

# Great Basin Consortium (GBC) First Annual Conference

## Conference Program November 7 - 9, 2011

University of Nevada, Reno  
Joe Crowley Student Union  
Reno, Nevada, USA

### Participating Organizations:

Great Basin Cooperative Ecosystem Studies Unit (GB-CESU)

Great Basin Environmental Program (GB-EP)

Great Basin Landscape Conservation Cooperative (GB-LCC)

Great Basin Research and Management Partnership (GB-RMP)

Great Basin Restoration Initiative (GB-RI)



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

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## CONFERENCE SCHEDULE

MONDAY, NOVEMBER 7

*Joe Crowley Student Union - Ballroom A Entrance*

**11:00 a.m. – 2:00 p.m.**            **Registration**

*Joe Crowley Student Union - Rita Laden Senate Chambers (3<sup>rd</sup> Floor)*

**11:30 a.m. – 1:00 p.m.**            **Great Basin-CESU business meeting** (lunch provided for GB-CESU partners)  
Convener: Michael W. Collopy, Director, Great Basin-CESU, UNR

*Joe Crowley Student Union - Ballroom A*

**1:00 – 1:20 p.m.**            **Conference Opening**  
Michael W. Collopy, Assistant Vice President for Research, UNR  
Director, Great Basin-CESU

**Welcome**  
Marc Johnson, President  
University of Nevada, Reno

*Joe Crowley Student Union - Ballroom A*

**1:20 – 2:30 p.m.**            **Organizational Updates from the five Consortium Members**  
Great Basin Cooperative Ecosystem Studies Unit (GB-CESU), Michael Collopy  
Great Basin Environmental Program (GB-EP), Stanley R. Johnson  
Great Basin Landscape Conservation Cooperative (GB-LCC), Linda Kelly  
Great Basin Research and Management Partnership (GB-RMP), Carol Schuler  
Great Basin Restoration Initiative (GB-RI), Mike Pellant

*Joe Crowley Student Union - Ballroom C*

**2:30 – 3:00 p.m.**            **Refreshment Break**

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ORAL PRESENTATIONS: EMERGING CRITICAL ISSUES AND NEW PROJECTS

*Moderator: Deborah Finch, USDA Forest Service, Rocky Mountain Research Station*

*Joe Crowley Student Union - Ballroom A*

**3:00 – 3:30 p.m.**            UNDERSTANDING, PREDICTING AND MANAGING SPECIES INVASIONS IN A  
CHANGING ENVIRONMENT – THE CASE OF ANNUAL BROME GRASSES  
**Jeanne Chambers** (US Forest Service, Rocky Mountain Research Station, Reno  
NV), Matt Germino (US Geological Survey, Forest and Rangeland Ecosystem  
Science Center, Boise ID), Bethany Bradley (University of Massachusetts,  
Amherst MA), Stuart Hardegree (USDA Agricultural Research Service, Boise ID),  
Cynthia Brown (Colorado State University, Ft Collins CO)

- 3:30 – 4:00 p.m.** INTEGRATED CHEATGRASS-DIEOFF PROJECT  
**Don Major** (Bureau of Land Management, Boise ID), Mike Pellant (Bureau of Land Management, Boise ID)
- 4:00 – 4:30 p.m.** POST-FIRE WIND EROSION: CAUSES, CONSEQUENCES, AND IMPLICATIONS  
**Matt Germino** (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Joel Sankey (US Geological Survey, Tucson AZ), Nancy Glenn (Idaho State University, Boise ID), Natalie Waggenbrenner (US Forest Service, Rocky Mountain Research Station, Moscow ID)
- 4:30 – 5:00 p.m.** MANAGING FOR RESILIENCE IN AN UNCERTAIN WORLD: THE ROLE OF HUMAN-ENVIRONMENT LINKAGES  
**Mark Brunson** (Utah State University, Logan UT)

*Joe Crowley Student Union - Ballroom C*

- 5:00 – 7:00 p.m.** **Reception**  
 No-host bar. Refreshments and hors d'oeuvres provided

*Joe Crowley Student Union - Conference Room 405*

- 10:00 a.m. – 5:00 p.m.** Conference room (capacity 12) available for ad hoc meetings, see registration desk for availability

## TUESDAY, NOVEMBER 8

*Joe Crowley Student Union - Conference room 423*

- 7:30 – 8:30 a.m.** **Great Basin Environmental Program business meeting**  
 Convener: Stanley R. Johnson, Great Basin-EP Project Coordinator, UNR

*Joe Crowley Student Union - Ballroom A Entrance*

- 8:00 – 11:30 a.m.** **Registration**

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### ORAL PRESENTATIONS: PROJECT HIGHLIGHTS

*Moderator: Sue Phillips, USGS Forest and Rangeland Ecosystem Science Center*

*Joe Crowley Student Union - Ballroom A*

- 8:30 – 8:45 a.m.** CONSERVATION OF LAHONTON CUTTHROAT TROUT  
**Mary Peacock** (University of Nevada, Reno NV), Helen Neville (Trout Unlimited, Boise ID), Veronica Kirchoff (University of Nevada, Reno NV)
- 8:45 – 9:00 a.m.** VULNERABILITY OF ASPEN AND ASSOCIATED BIRD COMMUNITIES TO CLIMATE CHANGE  
**Doug Shinneman** (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Susan Earnst (US Geological Survey, Forest and

Rangeland Ecosystem Science Center, Boise ID), Peter Weisberg (University of Nevada, Reno NV), Jian Yang (University of Nevada, Reno NV)

**9:00 – 9:15 a.m.**

UTAH/NEVADA PARTNERS FOR CONSERVATION AND DEVELOPMENT

**Lee Turner** (Nevada Department of Wildlife, Reno NV), Rory Reynolds (Utah Department of Natural Resources, Salt Lake City UT)

**9:15 – 9:30 a.m.**

EFFECTS OF PINYON AND JUNIPER EXPANSION ON WATERSHED HYDROLOGY AND VEGETATION RESPONSE

**Keirith Snyder** (USDA Agricultural Research Service, Great Basin Rangelands Research Unit, Reno NV), Tamzen Stringham (University of Nevada, Reno NV), Mark Weltz (USDA Agricultural Research Service, Great Basin Rangelands Research Unit, Reno NV), John Wilson (Bureau of Land Management, Reno NV)

**9:30 – 9:45 a.m.**

NATIVE PLANT INCREASE PROJECT FOR RESTORING GREAT BASIN ECOSYSTEMS

**Nancy Shaw** (US Forest Service, Rocky Mountain Research Station, Boise ID), Mike Pellant (Bureau of Land Management, Boise ID)

**9:45 – 10:00 a.m.**

GREAT BASIN SCIENCE DELIVERY PROJECT

**Eugénie MontBlanc** (University of Nevada, Reno NV), Mike Pellant (Bureau of Land Management, Boise ID), Jeanne Chambers (US Forest Service, Rocky Mountain Research Station, Reno NV), Kurt Pregitzer (University of Idaho, Moscow ID), Brad Schultz (University of Nevada Cooperative Extension, Winnemucca NV), Elizabeth Leger (University of Nevada, Reno NV), Randy Sharp (US Forest Service, Sparks NV)

*Joe Crowley Student Union - Ballroom B*

**10:00 – 10:30 a.m.**

**Refreshment Break**

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ORAL PRESENTATIONS: SAGEBRUSH TREATMENT EVALUATION PROJECT FOR RESTORING SAGEBRUSH ECOSYSTEMS

*Moderator: Linda Kelly, BLM*

*Joe Crowley Student Union - Ballroom A*

**10:30 – 11:00 a.m.**

OVERVIEW OF THE REGIONAL, COLLABORATIVE PROJECT WITH EMPHASES ON CHEATGRASS AND SAGE GROUSE

**James McIver** (Oregon State University, Corvallis OR), David Pyke (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis OR), Paul Doescher (Oregon State University, Corvallis OR), Eugene Schupp (Utah State University, Logan UT)

**11:00 – 11:15 a.m.**

EFFECTIVENESS OF PINYON AND JUNIPER EXPANSION TREATMENTS

**Bruce Roundy** (Brigham Young University, Provo UT), Rick Miller (Oregon State University, Corvallis OR), Robin Tausch (US Forest Service, Rocky Mountain

Research Station, Reno NV), Jeanne Chambers (US Forest Service, Rocky Mountain Research Station, Reno NV)

**11:15 – 11:30 a.m.**

ECONOMIC VIABILITY OF SAGEBRUSH TREATMENTS

**Kim Rollins** (University of Nevada, Reno NV), Michael Taylor (University of Nevada, Reno NV), Mimako Kobayashi (University of Nevada, Reno NV)

**11:30 a.m. – 1:00 p.m.**

**Lunch Break** (on your own in the student union)

*Joe Crowley Student Union - Conference room 423*

**11:30 a.m. – 1:00 p.m.**

**Great Basin-RMP business meeting**

Convener: Jeanne Chambers, Great Basin-RMP, US Forest Service, RMRS

*Joe Crowley Student Union - Conference room 324*

**11:30 a.m. – 1:00 p.m.**

**Great Basin-LCC informal “meet and greet” lunch** (bring your own lunch)

*Joe Crowley Student Union - Conference room 423*

**1:00 – 2:00 p.m.**

**Great Basin Consortium business meeting**

Conveners: GBC Coordinating Committee

*Joe Crowley Student Union - Ballroom A*

**2:00 – 5:00 p.m.**

**Great Basin-LCC Steering Committee meeting**

Convener: Linda Kelly, Great Basin-LCC Coordinator, BLM

*Joe Crowley Student Union - Conference Room 420*

**8:30 a.m. – 4:00 p.m.**

Conference room (capacity 14) available for ad hoc meetings, see registration desk for availability

WEDNESDAY, NOVEMBER 9

*Joe Crowley Student Union - Ballroom A*

**8:00 a.m. – 12:00 p.m.**

**Great Basin-LCC Steering Committee meeting (continued)**

## GENERAL INFORMATION

### REGISTRATION

Registration will be available at the Joe Crowley Student Union, Ballroom A Entrance on:

Monday, November 7, 2011	11:00 a.m. – 2:00 p.m.
Tuesday, November 8, 2011	8:00 a.m. – 11:30 a.m.

### MEETING LOCATION

The conference venue is the Joe Crowley Student Union on the campus of the University of Nevada, Reno.

### FACILITY AMENITIES AND INFORMATION

The Joe Crowley Student Union offers a number of retail and food options including: Bookstore with a mini mart, Starbucks, Keva Juice, Einstein Bros Bagels, Villa Italian Kitchen, Panda Express, Tahoe Creamery, Port of Subs, Spudistro and Cantina del Lobo.

### MEALS AND BREAKS

Refreshment breaks are provided on Monday, November 7 and Tuesday, November 8. Lunch is on your own. There are several eating establishments at the Joe Crowley Student Union and near the University campus. The reception on Monday evening will offer appetizers, refreshments and a no-host bar.

### GETTING TO THE CONFERENCE

#### CAMPUS PARKING

Parking is available at the Brian Whalen Parking Garage on the east side of Virginia Street, just south of the Lawlor Events Center on the University campus. Park on the top level and enter the provided event parking code (#1172011) at the kiosk by the elevators for a day use pass each day. A campus map is provided on page 17.

#### LOCAL PUBLIC TRANSPORTATION

The Sierra Spirit is a free bus that travels from downtown Reno to the University every 15 minutes from 7:00 a.m. to 7:00 p.m. every day of the week. Conference attendees can catch the northbound bus across Virginia Street on the east side of the Sierra Legacy hotel. It is a yellow bus that is easily identified. Sierra Spirit is wheelchair accessible and offers free WiFi. A route map is included on page 23 of this program. RTC Ride is the local public transportation system. The main bus terminal is one block east of the Silver Legacy at 40 East 4th Street. To get to the University, take Route 7, which runs every 30 minutes, and get off at Lawlor Events Center. The Joe Crowley Student Union is near the Lawlor Events Center. The cost is \$2 per ride. Exact change is required. RTC Ride is wheelchair accessible.



## GREAT BASIN CONSORTIUM - PARTICIPATING ORGANIZATIONS

### GREAT BASIN COOPERATIVE ECOSYSTEM STUDIES UNIT (GB-CESU)

*Mission Statement:* The GB-CESU is a partnership for research, technical assistance and education to enhance understanding and management of natural and cultural resources of the Great Basin.

*Unique Role:* Part of a national program that provides a funding mechanism for transferring funds from federal partners to universities to conduct projects

*Partners/Collaborators:* Universities and federal agencies

*Initiating Organization:* Department of the Interior

*Funding/Support:* Projects funded with federal agency funds through a cooperative agreement

### GREAT BASIN ENVIRONMENTAL PROGRAM (GB-EP)

*Mission Statement:* To develop funding for on-the-ground projects and related research and outreach education to improve the Great Basin environment

*Unique Role:* Develop funding from public and private sources to facilitate landscape-scale, on-the-ground projects by engaging NGOs, state agencies and their coalitions, and the private sector in collaboration with universities and federal agency partners

*Partners/Collaborators:* Universities, federal agencies, state agencies and coalitions, and NGOs

*Initiating Organization:* Land grant universities in the Great Basin

*Funding/Support:* Federal, state and private

### GREAT BASIN LANDSCAPE CONSERVATION COOPERATIVE (GB-LCC)

*Mission Statement:* The Great Basin Landscape Conservation Cooperative enhances understanding of the effects of changing climate and other natural and human impacts across the region and promotes the coordination of science-based actions to enable human and natural communities to respond and/or adapt to those conditions.

*Unique Role:* DOI initiative working with stakeholders to develop landscape-scale tools and monitoring to address climate change and other regional stressors

*Partners/Collaborators:* Inclusive! All agencies (federal, state and local), Tribes, NGO's, public, etc. No restrictions on participation via the LCC Forum

*Initiating Organization:* Initiated by Department of Interior in 2009 by Secretary Executive Order.

*Funding/Support:* Funding is committed to three positions (BLM, US F&WS, and USGS) with associated support funding for each position.

### GREAT BASIN RESEARCH AND MANAGEMENT PARTNERSHIP (GB-RMP)

*Mission Statement:* The GB-RMP promotes comprehensive and complementary research and management collaborations to sustain ecosystems, resources and communities across the Great Basin.

*Unique Role:* Grassroots organization that provides a web-based clearinghouse of information for the Great Basin and mobilizes teams of researchers and managers to fund and implement projects that address priority

science needs.

*Partners/Collaborators:* All Great Basin organizations—federal and state research labs and management agencies, universities, local agencies, tribal governments, NGOs, and collaboration developed to address regional and local needs

*Initiating Organization:* Research agencies and universities

*Funding/Support:* Member agencies and grants

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#### GREAT BASIN RESTORATION INITIATIVE (GB-RI)

*Mission Statement:* To maintain and/or restore public lands in the Great Basin using science-based strategies supported by stakeholders

*Unique Role:* Maintain or improve the health of public lands by reducing the impacts of wildfires and invasive species

*Partners:* USGS, Forest Service, ARS, and other research agencies, State management agencies, and larger NGO's (for example TNC)

*Initiating Organization:* Initiated by BLM (Nevada State Office and the National Interagency Fire Center) in 1999 to address the large wildfires in the Great Basin

*Funding/Support:* A permanent full-time Coordinator is funded for GBRI. The other main funding source is the BLM's Native Plant Initiative that provides \$800,000 per year for native plant development and application research.

UNDERSTANDING, PREDICTING AND MANAGING SPECIES INVASIONS IN A CHANGING ENVIRONMENT – THE CASE OF ANNUAL BROME GRASSES



**Jeanne Chambers** (US Forest Service, Rocky Mountain Research Station, Reno NV), Matt Germino (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Bethany Bradley (University of Massachusetts, Amherst MA), Stuart Hardegree (USDA Agricultural Research Service, Boise ID), Cynthia Brown (Colorado State University, Ft Collins CO)

<http://www.fs.fed.us/rm/reno/>

<http://www.fs.fed.us/rmrs/profiles/?last=Chambers&first=Jeanne+C>

The Great Basin is exhibiting rapid ecological and socioeconomic change due to global, regional, and local stressors. Invasive species are both responding and contributing to these changes. The classic example is invasion of annual bromes, development of an annual grass/fire cycle, and progressive conversion of shrublands and woodlands to these invaders. Past research and management focused on control of the invader and revegetation of degraded ecosystems. Due to the magnitude of the problem, a broader approach is needed. The current emphasis is on: 1) ecological studies that provide information on the effects of climate, disturbance, or land treatments on invasion processes; and 2) species distribution models that provide predictions or risk assessments of invasion under different land use or climate scenarios. Because ecologists and species distribution modelers interpret the same concepts differently and work at different scales, the potential exists for conflicting recommendations. Two linked collaborative efforts are developing an integrated and cross-system approach for understanding, predicting and managing brome invasions: 1) a USDA NIFA REENet Project on Exotic Bromus Grasses in the Western US; and 2) a USGS Powell Center Project on Integrating Ecological Forecasting Methods. Both projects promote idea exchange and development through syntheses, symposia and proceedings, proposals and a common website and database. Currently in progress are concept papers on integrating ecological and modeling concepts and approaches, a USDA NIFA proposal to examine effects of climate on cheatgrass and native species and develop management tools, and a database on existing distributional, biological and ecological information on invasive bromes.

INTEGRATED CHEATGRASS-DIEOFF PROJECT



**Don Major; Mike Pellant**  
(Bureau of Land Management, Boise ID)

<http://www.blm.gov/id/st/en/prog/gbri.html>

Cheatgrass (*Bromus tectorum*) invasion and expansion in sagebrush ecosystems of the Great Basin has been well documented. Currently, cheatgrass dominated rangelands cover approximately 10 million acres in the Great Basin, USA. Since 2003, the Winnemucca District (BLM NV) has been experiencing landscape scale vegetation changes resulting from the “die-off” (i.e, partial/complete stand failure) of cheatgrass within Wyoming Big Sagebrush ecological sites. A similar phenomenon has also been reported in the Salt Desert shrub systems of central/southern Utah. Initial estimates of “die-off” areas are estimated at greater than a half million acres. Once void of cheatgrass, these sites are exposed to accelerated soil erosion,

invasion by new weed species, loss of spring livestock and wildlife forage, and further degradation requiring additional management attention. In late 2010, members of BLM's Great Basin Restoration Initiative identified the need to develop a more formalized strategy to inform BLM managers on the magnitude of the die-off phenomena and engage the science community to examine potential causal mechanisms. The combined result was the development of the Integrated Cheatgrass Die-off Project. The primary objectives of this project are to (1) Identify/evaluate methods to characterize current CGDO occurrence and spatial extent with remotely sensed imagery, and (2) develop/implement an integrated science research project to examine the potential causal factor(s) responsible for these die-offs. We will highlight the various collaborator efforts and associated project accomplishments in 2011.

#### POST-FIRE WIND EROSION: CAUSES, CONSEQUENCES AND IMPLICATIONS



**Matt Germino** (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Joel Sankey (US Geological Survey, Tucson AZ), Nancy Glenn (Idaho State University, Boise; and DOE Idaho National Lab), Natalie Waggenbrenner (US Forest Service, Rocky Mountain Research Station, Moscow ID) [http://fresc.usgs.gov/staff/profile.asp?Emp\\_ID=1204](http://fresc.usgs.gov/staff/profile.asp?Emp_ID=1204)

Soil stability is a major concern for rangeland management in the Great Basin and other semiarid regions, and is a motivating factor for post-fire rehabilitation soil treatments and planting efforts. Atmospheric dust from soil has increased regionally and globally, and is an increasing issue for air quality, regional hydrology, and local soil fertility. Large wildfires that remove the protective cover of vegetation for months are notable and increasing point sources of dust in the Northern Great Basin. This presentation will summarize the seminal studies on the patterns and underlying processes of post-fire wind erosion in the Great Basin. Post-fire erosion is evident in 1) measurement of soil movement near ground, local dust production (>50 mg/m<sup>3</sup> in some pulses), and in satellite images of large dust plumes, and 2) changes in the elevation of soil made with LiDAR, erosion bridges, or depth of root exposure, which collectively reveal mm to >10 cm of soil loss in 6-12 months after fire. Large amounts of carbon and nitrogen are transported with the soil. Wind erosion has strong and reciprocal relationships to local and global climate, is linked related to invasive and disturbances, and is a process that connects up- and downwind site conditions in ways that will require landscape-scale management and research approaches.

#### MANAGING FOR RESILIENCE IN AN UNCERTAIN WORLD: THE ROLE OF HUMAN-ENVIRONMENT LINKAGES



**Mark Brunson** (Utah State University, Logan UT) <http://www.cnr.usu.edu/htm/facstaff/memberID=770>

Recent scientific interest in rangeland resilience has occurred alongside a growing belief that stewardship must be achieved by viewing managed landscapes as linked social-ecological systems. Due to the pervasiveness of human influence, we can no longer separate ecological and human elements of nature when tackling management challenges. Recent studies of human-environment linkages in Great Basin rangelands suggest that management may best be viewed as a function of interactions between large- and local-scale ecological and human processes. Decisions of land managers and politically active stakeholders are influenced by beliefs about large-scale factors such as an economic downturn or regional

climate conditions that define the bounds of possible action. Local-scale environmental and social factors influence choices about which actions are taken within those bounds. There also are feedbacks between these top-down and bottom-up processes. For example, beliefs about national-level political forces influence opposition to stewardship even if stakeholders positively view the local managers who implement such actions. Citizens and even less-experienced managers tend to assume local natural systems are relatively stable without human intervention. Such assumptions are contrary to the increasing belief among scientists that systems are most sustainable if they are resilient to inevitable shocks.

## ABSTRACTS | PRESENTATION OF PROJECT HIGHLIGHTS

### CONSERVATION OF LAHONTON CUTTHROAT TROUT



**Mary Peacock** (University of Nevada, Reno NV), Helen Neville (Trout Unlimited, Boise ID), Veronica Kirchoff (University of Nevada, Reno NV)  
<http://www.unr.edu/biology/peacock.htm>

Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*, LCT) is an interior basin salmonid endemic to the hydrographic Lahontan basin of northern Nevada, eastern California and southeastern Oregon. Listed as threatened under the U.S. Endangered Species Act in 1973, this subspecies continues to decline with a loss of greater than 30 populations over the past fifteen years. Metapopulation dynamics (i.e., independent population dynamics, gene flow among subpopulations and evidence of local population extirpation) are hypothesized to describe the natural dynamics of inland salmonid species that were found historically in large interconnected stream systems. Very few interconnected stream systems remain, but empirical evidence suggests that Lahontan cutthroat trout exhibited life history variation, variation in habitat use by different-aged fish, as well as metapopulation dynamics in these large interconnected stream systems. Here we use species-specific genetic markers to track the emergence of these patterns among populations found in isolated streams that have been recently reconnected in the Maggie Creek basin of central Nevada. The results of this research suggest complex dynamics among stream populations but also increased movement of fish among streams. Genetic effectiveness monitoring will be an important tool as connectedness among streams systems is restored in more watersheds throughout the range of Lahontan cutthroat trout.

### VULNERABILITY OF ASPEN AND ASSOCIATED BIRD COMMUNITIES TO CLIMATE CHANGE



**Doug Shinneman** (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Susan Earnst (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise ID), Peter Weisberg (University of Nevada, Reno NV), Jian Yang (University of Nevada, Reno NV)  
[http://fresc.usgs.gov/staff/profile.asp?Emp\\_ID=1070](http://fresc.usgs.gov/staff/profile.asp?Emp_ID=1070)

Quaking aspen populations are thought to be in decline throughout the Intermountain West due to altered fire regimes, competition with conifers, herbivory, drought, disease, and insect outbreaks. Aspen stands typically support higher bird biodiversity and abundance than surrounding habitat types, and maintaining current distribution and abundance of several bird species in the Great Basin is likely tied to the persistence of aspen on the landscape. We are interested in determining: 1) the relationship between avian abundance and successional,

structural, and spatial distribution of aspen on the landscape; 2) how aspen population dynamics and stand structures have been shaped by disturbance (e.g., grazing, fire); and 3) how climate change and disturbance will affect future aspen conditions and associated avian species. We are investigating these dynamics in the aspen woodlands of northern Nevada using analyses of field-sampled empirical data, habitat modeling, and spatially-explicit landscape modeling. In this presentation, we describe our research objectives in more detail and present some preliminary findings.

## UTAH/NEVADA PARTNERS FOR CONSERVATION AND DEVELOPMENT



**Lee Turner** (Nevada Department of Wildlife, Reno NV), Rory Reynolds (Utah Department of Natural Resources, Salt Lake City UT)  
<http://www.ndow.org/nevpcd/index.shtm>  
<http://wildlife.utah.gov/watersheds/>

Nevada's Partners for Conservation and Development (NPCD) and Utah's Watershed Restoration Initiative (WRI) programs are wide-view landscape and habitat restoration initiatives formed to leverage diverse interests including: government entities, NGO's, industry, citizens, and other like-minded organizations to mitigate and improve ecological health. The major goal of the NPCD and WRI is to provide cooperative mitigation of threats to land health through effective management and restoration actions on public and private

lands. This mission and goals will be accomplished based on a grassroots or ground-up model. The NPCD is new and is using the highly successful WRI as a template. A large part of the Utah WRI's success has been via their regional teams' participation and the NPCD is forming regional teams by employing the successful model. The regional teams are composed of restoration focused staff and representatives of the NPCD and WRI, as well as other local conservation minded organizations and stakeholders that reflect the ecologic, economic, and social demographics of that region. The WRI has over 700 projects completed, and nearly 500,000 acres treated, since the Initiative's inception in state fiscal year 2005. The NPCD is a new program and is currently involved in projects covering about 100,000 acres.

## EFFECTS OF PINYON AND JUNIPER EXPANSION ON WATERSHED HYDROLOGY AND VEGETATION RESPONSE



**Keirith Snyder** (USDA Agricultural Research Service, Great Basin Rangelands Research Unit, Reno NV), Tamzen Stringham (University of Nevada, Reno NV), Mark Weltz (USDA Agricultural Research Service, Great Basin Rangelands Research Unit, Reno NV), John Wilson (Bureau of Land Management, Reno NV)  
<https://www.ars.usda.gov/pandp/people/people.htm?personid=39024>

Pinyon and Juniper (P-J) woodlands have been expanding into areas formerly dominated by sagebrush steppe vegetation. This can produce changes in understory vegetation, fire regimes, erosion potential and hydrology. Porter Canyon was a unique opportunity for agencies, university researchers and private landowners to work together to understand the effects of P-J expansion and treatment techniques on watershed hydrology, plant water-use, erosion potential and how these processes interact with vegetation community composition and structure. The goal of the Porter Canyon project is to have a fully instrumented watershed to determine the effects of tree felling on the water budget and plant communities. The watershed is instrumented with detailed vegetation transects to

monitor changes in plant communities, sapflux sensors to measure tree water use, soil moisture probes, NRCS scan weather station, a network of groundwater monitoring pressure transducers, and spring boxes. Detailed experiments on tree canopy interception of rainfall, stemflow generation and plant water use, and soil erosion potential are also being conducted. We plan on installing flumes in 2012 to quantify stream flow. This collaborative effort can enhance our understanding of land management practices on ecosystem function.

#### NATIVE PLANT INCREASE PROJECT FOR RESTORING GREAT BASIN ECOSYSTEMS



**Nancy Shaw** (US Forest Service, Rocky Mountain Research Station, Boise ID),  
Mike Pellant (Bureau of Land Management, Boise ID)  
<http://www.fs.fed.us/rm/boise/research/shrub/bio/shaw.shtml>  
<http://www.fs.fed.us/rm/boise/research/shrub/greatbasin.shtml>

Initiated in 2001 through the Federal Interagency Native Plant Materials Development Program by the USDI Bureau of Land Management Great Basin Restoration Initiative and USDA Forest Service, Rocky Mountain Research Station, objectives of the Great Basin Native Plant Selection and Increase Project are to: 1) provide regionally adapted, genetically appropriate native plant materials, primarily herbs, for use in the Great Basin; 2) develop cultural practices and increase the private sector capacity for producing seeds of these materials; and 3) devise strategies and adapt equipment for improving the establishment of diverse native communities. To meet challenges posed by these objectives, the initial collaboration has expanded to include more than 20 researchers in disciplines ranging from genetics to agronomy, entomology, seed technology, climate change, restoration ecology, and equipment development. State seed regulatory agencies have aided by maintaining and distributing stock seed and addressing issues relative to the evolving prevariety germplasm program. Lack of stability in the native seed market and high initial cost of new materials have created major obstacles to success of this program. Efforts to meet this challenge include expediting science delivery to the seed industry and land managers to effect acceptance and use of new materials, establishment of provisional or species-specific seed zones that provide growers with a better indication of potential market needs, increased seed storage by buyers and growers to reduce spikes in purchasing in major fire years, purchasing through contracts rather than the open market for materials of limited geographic range, and increasing the market across public and private sector users.

#### THE GREAT BASIN SCIENCE DELIVERY PROJECT



**Eugénie MontBlanc** (University of Nevada, Reno NV), Mike Pellant (Bureau of Land Management, Boise ID), Jeanne Chambers (US Forest Service, Rocky Mountain Research Station, Reno NV), Kurt Pregitzer (University of Idaho, Moscow ID), Brad Schultz (University of Nevada Cooperative Extension, Winnemucca NV), Elizabeth Leger (University of Nevada, Reno NV), Randy Sharp (US Forest Service, Sparks NV)  
<http://greatbasin.wr.usgs.gov/gbrmp/ScienceDelivery.aspx>

The Great Basin Science Delivery Project assists field-level land managers in identifying and accessing the best fire and resource science information available. The goal is to improve technical and policy decision-making through enhanced communication and information sharing. This project is part of the Joint Fire Science Program's national network of regional knowledge exchange consortia that were initially established in 2010 to address current challenges in fire and fuels management due to increased land use, invasive species, shifting climate, and complexities with differing

agency missions and policies. To determine specific technical information and delivery needs for the Great Basin, the Science Delivery Project conducted a needs assessment of 111 federal land management agency personnel in Nevada, Utah, Idaho, and Oregon. Land managers requested information syntheses, online training, a web-based clearinghouse of information, networks of experts, and field workshops. To address these needs, the science delivery project sends quarterly newsletters and email updates about fire and resource science information and events, has established a website and a list serve, hosted five webinars and two workshops, and has developed an interagency restoration cadre. We expect public and private land managers to benefit from this project by having a place and a person to turn to for answers to technical questions, identifying research contacts, and creating a forum to communicate technical needs. We expect research scientists to benefit from this project by gaining new ideas and funding sources for research, and by providing new methods of outreach for their research results.

## ABSTRACTS | SAGEBRUSH TREATMENT EVALUATION PROJECT FOR RESTORING SAGEBRUSH ECOSYSTEMS

### SHORT-TERM RESPONSE TO FIRE AND FIRE SURROGATE TREATMENTS DESIGNED TO INHIBIT CHEATGRASS INVASION



**James McIver** (Oregon State University, Corvallis OR), David Pyke (US Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis OR), Paul Doescher (Oregon State University, Corvallis OR), Eugene Schupp (Utah State University, Logan UT)

This paper presents short-term results of the Sagebrush Steppe Treatment Evaluation Project (SageSTEP), focusing on the lower elevation Wyoming Big Sagebrush experiment. Seven study sites were established between 2005 and 2007, and each has now experienced a complete set of restoration treatments: prescribed fire, mowing, and herbicide (Spike) treatments were applied between 2006 and 2008, in an effort to improve the competitive balance between cheatgrass and native perennial grasses. The annual grass herbicide Plateau was

also applied on ½ of measurement sub-plots in all study plots, including un-manipulated controls. We've found that Plateau is effective in controlling cheatgrass up to three years after treatment. Continued monitoring is required to understand whether three years is sufficient time for perennials to capture the growing space before cheatgrass re-colonizes. We have also found that Wyoming Big Sage sites are more resistant to invasion if there are healthy biological crusts present, or if both shallow and deep-rooted perennial grasses are abundant. Overall, if managers can maintain grazing stress below thresholds, cheatgrass invasion will likely be inhibited. However, significant structural and compositional variation among sites will likely influence experimental results, making it more difficult for managers to predict details of treatment response.



## EFFECTIVENESS OF PINYON AND JUNIPER EXPANSION TREATMENTS



**Bruce Roundy** (Brigham Young University, Provo UT), Rick Miller (Oregon State University, Corvallis OR), Robin Tausch (US Forest Service, Rocky Mountain Research Station, Reno NV), Jeanne Chambers (US Forest Service, Rocky Mountain Research Station, Reno NV)  
<http://lifesciences.byu.edu/~bar2>

Fuel-control treatments reduce major water-users in sagebrush communities such as trees or shrubs and may increase soil water availability for both desirable and undesirable residual species. We measured hourly soil water potential and soil temperatures across the Great Basin on sagebrush communities for 3 phases of invasion by pinyon and juniper trees. Measurements were taken on plots that were untreated, burned or where trees were cut or shredded. Sites were ordered and treatment effects compared for seasonal time of soil water availability (number of days soil at 13-30 cm was wetter than -1.5 MPa), wet degree days (summation of hourly temperatures above 0°C when the soil is wet), and soil temperatures. Reducing trees by fire, cutting, or shredding increased the time of soil water availability most on Phase III wooded shrublands with highest pretreatment tree densities. Additional days of water availability from tree removal were highest the first year after removal, but continue even 4 years after treatment. Understory perennial and annual grasses and shrubs have increased in cover after all treatments. Increased soil water availability from tree or other perennial plant reduction carries both a benefit of increased cover of desirable understory species, but also a risk of dominance of undesirable weedy species. Communities with a higher cover of desirable species before treatment should be more resilient and more resistant to weed dominance after treatment.

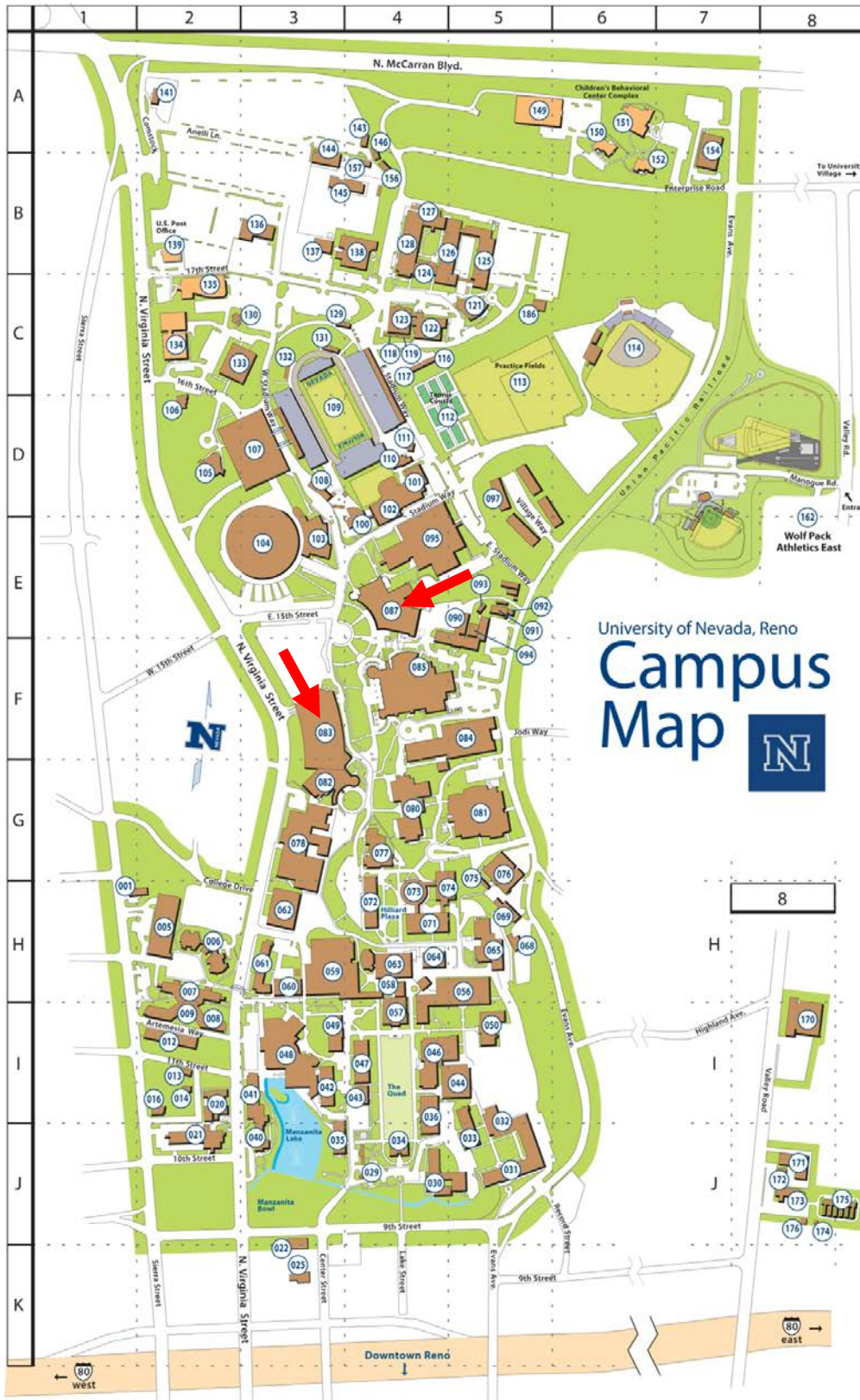
## ECONOMIC VIABILITY OF SAGEBRUSH TREATMENTS



**Kim Rollins** (University of Nevada, Reno NV), Michael Taylor (University of Nevada, Reno NV), Mimako Kobayashi (University of Nevada, Reno NV)  
<http://www.cabnr.unr.edu/core/default.aspx>

Economic benefits of implementing a vegetation treatment regime based on the underlying ecological dynamics of rangeland systems are estimated using an economic modeling framework that explicitly incorporates the state and transition ecological approach that has been widely adopted for Great Basin rangeland systems. Benefits from ecologically-based rangeland weed management include: (1) net gains to ranching, (2) wildfire suppression costs avoided and (3) the value of ecosystem service losses averted, which accrue to the general public, MINUS treatment costs. Ecological and economic parameters in the simulations are varied systematically to demonstrate the value of improving treatment success probabilities and knowledge of ecosystem responses to treatments - both of which are SageSTEP outcomes. Results are generated for two state and transition models common to the Great Basin. For Wyoming big sagebrush systems, wildfire suppression costs avoided are greatest for treatments applied to relatively healthy lands (\$238 per acre using a 3% discount rate applied over 200 years). As rangeland condition deteriorates, net benefits of treatment generally decline, but are highly variable (from \$0 to over \$500 depending on fire return intervals and treatment success rates). The probability of successful treatment and treatment costs are important drivers of net benefits for degraded systems; therefore as research and outreach continue to improve success rates and lower per acre treatment costs, these benefits can be expected to increase dramatically on degraded systems. However, the economic results are clear that prevention on healthier lands generates the highest benefits.

# CAMPUS MAP



## University Buildings

Grid	Building Name	Bldg. No.
J 8	Agricultural Education	AE 173
B 4	Anderson Health Sciences	AHS 128
E 5	Ansari Business Building	AB 063
E 5	Applied Research Facility	ARF 090
E 5	ARF (Clean Fuels Research Bldg.)	— 094
E 5	ARF (Ore Bins)	— 093
E 5	ARF (Annex 4)	— 092
E 5	ARF (Annex 2)	— 091
I 2	Argenta Hall	AH 008
I 2	Artemesia Building	ARTM 012
C 4	Bioinformatics, Center for	BC 116
F 3	Brian J. Whalen Parking Complex	BWPC 083
G 5	Buildings & Grounds	BG 076
B 3	B & G Storage Bldg. (North)	BGSN 144
H 5	B & G Storage (South)	BGSS 068
H 5	B & G (Modular 1)	— 075
A 4	B & G (Modular 2)	— 143
B 4	B & G (Modular 3)	— 146
B 4	B & G (Modular 4)	— 156
B 4	B & G (Modular 5)	— 157
H 2	Canada Hall	CH 006
H 4	Central Heat Plant	CHP 064
B 3	Central Services	CS 136
H 4	Chemistry Building	CB 071
I 2	Child Care Center	CCC 013
A 2	Child Care Facility	CCF 141
G 3	Church Fine Arts	CFA 078
J 3	Clark Administration Building	CA 035
A 7	Claude Howard System Administration Building	SAB 154
C 2	Computing Center	CC 133
I 2	Continuing Education Building	CEB 020
I 2	CEB Annex G	— 014
H 5	Custodial Building	CUSB 069
I 2	Dining Conference Center	DCC 009
G 5	Edmund J. Cain Hall	EJCH 081
C 2	Environmental Research Facility	ERF 130
I 8	Equestrian Center	EC 170
H 4	Facility Services Building	FS 058
C 4	Family Medicine Center (Brigham Building)	FMC 123
C 4	FMC (Storage Building)	— 118
G 3	Fitzgerald Student Services Bldg.	FSSB 082
J 5	Fleischmann Agriculture	FA 031
I 5	Davidson Mathematics and Science (under construction)	—
D 2	Fleischmann Planetarium	FP 105
C 5	Football Practice Field (John Sala Intramural Fields)	— 113
I 3	Fransden Humanities	FH 042
H 3	Gettwell	GL 059
H 5	Harry Reid Engineering Laboratory	HREL 065
B 5	Howard Medical Sciences	HMS 125
J 4	Information Kiosk	IK 029
K 3	International Center	IC 025
E 4	Joe Crowley Student Union	CSU 087
I 4	Jones Center	JV 048
I 3	Jot Travis Student Union	JTSU 043
I 3	Juniper Hall	JH 041
J 8	Knudtsen Resource Center	KRC 171
E 3	Lawlor Events Center	LEC 104
E 3	Legacy Hall	LEGH 103
H 4	Leifson Physics	LP 074
J 5	Life Science	LS 032
H 3	Lincoln Hall	LH 060
E 4	Lombardi Recreation Center	LRC 095
H 4	Mack Social Science	MSS 072
I 4	Mackay Mines	MM 057
I 4	Mackay Science	MS 036
D 3	Mackay Stadium	S 109
C 3	M. Stadium (North Restroom)	— 129
C 3	M. Stadium (N/E Restroom)	— 131
C 3	M. Stadium (N/W Restroom)	— 132
C 3	M. Stadium (S/E Restroom)	— 111
C 3	M. Stadium (S/W Restroom)	— 108
B 4	Marville Health Science	MHS 126
J 3	Manzanita Hall	MAH 040
D 4	Marquette W. Peterson Bldg. (Athletic Academic Center)	MWPB 100
F 4	Mathewson-IGT Knowledge Center	MIKC 085
J 4	Morrill Hall Alumni Center	MH 034
B 3	Motor Pool	MP 145
F 5	National Judicial College	NJC 084
C 4	Nell J. Redfield Building (Speech Pathology & Audiology, Student Health Center)	NJR 122
C 4	NJR (Student Health Storage)	— 119
B 4	Nellor Biomedical Sciences	NBS 127
H 4	Nevada State Health Laboratory	NSHL 138
H 2	Nye Hall	NH 007
J 5	Orvis School of Nursing	OSN 033
I 5	Palmer Engineering	PE 050
D 2	Parking Services	PS 106
I 5	Paul Laxalt Mineral Research	LME 046
I 5	Paul Laxalt Mineral Engineering	LMR 044
C 4	Pediatrics, Dept. of	PDO 117
C 5	Pennington Annex	PA 186
C 5	Pennington Medical Education Building	PMB 121
B 3	Purchasing Department	PD 137
K 3	Real Estate Office	REO 022
J 8	Renewable Resource Center	RRC 172
I 2	Residential Life Maintenance Office	RLMO 016
G 4	Reynolds School of Journalism	RSJ 077
D 4	Robert Cashell Fieldhouse	CFH 102
I 4	Ross Hall	RH 047
H 1	Sagebrush Newspaper Office	SNO 001
J 4	Sarah H. Fleischmann Building	SFB 030
B 4	Savitt Medical Science	SMS 124
H 4	Schulich Lecture Hall	SLH 073
H 5	Scrubbing Engineering/Mines	SEM 056
H 2	Sierra Street Parking Complex	SPC 005
D 4	Reno Orthopedic Sports Med. Complex	ROSMC 101
D 4	Stadium Visitors Locker Room	SLR 110
D 4	Tennis Courts	— 112
I 3	Thompson Building	TB 049
J 2	Sierra Hall	UI 021
J 2	University Village	UV 097
J 8	Valley Road Greenhouse Complex	VRGC 175
J 8	Valley Road Research Modular	VRRM 176
J 8	Valley Road Storage Building	VRSB 174
H 3	Virginia Street Gym	VSG 062
D 3	West Stadium Parking Complex	WSPC 107
H 3	White Pine Hall	WPH 061
C 6	William Peccole Park	WPP 114
G 4	William J. Raggio Building	WRB 089
D 8	Wolf Pack Athletics East	WPAE 162
A 6	Children's Behavioral Center	CBC 151
A 6	Children's Behavioral Center Unit A	CBCA 150
A 6	Children's Behavioral Center Unit B	CBCB 152
C 2	Nevada Historical Society	NHS 134
C 2	Reno KNPB Building	KNPB 135
A 5	Special Children's Clinic	SCC 149
B 2	U.S. Post Office	USPO 139

## ABOUT THE VENUE | JOE CROWLEY STUDENT UNION

Completed and formally dedicated in November 2007, the Joe Crowley Student Union is one of the most transformational buildings ever built on the campus of the University of Nevada, Reno. The 167,000-square-foot, environmentally friendly facility signals a shift in campus expansion, offering the campus and community a new centrally located “front door” to the University from Virginia Street.

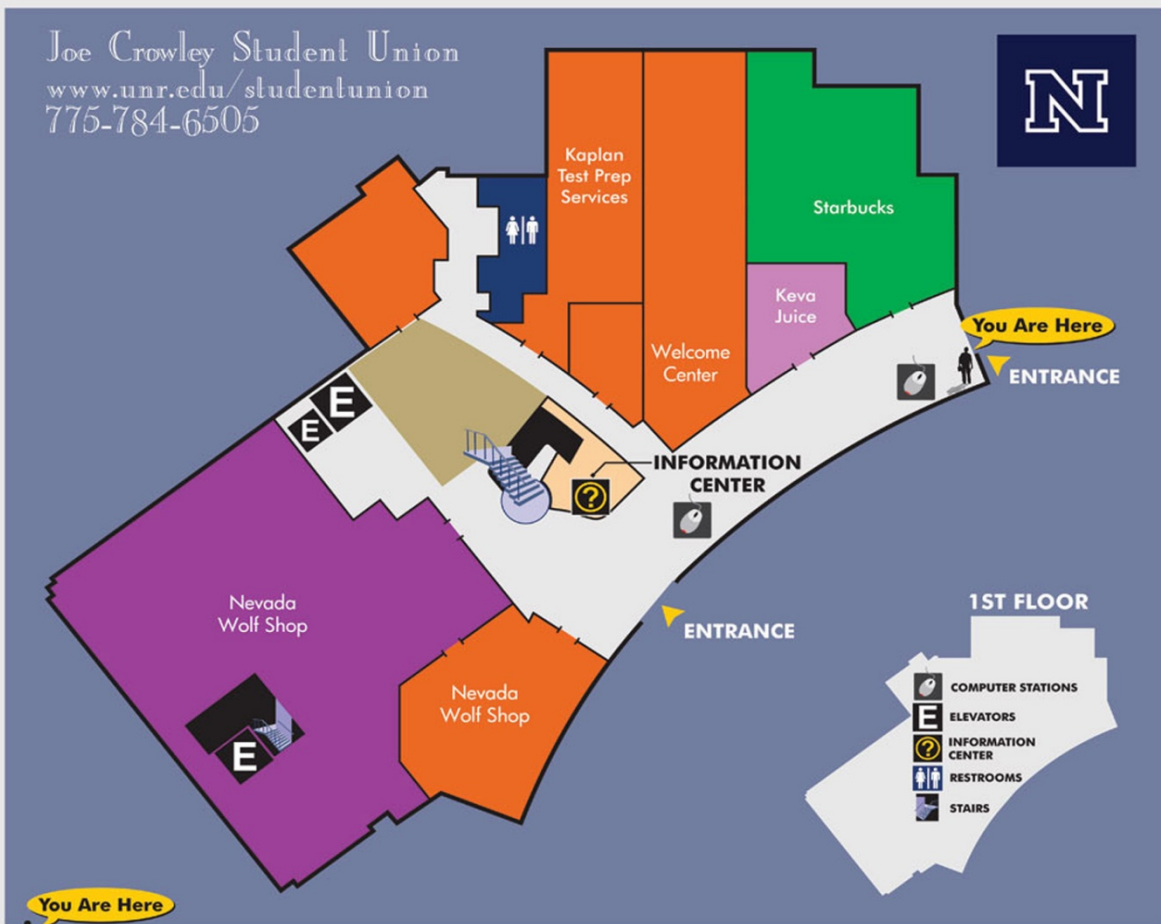
Named in honor of former University President Joe Crowley, whose 23-year tenure as the institution’s chief executive is a record, the Joe Crowley Student Union features a two-story ASUN Bookstore, a variety of food and drink retailers, a 1,200-seat grand ballroom, a 220-seat, two-level movie theater, a 2,000-square-foot student organization center, and is home to the Associated Students of the University of Nevada and the Graduate Student Association.

## WIRELESS ACCESS

Wireless Internet access is available in the Joe Crowley Student Union. Please check at the registration desk for a guest user name and password.



JOE CROWLEY STUDENT UNION – LEVEL ONE MAP



**Floor 1**

- Information Center
- Kaplan Test Prep Services
- Keva Juice
- Nevada Wolf Shop
- Starbucks
- Welcome Center

**Floor 2**

- ATM's
- 15th St. Food Court
- Einstein Bros Bagels
- Panda Express
- Port of Subs
- Villa Fresh Italian Kitchen
- Loading Dock
- Nevada Wolf Shop
- WolfCard Office

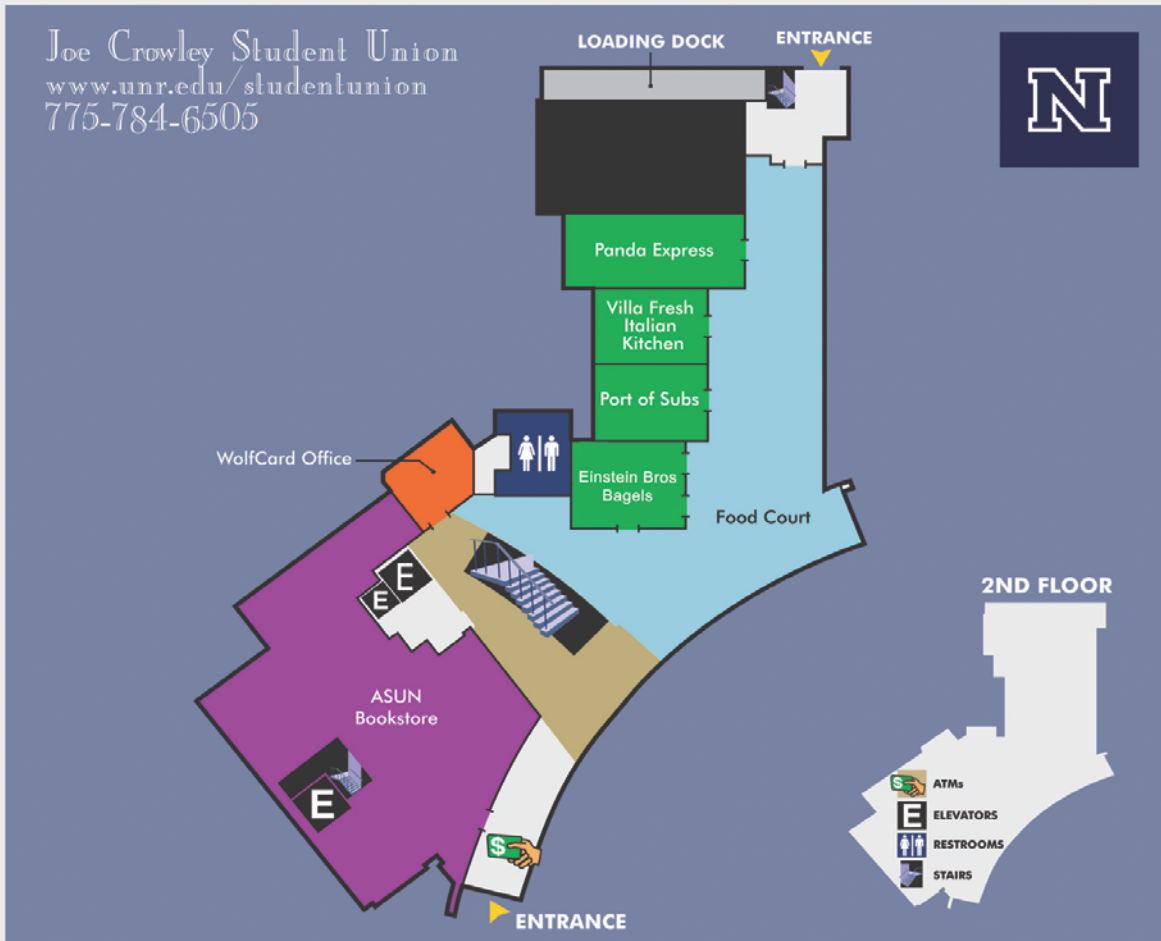
**Floor 3**

- Associated Students of the University Of Nevada (ASUN)/Student Activities Center
- Box Office/Concessions
- Cantina del Lobo
- Computer Lounge
- Conference Rooms 317, 320, 232, 324
- Graduate Student Association (GSA)
- Graduate Student Lounge
- Rita Laden Senate Chambers
- The Center For Student Cultural Diversity Theatre

**Floor 4**

- Ballroom A, B, C
- Conference Rooms 402, 405, 406, 420 422, 423
- Pre-Function Lounge
- Silver & Blue Catering
- Student Union Administration
- The Great Room

JOE CROWLEY STUDENT UNION – LEVEL TWO MAP



**FLOOR 1**

- ASUN Bookstore
- ASUN Pack Pit Stop
- College Optical Express
- Information Center
- Kaplan Test Prep Services
- Keva Juice
- Silver State Schools Credit Union
- Starbucks
- Welcome Center

You Are Here



**FLOOR 2**

- ASUN Bookstore
- ATMs
- 15th St. Food Court
- Einstein Bros Bagels
- Panda Express
- Port of Subs
- Villa Fresh Italian Kitchen
- Loading Dock
- WolfCard Office

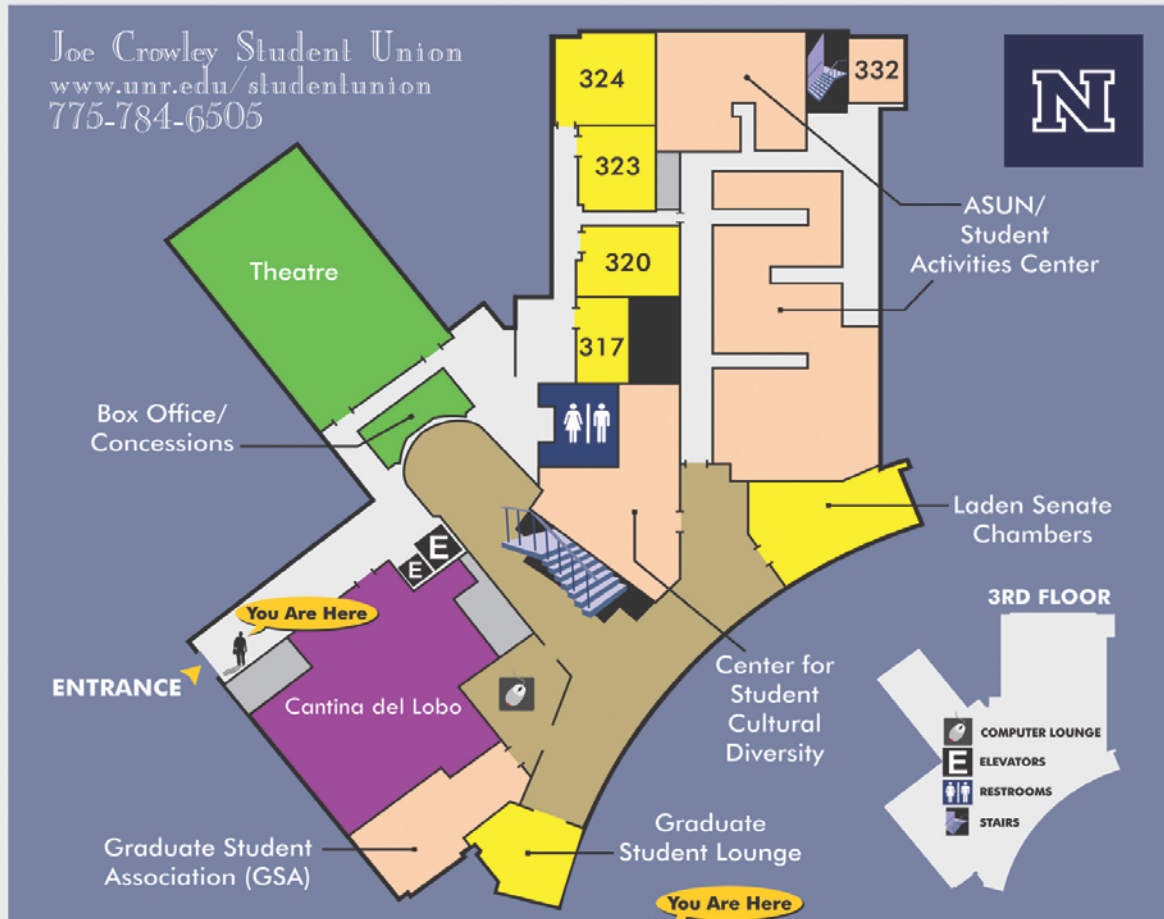
**FLOOR 3**

- Associated Students of the University of Nevada (ASUN)/Student Activities Center
- Box Office/Concessions
- Cantina del Lobo
- Computer Lounge
- Conference Rooms 317, 320, 323, 324
- Graduate Student Association (GSA)
- Graduate Student Lounge
- Laden Senate Chambers
- The Center for Student Cultural Diversity
- Theatre

**FLOOR 4**

- Ballroom A,B,C
- Conference Rooms 402, 405, 406, 420, 422, 423
- Pre-Function Lounge
- Silver & Blue Catering
- Student Union Administration
- The Great Room

JOE CROWLEY STUDENT UNION – LEVEL THREE MAP



**FLOOR 1**

- ASUN Bookstore
- ASUN Pack Pit Stop
- College Optical Express
- Information Center
- Kaplan Test Prep Services
- Keva Juice
- Silver State Schools Credit Union
- Starbucks
- Welcome Center

**FLOOR 2**

- ASUN Bookstore
- ATMs
- 15th St. Food Court
  - Einstein Bros Bagels
  - Panda Express
  - Port of Subs
  - Villa Fresh Italian Kitchen
- Loading Dock
- WolfCard Office

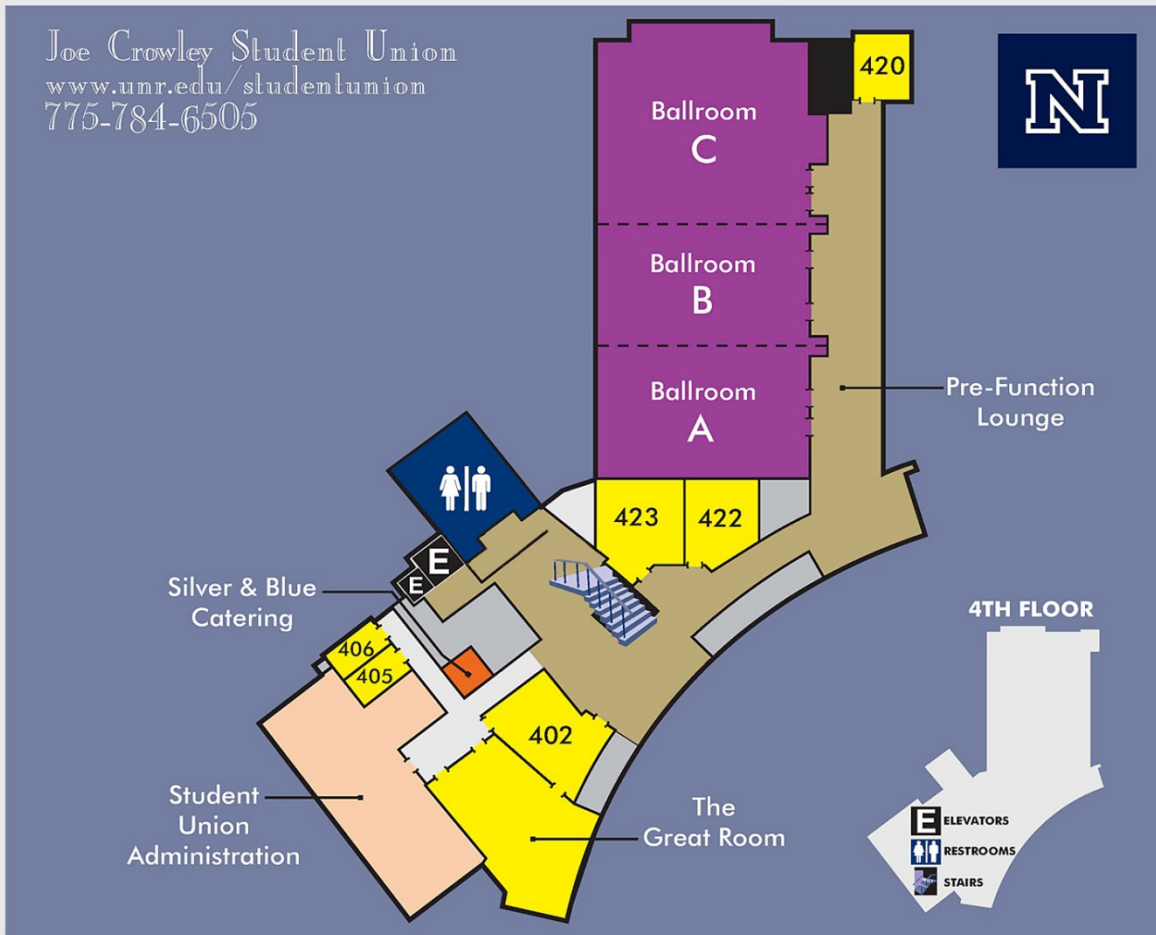
**FLOOR 3**

- Associated Students of the University of Nevada (ASUN)/Student Activities Center
- Box Office/Concessions
- Cantina del Lobo
- Computer Lounge
- Conference Rooms 317, 320, 323, 324
- Graduate Student Association (GSA)
- Graduate Student Lounge
- Laden Senate Chambers
- The Center for Student Cultural Diversity
- Theatre

**FLOOR 4**

- Ballroom A,B,C
- Conference Rooms 402, 405, 406, 420, 422, 423
- Pre-Function Lounge
- Silver & Blue Catering
- Student Union Administration
- The Great Room

JOE CROWLEY STUDENT UNION – LEVEL FOUR MAP



**FLOOR 1**

- ASUN Bookstore
- Information Center
- JC&C Wireless
- Kaplan Test Prep Services
- Keva Juice
- Pack Pit Stop
- Silver State Schools Credit Union
- Starbucks
- Wolf Package

**FLOOR 2**

- ASUN Bookstore
- ATMs
- Food Court
- Loading Dock
- Panda Express
- Port of Subs
- Tahoe Creamery
- Villa Fresh Italian Kitchen
- WolfCard Office

**FLOOR 3**

- Associated Students of the University of Nevada (ASUN)/Student Activities Center
- Box Office/Concessions
- Computer Lounge
- Conference Rooms 317, 320, 323, 324
- Graduate Student Association (GSA)
- Graduate Student Lounge
- Laden Senate Chambers
- Sports Grille
- The Center for Student Cultural Diversity
- Theatre

**FLOOR 4**

- Ballroom A,B,C
- Conference Rooms 402, 405, 406, 420, 422, 423
- Pre-Function Lounge
- Silver & Blue Catering
- Student Union Administration
- The Great Room

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**LEGEND**

-  RTC SIERRA SPIRIT Route
-  RTC SIERRA SPIRIT Special Event Detour Routing (for most events)
-  41 RTC 4TH STREET STATION





## ACKNOWLEDGMENTS

We would like to thank the many people who have helped make this conference a reality.

This meeting was conceived and developed by the Great Basin Consortium coordinating committee (Jeanne Chambers [GB-RMP], Mike Collopy [GB-CESU], Stan Johnson [GB-EP], and Mike Pellant [GB-RI; GB-LCC]); their efforts have helped further our collective goal of increasing communication among the many organizations and stakeholders committed to managing, conserving and restoring the Great Basin.

The conference program committee did a great job identifying speakers that are working on highly relevant issues in the Great Basin. Committee members included Jeanne Chambers, Matt Germino, Stan Johnson, and Sue Phillips.

Several offices at the University of Nevada, Reno, provided significant assistance in hosting this conference. We would like to thank Jane Tors and Mike Wolterbeek in the Office of Media Relations for their assistance in getting the word out on the conference. John Trent from the Office of Integrated Marketing developed a story for the university website that highlighted faculty and student involvement in Great Basin research, and their role in the conference. Staff at the Joe Crowley Student Union prepared the venue and assisted with logistics throughout the meeting. Lori Davis and staff at Silver and Blue Catering assisted with the catered reception and refreshment breaks.

We also want to thank Sonya Leyva and Carol Creekman from the Silver Legacy for assistance with lodging arrangements for meeting participants.

Finally, we want to offer our special thanks to Christina Clack and Amber Gallop from UNR's Office of Undergraduate and Interdisciplinary Research and Academy for the Environment. Christina is an event planner extraordinaire, as she managed all logistics associated with the conference, including lodging, registration, refreshments (both the evening reception and meeting breaks), development of the GBC website and on-line conference packet, and production of the printed meeting program. Amber worked with Christina to facilitate the many fiscal processes needed to support the conference. Without their hard work this conference would not have been possible.

