Great Basin Consortium Conference

Charting a Course for Rangeland Science in the Sagebrush Biome

Conference Agenda
February 21-23, 2017

University of Nevada, Reno
Joe Crowley Student Union, 4th Floor
Reno, Nevada, USA

http://environment.unr.edu/consortium/

Great Basin Consortium

University of Nevada, Reno

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

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Conference Objectives

The objectives of the 2017 Great Basin Consortium Conference are to have participants learn about and contribute to implementation of the Integrated Rangeland Fire Management Strategy Actionable Science Plan. Initial speakers will discuss the purpose and components of the strategy and the science plan, and breakout sessions (see conference agenda below) will allow workshop participants to contribute ideas and steps for implementation of the science plan over the short term and the long term. Current research projects will be presented through poster sessions. A report will be produced from feedback received from breakout sessions on the five topics of the Science Plan. Researchers, managers, and practitioners from all regions of the sagebrush biome are encouraged to attend.

Actionable Science Plan Background

The Integrated Rangeland Fire Management Strategy called for an actionable science plan of prioritized research needs (view the Actionable Science Plan on IRFMS.org). The plan was completed in 2016 and identifies 37 priority science needs categorized in five broad topics related to management of the sagebrush ecosystem of the western United States. The topics are: fire, invasive plants, restoration, sagebrush and greater sage-grouse, and climate and weather. The 37 priority science needs identified in the plan are a shared vision of the near-term science needed to inform management strategies and develop management tools. Science planning and prioritization work conducted over the past five years by Federal and State agencies was the foundation for plan development. The science plan team and contributors from Federal and State management agencies and universities have developed a description of each of the priority needs and identified actions for addressing them. This plan was developed utilizing a process that allowed interested publics and stakeholders the opportunity to provide input on prioritization of the science needs. It has also gone through peer and collegial review as well as agency protocols for the publication of science documents (U.S. Geological Survey and U.S. Forest Service Research and Development review and approval). The science plan team consisted of staff from the Department of Interior (DOI), Department of Agriculture, Great Basin and Great Northern Landscape Conservation Cooperatives, Joint Fire Science Program, and Western Association of Fish Wildlife Agencies. The U.S. Geological Survey (USGS), Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (USFWS) participated from the DOI. The U.S. Forest Service (USFS), Natural Resources Conservation Service (NRCS), and Agriculture Research Service (ARS) participated from the Department of Agriculture.

Conference Agenda

Tuesday February 21st

Plenary, Ballroom A

1:00-1:20	Welcome – Tony Wasley, Director, Nevada Department of Wildlife
1:20-1:40	Why Secretarial Order 3336 and The Integrated Rangeland Fire Management Strategy? – Rick Belger, Integrated Rangeland Fire Management Strategy Implementation Manager, Office of the Deputy Secretary, BLM
1:40-2:40	The Actionable Science Plan: An Outcome of SO 3336 – Deborah Finch, Program

	Manager for Grassland, Shrubland, and Desert Ecosystems Science, USFS, RMRS and Ken Berg, Director, USGS Forest and Rangeland Ecosystem Science Center
2:40-3:00	Western Association of Fish and Wildlife (WAFWA) Contributions – Tom Remington, Sagebrush Science Initiative Project Coordinator, WAFWA
3:00-3:15	Q&A with presenters
3:15-3:30	Process for the week – Richard Kearney, Coordinator, Great Basin Landscape Conservation Cooperative
3:30-4:00	Break

Poster Session and Social, Ballrooms B&C

4:00-4:30	Ignite Session
4:30-6:30	Poster Session and Social

Wednesday February 22nd

8:00	REPORT TO YOUR BREAKOUT SESSION TOPIC ROOM **Fire, Rm. 422** (p. 7 of the Actionable Science Plan) Lead – Molly Hunter, Research Scientist and JFSP Science Advisor, UA Co-lead – Paul Steblein, Fire Science Coordinator, USGS, DOI Office of Wildland Fire **Invasives, Rm. 423** (p. 27 of the Actionable Science Plan) Lead – Jeanne Chambers, Research Ecologist, USFS RMRS Co-lead – Matt Germino, Research Ecologist, USGS **Restoration, Ballroom A** (p. 43 of the Actionable Science Plan) Lead – Dave Pyke, Research Ecologist, USGS Co-lead – Francis Kilkenny, Research Biologist, USFS RMRS **Sagebrush and sage grouse, Ballroom B** (p. 65 of the Actionable Science Plan) Lead – Steve Hanser, Sagebrush Ecosystem Specialist, USGS Co-lead – Pat Deibert, Sagebrush Science Coordinator, USFWS **Climate and weather, Rm. 420** (p. 89 of the Actionable Science Plan) Lead – Bryce Richardson, Plant Research Geneticist, USFS RMRS Co-lead – Peter Adler, Plant Ecologist, USU
8:00-8:30	Review of the Actionable Science Plan Topic
8:30-9:00	Instructions for your breakout session and get into science needs small groups
9:00-10:00	Small group discussion to develop pathways to address the science needs and identified actions from both a management (what's applicable) and a research (what's possible) perspective
10:00-10:20	**Break in Ballroom C**
10:20-12:00	Continue developing pathways to address the science needs and identified actions
12:00-1:00	Lunch on own
1:00	MEET BACK IN YOUR BREAKOUT SESSION TOPIC ROOM
1:00-1:45	Prepare initial report out
1:45-2:00	**Meet in full conference, Ballroom C**

2:00-3:00	Report out/discussion
3:00-5:00	**Poster Session and snacks, Ballroom A**

Thursday February 23rd

8:00	**REPORT TO YOUR BREAKOUT SESSION ROOM (same as yesterday)**
8:00-10:45	Final discussion on suggested pathways for Science Plan implementation and compilation of materials/notes from the groups
10:45-11:00	**Break in Ballroom C**
11:00	**Meet back in full conference, Ballroom C**
11:00-12:15	Large-group report out
12:15-12:30	Closing Remarks
12:30	Adjourn

Meeting Agenda

Tuesday February 21st

12:00 pm-1:00 pm	Great Basin Society for Ecological Restoration (GBSER) Meeting, Rm. 423

Wednesday February 22nd

12:00 pm-1:00 pm	Great Basin Environmental Program (GBEP) Meeting, Rm. 405
5:30 pm-7:00 pm	Great Basin Research and Management Partnership (GBRMP) Meeting, Rm. 423

Thursday February 23rd

1:00 pm-4:00 pm	Great Basin Landscape Conservation Cooperative (GBLCC) Meeting, Rita Laden Senate Chambers, 3rd Floor
3:00 pm-5:00 pm	Great Basin Fire Science Exchange (GBFSE) Meeting, Rm. 422

Friday February 24th

7:30 am-3:00 pm	Sagebrush Steppe Treatment Evaluation Project (SageSTEP) Meeting, Rm. 420
8:00 am-12:00 pm	Secretarial Order 3336 Business Meeting, Rm. 323
8:00 pm-5:00 pm	Open room for work or impromptu meetings, Rm. 406

Program View At-a-Glance

Great Basin Consortium Conference 2017: Charting a course for rangeland science in the sagebrush biome

	Monday 20th	Tuesday 21st	Wednesday 22nd					Thursday 23rd					Friday 24th
	President's Day		Fire Rm. 422	Invasives Rm. 423	Restoration Ballroom A	Sagebrush & sage-grouse Ballroom B	Climate & weather Rm. 420	Fire Rm. 422	Invasives Rm. 423	Restoration Ballroom A	Sagebrush & sage-grouse Ballroom B	Climate & weather Rm. 420	
8:00			Breakout	Breakout	Breakout	Breakout	Breakout	Breakout	Breakout	Breakout	Breakout	Breakout	SageSTEP Meeting (7:30-3:00) Rm. 420
8:30													
9:00													
9:30													
10:00				Break (Ballroom C) from 10:00-10:20									
10:30									Break (Ballroom C) from 10:45-11:00				S.O. Meeting (8:00-12:00) Rm. 323
11:00								Full Group Report Out and Closing Remarks Ballroom C					
11:30													
12:00		GBSER Meeting Rm. 423	Lunch GBEP Meeting, Rm. 405										Open Room Rm. 406
12:30								Lunch					
1:00		Welcome and Plenaries Ballroom A	Breakout	Breakout	Breakout	Breakout	Breakout	GBLCC Meeting (1:00-4:00, purple boundary) Rita Laden Senate Chambers, 3rd Floor					
1:30													
2:00			Full Group Report Out/Discussion Ballroom C										
2:30													
3:00			Poster Session and snacks Ballroom A					(overlap between meetings)					
3:30		Break											
4:00		Ignite Session						GBFSE Meeting (3:00-5:00, green boundary) Rm. 422					
4:30		Poster Session and Social Ballrooms B&C											
5:00													
5:30			GBRMP Meeting, Rm. 423										
6:00													
6:30													

Poster Abstracts

ECOLOGY AND BIOLOGY OF KEY WILDLIFE SPECIES

Leveraging sage-grouse genomes to inform appropriate sagebrush restoration practices

Kevin Oh, Fort Collins Science Center, USGS, koh@usgs.gov
Cameron Aldridge, Colorado State Univ/USGS; Sara Oyler-McCance, USGS

Establishing guidelines to assist managers in selecting ecologically-appropriate plant materials is key for restoration of functioning sagebrush ecosystems and critical sage-grouse habitat. Evidence suggests that sage-grouse populations might possess distinct genetic adaptations to consuming local sagebrush types, which can differ in composition of toxic metabolites. We report initial findings of whole-genome resequencing efforts to identify putative genes underlying metabolic adaptations across sage-grouse populations. Elucidating these associations could have implications for restoration practices and sage-grouse management.
USGS Project

Assessing range-wide genetic connectivity in Greater Sage-grouse using genetic techniques

Sara J. Oyler-McCance, USGS Fort Collins Science Center, soyler@usgs.gov
S. Knick, USGS FRESC; T. Cross, U. Montana; B. Fedy, U. Waterloo; J. Row, U. Waterloo; M. Schwartz, USDA Forest Service; D. Naugle, U. Montana

Successful conservation of Greater Sage-grouse requires maintaining a set of viable and connected populations. Our understanding of how populations are connected and what landscape features influence gene flow is limited. We are using genetic information to gain insights into the processes that: (1) structure breeding populations, (2) influence how populations are interconnected across regions of lower densities and less suitable habitat, and (3) govern gene flow and dispersal across a landscape. With cooperation from state and provincial agencies, we collected feathers from leks across the range of Greater Sage-grouse. We genotyped > 11,000 feathers sampled from 2,891 locations, and identified 3428 individuals using a set of 16 microsatellite loci. In this poster, we update our progress and discuss the application of our future results to sage-grouse conservation.

Habitat selection by pygmy rabbit at three Great Basin landscapes

Thomas Dilts, University of Nevada Reno, tdilts@cabnr.unr.edu
P. Weisberg, UNR; M. Crowell, UNR; M. Matocq, UNR; K. Shoemaker, UNR; E. Larrucea, independent scientist

Proper management of sagebrush ecosystems is critical for protecting a wide diversity of fauna and flora that are critically dependent on sagebrush. Pygmy rabbits (*Brachylagus idahoensis*) are among the most specialized of sagebrush obligate species relying heavily on sagebrush for their diet and to provide cover from predators. We present results from preliminary habitat models for three study systems, Hart-Sheldon, Elko, and Austin, which includes maps and associations between pygmy rabbit occurrence and abiotic variables. **GBLCC Project**

INVASIVES AND ENCROACHMENT

Ecosystem Change in the Blue Mountains Ecoregion: Understanding the Ventenata Invasion
Becky K. Kerns, USFS, Pacific Northwest Research Station, Corvallis, OR, bkerns@fs.fed.us
Megan Krawchuk, Oregon State University
Nicole Vaillant, John B. Kim, and Bridgett Naylor, USFS PNW

Exotic plant invasions are a major challenge to the management of sagebrush ecosystems. Grasses such as cheatgrass negatively impact millions of hectares across the Great Basin and a similar threat is developing in the interior Pacific Northwest region with a relatively new invasive annual grass, *Ventenata dubia* (ventenata). We are conducting a multi-phased landscape scale project focused on the Blue Mountain Ecoregion (approximately 28% of which is classified as sagebrush ecosystems) to examine the extent of ventenata invasion and associated ecosystem change. Our poster provides information about our newly launched research and preliminary results.
JFSP project

Cheatgrass Stand Failure in the Great Basin: Fungal Pathogens, Carbon Dynamics, and Fungistasis
Susan Meyer (USFS RMRS), Phil Allen (BYU), Julie Beckstead (Gonzaga U), Taryn Johnson (BYU), Craig Coleman (BYU)

Stand failure is sporadically observed in cheatgrass monocultures across the Great Basin. To examine the role of carbohydrate carbon in stand failure, we added sugar in the fall and measured subsequent stand density. Sugar addition reduced stand density 60-72% at two sites with die-off history, but had less effect at a non-die- off site. Labile carbon apparently interacts with pathogen inoculum density to mediate levels of seedling mortality. We have developed methodology to measure field inoculum loads.
GBLCC project

Mapping thirty years of cheatgrass die-off in the Great Basin using the Landsat archive
Peter J. Weisberg, University of Nevada, Reno, pweisberg@cabnr.unr.edu
Thomas E. Dilts, UNR; Owen W. Baughman, UNR; Susan E. Meyer, USFS RMRS; Elizabeth A. Leger, UNR; K. Jane Van Gunst, NDOW; Lauren Cleeves, USGS

Episodic regeneration failure of cheatgrass monocultures ("die-off") can have negative ecosystem consequences, but also provides opportunity for ecological restoration within the imperiled sagebrush ecosystem. We developed a remote sensing approach for mapping die-off from 30-m Landsat imagery, and used this to quantify die-off occurrence patterns annually (1985 – 2016). Results suggest some predictability of cheatgrass die-off occurrence as the intersection of site environment with annual weather patterns, likely combining to create conditions favorable for disease expression.
GBLCC and BLM (through GBCESU)

Expanding the cheatgrass percent cover model through time and space

Stephen P. Boyte 1 , Bruce K. Wylie 2 and Donald J. Major 3; 1 Stinger Ghaffarian Technologies, Inc. Contractor to the U.S. Geological Survey EROS Center, Sioux Falls, SD, work performed under contract G15PC00012; 2 U.S. Geological Survey, EROS Center, Sioux Falls, SD; 3 BLM, Idaho State Office, Boise, ID

We are developing a regression-tree model to generate a time series (2000 – 2016) of annual grass mapsfor approximately 1.3 million km 2 in the western United States. Using regression tree approaches driven by spatial digital input maps, we predict and map annual grass percent cover at a resolution of 250 m in sagebrush ecosystems. We plan to use the mapping model to generate near-real- time annual grass maps and datasets for 2017 and beyond.

Changes in Great Basin tree cover using multidecadal remote sensing

Jonathan A. Greenberg, Natural Resources & Environmental Science, University of Nevada, Reno, jgreenberg@unr.edu
P. Weisberg, UNR NRES; T. Dilts, UNR NRES; Q. Xu, UNR NRES; Z. Hou, UNR NRES; A. Parra, UNR EECB; B. Morrison UIUC PEEC

Pinyon-juniper woodland expansion in the Great Basin has been associated with loss of habitat for sagebrush-obligate species, increased crown fire risk, and other ecosystem changes; yet some studies suggest that recent drought and wildfire have led to net reduction in woodland cover. Using a model of fractional tree cover calibrated from airborne LiDAR and Landsat data, we predicted treecover for the entire Great Basin at 30m resolution from the period of 1985 to present.

Mapping Vegetation and Biological Soil Crusts: an introductory look

Josh Enterkine, Boise State University Dept Geosciences, Boise Center Aerospace Laboratory, joshenterkine@u.boisestate.edu
N. Glenn, BSU BCAL; L. Spaete, BSU BCAL

Multispectral RapidEye imagery and field data will be used to create a vegetation and biocrust map within the Morley Nelson Snake River Birds of Prey National Conservation Area. This poster is an overview of the project to date, including field data and satellite image collection and processing methods, proposed analyses, and expected outcomes. The ability to map biocrusts may increase their inclusion in additional fields of study such as fire, invasive species, and habitat restoration.

Mountain Home AFB Project

SHRUB-STEPPE ECOSYSTEM FUNCTION

Temporal Tradeoffs in Great Basin Vegetation from 35,000 Years of Climate Change

Robin J. Tausch, USFS RMRS Retired, rjtausch@att.net
R.S. Nowak, Chair, NRES UNR; and C.L. Nowak, Paleobiologist, NRES UNR

Tree, shrub, grass, and forb plant functional groups from woodrat midden strata were used to study 35,000 years of vegetation / climate interactions. Six identified time periods had relatively stable climate conditions and vegetation composition. Climate and vegetation rapidly changed between

periods. Over the last 8,000 years these changes have decreased herbaceous abundance and increased shrub abundance. These trends contributed to the increasing establishment and dominance of exotic species in affected sagebrush ecosystems.

Effects of Phos-Chek® on Soil Nutrient Availability

Tye Morgan and Dr. Robert Blank, ARS Reno NV

Fire retardants are an essential tool used by wildland firefighters during wildfires. Primarily, fire retardants are composed of phosphate and sulfate salts that prevent combustion of cellulosic materials, but also have similar properties to fertilizers. The typical residual time for fire retardant is three months, however during drought conditions residual times can be longer. This study examined the effect of phos-check application on soil nutrient availability during a drought period.

Sagebrush Wildfire Effects on Surface Soil Nutrient Availability: A Temporal and Spatial Study

Robert Blank, Charlie Clements, Tye Morgan, Dan Harmon, and Jacob Phillips, ARS Reno NV

We quantified soil nutrient availability, following a wildfire in a mountain big sagebrush community, of surface soil (0-10 cm) by microsite (shrub interspace and shrub canopy), treatment (burned and unburned), and temporally (monthly from Nov., 2013 through May, 2015). For most months and relative to unburned shrub canopies, burned shrub canopies had elevated availability of mineral N (dominantly NH_4^+-N), bicarbonate-extractable P, DTPA-extractable Mn, and solution-phase Ca^{+2}, Mg^{+2}, SO_4^{-2}, K^+, and ortho-P.

Natural recruitment of Wyoming big sagebrush in burned and unburned areas during an El Nino year

April G. Smith, USDA Agricultural Research Service, Great Basin Rangelands Research Unit, april.smith@ars.usda.gov
Camie M. Dencker, UNR; Beth A. Newingham, USDA ARS

We assessed Wyoming big sagebrush recruitment inside and outside burned areas. Juveniles were tracked for growth and survivorship. Juvenile sagebrush were predominantly found in unburned sites. Within unburned sites, juvenile density and height was negatively influenced by bareground, distance to patch edge, slope, and gravel. Juvenile height was positively associated with perennial cover. Our results will provide insight into the episodic nature of Wyoming sagebrush recruitment and may assist managers in determining future vegetation management.

RESTORATION EFFECTS

Post-fire sagebrush seeding success in Wyoming and the Front Range: an extension of SageSuccess

Daniel Manier1, dmanier@usgs.gov
Co-authors: David Pilliod1, David Pyke1, Matt Germin1, Justin Welty1, Robert Arkle1,
John Bradford3, Mike Duniway3
US Geological Survey: 1-Fort Collins Science Center, 2-Forest Rangeland Ecological Science Center, 3-Southwestern Biological Science Center

Abstract: The SageSuccess Project is a joint effort between USGS, BLM, and FWS to understand how to establish big sagebrush and ultimately restore functioning sagebrush ecosystems. Improving the success of land management treatments to restore sagebrush-steppe is important for reducing the long-term impacts of rangeland fire on sage-grouse and over 350 other wildlife species that use these habitats. The project evaluates treatments completed between 1990 and 2013 and determine the treatment methods and environmental factors that have contributed to past restoration success. This research will help inform future land management activities and contribute to the development of new practices or improvement of existing methods to restore sagebrush ecosystems. This poster presents results of a single sampling season (2016) during which we visited 24 post-fire locations in Wyoming and northwestern Colorado using the same sampling design used for Great Basin assessments. The sampled sites included seeded and non-seeded treatments and a range of time-since-disturbance (TSD) of 2 – 55 years. Total vegetation cover, perennial grass cover and canopy gap size showed the strongest trends related to TSD, and seeding treatment.

Multi-scale assessment of wildlife response to juniper removal

Tracey N. Johnson, University of Idaho, traceyj@uidaho.edu
Co-authors: N. Garlick, Univ. of ID; D. Shinneman, USGS FRESC; T. Katzner, USGS FRESC; D. Pilliod, USGS FRESC

Habitat treatments in support of greater sage-grouse include removal of 600,000 ac of juniper in Idaho. There is limited evidence that woodland reduction benefits other sagebrush obligates, and woodland-associated species may be impacted. We will use a before-after control-impact design to assess effects of removal for multiple species, including sage-grouse predators, while accounting for influence of landscape-level variables. Our approach provides an opportunity to improve understanding of wildlife responses to management of sagebrush ecosystems.

GBLCC Project

Sagebrush Steppe Ecosystem Management Using Integrated Range Improvement Practices

Dan N. Harmon, Charlie D. Clements, Mark Weltz and Jeff White daniel.harmon@ars.usda.gov
USDA, Agricultural Research Service, Great Basin Rangelands Research Unit, 920 Valley Road, Reno, NV 89512, 4 Vice President, Elko Land and Livestock

We will present research on techniques used in integrated range management that successfully restore sagebrush ecosystems, including cheatgrass control, perennial seeding and shrub transplanting. Discing and herbicide research led to 80-98% reduction in cheatgrass, tenfold increases in perennial establishment and 90% reduction in fuels. Establishing perennial grasses suppresses cheatgrass, restoring succession and sagebrush cover. The methods we have researched help achieve successful sagebrush ecosystem restoration and are the first steps in protecting this threatened environment.

Plant phenology and productivity at sagebrush treatments in Wyoming

Aaron Johnston, U.S. Geological Survey, Northern Rocky Mountain Science Center, ajohnston@usgs.gov
Geneva Chong, USGS; Jerod Merkle, University of Wyoming; Erik Beever, USGS

Plant phenology and productivity are important habitat factors for wildlife, but effects of sagebrush reduction treatments on these vegetative characteristics are poorly understood. We compared NDVI-based metrics for phenology and productivity at sites treated with fire, herbicide, and mechanical methods to untreated sites after accounting for environmental factors. Effects varied by treatment and dissipated over time. Our results can inform managers on vegetative responses to sagebrush treatments and implications for wildlife management.

Porter Canyon Experimental Watershed: Vegetation Phenology and Water Availability.

Keirith A. Snyder, USDA ARS, keirith.snyder@ars.usda.gov
Bryce L. Wehan, UNR and ARS; Ceasar J. Medina, USDA ARS; Tamzen Stringham, UNR; Devon Snyder, UNR.

In the Great Basin, management of sagebrush steppe requires an understanding of water availability and the timing of vegetation green-up. Reductions in pinyon and juniper density coupled with the restoration of sagebrush steppe vegetation are likely to alter components of the water budget. We characterized community vigor with land-based cameras and measured environmental variables to understand the temporal and spatial variability across communities.

GBLCC project

Soil moisture and temperature associates with vegetation response to woody fuel control in sagebrush steppe

Bruce Roundy Brigham Young University bruce_roundy@byu.edu
Rachel Williams, US Fish and Wildlife Service; Trevor Gruell, Brigham Young University

We measured soil water availability and soil temperatures at 13-30 cm and vegetation cover 6 years after woody plant control on 11 conifer-encroached sites and 6 treeless sagebrush steppe sites. Partition analysis (Decision tree) indicated that sites with wetter winters and springs had greater resilience as indicated by higher perennial herbaceous cover. Sites with warmer springs, and warmer and wetter falls had less resistance to cheatgrass dominance.

GBLCC and JFSP project

Regional Impacts of Pinyon and Juniper Removal on Non-target Faunal Communities

Kevin T. Shoemaker, University of Nevada, Reno, Department of Natural Resources and Environmental Science, email: kshoemaker@cabnr.unr.edu
D. Miles, UNR; M. Forister, UNR; C. Feldman, UNR; P. Weisberg, UNR; T. Dilts, UNR; G. Collins, USFWS; J. Williams, NDOW; J. VanGunst, NDOW; T. Bowden, BLM; B. Hamilton, NPS.

Short Abstract: Using a before-after-control-impact (BACI) experimental design, replicated at five locations across northern Nevada, we will quantify how PJ removal treatments cascade through trophic levels at varying spatial scales, focusing on bats, reptiles, birds, insects, and small mammals. This project will result in (1) understanding of biological community variation along the gradient from PJ to

"sagebrush sea", (2) impact assessment for PJ removal treatments re non-target species, and (3) guidance regarding future PJ management.
GBLCC, WAFWA (Sagebrush Science Initiative)

Effects of mulch on plant and soil recovery after wildfire in the eastern Great Basin
Burgess Munyer; University of Nevada, Reno; bmunyer@unr.edu
C. Dencker, NRES UNR; J. Gicklhorn, NRES UNR; L. Derasary, ENLC; B. Newingham, USDA

We investigated the effects of straw mulch applications on post-fire restoration efforts. Straw mulch and a seed mix was aerially applied in eastern Nevada. The mulch treatment increased canopy, perennial grass, seeded species and decreased bareground cover but did not affect soil stability or invasive species cover. Our results suggest that post-fire mulch applications promote vegetative growth and decreases bareground, but land managers should consider additional treatments to stabilize soil and to suppress invasion.

Upper Gunnison Basin riparian restoration project: Assessing the impacts of riparian restoration on arthropod abundance and diversity
Sammantha Rowland Western Colorado State University Master in Environmental Management sammantha.rowland@gmail.com, T.Grant III, BLM, TNC, CPW

This project monitors arthropod abundance and diversity in response to the installation of riparian restoration structures in sage-steppe habitat, a vital habitat for sage grouse (*Centrocercus minimus*). Sage grouse broods require an area that holds enough moisture to sustain the young until the juvenile stage, which not only hold better cover for nests, but also hold a critical food source - arthropods. Recent studies have shown arthropod abundance and diversity also can serve as a micro-indicator of riparian restoration success, and should therefore be considered for monitoring in the future.

RESTORATION TOOLS AND CONCEPTS

Research, monitoring, and adaptive management on the 2015 Soda Wildfire: relevance to SO#3336
MATT GERMINO, US Geological Survey, Forest and Rangeland Ecosystem Science Center
Pete Torma, BLM Owyhee Field Office, Cindy Fritz, BLM Boise District

The management response to the 2015 Soda Wildfire is the first implementation of SO #3336 on Rangeland Fire and Restoration. New developments in collaboration, objective setting, monitoring, use of multiple interventions, retreatments, and assessing resistance, resilience, and grazing resumption are underway. Research on topics such as factors affecting treatment success, soil stabilization, and weed-suppressive bacteria are integrated with the post-fire management. The outcomes will help improve efficacy and efficiency of responses to other fires in sagebrush steppe.

The Power of Big Data: An Introduction to the Land Treatment Digital Library for the Great Basin
David S. Pilliod and Justin L. Welty, dpilliod@usgs.gov
US Geological Survey, Forest and Rangeland Ecosystem Science Center

The Land Treatment Digital Library (LTDL) was developed to provide a centralized spatial and tabular database of vegetation and soil treatments conducted on public lands managed by the Bureau of Land Management (BLM) across the western U.S. Since 1940, nearly 10,000 land treatments spanning 3.76 million ha have been completed on lands administered by the BLM in the Great Basin alone. Of these treated lands, 1.65 million ha were treated more than once and some were treated up to 10 times between 1940 and 2015. The LTDL has created new adaptive management and research opportunities that could improve our understanding of responses of vegetation, habitat, and ecosystems to land use and management actions and factors influencing treatment outcomes. Here we demonstrate some of this potential by reporting on the relationships between seeding success and precipitation and how use of native over non-native seed species have changed through time in the Great Basin.

Methods for Creating Resilient Sagebrush Ecosystems in the Great Basin

Alison Agneray and Lana Sheta, UNR, aagneray@nevada.unr.edu and lsheta@nevada.unr.edu
E. Leger, UNR; T. Parchman, UNR

This project is being conducted at UNR with funding from the BLM's National Native Seed Strategy and has been recommended for funding by the USDA.

The Great Basin needs reliable methods for establishing diverse sagebrush ecosystems in order to halt the spread of invasive species and preserve our native biodiversity. Following previous results, we are proposing a comprehensive assessment of seeding sources and strategies. Our methods include (1) Identifying and comparing seed sources throughout Nevada, California, and Oregon (2) Using these seeds in designed communities to test efficacy (3) Quantifying landscape genetic variation to understand diversity, gene flow, and differentiation among source populations.

Trait clines of big sagebrush (*Artemisia tridentata*): relationships to climate and development of seed transfer zones

Bryce A. Richardson[1], Lindsay Chaney[2], Nancy L. Shaw[3], Matthew J. Germino[4]
1-USDA Forest Service, Rocky Mountain Research Station, Provo, Utah, USA
2-Department of Biology, Snow College, Ephraim, Utah, USA
3-USDA Forest Service, Rocky Mountain Research Station, Boise, Idaho, USA
4-US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise, Idaho, USA

Plant species that occupy large geographic distributions contend with highly varied climates. Such climatic variation across a species distribution frequently requires genetic adaptation. Failure to understand how these species are adapted to climate will impede restoration. In this study, we assess the flower phenology, seed yield and survivorship of big sagebrush (*Artemisia tridentata* subspecies *tridentata*, *vaseyana* and *wyomingensis*) over several years in three common gardens.

Quantifying risks to sustainability of Great Basin Rangelands

Mark A. Weltz, USDA-ARS Great Basin Rangelands Research Unit, 920 Valley Road, Reno, Nevada 89512. Mark.weltz@ars.usda.gov.
S. K. Nouwapko, UNR, J. Nesbit, ARS, and K.C. McGwire, DRI

The USDA Agricultural Research Service has created the Agricultural Runoff Erosion, and Salinity – ARES database to help predict sustainability of rangelands. Data in the ARES database from the Great Basin were used to run the Rangeland Hydrology and Erosion Model (RHEM). RHEM did an excellent job in predicting runoff and soil loss in Nevada and Utah. These tools can be used to quantify risk to sustainability for Great Basin rangelands from accelerated soil erosion.

Agricultural, Runoff, Erosion and Salinity (ARES) Database to Better Evaluate Rangeland State and Sustainability

Jason Nesbit, USDA-ARS Great Basin Rangelands Research Unit, 920 Valley Road, Reno, Nevada 89512. Jason.Nesbit@ars.usda.gov
S. K. Nouwapko, UNR, M. Weltz, ARS, and K.C. McGwire, DRI

The Agricultural Runoff Erosion, and Salinity database contains 100 plant communities and 2,000 rainfall simulation experiments. This data is being used to parametrize the Rangeland Hydrology and Erosion Model for predicting the risk of sustainability of Great Basin rangelands. These tools are being used by Natural Resources Conservation Service to develop hydrologic sections of their Ecological Site Descriptions to describe optimal vegetation cover for reducing soil erosion and improving rangeland sustainability in the Great Basin

Meeting sagebrush steppe restoration challenges: using the Target Plant Concept

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Meeting sagebrush steppe restoration challenges requires successful establishment of plant materials. The Target Plant Concept provides a flexible framework that nurseries, seed producers, and clients can use to improve plant material performance. Through the nursery–client partnership, answers to a matrix of interrelated questions define target plant materials. These questions focus on project objectives; site characteristics, limiting factors, and mitigation efforts; species and genetic criteria; stocktype; outplanting tools and techniques; and outplanting window.

How is Wildfire Science Used to Inform Managers at the Wildland Urban Interface?

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The Integrated Rangeland Fire Management Strategy Actionable Science Plan identifies priority science needs for successfully managing our future rangeland ecosystems. Here we provide results of a mixed method study identifying how wildfire science is used to inform policy decisions by managers at the Boise Wildland Urban Interface. The framework presented meets the challenge of transferring science into management, and may be used to inform how to communicate science to managers representing diverse jurisdictions and goals.

JFSP project

Sagebrush Climate Console and Landscape Simulator: tools created with and for managers

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Conservation Biology Institute developed the GB-LCC Conservation Atlas to visualize regional data (https://gblcc.databasin.org/), the Landscape Climate Dashboard (http://bit.ly/2atu8Df) to provide climate and vegetation shifts projections for protected lands across western US, the Sagebrush Climate Console (climateconsole.org/sagebrush) to provide NOAA forecasts, CMIP5 climate projections, regional intactness and site sensitivity over sagebrush extent and grouse range, and the Landscape Simulator (landscapesim.org) to serve as a web platform to run state and transition models for those areas.

GBLCC project

A Field Guide to Grasses and Grass-like Plants of Idaho

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Native grasses are essential habitat components for sagebrush obligate wildlife species and contribute to forage for wildlife and domestic livestock. We are developing a user-friendly field guide and offline smartphone app to the grasses and grass-like plants of Idaho, intended for K-16 educators and students, ranchers, land owners, recreationists, and nature enthusiasts. It features colorful photographs and line drawings showing vegetative features of each grass, an easy-to-use dichotomous key, and information on each plant's characteristics.

Fire occurrence and burn severity trends in the Great Basin using MTBS data

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We used data from the Monitoring Trends in Burn Severity (MTBS) program to assess regional trends and variation in fire occurrence and burn severity from 1984-2016. We quantified total area and number of times burned for the region, and identified six clusters of high fire occurrence. We also identified inconsistencies across burn severity metrics within the region's dominant vegetation types, which may help inform ecologically significant burn severity classification and post-fire restoration treatments.

JFSP project

http://environment.unr.edu/consortium/