Invasive Species and Related Natural Resource Issues in Nevada and the Great Basin
Land Grant Universities were created by the 1862 Morrill Act signed by President Lincoln. Federal land was granted to states to sell to raise funds to establish and endow "land-grant" colleges. The original mission of land grants was modern agriculture, science, military science, and engineering. They were in response to the industrial revolution and a changing social environment in which education was no reserved for the wealthy. Transformed US society and economy from rural and agricultural to modern, industrial, and learning-based. Designed to improve lives by addressing practical problems through education, research, and extension.
College of Agriculture, Biotechnology and Natural Resources

Faculty

Wildlife* 5
Range & Forestry 6
Natural Resources 6
Nutrition & Health* 6

Agricultural Sci* 10
Biochemistry* 15
Resource Econ 3
Environmental Sci 7

* Pending new hire
Important Natural Resources Management Issues

- Water
- Fire
- Endangered species
- Invasive species
- Public lands management
Sierra Snowpack
Drought Forecast

Likely effects on agricultural production and therefore food prices and rural economies

Public outdoor recreation

Wildlife

Other
Predicted Tree Mortality for 2015

- Over 2 million trees died from bark beetles across 820,000 acres in 2014, which is double the acres with mortality from 2013.
- A dramatic increase in tree mortality is anticipated this year.
Remote sensing of pinyon-juniper woodland expansion:
Object-oriented, multi-scale classification of 1-m aerial photography

Effects on:
- Habitat
- Hydrology
- Fuel-load
- Forage availability

Weisberg et al. 2007. Rangeland Ecol Manage 60:115-124
Since 2012 there has been extensive PJ woodland mortality in the central Great Basin.

Woodland mortality has disproportionately affected drier sites and lower elevations (< 2500 m).

Weisberg & Dilts, in progress
Latest Fuel Conditions

- Grasses are mostly cured on south facing slopes below 3,000 feet.
- Grasses will likely cure across the back country and higher elevations within the next month.
Increasing Wildfire

- Mega fires
  - 7 of 11 western states since 2000, largest wildfires in recorded history

Wildfires have had dramatic impacts on the Great Basin’s natural resources and rural economy over the past 5 years.
Wildland Fires (1980-2012)

National Interagency Fire Center data
Ecologic and Economic Impacts of Wildfire

- Public safety hazard from smoke, dust on roads, flooding etc.
- Wildlife habitat loss
- Erosion and flood damage to watersheds
- Loss of forage for grazing
- Economic Losses for urban and rural communities
- Loss of visual, aesthetic landscape values
- High costs of suppression, stabilization, rehabilitation and restoration
<table>
<thead>
<tr>
<th>FIRE</th>
<th>Suppression Costs</th>
<th>Other Direct Costs</th>
<th>Rehabilitation Costs</th>
<th>Indirect Costs</th>
<th>Additional Costs</th>
<th>Total Costs</th>
<th>Total / Suppression</th>
<th>Suppression / Total</th>
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</thead>
<tbody>
<tr>
<td>Canyon Ferry Complex (MT 2000)</td>
<td>$9,544,627</td>
<td>$400,000</td>
<td>$8,075,921</td>
<td>$55,310</td>
<td>n/a</td>
<td>$18,075,858</td>
<td>1.9</td>
<td>53%</td>
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<td>Cerro Grande (NM 2000)</td>
<td>$33,500,000</td>
<td>$864,500,000</td>
<td>$72,388,944</td>
<td>n/a</td>
<td>n/a</td>
<td>$970,388,944</td>
<td>29.0</td>
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<td>Hayman (CO 2002)</td>
<td>$42,279,000</td>
<td>$93,269,834</td>
<td>$39,930,000</td>
<td>$2,691,601</td>
<td>$29,529,614</td>
<td>$207,700,049</td>
<td>4.9</td>
<td>20%</td>
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<td>Missionary Ridge (CO 2002)</td>
<td>$37,714,992</td>
<td>$52,561,331</td>
<td>$8,623,203</td>
<td>$50,499,849</td>
<td>$3,404,410</td>
<td>$152,803,785</td>
<td>4.1</td>
<td>25%</td>
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<td>Rodeo-Chediski (AZ 2002)</td>
<td>$46,500,000</td>
<td>$122,500,000</td>
<td>$139,000,000</td>
<td>$403,000</td>
<td>n/a</td>
<td>$308,403,000</td>
<td>6.6</td>
<td>15%</td>
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<td>Old, Grand Prix, Padua (CA 2003)</td>
<td>$61,335,684</td>
<td>n/a</td>
<td>$534,593,425</td>
<td>$681,004,114</td>
<td>n/a</td>
<td>$1,276,933,224</td>
<td>20.8</td>
<td>5%</td>
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</table>
Cause of Perennial Bunch Grass Mortality

- Lethal temps for plant tissue 60 – 100oC
- Not just max temp…time is a factor
- Head load = time above lethal temp

Wright (1990)
Cheatgrass Invasion

Non-native species introduced from Eurasia, that germinates in early spring or fall

- Growth is typically earlier than native vegetation by 2-3 weeks.
- Ladder fuel carries fire to brush, forbs, trees.
- Survives fire, reoccupies the burned area and creates a monoculture.
Cheatgrass fuels more frequent and destructive fires!
Greater sage-grouse (Centrocercus urophasianus) Conservation in the Great Basin

<table>
<thead>
<tr>
<th></th>
<th>Biology and behavior</th>
<th>Habitat</th>
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<tbody>
<tr>
<td>Peer-reviewed Journal articles</td>
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<td>37</td>
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<tr>
<td>Proceedings</td>
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<td>Fact Sheets, Books, Reports and Special Publications</td>
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<td>Theses and Dissertations</td>
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<td>Active grants</td>
<td>$2,259,488</td>
<td>$1,602,838</td>
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<td>Completed grants</td>
<td>$1,183,207</td>
<td>$1,137,202</td>
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</tbody>
</table>
From Strand et al. 2014
Flash Grazing

Grazing specific area for short period of time to:

- Reduce competition with native vegetation for available moisture and soil nutrients.
- Promote growth of native species.
- Abate cheatgrass-fire cycle.
- Reduce production of cheatgrass seed.
Pastoralism and the Green Economy – a natural nexus?
Status, challenges and policy implications

The importance of livestock grazing for wildlife conservation
working today for nature tomorrow
Multiple Use
Federal Land Policy and Management Act (FLPMA) of 1976

Managing public lands under principles of Multiple Use and Sustained Yield
“Why do you Nevadans hate wild horses so much? That would be like New Yorkers hating the Statue of Liberty, or San Franciscans hating the Golden Gate Bridge. You should be honored to be their host. They are an American Legacy, and you're proving yourself to be heartless, mean spirited, and unpatriotic when you do all you can to wipe them off the PUBLIC land in your state. Your senses of entitlement are very unbecoming, and your proclivity for spewing inaccurate information is proving your failure to self-educate- and it demonstrates your blatant lack of interest in the truth.”
The foundation of the Sagebrush Ecosystem Conservation Plan (2014) is an adaptive management process based on an ongoing commitment to finding long-term solutions to the persistent challenge of grazing western public lands. By incorporating conservation education, evaluation, common goals, and long-term commitment of the SANE members. The SANE process is depicted in the following chart.

Stewardship Alliance of NE Elko (SANE)
Landowner-Driven Collaboration

Adaptive Management
Trust, Flexibility and Responsibility to Meet Socio-Economic and Environmental Goals

- Identify knowledge gaps and educational needs
- Evaluate threats to sagebrush habitat
- Maintain and/or restore distinct conditions
- Leverage funding
- Monitor for pasture grazing
- Develop a prioritization of projects to address threats to sagebrush ecosystems
- Improve stakeholder involvement
- Improve NEPA efficiency
- Reduce conflict
- Landscape approach to land management
- Landowners, State and Federal agencies
- Non-Government Organizations
- Public, County and local government

Stewardship Alliance of Northeast Elko County
Welcome

The Great Basin Environmental Program is a bold and innovative land-based environmental management initiative similar in concept to 25 other estuarial environmental programs that have been operating in the United States since the approval of the Clean Water Act. Read more.