

Application of Current Research in Post-fire Management



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Fire Changes

- **Size – acres burned**
- **Number – Increase of Decrease?**
- **Vegetation Burning?**
 - Native
 - Introduced/Invasive

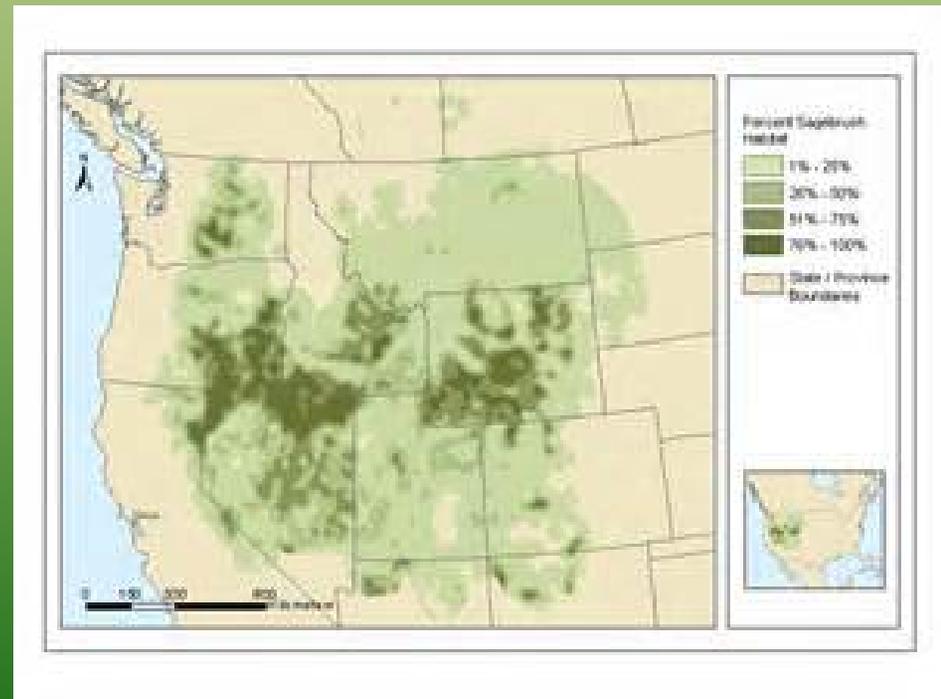


Variability

- **Variability in the system is a challenge to applying information**
 - Scientific
 - Experience
- **Affects response of the system to disturbance**
 - Species composition
 - Fire Intensity/Severity

Spatial Variability

- **Area – 500,000 km² (12.2 million acres)**
 - **13 Species & 12 Subspecies**
 - **Variety of Soils**
 - **Climatic Regimes**
 - **Ecological Sites**



Temporal Variability

- **Year-to-Year Changes**
 - Precipitation
 - Temperature
- **Within Year/Season Changes**
- **Within Day Changes**
 - Influences fire behavior
 - Influences fire effects



Finding Information

- **Where do you find information to help make decisions?**
 - **Scientific Journals**
 - **Technical Bulletins**
 - **Symposium or Proceedings**
 - **Research Reports**
 - **Agency Technical Bulletins**
 - **File Data**
 - **Personal/Professional Experience**

Hierarchy of Science

- **Refereed Journal Article**
 - Research paper
 - Technical report
- **Research Center Article or Report**
- **Symposium/Conference Proceedings**
- **Agency Technical Bulletin**
- **File Data**
- **Personal/Professional Experience**
- **Other**

Matching Information to Site

- **Similar to Selecting Plant Material**
- **Closer to Home the Better**
 - **Site Specific Research**
 - **Similar Site/Species – Regional**
 - **Similar Site/Species – Neighboring Region**
 - **Different Site/Species**

Miller Homestead and Holloway Fire

- Fires Burned 622,837 acres
- August 2012
- 573,000 acres in Sage-grouse Habitat
- 4,200 ft to 7,800 ft elevation gradient



Site Evaluation

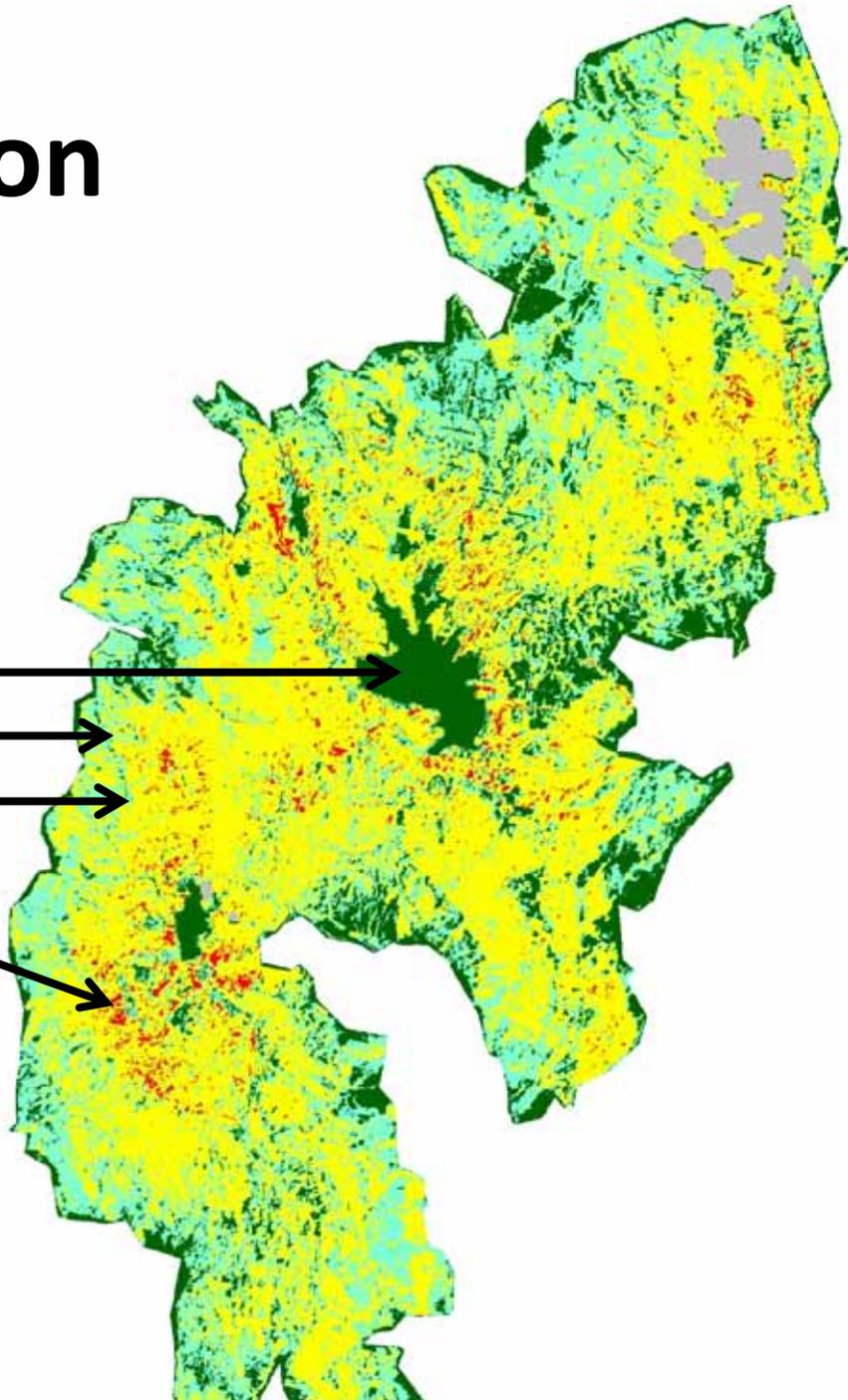
- **Fire Impacts**
 - **BARC – Burned Area Reflectance Classification**
 - Satellite imagery of post-fire vegetation conditions
 - Indication of burn severity
 - 4 Classes
 - Unburned
 - Low
 - Moderate
 - High
 - Gives a broad indication of severity, but not good in lighter fuels
 - Requires on the ground verification.

Site Evaluation

- BARC Map
- Holloway

Unburned →
Low →
Moderate →
High →

- Less than 5% High
- Accuracy?



Severity of Burn

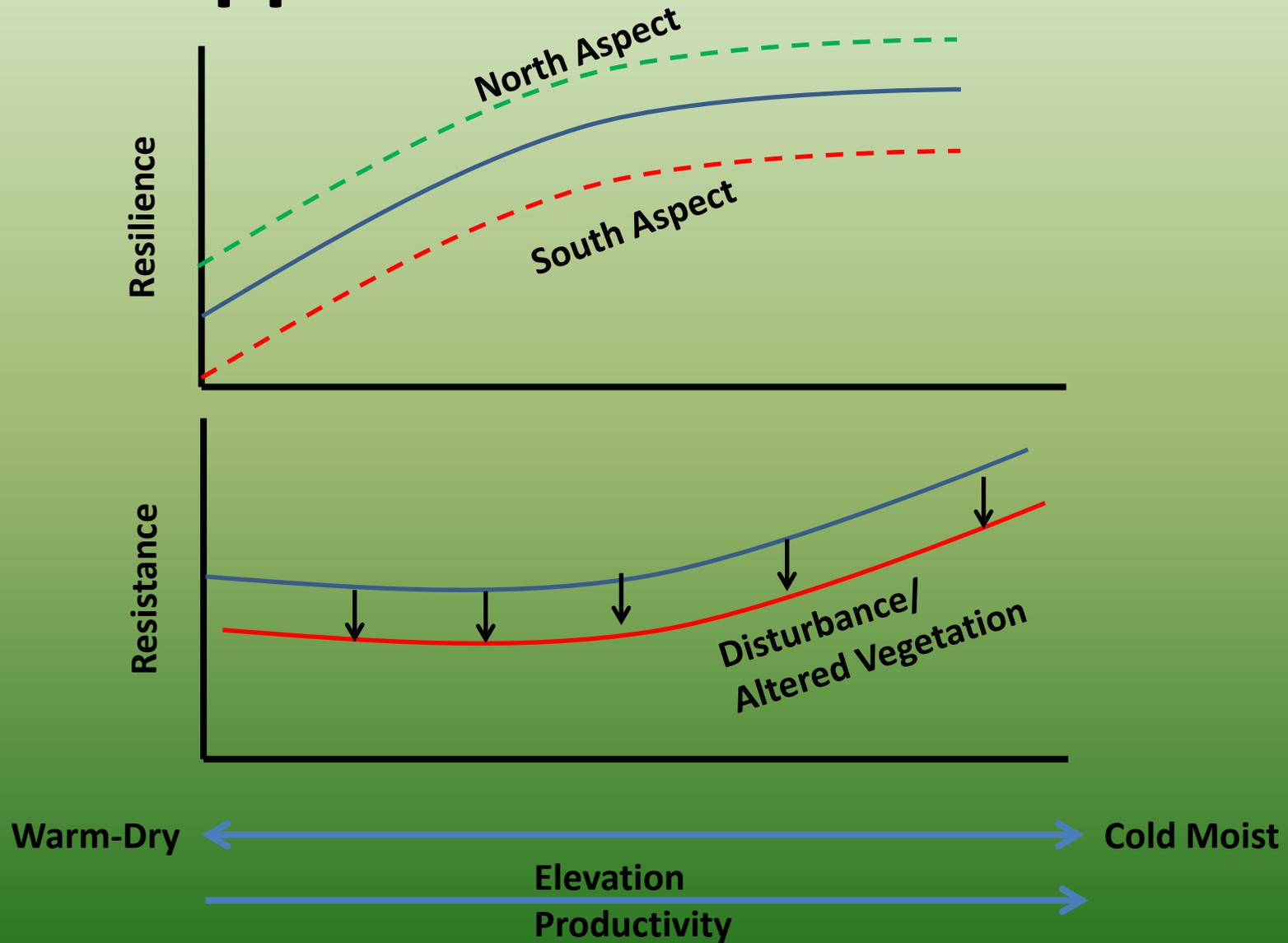
(after Parsons et al 2010)

Low Severity	Moderate Severity	High Severity
> 75% burned sagebrush skeletons	15-75% burned sagebrush skeletons	Sagebrush basal stumps remain or burned below surface
Grasses > 2 in blackened stubble remains	Grasses 0.25-1 in blackened stubble remains	Grass crown consumed to or below surface
Unburned patches >50%	Unburned patches 15-50%	Unburned patches < 15%
Interspace litter consumption <50%	Interspace litter consumption 50-80%	Interspace litter consumption >80%
No ash, ground fuels blackened and recognizable	Thin layer of black to gray ash, some litter recognizable	Layer of powdery gray or white ash > 90% surface organics consumed
No fire induced water repellency	Weak to medium water repellency at or below surface	Strong water repellency at or below the surface

Site Evaluation

- **Ecological Site – land classification system that describes soil-climate-plant associations (USDA 2003)**
 - Describes suite of plant communities
 - Describes suite of perturbations/disturbances
- **Reference State –**
 - Not one plant community
- **Alternative States-**
 - New set of communities where relatively irreversible transitions may create stable states with unique sets of plants

Opportunities for Success



Chambers et al 2014

Holloway and Miller Homestead Ecological Sites

- **32 Ecological Sites Burned in the Fire**
 - 6 sites with moisture regimes 8" or below
 - 16 sites with moisture regimes 8-12"
 - 10 sites with moisture regimes +12"
- **Targeted Restoration and Rehabilitation at areas with moisture regimes above 8"**



Selection of Goals and Objectives

- **Fire Severity - High to Moderate across 262,000 acres**
- **Soil Moisture Regime – 164,000 acres in Ecological 8-12” moisture regime.**
- **Additional factors to consider**
 - **Soil Type and Depth**
 - **Slope and Aspect**
 - **Pre-burn Plant Community**

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Passive vs Active

- **Passive – does not require human-aided management actions. Recovery occurs through normal successional processes (Pyke 2011)**
 - **Plant community largely intact**
 - **May include changes to management**
 - **Level or intensity**
 - **Season of use**

Passive vs Active

- **Active – Requires intervention to restore desired species are absent and/or ecosystem processes are interrupted (Pyke 2011)**
 - **Restoration – Native Species**
 - **Rehabilitation – May use species with similar structure and function**
 - **Challenges**
 - **Seed availability**
 - **Specialized equipment for seeding and planting**

Miller Homestead and Holloway Fires

- **Treatments**
 - Majority of the burned area was allowed to recover naturally – **Passive**
 - Fencing
 - Grazing Management
 - **Monitoring**
 - Annually first 3 years
 - Periodic



Seeding

- **22,000 acres selected to seed**
 - 163,000 met criteria
- **Drill Seeding**
- **Two seed mixes**
 - High Elevation
 - sagebrush drilled
 - Low Elevation
 - sagebrush broadcast following seeding
- **Fall Seeding (Nov-Dec)**



Shrub Establishment

- **Seeding**
 - Aerial
 - Drilling
 - Piles
- **Planting**
 - Tubeling vs Bareroot



Seeding

- **Areas Requiring Seeding**
 - **Difficult to assess plant death**
 - **Seeding into surviving vegetation**
 - **Additional disturbance**
 - **Slow Recovery**
 - **Risk of Invasives**
 - **Unnecessary Cost/Time**
 - **Which Risk is Greater?**
 - **Seed When Unnecessary**
 - **Not Seed When Necessary**



Post Treatment Grazing Management

- **Policy – Livestock are to be excluded from burned areas until monitoring results, documented in writing, show emergency stabilization and rehabilitation objectives have been met – BLM Handbook H-1742-1**

Post Treatment Grazing Management

- **Natural Recovery vs Seedlings**
 - Seeded species need time to establish
 - Recovering species
- **Criteria for Grazing**
 - 5 large perennial bunchgrasses per m²
 - Permanent sampling points at random locations
 - Season of use and numbers determined annually

Post Treatment Grazing Management

- 22 Allotments impacted by fires
- 10 met criteria to graze in 1st year
- Miller Homestead
 - 200 AMUs
 - Six Week Grazing Period



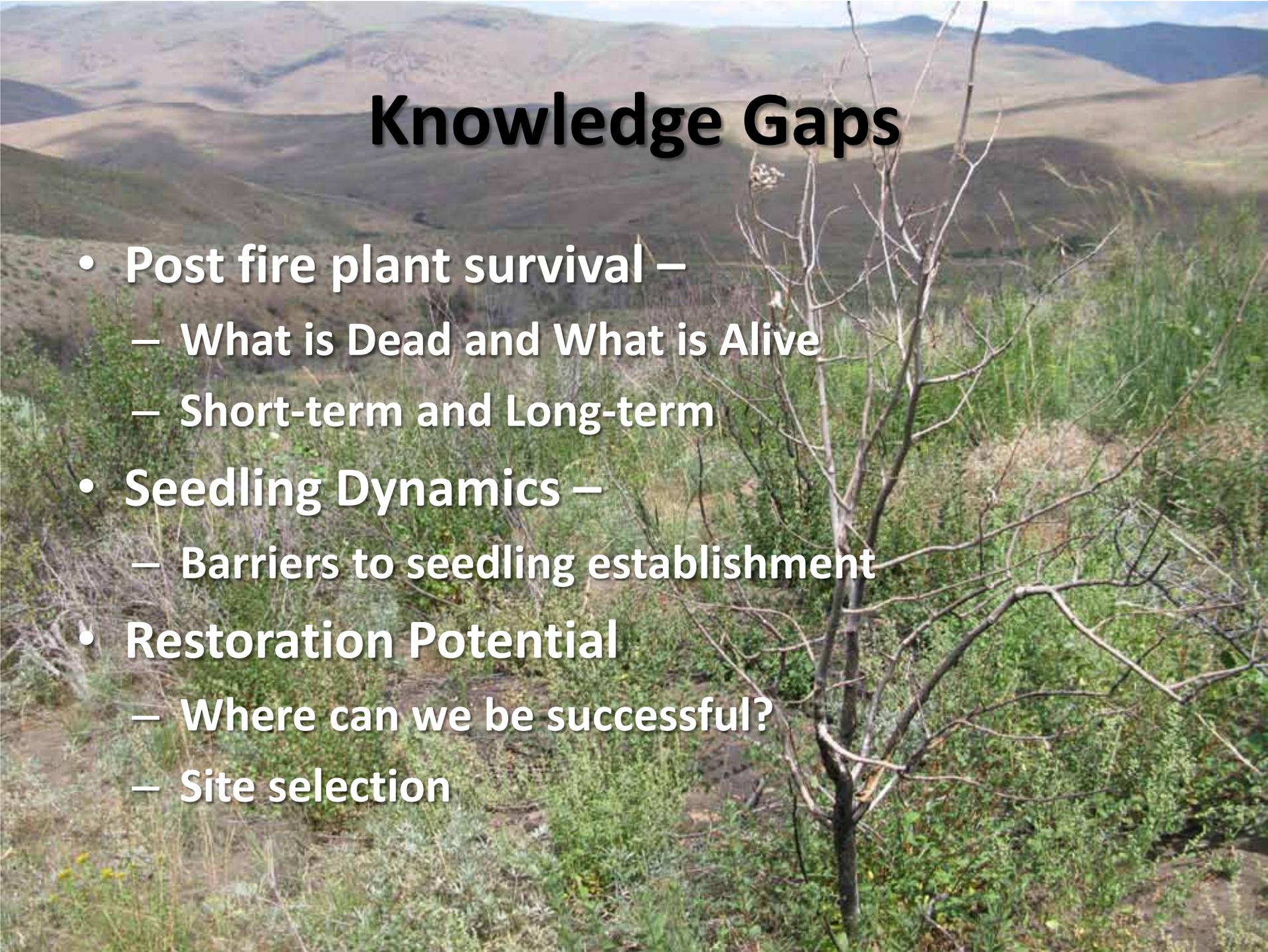
Fire Size and Treatment Selection

- As fire size increases the need to Triage increases.
- Small Fires – more homogenous conditions
- Larger Fires
 - More variability in fire effects
 - Overwhelmed by choices
 - Limitations of funding to treat all areas

Post Fire Monitoring

- **Annually for 1st 3 years following Fire**
- **Periodically following the initial 3 year Period**
- **5yr increments**
- **Permanent plots**
- **Research Partnerships**





Knowledge Gaps

- **Post fire plant survival –**
 - What is Dead and What is Alive
 - Short-term and Long-term
- **Seedling Dynamics –**
 - Barriers to seedling establishment
- **Restoration Potential**
 - Where can we be successful?
 - Site selection