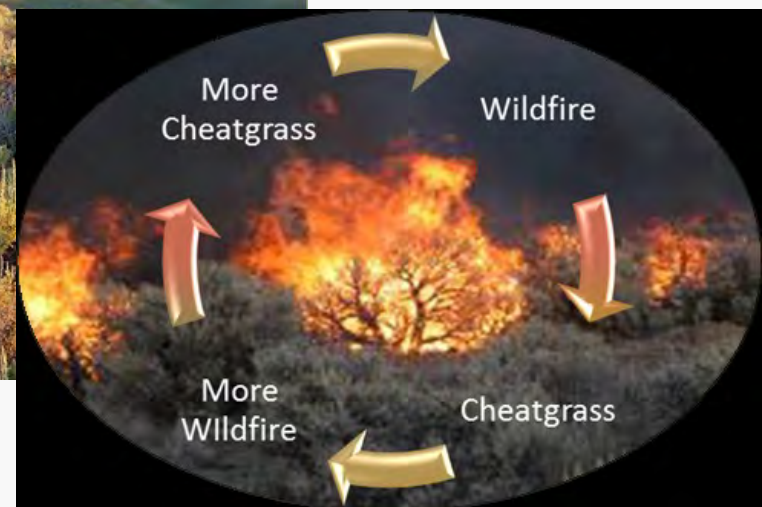


THE ROLES OF SEED SCIENCE AND RESTORATION IN THE INTEGRATED RANGELAND FIRE MANAGEMENT STRATEGY

Deborah M. Finch, USDA Forest Service
and Ken Berg, US Geological Survey



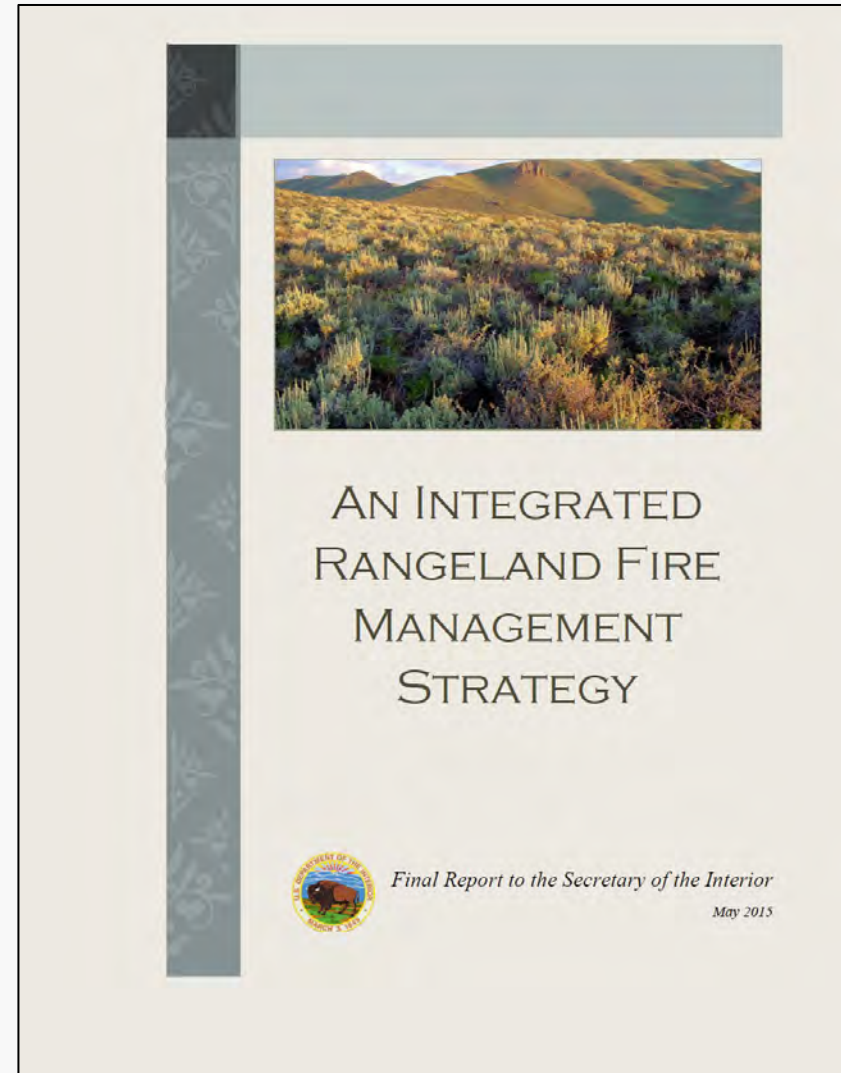
- DOI SO 3336 established a Rangeland Fire Task Force with the charge to present a final report no later than May 1, 2015.
- The resulting report, *An Integrated Rangeland Fire Management Strategy*, outlines long-term actions to implement the policy and strategy set forth in the Order.



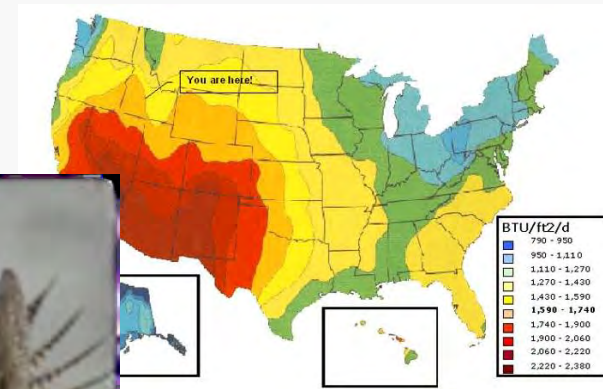
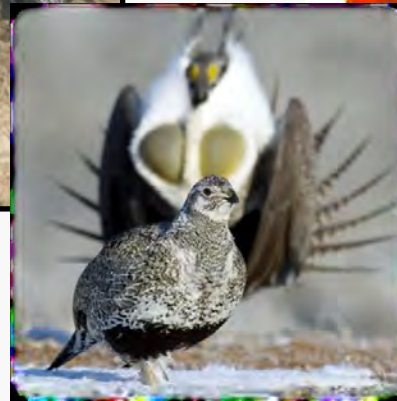
The Integrated Rangeland Fire Management Strategy

“The Strategy is intended to improve the efficiency and efficacy of actions to address rangeland fire, to better prevent and suppress rangeland fire, and improve efforts to restore fire-impacted landscapes.”

“ These activities involve targeted investments to enhance efforts to manage rangeland fire in specific portions of the Great Basin region...”



The Strategy calls for the identification of knowledge gaps that limit implementation of effective strategies to meet current management challenges.



Section 7b(viii) - Science and Research

Commit to multi-year investments in science and research

Calls for a multi-year plan for science and research that will provide a basis for an integrated approach to identifying, prioritizing, and funding science and research activities necessary to support the Strategy

Develop an actionable science plan of prioritized research needs

Conduct periodic reviews and updates of the science action plan

Action Item #3

Develop an actionable science plan of prioritized research needs. Develop a science action plan that prioritizes science needs, and identifies specific research efforts and associated costs and timelines.

Responsibility:

Co-Leads: USGS Associate Director for Ecosystems and USFS Deputy Chief for Research and Development

Support: Interagency team of appropriate Federal, state, tribal, academic, JFSP, and GBLCC representatives

Target to Complete: Third Quarter 2016

Actionable Science Plan Team

(in alphabetical order)

- **Ken Berg, Co-Lead, USGS**
- Gustavo Bisbal, USGS NWCSC
- Chad Boyd, USDA ARS
- Ed Brunson, JFSP
- John Cissel, JFSP
- Dawn Davis, USFWS
- Nicole DeCrappeo, USGS NWCSC
- Pat Deibert, USFWS
- **Debbie Finch, Co-Lead, FS R&D**
- Sean Finn, GNLCC
- Larisa Ford, BLM
- John Hall, JFSP
- Steven Hanser, USGS
- Michael Haske, DOI SO 3336
- Todd Hopkins, GBLCC
- Molly Hunter, JFSP
- Richard Kearney, GBLCC
- Kenneth Mayer, WAFWA
- Susan Phillips, USGS
- Bryce Richardson, USDA FS R&D / SWCH
- Carol Schuler, USGS
- San Stiver, WAFWA

Process – 7b(viii) Action Item #3

- Further refined the list of science needs from Action Team 2
- Conducted a series of town-hall style prioritization sessions to select highest-priority needs from the list of 149 total needs
- Identified 37 priority science needs

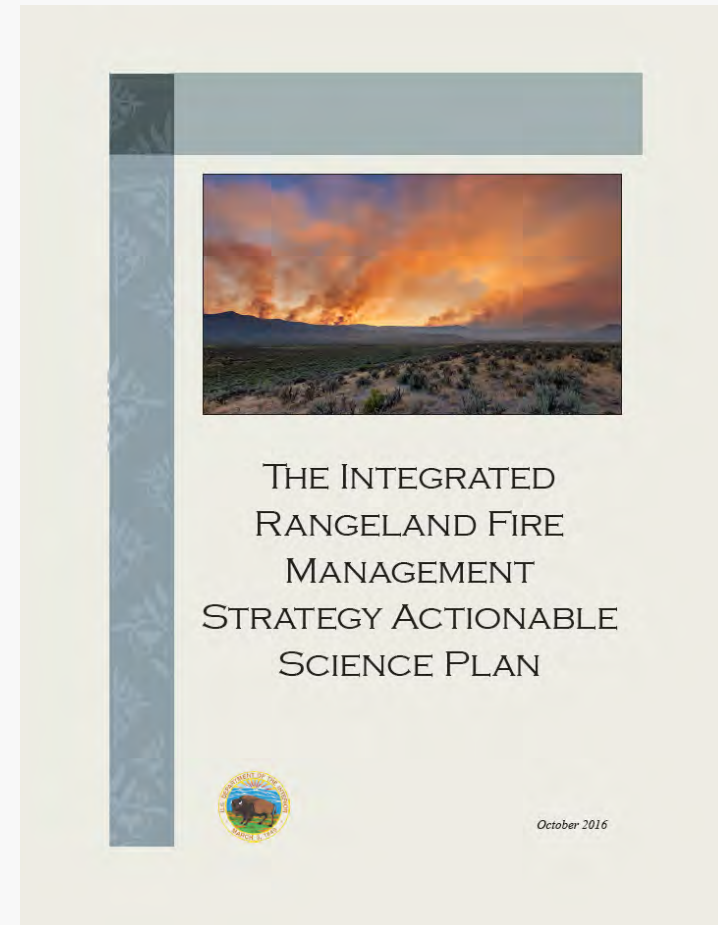


Priority Science Needs

- Developed narratives outlining the background, recent science and syntheses, existing science gaps, and next steps
- Next steps: short-term (1 to 3 years) and long-term (accomplished in more than 3 years)
 1. Synthesize existing knowledge in a manner that is easily accessible and applicable in a management context
 2. Provide tools that will put new or existing knowledge in hands of on-the-ground managers and resource specialists
 3. Develop new knowledge when information is lacking or questions still remain

Plan Organization

- Introduction
- Process
- Priority Science Needs
 - Fire
 - Invasives
 - **Restoration**
 - Sagebrush and sage-grouse
 - **Climate and weather**
- Implementation



Released October 31, 2016

http://integratedrangelandfiremanagementstrategy.org/IRFMS_Actionable_Science_Plan.pdf

Science Needs Build on the National Seed Strategy

Restoration

- **Develop and improve seeding methods, seed mixes, and equipment used for post-fire rehabilitation or restoration.**
- **Develop site preparation and seeding and transplanting strategies that improve plant establishment.**
- **Evaluate the effectiveness of various rehabilitation or restoration activities in sage-grouse habitat.**
- **Complete a generalized seed-zone map**

Climate and weather

- **Improve the collection of climate-appropriate seeds**
- **Understand the complex set of variables that controls seeding success**

Examples
of National Seed
Strategy research
underway or
implemented on
Restoration or
Climate & Weather
topics in response
to the IRFMS
Actionable Science
Plan



Post-fire Seeding Experiment

Objective: Compare seeding treatments differing by:

- Drill Type

- Conventional
- Minimum-till

- Broadcast Method

- Drill-broadcast

- Aerial Broadcast

- Sagebrush Seeding Rate

- ~50 Pure Live Seed/m²
- ~250 Pure Live Seed/m²
- ~500 Pure Live Seed/m²

Fall aerial broadcast



Winter aerial broadcast

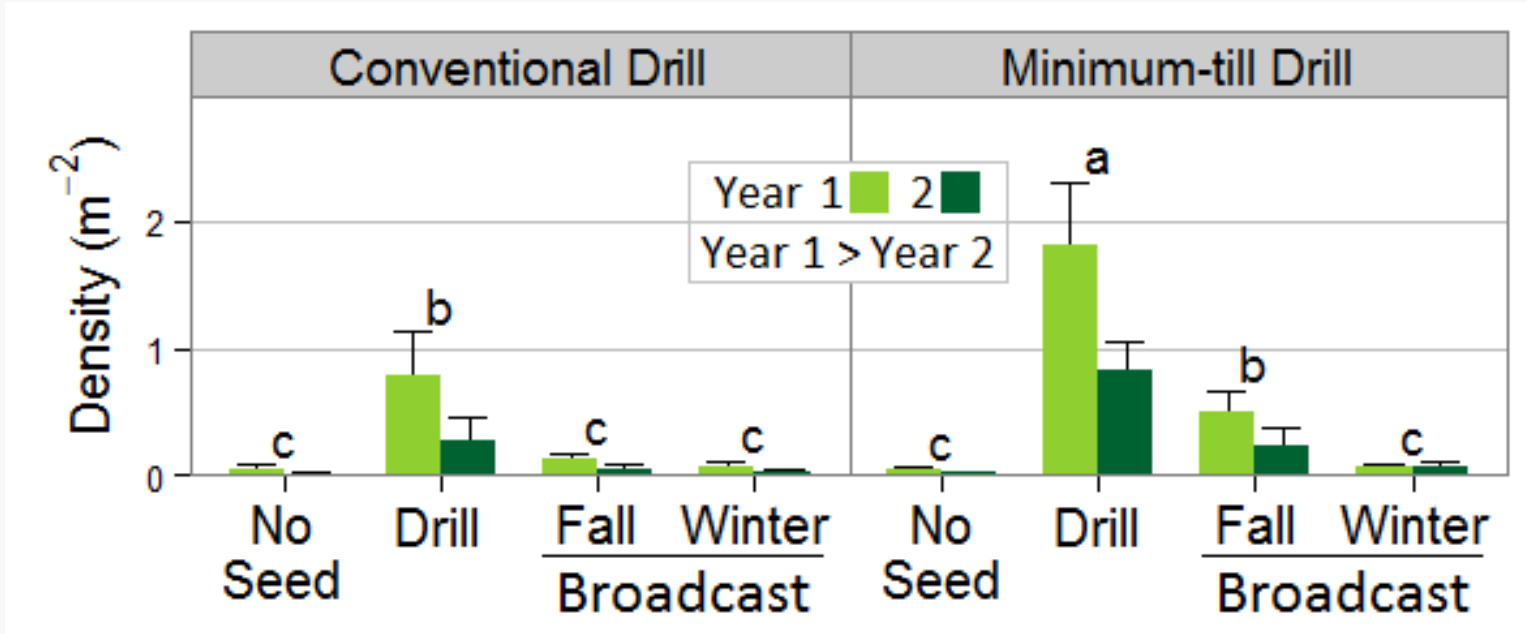


- Aerial Broadcast Timing

- Fall (late Oct.-early Nov.)
- Winter (Jan.-early Feb.)



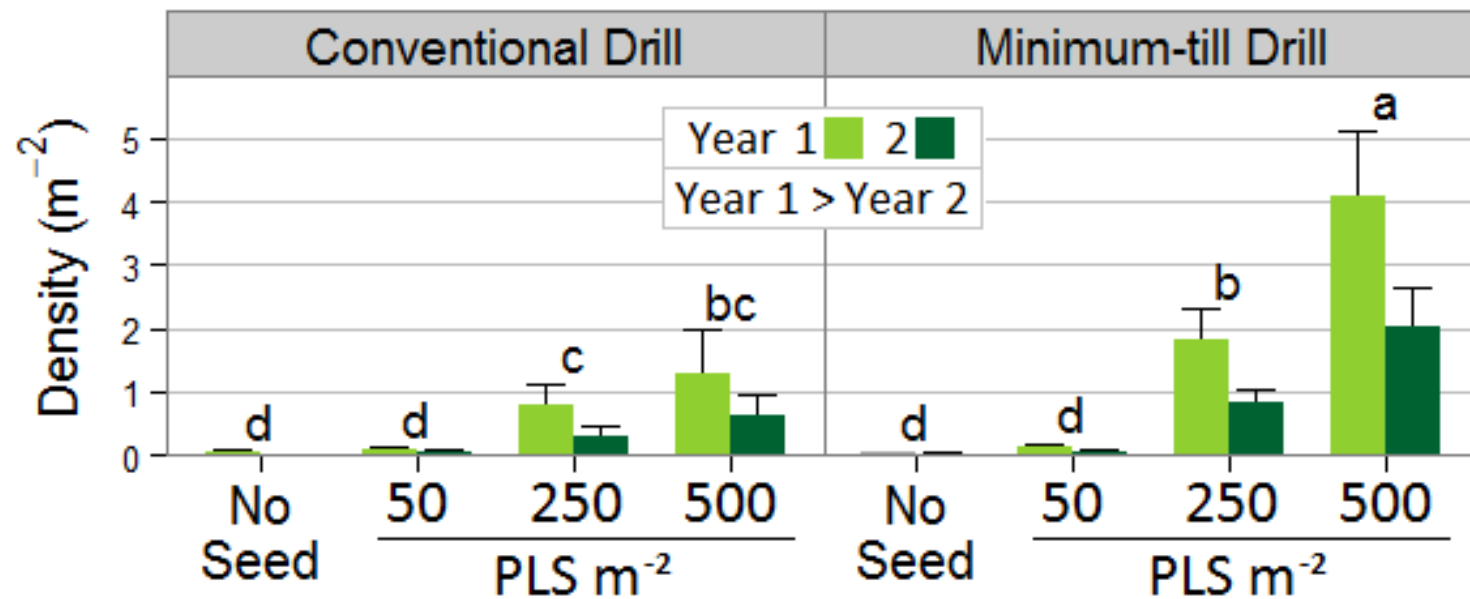
Post-fire Wyoming Big Sagebrush Establishment, ID



Ott, J. E.; et al. In review.



Post-fire Wyoming Big Sagebrush Establishment, ID



Ott, J. E.; et al. In review.



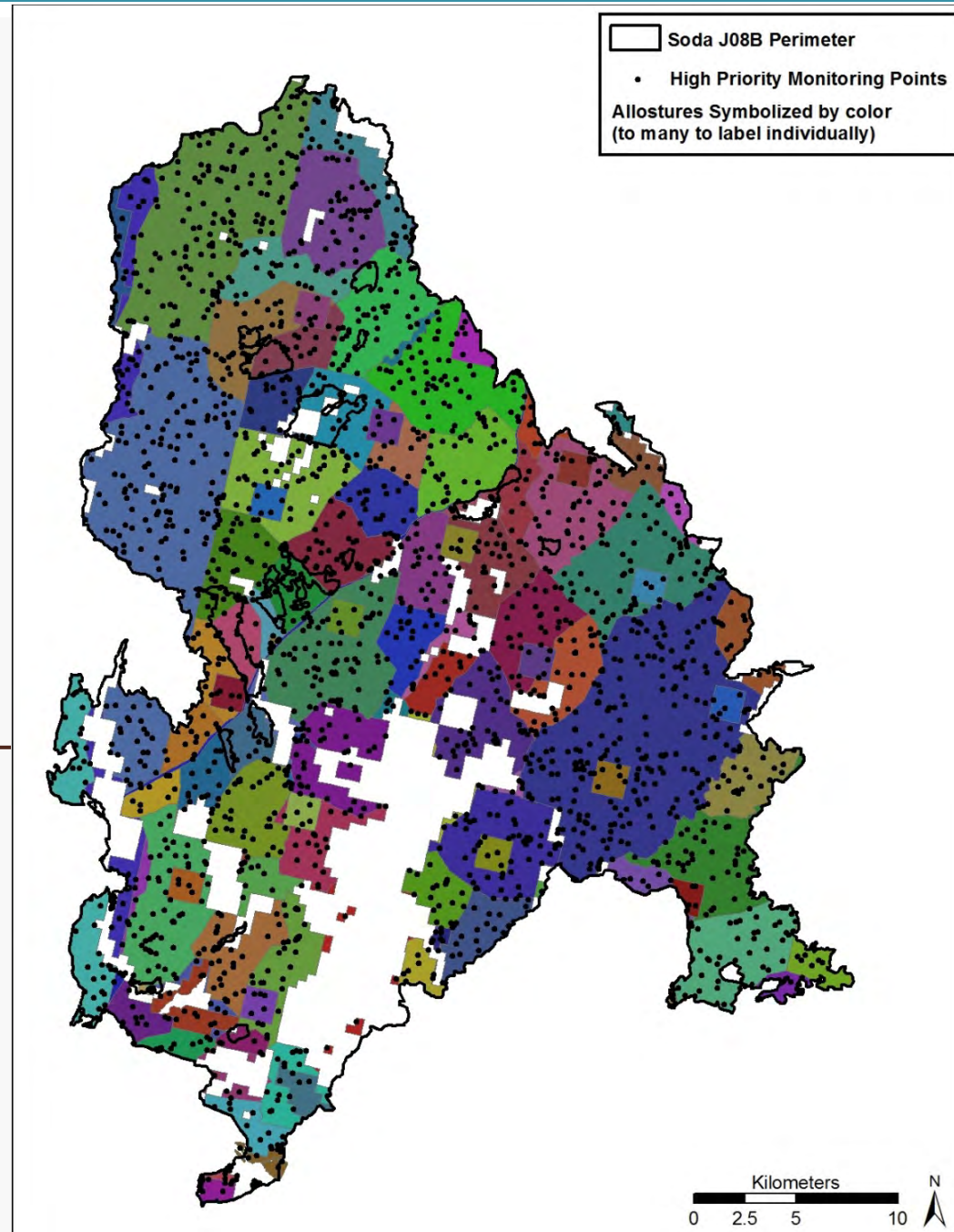
Soda Fire Emergency Stabilization and Rehabilitation Monitoring: science integrated with adaptive management



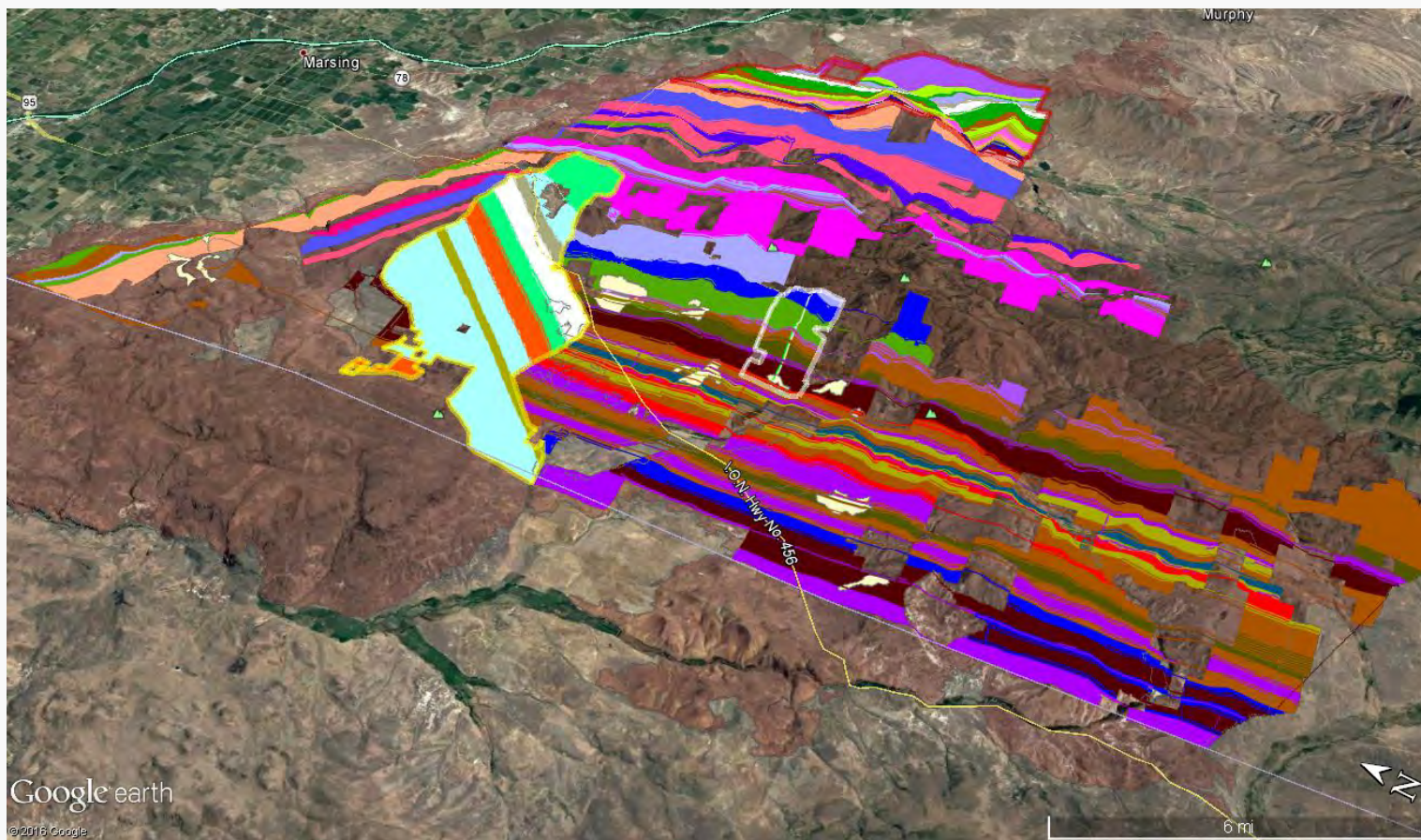
Soda Fire: first major fire following SO#3336

New adaptive-management approach to fire response includes:

- Incorporating principles of resistance and resilience
- Multiple treatment interventions within a 5-year period
- Sound monitoring plan with replication
- Addresses key research questions about soil, plant, and wildlife responses to treatments



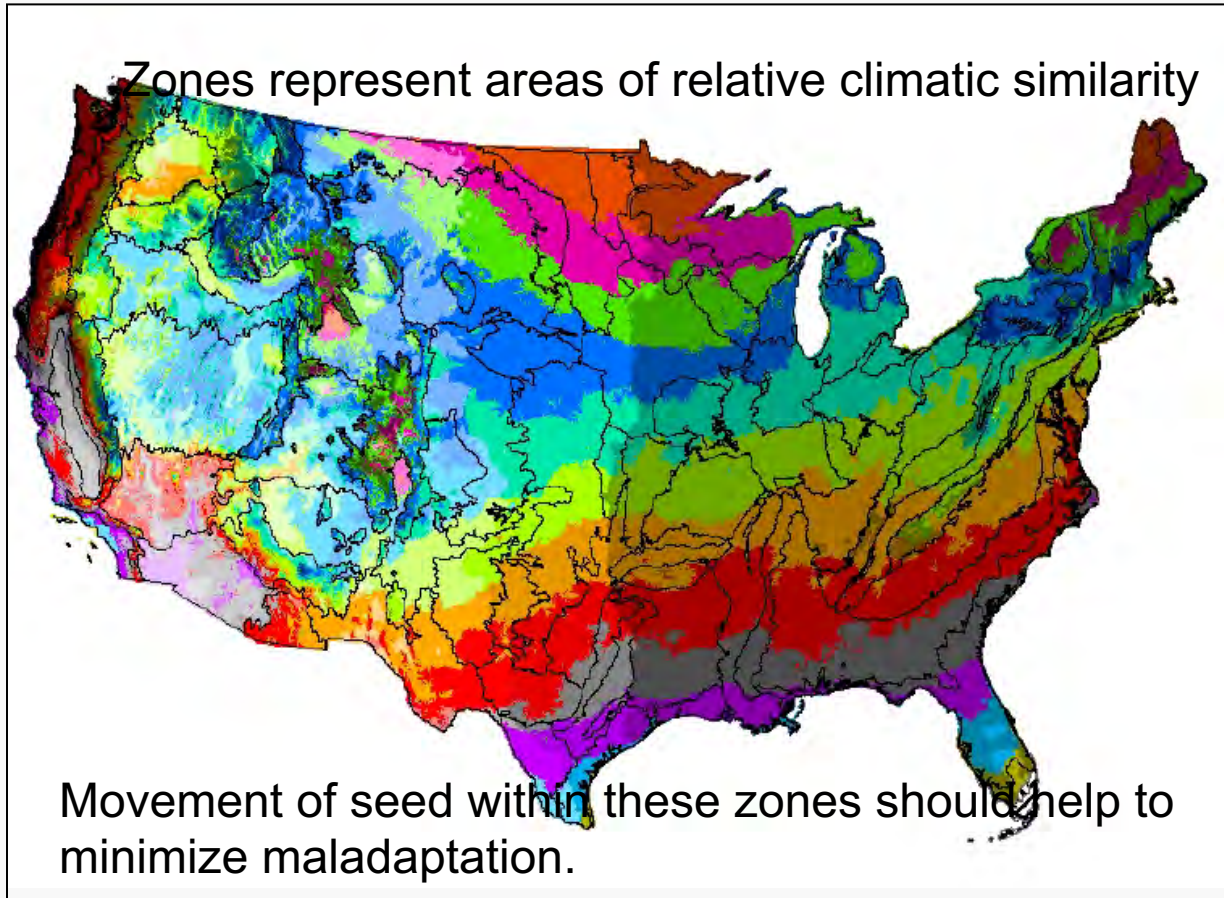
Determining seed-source effects from landscape-level manager's treatments:
Nearly 40 seed sources for sagebrush used on Soda Fire, applied individually.
Tarps for leave areas, common gardens established, intensive measurements



Each colored strip received a unique sagebrush seed source. Collaborators USGS, USFS RMRS, IDFG, more

Seed zones and population movement guidelines developed to ensure climate-adapted plants are used in restoration

Generalized Provisional Seed Zones



for the greatest good

Seedlot Selection Tool

The screenshot shows the Seedlot Selection Tool web application. The browser address bar displays the URL <https://seedlotselectiontool.org/sst/>. The page has a navigation menu with 'About', 'Tool', and 'Saved Runs'. The main content area is titled 'Planting Healthy Forests' and includes a sub-header 'The seedlot selection tool (SST) is a GIS mapping program designed to help forest managers match seedlots with planting sites based on climatic information.' Below this is a list of eight steps: 1. Select Objective, 2. Select Location, 3. Select Climate Scenarios, 4. Select Transfer Limit Method, 5. Select Species, 6. Select Zone, 7. Select Climate Variables, and 8. Map your Results. The central part of the page is a large map of North America, showing the United States and Canada with various geographical features and state/province boundaries. A large URL <https://seedlotselectiontool.org/sst/> is overlaid on the bottom of the map. The Windows taskbar at the bottom shows the system tray with the date 7/27/2016 and time 9:10 AM.

<https://seedlotselectiontool.org/sst/>

Seedlot Selection Tool can address two needs:

Given a planting site

Which seedlot is well adapted today...or in the future?



Find



Given a seedlot

Where is it well adapted today...or in the future?



Find



Adapted Sources for Soda Fire Restoration

Seedlot Selection Tool

Purpose Instructions More Information People News & Updates Report an Issue Account

About Tool Saved Runs

1 Select objective

Find seedlots Find planting sites

2 Select planting site location

Locate your planting site
Use the map or enter coordinates

Lat: 43.1230 Lon: -116.9570

Elevation: 4892 ft

3 Select climate scenarios

Which climate are the seedlots adapted to?

1961 - 1990

When should trees be best adapted to the planting site?

1961 - 1990

4 Select transfer limit method

Custom Zone

5 Select climate variables

Units: Metric Imperial

Add a variable...

6 Map your Results

Run Tool

Save Last Run

Export PDF



Adapted Sources for Soda Fire Restoration

Seedlot Selection Tool

Purpose Instructions More Information People News & Updates Report an Issue Account

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1 Select objective

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Elevation: 4892 ft

3 Select climate scenarios

Which climate are the seedlots adapted to?

1961 - 1990

When should trees be best adapted to the planting site?

1981 - 2010

4 Select transfer limit method

Custom Zone

5 Select climate variables

Units: Metric Imperial

Name	Center	Transfer limit (+/-)	
✕ MCMT	-2.7 °C	<u>2.00 °C</u>	⊖
✕ MAP	420 mm	<u>250 mm</u>	⊖

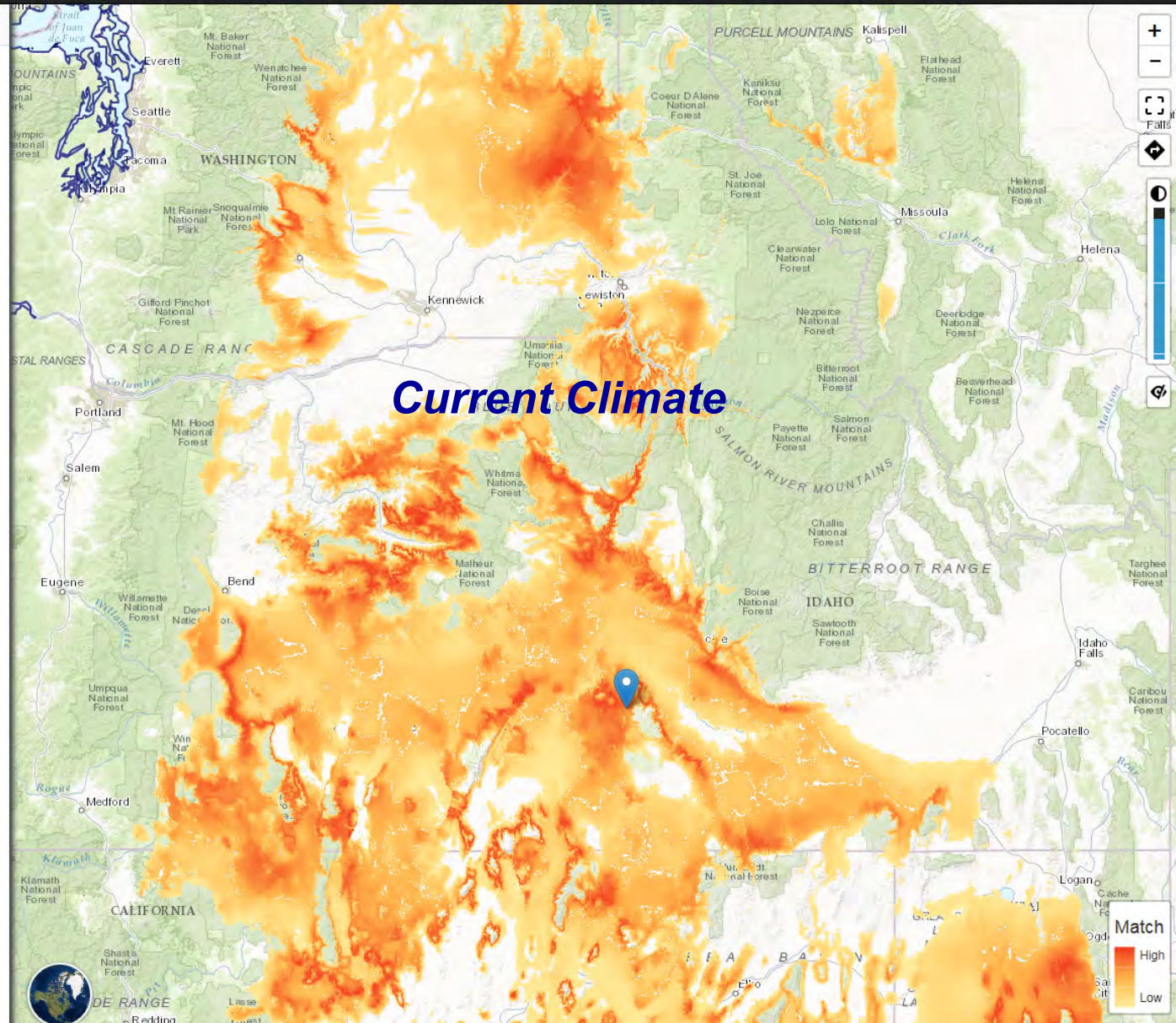
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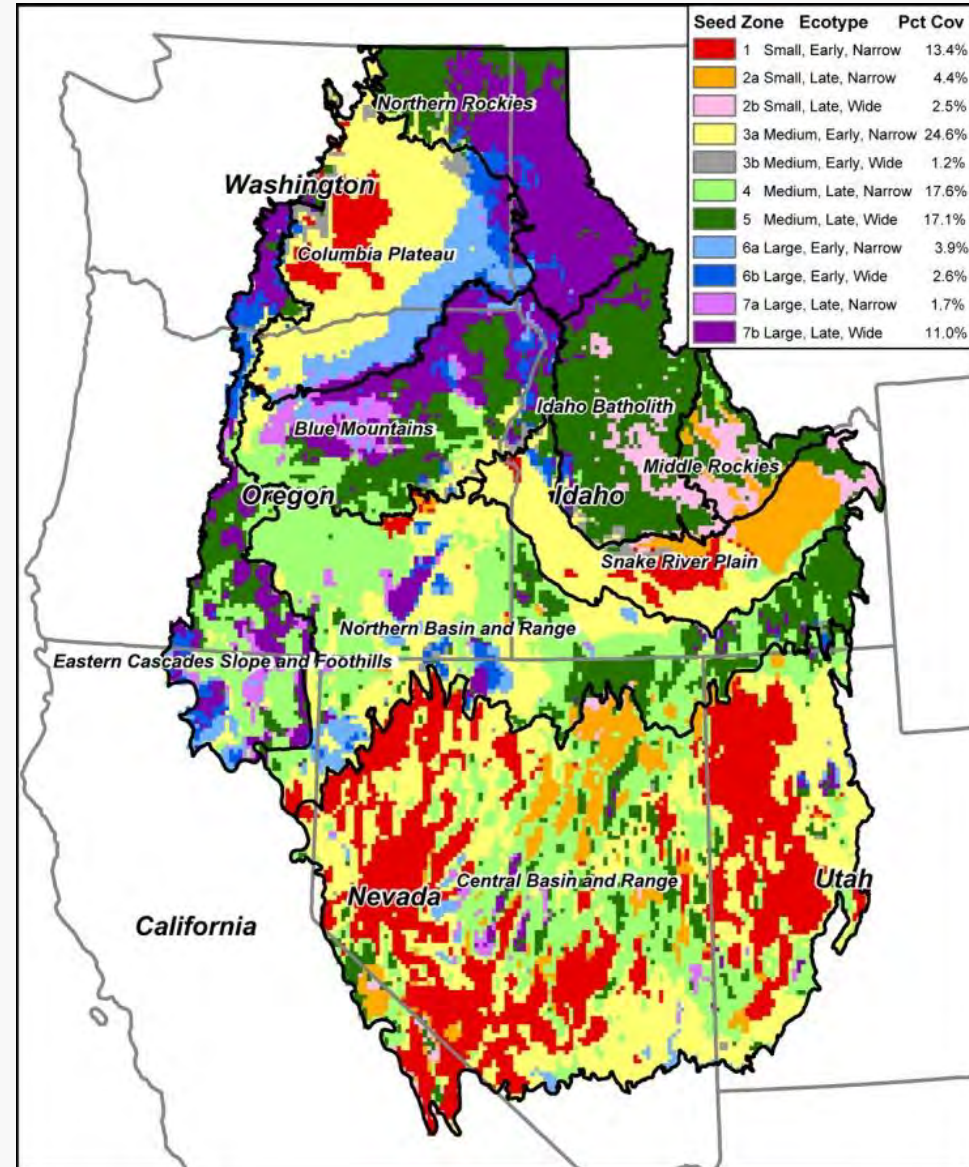
Research by the Great Basin Native Plant Project.

St. Clair et al. (2013) found that bluebunch wheatgrass populations differed in key traits of adaptation to precipitation and temperature (*Evol. Appl.* 6: 933-948).

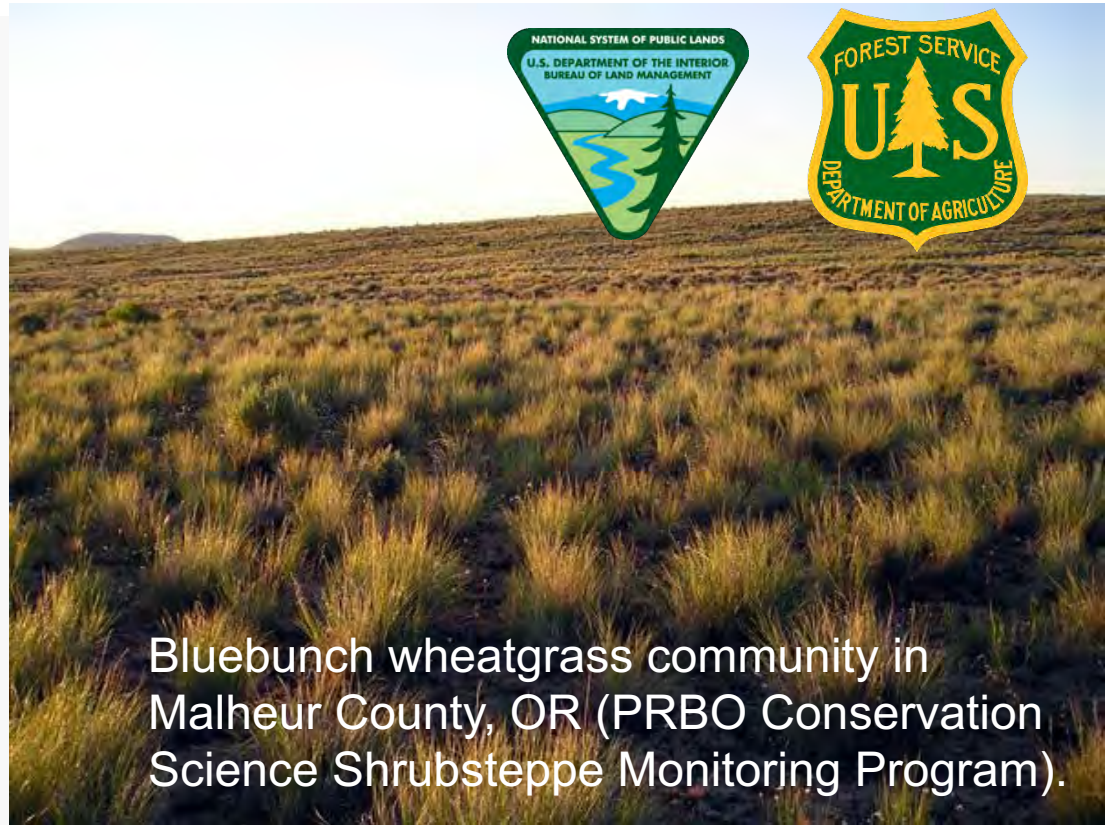
New: Studying the efficacy of seed zones by comparing differences in establishment, survival, and reproduction of bluebunch wheatgrass from local seed zones vs. non-local.

Hypothesis: Populations from local seed zones will better establish, survive, and reproduce than those from non-local zones.

11 seed zones delineated for PNW and GB.



Results will help land managers determine seed sources of bluebunch wheatgrass for post-fire restoration.



Bluebunch wheatgrass community in Malheur County, OR (PRBO Conservation Science Shrubsteppe Monitoring Program).

Results will also be helpful for understanding tradeoffs between different management options for current and future climates.

Conclusion

- The IRFMS Actionable Science Plan is an outcome of DOI SO 3336 for preventing rangeland (especially sagebrush) fire and restoring post-fire and disturbed landscapes
- The Science Plan is linked to goals and actions identified in the National Seed Strategy
- Examples of restoration and seeding experiments and methods were presented here to illustrate implementation of the Actionable Science Plan
- The implementation phase is underway and we need your help!

Implementation: Great Basin Consortium Conference



"Charting a Course for Rangeland Science in the Sagebrush Biome"

February 21-23, 2017, University of Nevada, Reno





The preceding presentation was delivered at the

2017 National Native Seed Conference

Washington, D.C. February 13-16, 2017

This and additional presentations available at <http://nativeseed.info>

