn specific language tools that empower you to engage in conversations from a position of curiosity and connection in service of things that matter.

Workshop: National Animal Nutrition Program-Rangeland Symposia: Mathematical Grazing Livestock Nutrition Models for Enhancing Sustainable Livestock Production - Part 1 of 2

Organizer: Hector Menendez III

Description: This session will highlight the current use of precision livestock technologies and data science to drive mathematical nutrition models for the sustainable enhancement of grazing livestock production systems. The session will include current applications of precision livestock technology for rangeland livestock production and training on how to fully leverage data in mathematical nutrition models and decision support tools. This session is an extension of the National Animal Nutrition Program-Modeling Committee (<https://animalnutrition.org/workshops-symposia>) and the newly established NANP Climate-Smart Feed Management committee (<https://animalnutrition.org/climate-smart-feed-management>) in partnership with the NRCS.

Jameson Brennan/Paco Molina (SDSU; Cordoba Spain): Precision Livestock Technologies and Big Data Management for Extensive Rangelands

Mozart Fonseca (New Mexico State University): Hands-on: Applying Mixed Models and Bayesian Techniques for Assessing Rangeland Livestock Systems

Luis O. Tedeschi (TAMU): Future Directions of Grazing Nutrition for Sustainable Livestock Production/Mathematical Model Evaluation Training (producers, NRCS, research)

Ira Parsons (SDSU) Hands-on: Using Decision Support Tools for Range Nutrition, Energetics, and Pasture Utilization

Benjamin Turner (TAMUK): Hands-on: Systems Thinking and System Dynamics Model Training

Alberto Atzori (University of Sassari) Round Table and Summary: Understanding Sustainability Metrics and Future Directions

Symposium: SageSTEP: Vegetation treatments for sustainable rangelands, fire risk reduction and ecosystem resilience - Part 2 of 3

Organizer: Lisa Ellsworth, Beth Newingham

Description: The Sagebrush Steppe Treatment Evaluation Project (SageSTEP) is a regional experiment evaluating methods for fuel reduction and ecological restoration. Fuel treatments were implemented fifteen years ago at 21 sites either invaded by annual grasses or encroached by pinyon-juniper across the Intermountain West. We have collected annual fuel, vegetation, and climate data, as well as periodic data on soils and higher trophic levels to understand changes in response to treatment, climate, and disturbance. We share a background of the project and the landscape-scale context, provide current research on soil and organismal responses, and present modeling efforts using SageSTEP

1:20pm: Introduction: SageSTEP Special Session

1:25pm: Effects of pre-fire vegetation on the post-fire plant community response to wildfire along a successional gradient in western juniper woodlands: Eva K. Strand, Department of Forest, Rangeland, and Fire Sciences, University of Idaho

1:40pm: Do historical fuel treatments affect wind erosion responses after wildfire?: Brian Morra, University of Nevada

1:55pm: Post-wildfire vegetation dynamics differ by pre-wildfire fuels management: Marco U. Donoso, University of Nevada, Reno

2:10pm: Woodland wildfire recovery and reburn risk: Claire L. Williams, University of Nevada, Reno

2:25pm: Allometric relationships to calculate aboveground biomass for eight rangeland shrubs using the SageSTEP network: Georgia R. Harrison, USDA Agricultural Research Service Jornada Experimental Range

2:40pm: Managing for ecological resilience and necessary fire management in sagebrush ecosystems: Can we do it all?: Karen Short, USFS, Rocky Mountain Research Station

2:55pm: Conclusions

Symposium: Innovative Approaches to Sustainability in Ranching and Rangeland Management – The Culmination of a Five-Year Coordinated Agriculture Project - Part 2 of 2

Organizers: Angus “Skye” Aney, Paige Ramsey

Description: This symposium will provide a multifaceted look at rangeland sustainability in the increasingly warming and drying southwest US. We will begin with a more expansive view of rangeland health and progress to proposing some novel strategies for sustainable ranching. The second half of this symposium will explore new applications for improved decision support, more inclusive outreach to increase effectiveness, and educating the next generation of ranchers, resource managers, and public.

1:20pm: Digital Decision Support Tools for Ranching – Skye Aney, USDA-ARS Southwest Climate Hub

1:20-1:40pm: Outreach to Impacts: Results of an Event Attendance Follow-up Survey – Dr. Emile Elias, USDA-ARS Southwest Climate Hub

1:40-2pm: Mainstreaming Agriculture in K12 Education – Dr. Stephanie Bestelmeyer, Asombro Institute for Science Education

2pm: Little Green Minds: The Power of Climate Education in the Classroom – Susan Eisenhour, USDA-ARS Southern Plains Climate Hub

Discussion:

2:20pm: Additional Q&A for the speakers

2:30pm: Audience participatory discussion question: Identifying needs - what educational or extension resources do you wish you had?

Symposium: Riparian Restoration of Functions and Values - Linking LTPBR, PFC, Adaptive Grazing Management, and Beaver; Part 2 of 2

Organizer: Sherman Swanson

Description: An overview of Maestas, J. D., J. W. Wheaton, N. Bouwes, S. R. Swanson, and M. Dickard. 2023b. Water is life: Importance and management of riparian areas for rangeland wildlife in: L. B. McNew, D. K. Dahlgren, J. L. Beck, editors. Rangeland Wildlife Ecology and Conservation. Springer, Dordrecht, The Netherlands. Also, LTPBR is Low tech Process Based Riparian Restoration and has been widely applied. PFC is Riparian Proper function Condition, the focus of the Bureau of Land Management watershed-focused land health standard as well as management of many private lands, Forest Service lands, etc.

Water is Life: Importance and Management of Rangeland Riparian Areas – Jeremy Maestas

Low-Tech Process Based Restoration – Steve Bennett/Joe Wheaton/Nick Bouwes; Steve works on the Asotin project in WA so may be a good one to speak to both the concept of LTPBR and a case study;

How and why BLM is engaging with LTPBR for riparian restoration across BLM lands -- Alden Shallcross

Rancher's perspective: Bringing Beaver Back to Birch Creek – Jay Wilde, Idaho rancher; Jay's story encompasses grazing, LTPBR, and beaver reintroduction; <https://idrange.org/range-stories/southeast-idaho/restoring-beaver-to-birch-creek/>

Riparian proper functioning conditions the foundation for watershed land health – Sherman Swanson

Principles and strategies for riparian grazing management – Kathryn Dyer

Build it and they will come – Grazing for woodies and beaver will come – Carol Evans

Monitoring success from space – Kurt Fessenmeyer

Having water in a drought – Agee Smith (or some speaker from Washington with a great riparian story)

Changing a Landscape to a Lifescape

Symposium: Managing what we measure: the state of the art in soil carbon quantification on rangelands

Organizers: Paige Stanley, Chris Wilson

Description: Global grazing lands account for a significant fraction of the global soil carbon stock. Despite the large interest in grassland management practices to foster soil carbon sequestration, the quantification of soil carbon across relevant spatial and temporal scales remains challenging. In turn, this uncertainty in measurement and estimation hinders efforts to monitor, model and manage soil carbon adaptively. In this session, we feature researchers working across scales on the challenge to quantify soil carbon, with the goal to characterize the current state of the art and help inform adaptive management of grazing lands for soil carbon and related ecosystem services.

10:30 - 10:42: The soil organic carbon sequestration potential of time-controlled, rapid-rotation livestock grazing on the Three Creeks Grazing Project in northern Utah: Megan Nasto

10:45 - 10:57: Implications of Grazing Intensity for Dryland Soil Carbon Storage on the Colorado Plateau: Savannah Adkins

11:00 - 11:12: Ecosystem services of rangeland carbon - A fresh look at a decade of data in California: Erika Foster

11:15 - 11:27: Advancing beef sustainability: long-term impacts of adaptive multipaddock grazing and soil carbon sequestration in the Midwestern USA: Lautaro Garcia

11:30 - 11:42: Grazer mobility and the effects of grazing on soil carbon sequestration: lessons from open pastoralist systems in Africa: Mark Ritchie

11:45 - 12:00: panel discussion + Q&A with all session speakers

Workshop: Process-based management the Science and Application; Part 3 of 4

Organizer: Roy Roath

Description: Rangeland ecology and management is about making decisions about management choices to produce some expected outcome. Historically, management outcomes were based on response to practices. But frequently the outcome was unexpected or wrong. Increased predictability would be a boon. Certainly, some understanding of the ecological processes directing the system would be vastly better than implementing a practice blindly hoping for the best outcome. The foundation for natural resource management is identifying bio-physical and social processes vs things that control system outcomes.

The session will initiate a discussion on process-based natural resource management as a seamless connection of ways of knowing and adaptive decision-making. How do we predict reliable outcomes from practice? We will explore the roles of science and management in decision making.

Workshop– Presentations and Discussion

Rangeland Communities and Succession in State and Transition models: Scott Woodall USFS White River National Forest

How Livestock Grazing Decisions use Knowledge of Processes: Tim Steffens West Texas A&M, Associate Professor

From the Draw to the Hill, Landscape Watershed Decisions: Clayton Marlow, Montana State Univ., Professor

Wildlife Habitat Decisions based on Processes: Roy Roath, Colorado State Univ., Professor Emeritus

Summary: Roy Roath

Symposium: Measuring Rangeland Restoration Effectiveness for Wildlife

Organizer: Savannah Bartel

Description: Ecological restoration of degraded rangelands is critical for recovering rangeland ecosystem services and achieving sustainable land-use that maintains native wildlife populations. Outcomes of restoration actions for native wildlife in rangelands can be highly variable. An essential component, and challenge, of understanding this variation is identifying standard metrics of restoration effectiveness for wildlife in terms of habitat or species responses. This symposium will feature presentations from scientists working to overcome this challenge in measuring restoration effectiveness and understanding variation in outcomes for wildlife. Presentations will include frameworks for measuring and predicting restoration effectiveness that may guide future design of wildlife restoration actions and monitoring.

“Evaluating the effectiveness of post-fire restoration treatments for wildlife: small mammal habitat and community composition”: Savannah L. Bartel, David Pilliod, Robert Arkle

“Effectiveness of sagebrush reduction treatments for greater sage-grouse in Wyoming big sagebrush habitats”: Jeffrey L. Beck, Jason R. LeVan, Jennifer E. Hess, Anna D. Chalfoun, Stanley R. Harter, Thomas J. Christiansen, Sue Oberlie, and Kurt T. Smith

“Scaling monitoring to match capacity: Greater sage-grouse habitat restoration case studies”: Jackie Cupples, Robert Arkle, Megan Creutzburg, David Pilliod, Michelle Jeffries, and Justin Welty

“Habitat restoration effectiveness from plants to mule deer in sagebrush and aspen ecosystems”: Aaron Johnston, Tabitha Graves, Teagan Hayes, Anna Ortega, Kyle Ebenhoch, Matthew Kauffman

"Scratching the surface: What do common restoration treatments mean for biological soil crusts?": Lea Condon, Kierstin Acuña, Brian Prochazka, Lindsey Stone, and Peter Coates

Contributed Oral Session: Misc. 1: Monitoring & Ecology

1:20pm-1:40pm: Ada Smith: Formal and Informal Monitoring on Pasture and Rangelands in the U.S.: Bridging Two Knowledge Paradigms

1:40pm-2:00pm: Tim Ross: Long-term treatment and monitoring: Why do we do all these things and never make use of them?

2:00pm-2:20pm: Kristi Gordon: Increasing education and awareness on grassland ecosystems through the development of curriculum.

2:20pm-2:40pm: Devan McGranahan: Quantifying wildfire risk to the built environment in rural rangelands of the US Interior West

2:40pm-3:00pm: Tolibjon Mukimov: Regulation of pasture turnover and regulatory burden on the lands of the state forest fund of the Republic of Uzbekistan

Contributed Oral Session: Prescribed Burning

1:20pm-1:40pm: Lauren Porensky: Fall and spring prescribed fires enhance forage quality in northern mixed-grass prairie and a sagebrush grassland ecotone

1:40pm-2:00pm: Katie Worden: Pyric herbivory effects on floral resource availability

2:00pm-2:20pm: Kayla Johnson: "The Effect of Integrating Fire and Herbicide for Invasive *Lespedeza cuneata* control in the Tallgrass Prairie"

2:20pm-2:40pm: Cami Dixon: Burning questions: synchronizing prescribed fire to *B. inermis* phenology

2:40pm-3:00pm: Tracy Schohr: Small Ruminant Silvopastoralism in Forest and Woodland Fuels Reduction

Contributed Oral Session: Misc. 2: Invasives & Climate

1:20pm-1:40pm: Tracy Shane: Application of a hierarchical, zero-inflated beta model for evaluating changes in cheatgrass (*Bromus tectorum* L.) cover over four years of targeted grazing treatment.

1:40pm-2:00pm: *OPEN*

2:00pm-2:20pm: Sam Jordan: Think globally, describe locally: climate change information for BLM National Monuments and National Conservation Areas

2:20pm-2:40pm: Sarah Whipple: Assessing current consideration of climate and applications of climate science in decision making on federal public lands

2:40pm-3:00pm: Anna Maher: Climate change vulnerabilities and adaptation strategies on Northwest U.S. rangelands— a new resource for rangeland managers

Contributed Oral Session: Restoration 4

1:20pm-1:40pm: Melissa Burrell: Soil amendments to improve bunchgrass establishment at a mine tailings impoundment

1:40pm-2:00pm: Matt Madsen: Development of Seed Coating Technologies and Seeding Techniques to Improve Wildlife Habitat in the Sagebrush Steppe

2:00pm-2:20pm: Joseph Smith: Why passive management of invasive annual grasses will fail

2:20pm-2:40pm: Becky Kerns: Ventenata dubia projected to expand in the western US

2:40pm-3:00pm: Danny Summers: Habitat restoration conservation partnering for wildlife and producers in Utah - NRCS and the Utah Division of Wildlife Resources

3:20pm-5pm

Workshop: National Animal Nutrition Program-Rangeland Symposia: Mathematical Grazing Livestock Nutrition Models for Enhancing Sustainable Livestock Production - Part 2 of 2

Organizer: Hector Menendez III

Description: This session will highlight the current use of precision livestock technologies and data science to drive mathematical nutrition models for the sustainable enhancement of grazing livestock production systems. The session will include current applications of precision livestock technology for rangeland livestock production and training on how to fully leverage data in mathematical nutrition models and decision support tools. This session is an extension of the National Animal Nutrition Program-Modeling Committee (<https://animalnutrition.org/workshops-symposia>) and the newly established NANP Climate-Smart Feed Management committee (<https://animalnutrition.org/climate-smart-feed-management>) in partnership with the NRCS.

Jameson Brennan/Paco Molina (SDSU; Cordoba Spain): Precision Livestock Technologies and Big Data Management for Extensive Rangelands

Mozart Fonseca (New Mexico State University): Hands-on: Applying Mixed Models and Bayesian Techniques for Assessing Rangeland Livestock Systems

Luis O. Tedeschi (TAMU): Future Directions of Grazing Nutrition for Sustainable Livestock Production/Mathematical Model Evaluation Training (producers, NRCS, research)

Ira Parsons (SDSU) Hands-on: Using Decision Support Tools for Range Nutrition, Energetics, and Pasture Utilization

Benjamin Turner (TAMUK): Hands-on: Systems Thinking and System Dynamics Model Training

Alberto Atzori (University of Sassari) Round Table and Summary: Understanding Sustainability Metrics and Future Directions

Workshop: Grassvasion! Using games to learn and educate about invasive plant management

Organizer: Aaron Lien

Description: Calling all gamers! Have you ever thought, "Birders have Wingspan - why can't we have an awesome boardgame for range?" This is your chance to make that happen! Help us test Grassvasion!, a game where you try to stop invasive grasses. Grassvasion! is a collaborative boardgame where you work together to

stop wildfires triggered by invasive grasses. In addition to being fun, Grassvasion! is designed to help us learn. Players balance personal goals with a collective goal of eradicating invasive grasses. It teaches about collaboration challenges and allows us to learn about how and why players are making decisions.

Workshop: From Data to Action: Synthesizing, Visualizing, and Interpreting Monitoring Data for Evaluating Treatment Outcomes

Organizer: Aleta Nafus

Description: Monitoring information from field-based measurements and remote sensing allows us to evaluate the outcomes of rangeland restoration treatments at scales ranging from plots to large landscapes. A combination of these data sources alongside expert interpretation is powerful in communicating outcomes and guiding adaptive management, but it is challenging to effectively integrate, visualize, and interpret multiple types of information. Using examples and interactive activities, this workshop will: 1) provide examples and explore options for visualizing treatment effectiveness data, and 2) guide participants through data synthesis integrating multiple lines of evidence.

Symposium: SageSTEP: Vegetation treatments for sustainable rangelands, fire risk reduction and ecosystem resilience - Part 3 of 3

Organizer: Lisa Ellsworth, Beth Newingham

Description: The Sagebrush Steppe Treatment Evaluation Project (SageSTEP) is a regional experiment evaluating methods for fuel reduction and ecological restoration. Fuel treatments were implemented fifteen years ago at 21 sites either invaded by annual grasses or encroached by pinyon-juniper across the Intermountain West. We have collected annual fuel, vegetation, and climate data, as well as periodic data on soils and higher trophic levels to understand changes in response to treatment, climate, and disturbance. We share a background of the project and the landscape-scale context, provide current research on soil and organismal responses, and present modeling efforts using SageSTEP data.

3:20: Introduction: SageSTEP Special Session

3:25pm: Assessing the 10-year impact of fuel-reduction treatments on soil organic carbon in the SageSTEP network: Seren H. Bagcilar, Forest and Rangeland Ecosystem Science Center, U.S. Geological Survey

3:40pm: Carbon Security vs Carbon Stocks: A SageSTEP Case Study: Rory O'Connor, USDA-ARS, Range and Meadow Forage Research Unit

3:55pm: Correspondence between satellite-derived and long-term field observations of vegetation cover at Great Basin experimental treatments: Matthew Rigge, U.S. Geological Survey Earth Resources Observation and Science Center

4:10pm: Simulating sagebrush-cheatgrass plant community production in the Great Basin using ALMANAC: Merilyn Schantz, Grassland Soil and Water Research Laboratory, ARS

4:25pm: Vegetation treatments and drought resilience in sagebrush ecosystems: Madelon F. Case, USGS, Forest and Rangeland Ecosystem Science Center

4:40pm: Reinvigorating the human dimensions of SageSTEP research: Mark Brunson, Utah State University

4:55pm: Conclusions

Symposium: Rangeland restoration amidst short-term variability and long-term change

Organizers: Gregor-Fausto Siegmund, Trace Martyn, Julie Larson

Description: How can rangeland restoration prepare for long-term climate change while dealing with ongoing short-term variation? Climate change projections suggest that we will be facing a warmer and more variable future with altered disturbance patterns. At the same time, restoration practitioners are already squeezed by historical constraints, 'normal' variability, and day-to-day challenges. How can we steward rangelands in the present while planning for uncertain climate futures? We bring together speakers who will discuss how dealing with current restoration challenges can help with adaptation to long-term climate change.

10:00am: Justin Luong: GRASS-Net: Connecting restoration practitioners to support restoration outcomes in maximizing biodiversity and climate resiliency

10:20am: Seth Munson, Laura Shriver: RestoreNet: a field trial network to improve restoration outcomes across environmental gradients

10:40am: Stella Copeland: Seeding decisions alter simulated dryland restoration outcomes associated with adverse weather

11:00

11:20: Q&A with speakers and discussion

Symposium: Aiming for the STARs: Advancing Healthy Rangelands by Supporting Rancher Decision-Making

Organizer: Anna Clare Monlezun

Description: Rangelands are an increasing focus of climate change mitigation. Outcome-based programs resulting in commodity label claims are becoming widespread. However, rangeland grazing management is nuanced and calls for adaptation and flexibility. The "healthy rangelands" story is far more complex than a set of ecological outcomes alone. Effective livestock grazing is a story of human process, observation, evaluation, and decision-making. Could process-based programs that inspire, guide, and evaluate grazing management through a standardized approach better reflect that story? STAR (Saving Tomorrow's Agriculture Resources) is one example we'll exemplify to provide diverse perspectives on process-based, rancher-focused grazing programs, from theory to implementation.

1:00-1:10pm: Jody Bickel, Chief Executive Officer, Creekbank Associates: The State of U.S. Rangelands & Environmental Markets Programs

1:10-1:20pm: Megan Macmuller, PhD, Research Scientist, Colorado State University: Developing a Process-Based Evaluation Tool and the Science Behind It

1:20-1:30pm: Caroline Wade, Executive Director, Saving Tomorrow's Agriculture Resources (STAR): National STAR - a Standardized Framework for Conservation Evaluation, Guidance, and Rewards

1:30-1:40pm: Reece Melton, Soil Health Specialist, Colorado Department of Agriculture: Colorado STAR - a case study of Affiliate STAR Implementation

1:40-1:50pm: Anna Clare Monlezun, PhD, Founder, La Dolce Vita Ranch & Graze LLC: Outcome versus Process-Based Programs for Grazinglands, a Rancher's Perspective

1:50-2:10pm: Break

2:10-3pm: Audience Discussion & Speaker Q&A

Workshop: Process-based management the Science and Application; Part 4 of 4

Organizer: Roy Roath

Description: Rangeland ecology and management is about making decisions about management choices to produce some expected outcome. Historically, management outcomes were based on response to practices. But frequently the outcome was unexpected or wrong. Increased predictability would be a boon. Certainly, some understanding of the ecological processes directing the system would be vastly better than implementing a practice blindly hoping for the best outcome. The foundation for natural resource management is identifying bio-physical and social processes vs things that control system outcomes.

The session will initiate a discussion on process-based natural resource management as a seamless connection of ways of knowing and adaptive decision-making. How do we predict reliable outcomes from practice? We will explore the roles of science and management in decision making.

Workshop– Presentations and Discussion

Rangeland Communities and Succession in State and Transition models: Scott Woodall USFS White River National Forest

How Livestock Grazing Decisions use Knowledge of Processes: Tim Steffens West Texas A&M, Associate Professor

From the Draw to the Hill, Landscape Watershed Decisions: Clayton Marlow, Montana State Univ., Professor

Wildlife Habitat Decisions based on Processes: Roy Roath, Colorado State Univ., Professor Emeritus

Summary: Roy Roath

Symposium: Grazing Associations: Institutions for increasing the adaptive capacity of federal lands grazing?

Organizers: Susan Charnley and Hailey Wilmer

Description:

3:30-3:30pm: Introduction – Why a Symposium on Grazing Associations? Susan Charnley (U.S. Forest Service, session co-organizer)

3:30-3:45pm: An Overview of the Collaborative History Between Grazing Associations and the USDA Forest Service: Casey Johnson (U.S. Forest Service)

3:45-4:05pm: The Thunder Basin Grazing Association and adaptive management on the National Grasslands: Dave Pellatz, Thunder Basin Grazing Association and Lauren Porensky (Agricultural Research Service)

4:05-4:25pm: Grazing associations on the Curlew National Grassland: Opportunities and Challenges: Matt Tubbs, Curlew and Buist Fields Grazing Association member

4:25-4:45pm: Opportunities and challenges of grazing associations for adaptive management on Forest Service lands: Justin Derner (Agricultural Research Service)

4:45-5pm: Social-ecological research to support adaptive grassland management: lessons from science-grazing association partnerships: Hailey Wilmer (Agricultural Research Service, session co-organizer)

Contributed Oral Session: Wildlife 2

3:20pm-3:40pm: Marlin Dart: Linking behavioral states with movement to examine resource selection dynamics of pronghorn in the southern shortgrass prairie

3:40pm-4:00pm: Laura Beck: sound transmission in shifting rangelands

4:00pm-4:20pm: Sarah Webster: Long-term influence of communication tower infrastructure on an imperiled species, the greater sage-grouse (*Centrocercus urophasianus*)

4:20pm-4:40pm: Megan Milligan: Estimating spatial variation in greater sage-grouse space use relative to leks to inform regional buffers and surface use designations

4:40pm-5:00pm: Wayne Smith: Enhancing Sage-Grouse Conservation: Integrating Remote Sensing with the Habitat Assessment Framework

Contributed Oral Session: Virtual Fencing 1

3:20pm-3:40pm: Timothy Olsen: Virtual Fencing Technology Increases Heterogeneity of Rangeland Vegetation Structure

3:40pm-4:00pm: Logan Vandermark: The Need for Cybersecurity Integration with Precision Livestock Technologies in Rangeland Management

4:00pm-4:20pm: Tyler Harris: Conditions that drive virtual fence adoption among ranchers in the northern Great Basin

4:20pm-4:40pm: Kyle Pfaffenberger: Virtual Fencing in Rangeland Conservation: A Case Study on Livestock Exclusion and Habitat Restoration

4:40pm-5:00pm: Joel Yelich: Virtual fence technology used to manage cattle grazing in post-wildfire burn areas on public grazing allotments

Contributed Oral Session: Remote Sensing and Modeling 3

3:20pm-3:40pm: E P Sargeant: Applying remote sensing to pre- and post-restoration rangeland stream monitoring

3:40pm-4:00pm: Nick Litizzette: Assessing large Irrigated Wet Meadows Using Remote Sensing for Long-Term Management

4:00pm-4:20pm: Anne Blackwood: Automating High-Resolution Image Classification

4:20pm-4:40pm: Mike Anderson: Addressing sustainability through remote sensing

4:40pm-5:00pm: Wayne Smith: Differentiating Between Medusahead and Cheatgrass Using Remote Sensing

Contributed Oral Session: Ecology 3

3:20pm-3:40pm: Esben Kjaer: Graze Anatomy: Understanding How Fire and Grazing Promote Plant Diversity Under Different Management Practices

3:40pm-4:00pm: Rachel Renne: Exploring the local microsites and spatial distribution of perennial forbs in sagebrush ecosystems

4:00pm-4:20pm: Sarah Turner: Long-term Vegetation Dynamics on a Semi-arid Multiple-use Landscape

4:20pm-4:40pm: Robert Heckman: Precipitation seasonality, precipitation legacies, and invasive annuals impact forage production in a Great Basin rangeland

4:40pm-5:00pm: Scott Carpenter: Tying Climate Change to Management: Consequences of extended an growing season on perennial bunchgrass production, phenology, and reproductive effort under variable livestock grazing.

Wednesday, February 12th

10:20am-Noon

Ignite: Incorporating Active and High-Impact Learning Experiences in Rangeland Education

Organizer: Ashley Unger

Description: This ignite session will showcase approaches to high-impact learning in rangeland education through a rapid series of presentations. Eight speakers will deliver concise, 5-minute talks using auto-advancing slides (20 slides or less). Presentations will highlight diverse tools and pedagogies, including applications of the Rangeland Analysis Platform, inquiry-based learning projects for classrooms of different sizes, and educational games. With all talks focusing on rangeland management and ecology, attendees will be able to gain practical ideas to enhance learning in their range courses. A Q&A session following the presentations (~30-40 minutes) will allow participants to engage with speakers, share their experiences, and discuss modern challenges in rangeland education.

10:20-10:25am: Ben Wu: Authentic Inquiry Projects in Large, Introductory Classes

10:25-10:30am: Lesley Morris: Place, People, & Participation: Creating connections for teaching about rangelands

10:30-10:35am: Laura Goodman: Technical Tools in the Classroom: The Rangeland Analysis Platform

10:35-10:40am: Evan Tanner: Addressing Climate-Anxiety in the Classroom

10:40-10:45am: Mitch Greer: Connecting Real World Experience With Classroom Learning

10:45-10:50am: Melissa Shehane: Assessment as Learning

10:50-10:55am: Anthony Perlinski: Healthy Skepticism: Developing Critical Thinking Skills in the Classroom

10:55-11am: Ashley Tanner: Alternative Grading Practices for High-Impact Learning

Workshop: Soils 101: Practical Information on Soil Form, Function, and Carbon for Grazing Management - Part 1 of 2

Organizer: Savannah Adkins

Description: Soil carbon sequestration has emerged as a hot topic among SRM's membership, eliciting excitement about co-benefits and ecosystem services associated with building soil health indicators, as well as doubts and confusion surrounding soil science. During this workshop attendees will be equipped with foundational knowledge of soil science, including soil carbon and how grazing impacts carbon cycling, along with a deep understanding of co-benefits and how they may differ across landscapes. The workshop will also provide ample opportunities for questions and discussion with experts in carbon cycling and biogeochemistry.

10:20 am – 10:25 am: Workshop Introduction: Savannah Adkins

10:25 am – 10:55 am: Fundamentals of Soil Form and Function: Savannah Adkins

10:55 am – 11:10 am: Global and Regional Carbon Cycling: Brooke Osborne

11:10 am – 11:25 am: How Grazing Influences Soils: Megan Nasto

11:25 am – 11:40 am: The Influence of Fire and Fire Management of Soils: Seren Bagcilar

11:40 am – 11:55 am: Effects of Invasive Plants on Soils: Toby Maxwell

Workshop/Symposium: Threat-Based Strategic Conservation to inform post-fire planning on large landscapes - Part 1 of 2

Organizer: Katie Wollstein

Description: Managing a landscape to increase resistance to invasive annual grasses is foundational to maintaining and/or restoring a functional sagebrush ecosystem. When large areas burn, difficult decisions must be made about where to direct recovery efforts and the actions that will promote resistance to annual grasses. Threat-Based Strategic Conservation (TBSC) offers a framework for focusing limited resources immediately following fire where impacted rangelands are prone to annual grass invasion. The results of this strategy can be used to prioritize post-fire management within large burned landscapes, or on smaller management sub-units (e.g., a private land holding within a larger fire perimeter).

10:20-10:30am: Introduction to Threat-Based Strategic Conservation post-fire planning framework: Wollstein, Johnson, Boyd, Duquette (EOARC)

10:30-11:30am: Creating post-fire management units using geospatial data: EOARC, Institute for Natural Resources (if available)

Live demo, discussion: EOARC, Moore

11:30-Noon: Small group work: Creating post-fire management units: Small group facilitators (EOARC)

Workshop: Unlocking Rangeland Analysis Platform (RAP) Data: Five ways to access and explore data

Organizer: Georgia Harrison

Description: Explore five methods to access Rangeland Analysis Platform (RAP) cover and production data in this interactive workshop. Through an applied case study, we will explore RAP and Climate Engine web APIs, and view data within ArcGIS. For advanced analysis, we will download rasters using a command line interface and interact with the

data in Google Earth Engine. This workshop will offer practical tips and tricks for accessing RAP data for folks of all skill levels and discuss the types of questions that could be addressed with each approach. Participants are encouraged to bring their laptops for hands-on participation.

Sarah McCord (USDA-ARS): Unlocking Rangeland Analysis Platform (RAP) Data: Five ways to access and explore data (10 min)

Eric Jensen (Desert Research Institute): Accessing and analyzing RAP data in ClimateEngine (15 min)

Nelson Stauffer (USDA-ARS): Accessing RAP data through web API (15 min)

Georgia Harrison (USDA-ARS): Accessing and analyzing RAP data within ArcGIS Pro (15 min)

Brady Allred (University of Montana): Accessing and analyzing RAP data using Google Earth Engine (15 min)

Brandon McNellis (USDA-ARS): Interacting with RAP data in R (15 min)

Empty 15 min at end for buffer time, discussion and questions.

Symposium: Co-Laboring Block Three: Symposium-Stewardship Economies as a Shared Vision

Description: Building off earlier sessions, we will explore the challenges (risk and biases) and opportunities (working together) and importance of fostering Stewardship Economies in rangelands — an economy shaped by the need and responsibility to manage for the sustainability of both land and communities. Grounded in rancher perspectives we will connect key insights, including the inefficiency of resilience; the role of accountability if we are to maintain flexibility; and pragmatic eco-literacy as foundational to sustained purpose and productivity, along with the critical element of profit for ongoing stewardship investment.

Symposium participants will hear peer-to-peer conversations between ranchers, then have the opportunity for targeted communication with speakers and one another.

Session Facilitator: Bre Owens

- 10 min: Introduction to Stewardship Economies
- 30 min: Ranch Strategists and Ranchers/Producers/Graziers 'round the table (James Rogers, Burke Teichert, Jim Stone-tentative, Maggie Hannah, Agee Smith, Mark and Wendy Pratt, Bianca Soares-tentative, Sarah King-tentative, Alex Karol)
- 15 min: Audience engaged discussion
- 30 min: Round two 'round the table
- 15 min: Audience engaged discussion

Symposium: Place-Based Ecology and Sustainability: Reviving Traditional Practices for Holistic Needs in Rangeland Management

Organizers: Nick Padilla, Devii Rao; NARAC and D&I

Description: Balancing healthy rangelands and sustainability are core values in Indigenous communities. Adaptability to climate changes and deep understanding of the land allowed Indigenous peoples to thrive until colonialism disrupted traditional practices. Place-based observations ensured healthy management of rangelands for habitat, food sustainability, healing, and spiritual needs. Despite historical traumas and forced removal, Indigenous communities are reviving ancestral methodologies. These once-novel ideas are now guiding a path forward, connecting past wisdom with present needs for

sustainable living. The Symposium provides a space for diverse conceptions, enabling SRM members to participate in meaningful conversations about Traditional Ecological Knowledge and place-based ecology.

10:20-10:30am: Welcome and Introduction, NARAC and D&I Committee

10:30-10:58am: Warren Seyler, Spokane Tribe BPA Coordination Office
Presentation Title: "Spokane Tribe and the Land Which They Live"

10:58-11:26am: Marcie Carter, Nez Perce Tribe, Lapwai, ID; Position: Deputy Director of Watershed Division, Dept of Fisheries Resource Mgmt: "Integrating Remote Sensing UAVs and Land Based Knowledge to Manage a Culturally Significant Place"

11:26-11:54am: John Waconda, The Nature Conservancy; Position: Indigenous Partnerships Program Manager: "Exploring and Creating Public and Private Partnerships to Assist and Support Tribal Ranching, and Grasslands Protection and Conservation"

11:54-12pm: Wrap up and thank you

Symposium: Thirty Years of Interpreting Indicators of Rangeland Health Assessments: Past, Present and Future - Part 1 of 2

Organizers: Nika Lepak

Description: The seminal 1994 National Research Council publication, Rangeland Health-New Methods to Classify, Inventory and Monitor Rangelands described a new approach for evaluating the ecological health of rangelands. This report recommends indicators and methods to assess rangeland health that are practical and applicable to large areas. An interagency team was set up in 1994 to develop an ecological process-based protocol to rangeland assessment protocol based on these methods. The resulting Interpreting Indicators of Rangeland Health (IIRH) protocol has been refined over three decades and five versions, three of which are described in interagency technical references. The IIRH protocol has been widely used by the Bureau of Land Management to evaluate rangeland health, and by the NRCS in ranch and conservation planning. The protocol has also been adapted for international applications and used as the basis for developing other specific assessment protocols. The first half of the symposium will describe the evolution and applications of the Interpreting Indicators of Rangeland Health protocol as described in an interagency technical reference (Version 5 was published in 2020). The second half of the symposium will explore current and future opportunities and challenges including integration of quantitative data, application of new technology and tools, research needs, and the challenge of assessing rangeland health in a changing climate.

Symposium Part 1 – Lessons from Thirty Years of Interpreting Indicators of Rangeland Health

(15 minute talks)

Fee Busby: National Research Council's 1994 publication, "Rangeland Health-New Methods to Classify, Inventory and Monitor Rangelands."

Mike Pellant: Interpreting Indicators of Rangeland Health Protocol: Origins and Progression (Versions 1 & 2)

Pat Shaver: Development of Version 3 and Version 4 of Interpreting Indicators of Rangeland Health

Nika Lepak: Interagency Training and Development of Version 5 of Interpreting Indicators of Rangeland Health

Joshua Tashiro: Ranch Management Decisions Utilization Interpreting Indicators of Rangeland Health Assessments

Alex Stoneburner: Rangeland Health Assessments of Grazing Allotments in Dinosaur National Monument

Symposium: Climate-Smart Beef Production in a Rangeland Systems

Organizer: Dalen Zuidema

Description: This session will highlight ongoing work from the USDA partnerships for climate-smart commodities projects, focused on implementing climate smart practices to increase sustainability of beef production on rangeland. The session will include discussion of producer receptivity, preliminary data sharing from soil carbon, methane emission, and biodiversity survey work, and ongoing climate-smart beef market development strategies.

10:20-10:25am: Dalen Zuidema: An Introduction to Partnerships for Climate-Smart Commodity Beef Projects

10:25-10:35am: Dalen Zuidema: The Grass is Greener on the Other Side: Developing Beef and Bison Commodities

10:35-10:45am: Dallas Hall: Building a Regenerative Ranching Economy in the West

10:45-11am: Hector Menendez: Establishing a Climate-Smart Agriculture Enteric Emissions Program for Beef and Bison in the Northern Great Plains

11-11:15am: Joseph Burke: Sampling for Carbon Stocks and Sequestration Potential in Semi-Arid Regions

11:15-11:30am: Jeff Goodwin: Empowering Grazing Management in the West

11:30-12:00pm: Climate-Smart Beef Production in Rangeland Systems Panel Discussion - Includes Hector Menendez, Joseph Burke, Jeff Goodwin, Nick Jorgensen and Reid Hensen

Symposium: Improving Landscape Scale Management with Decision Support Tools - Part 1 of 2

Organizers: Michelle Jeffries, Cali Weise

Description: Talks in this session will feature available tools and concisely explore how they can be used to gain understanding about a landscape and optimize management outcomes through science-based decision support. This session is of great value for stakeholders across the west, who face multifaceted and evolving management challenges across vast landscapes. Improvements in technology and computing capabilities have resulted in a toolbelt of applications, models, and frameworks to assist with management decisions. This session seeks to clearly demonstrate the applicability of available tools and connect their function to real-world scenarios.

10:20-10:40am: Bryan Tarbox: Co-developing a prioritization tool to guide sagebrush conservation and restoration for wildlife in northwest Colorado

10:40-11am: Cameron Aldridge: PReSET across scales - Prioritizing local management actions and balancing renewable energy and conservation within the sagebrush biome

11-11:20am: Erica Christensen: Simulating vegetation trajectories under restoration treatment scenarios

11:20-11:40am: Morgan Roche: Predicted future trajectories of annual grass invasion for identifying opportunities for climate-durable management actions

11:40-12:00pm: Beth Orning: Coupling co-production and simulation modeling to evaluate biome-wide costs and benefits of invasive annual grass management under the Sagebrush Conservation Design

Symposium: Applying The Principles of Ecosystem Management - Part 1 of 2

Organizers: Lee Sexton, Targeted Grazing Committee Chair

Description: This symposium will cover two sessions providing principles and applications that will help in the management of our complex ecosystem. How well are we at evaluating the impact of our decisions? What is the environmental, social and economic impact of our decisions? How good are we at observing what the land is telling us? How to incorporate livestock into cropping and range systems to enhance the ecosystem.

Tony Malmberg – Author of “Green Grass in the Spring” Holistic Management Past and Present – Making decisions that are environmentally, economically and socially sound.

Craig Madsen – Cloverdale Ranch Inc. Ecological Management – How well are we at observing the story of the land? What is the land telling us?

Matt Gabica – We Rent Goats- Targeted Grazing – practice and principles of land enhancement/improvement/increasing soil biology. Can the Targeted Grazing community do better?

Chris Schachtschneider – Lighting S Livestock Solutions – Incorporating livestock into cropping systems balancing animal and soil health.

Contributed Oral Session: Restoration 5

10:20am-10:40am: Lauren Svejcar: Who took my seeds? The role of granivory in ecosystem restoration across the Great Basin sagebrush steppe

10:40am-11:00am: Melissa Landeen: Response of Seeded Species to Three Common Herbicides Used for Cheatgrass Control Over Five Years

11:00am-11:20am: Stuart Jennings: Using fertilizer in combination with herbicide for improved control of *Bromus tectorum* and improved biodiversity

11:20am-11:40am: Tolibjon Mukimov: Improvement of degraded pastures of the foothill semi-desert of Uzbekistan

11:40am-12:00pm: John Hendrickson: Impact of burning and mob grazing on density of Kentucky bluegrass (*Poa pratensis* L.) in the northern Great Plains

Contributed Oral Session: Remote Sensing and Modeling 4

10:20am-10:40am: Javier Arturo Ñaupari Vasquez: quantification of aboveground net primary productivity service provision in vicugna protected zones, within high andean rangelands using uas and satellite remote sensing

10:40am-11:00am: Alejandro Bazaldua: Use of Remote-Sensing Data to Develop Habitat-Northern Bobwhite Relationships across Large Spatial Extents

11:00am-11:20am: Derek Bailey: Potential to Use Real-Time Tracking to Remotely Monitor Forage Utilization Patterns

11:20am-11:40am: Alice Stears: Generating near-term forecasts of ecological drought to improve restoration success

11:40am-12:00pm: OPEN

Contributed Oral Session: Ecology 4

10:20am-10:40am: Scott Morford: Dynamic Shifts in Herbaceous Production Across the Great Plains: Implications for Producers and Conservation

10:40am-11:00am: Trace Martyn: Evaluating accuracy of vegetation cover field sampling methods (line-point intercept, line intercept, quadrats) utilizing a simulation model.

11:00am-11:20am: Joshua Day: Effects of soil, ungulate exclusion, and elevation on big sagebrush (*Artemisia tridentata*) density and cover in the Colorado Plateau

11:20am-11:40am: Austin Housley: Comparison of the Distribution and Abundance of St. Anthony Evening Primrose Individuals after 30 years since last population inventory

11:40am-12:00pm: Austin Nash: Estimating livestock and wild horse influences on vegetation and wildlife populations across the sagebrush biome

1:20pm-3pm

Workshop: Soils 101: Practical Information on Soil Form, Function, and Carbon for Grazing Management - Part 2 of 2

Organizer: Savannah Adkins

Description: Soil carbon sequestration has emerged as a hot topic among SRM's membership, eliciting excitement about co-benefits and ecosystem services associated with building soil health indicators, as well as doubts and confusion surrounding soil science. During this workshop attendees will be equipped with foundational knowledge of soil science, including soil carbon and how grazing impacts carbon cycling, along with a deep understanding of co-benefits and how they may differ across landscapes. The workshop will also provide ample opportunities for questions and discussion with experts in carbon cycling and biogeochemistry.

1:20 pm – 1:50 pm: Soil Heterogeneity and Why it Matters for Management: Brooke Osborne and Toby Maxwell

1:50 pm – 2:05 pm: Co-benefits of Fertile Soil: Toby Maxwell

2:05 pm – 2:25 pm: Measuring Soil Carbon: Megan Nasto and Seren Bagcilar

2:25 pm – 2:40 pm: Knowns and Unknowns Surrounding Grazing Management for Soil Carbon: Sasha Reed

2:40 pm – 3 pm: Q + A Panel, Attendee Survey: Savannah Adkins, Brooke Osborne, Megan Nasto, Seren Bagcilar, Toby Maxwell

Workshop/Symposium: Threat-Based Strategic Conservation to inform post-fire planning on large landscapes - Part 2 of 2

Organizer: Katie Wollstein

Description: Managing a landscape to increase resistance to invasive annual grasses is foundational to maintaining and/or restoring a functional sagebrush ecosystem. When large areas burn, difficult decisions must be made about where to direct recovery efforts and the actions that will promote resistance to annual grasses. Threat-Based Strategic Conservation (TBSC) offers a framework for focusing limited resources immediately following fire where impacted rangelands are prone to annual grass invasion. The results of this strategy can be used to prioritize post-fire management within large burned landscapes, or on smaller management sub-units (e.g., a private land holding within a larger fire perimeter).

1:20-2:20pm: Selecting appropriate management actions for units: EOARC

Live demo, discussion: EOARC, Moore

2:20-3pm: Applying the framework: Perspectives from partner agencies: USFWS, NRCS (speakers TBD)

Symposium: Co-Laboring Block Four: Workshop- Frameworks for Success – A Team of Teams Approach

Description: Is collaboration worth the time and effort for your situation?

We will explore a team of teams approach to fostering shared consciousness, common purpose, and empowered execution to advance programs and projects that result in resilient ranches, healthy rangelands, and more stable communities.

If you're up against daunting challenges, this workshop will hone your skills in strategic partnering to secure a better future for land, families, businesses, and communities. Come prepared to dive deep with peers, partners, and mentors to develop your own action plan.

Building on the information shared in the previous three sessions and using a workbook supplied on-site to attendees, participants will have the opportunity to self-identify the biggest challenges or opportunities in their communities, then join facilitated small group sessions which might include, but will not be limited to, participant-selected topics such as:

- dealing with wildlife issues
- public lands grazing challenges
- challenges around energy development/decommissioning
- building a stewardship economy
- evaluating the success of rangeland programs, processes and collaborations

We will aim to have no more than 10 people in each small group. Session facilitators Linda Poole, Bre Owens, Jared Talley, and Kris Hulvey will coach small group facilitators in the process of effective breakout group interactions using the general consensus approach of Robert Chadwick and/or Jared Talley's situation/problem/solution approach. The time block will be apportioned as:

- 10 min: Introduction to the process of small group sessions, use of the workbook
- 35 min: Interactions within small groups
- 10 min: Share out on first breakout groups
- 30 min: Interactions within small groups, option to rejoin your first group or move to another
- 15 min: Session and series closeout

Symposium: Thirty Years of Interpreting Indicators of Rangeland Health Assessments: Past, Present and Future - Part 2 of 2

Organizers: Nika Lepak

Description: The seminal 1994 National Research Council publication, Rangeland Health-New Methods to Classify, Inventory and Monitor Rangelands described a new approach for evaluating the ecological health of rangelands. This report recommends indicators and methods to assess rangeland health that are practical and applicable to large areas. An interagency team was set up in 1994 to develop an ecological process-based protocol to rangeland assessment protocol based on these methods. The resulting Interpreting Indicators of Rangeland Health (IIRH) protocol has been refined over three decades and five versions, three of which are described in interagency technical references. The IIRH protocol has been widely used by the Bureau of Land Management to evaluate rangeland health, and by the NRCS in ranch and conservation planning. The protocol has also been adapted for international applications and used as the basis for developing other specific assessment protocols. The first half of the symposium will describe the evolution and

applications of the Interpreting Indicators of Rangeland Health protocol as described in an interagency technical reference (Version 5 was published in 2020). The second half of the symposium will explore current and future opportunities and challenges including integration of quantitative data, application of new technology and tools, research needs, and the challenge of assessing rangeland health in a changing climate.

The Next Thirty Years of Interpreting Indicators of Rangeland Health – New tools, Opportunities and Challenges

1:20-1:35pm: Emily Kachergis: Integrating Qualitative Assessments with Quantitative Monitoring

1:35-1:50pm: Jennifer Moffitt: Describing Indicators of Rangeland Health when a Reference Sheet is Not Available

1:50-2:05pm: Brandi Wheeler: Integrating Erosion Models into Land Health Assessments to Better Understand Landscape Condition

2:05-2:20pm: Julian Reyes and Julian Scott: Defining the Reference for Assessing Rangeland Health in a Changing Climate

2:20-2:35pm: Chris Domschke, Nathan Kleist and Tim Assal: Leveraging Remote Sensing to Understand Rangeland Health at Landscape Scales

2:35-2:50pm: Beth Newingham and David Toledo: Opportunities for Application and Collaboration Using Interpreting Indicators of Rangeland Health

Symposium: Improving Landscape Scale Management with Decision Support Tools - Part 2 of 2

Organizers: Michelle Jeffries, Cali Weise

Description: Talks in this session will feature available tools and concisely explore how they can be used to gain understanding about a landscape and optimize management outcomes through science-based decision support. This session is of great value for stakeholders across the west, who face multifaceted and evolving management challenges across vast landscapes. Improvements in technology and computing capabilities have resulted in a toolbelt of applications, models, and frameworks to assist with management decisions. This session seeks to clearly demonstrate the applicability of available tools and connect their function to real-world scenarios.

1:20-1:40pm: Gregory Wann: Evaluating relationships between greater sage-grouse trends and seasonal habitats to identify population-level management targets

1:40-2pm: Cali Weise: A results-oriented grazing planning and management tool for ecological resilience in rangelands

2pm-2:20pm: Michelle Jeffries: Optimizing Restoration Planning with the Land Treatment Exploration Tool

2:20-2:40pm: Bryce Richardson: Climate Smart Restoration Tool, version 2 – linking vegetative plot data and seed transfer distance to inform decision support

2:40-3pm: Cara Applestein: SAMPLE Toolbox for Designing Monitoring Projects

Symposium: RTEC: From beginning to end; the equipment, methods and processes of seed based restoration

Organizer: Kevin Gunnell

Description: Many land managers and restoration practitioners are familiar with portions of the restoration process, but often are unfamiliar with the entirety of the cycle of developing appropriate plant materials to the actual implementation of seed based restoration projects. This symposium seeks to highlight and share information on the equipment and methods necessary to restore landscapes from initial seed collection and production through to implementation.

Your Way, Right Away! Matthew Benson

Jason Stevenson

Katherine Fitch

Nevada Department of Wildlife Seed-Based Habitat Restoration: Brittany Allen

Getting SEEDS on and off the ground: Challenges and opportunities for developing a large network of experimental, post-wildfire seeding sites: Beth A. Newingham

Workshop: Combating information overload: Technical transfer to empower rangeland managers with actionable science

Organizer: Megan Creutzburg

Description: 1. Over the past decade, an explosion of new science and technology has improved our understanding of rangeland ecosystems but left many of us stuck in information overload. This interactive workshop will help participants build the skillsets to conduct effective technical transfer, which helps empower managers and practitioners to apply relevant science, data, technology, and best practices to improve management outcomes on the ground. We will guide participants through resources developed by the Sagebrush Technical Transfer Network, including a framework, technical transfer planning worksheet, and case studies designed to help make technical information more accessible and practical for management decision-making.

Speakers and facilitators:

Megan Creutzburg, Institute for Natural Resources

Andrew Olsen, Intermountain West Joint Venture

Mariah McIntosh, Intermountain West Joint Venture

Dylan O'Leary, Institute for Natural Resources

Teagan Hayes, Intermountain West Joint Venture

Claire Visconti, University of Wyoming - IMAGINE

1:20-1:30pm: Welcome and introduction

1:30-1:40pm: The foundations of technical transfer: what is it, why is it important, and how do we approach it?

1:40-2:05pm: Introducing and test driving a framework for planning impactful tech transfer: small group activity

2:05-2:25pm: Lessons learned from case studies - the Invasive Annual Grass Tech Transfer Partnership and Threat-Based Strategic Conservation workshops

2:25-2:50pm: Reflection on tech transfer framework and worksheet: Small and large group discussion

2:50-3pm: Tech transfer resources: keep learning about tech transfer and an invitation to join the Sagebrush Technical Transfer Network

Workshop: Making sense of states and transitions: a simplified approach to understanding rangeland change

Organizer: Brandon Bestelmeyer

Description: State-and-transition models (STMs) describe how rangeland ecosystems can change in response to management and climate. They provide guidance for evaluating, mapping, and managing rangeland change. STMs can also play central roles in measurement, monitoring, reporting, and verification of carbon storage and other ecosystem services. STMs, however, can be difficult to develop and understand for the uninitiated. We produced a State and Transition Model Classifier tool that guides users through the production of STMs using a systematic, streamlined, and science-based approach. In this workshop, we will instruct users on the use of the tool, participants will go through examples, and critique the tool to improve it.

Can we make state and transition models more precise, powerful, and simple?: Brandon Bestelmeyer, USDA-ARS Jornada Experimental Range, Las Cruces, NM

The utility of state and transition models in a changing climate: Michael C. Duniway, US Geological Survey, Southwest Biological Science Center, Moab, UT

Can we mass produce relevant interpretations for state and transition model (STM) which are easily understood and applied by STM users?: Jamin Johanson, USDA Natural Resources Conservation Service, Wasilla, AK

Symposium: Tribal First Foods Mission and Management Visions Facilitate Rangeland Health, Collaboration, and Learning

Organizers: Bryan Endress, Eric Quaempts

Description: The Confederated Tribes of the Umatilla Indian Reservation's Department of Natural Resources has a mission to protect and restore "First Foods," water and native animal and plant species central to Tribal religion and culture, as well as community and individual health. We present First Foods as an ecological knowledge system that informs our work and provide applied management examples. We demonstrate how this approach can inspire research, reform contemporary management practices, its utility for agencies who have responsibilities for rangeland resources, water and water quality, and finally, its transferability to other Tribes and managers who have trust responsibilities to Tribes.

1:20-1:40pm: First Foods Mission and Upland and River Visions: Eric Quaempts

1:40-2pm: Enhancing Floodplains for Water Quality and Native Fish: Mike Lambert

3 'ignite' talks: Root and Berry Monitoring

2-2:05pm: Root and Celery Monitoring: Timing is Everything: Bryan Endress

2:05-2:10pm: First Foods and Pollinator Monitoring: Cheryl Shippentower

2:10-2:15pm: Long-term Wíwnu Phenology and Soil Monitoring to Detect Climate Change Impacts: Amanda Lowe

3 'ignite' talks: Management, Monitoring and Collaborations

2:15-2:20pm: Managing Livestock Grazing on the Umatilla Indian Reservation: Gordy Schumacher

2:20-2:25pm: Herbicides and First Foods: using the upland vision to guide applied research: Bryan Endress

2:25-2:30pm: Investment in centralized data management has improved data access and makes mapping and reporting easier: Stacy Schumacher

2:30-3pm: PANEL DISCUSSION: Tribal Partnerships and Collaborations

Symposium: Applying The Principles of Ecosystem Management - Part 2 of 2

Organizers: Lee Sexton, Targeted Grazing Committee Chair

Description: This symposium will cover two sessions providing principles and applications that will help in the management of our complex ecosystem. How well are we at evaluating the impact of our decisions? What is the environmental, social and economic impact of our decisions? How good are we at observing what the land is telling us? How to incorporate livestock into cropping and range systems to enhance the ecosystem.

Tony Malmberg – Author of “Green Grass in the Spring” Holistic Management Past and Present – Making decisions that are environmentally, economically and socially sound.

Craig Madsen – Cloverdale Ranch Inc. Ecological Management – How well are we at observing the story of the land? What is the land telling us?

Matt Gabica – We Rent Goats- Targeted Grazing – practice and principles of land enhancement/improvement/increasing soil biology. Can the Targeted Grazing community do better?

Chris Schachtschneider – Lighting S Livestock Solutions – Incorporating livestock into cropping systems balancing animal and soil health.

Contributed Oral Session: Grazing 2

1:20pm-1:40pm: Hadley Dotts: The impacts of precision heifer development on rangeland systems.

1:40pm-2:00pm: Georga Boffen Yordanov: Effectiveness of Sod-Seeding Legumes in Central Alberta Pastures

2:00pm-2:20pm: Miranda Stotz: Effects of different area allowances on plant selection, temporal grazing behavior, and soil bulk density in the Texas panhandle.

2:20pm-2:40pm: Noah Davis: Influence of Weather and Season on the Winter Forage Quality of Bluebunch Wheatgrass and Idaho Fescue

2:40pm-3:00pm: Krista Ehlert: Effects of soil quality on rangeland forage growth and nutrition without reliance on underground storage mechanisms

Contributed Oral Session: Human Dimensions/SES 2

1:20pm-1:40pm: Zubair Barkat: Reimagining Rangeland Research: Feminist Standpoint Theory Meets Rangeland Social Science

1:40pm-2:00pm: Justin Wied: Combining citizen science on Zooniverse with inquiry-based learning to enhance rangeland literacy among undergraduate students

2:00pm-2:20pm: John Ritten: Improving livestock production: Case studies highlight the value of local context in building integrated, effective solutions for people, ecosystems, and climate

2:20pm-2:40pm: Melissa Shehane: Cultivating Climate-Smart Leaders: The Climate Hub Fellows Program

2:4pm-3:00pm: Rachel Frost: The Future of Working Landscapes and the Agriculture Labor Crisis: Finding Solutions for Industry, Educators, and Partners.

Contributed Oral Session: Virtual Fence 2

1:20pm-1:40pm: Krista Ehlert: Leveraging Extension in outreach and education of virtual fencing: Kolb's experiential learning theory

1:40pm-2:00pm: Brandon Kenneth Mayer: Implementing Virtual Rotations: Enhancing Rangeland Management with Virtual Fencing on the Santa Rita Experimental Range

2:00pm-2:20pm: Andres Perea: Virtual grazing of Raramuri Criollo and Angus-Hereford cattle on arid rangelands

2:20pm-2:40pm: Andrew Antaya: Challenges with Virtual Fence Data

2:40pm-3:00pm: OPEN