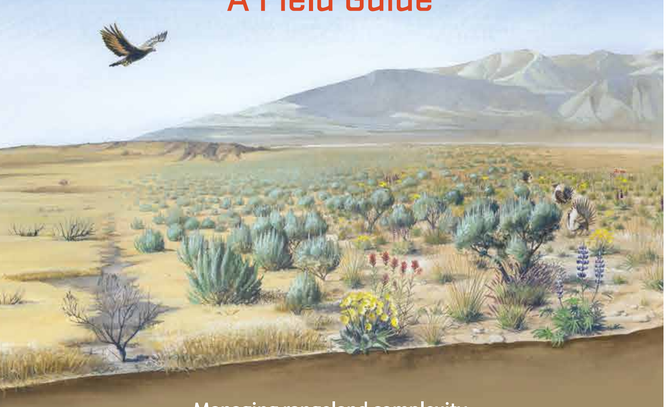
Threat-Based Land Management in the Northern Great Basin: A Field Guide



Managing rangeland complexity at feasible, relevant scales

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Before using this guide, you should know

Sagebrush ecosystems in the northern Great Basin face threats from invasive annual grasses and expanding conifers. Land managers need to work at large spatial scales to address these two ecological threats, but have limited resources to do so.

This guide provides a framework for land managers to efficiently identify, discuss and address landscape-level threats. It is not an instruction manual.

With this method, users map simplified ecological states and estimate future trend. Broad ranges of vegetation and environmental conditions can be mapped with the same state if they are faced with similar threats.

Understanding plant communities and tracking true change over time requires detailed and repeated monitoring.

This field guide is meant to pair with *Threat-Based Land Management in the Northern Great Basin: A Manager's Guide*, a more in-depth resource that provides greater detail and background on this process. The manager's guide can be found at: https://catalog.extension.oregonstate.edu/pnw722

Steps for state classification and management

0 **Establish your management objectives:** Do this before using this guide—all other steps follow from your objectives. Clearly stated objectives will help you make key scale and management decisions.

Management objectives specify the overall desired outcome achieved by addressing a threat. The Bureau of Land Management provides a good resource to begin writing management objectives—a QR link is at the bottom right of this guide.

1 **Understand relevant ecology:** This guide uses plant functional groups and simplified vegetation patterns to identify states.

2 **Understand threats:** Environmental factors drive juniper encroachment and annual grass invasion. The resistance and resilience of a site will change how threats are expressed.

3 **Understand states:** Use the decision tree, photographs and illustrations on the back of this guide to understand and differentiate states. Recognize that reality will be more complex than the detail used in this framework.

4 **Choose appropriate scale and delineate states:** Mapping is difficult and subjective. The size of an individual map unit depends on the total scale of your specific landscape and on your management objectives. Choose map units that are large enough to matter, but small enough to manage. There is no perfect answer.

5 **Assess apparent trend:** Assess the apparent trend of each state as upward, downward, stable or unclear. Consider all factors together. Apparent trend is a snapshot estimate of how the plant community may change in the future.

6 **Identify management actions:** Assign management actions to each state based on its apparent trend. Be sure to describe how management actions will achieve management objectives.

1 Understand relevant ecology

Using functional groups improves monitoring efficiency, reduces observer error and eases sampling timing. Functional groups make visually evaluating vegetation state and apparent trend feasible over large areas. We include seven functional groups in our models based on southeastern Oregon, but these groupings may vary across the range of this vast biome.

Large perennial bunchgrasses are the glue that holds the western sagebrush ecosystem together. LPBG root masses bind soil in place, effectively compete with annual grasses, and provide forage and habitat for wildlife. Common species include bluebunch wheatgrass, Idaho fescue, needlegrasses and squirreltail.

Annual forbs are generally small-statured plants with highly variable productivity depending on year and site conditions. Common species include blue-eyed Mary (*Collinsia* sp.) and alyssum (*Alyssum* sp.). Large amounts of annual forbs, especially of introduced species, can indicate a depleted understory. This category does not include weeds such as yellow star-thistle which should be mapped and managed on a species-specific basis.

Invasive annual grasses, including cheatgrass, medusahead and ventenata, are species that can fundamentally alter vegetation communities by replacing native grasses, dramatically increasing fire frequency and leading to a loss of sagebrush and perennial cover.

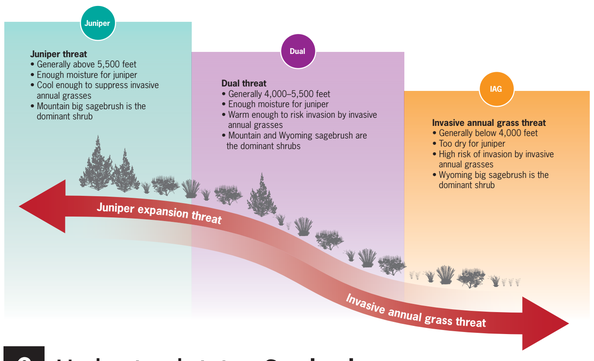
Conifers include tree species that are encroaching on historically treeless sagebrush rangelands. This guide primarily refers to juniper because Western juniper is of major concern in the northern portion of the sagebrush ecosystem, but Utah juniper and pinyon pine are major threats in other regions.

Small perennial bunchgrasses primarily refers to Sandberg's bluegrass, a low-statured and early-growing species common across the western portion of the sagebrush ecosystem. SPBG can dominate in harsh, shallow soil sites or where heavy continuous grazing has reduced other bunchgrasses. Despite often occurring at high densities, SPBG have shallow root systems and do not compete as effectively with annual grasses.

Perennial forbs are a large, diverse and variable group and are important for wildlife habitat and forage. The aster family, as well as lupines and paintbrushes, are particularly abundant.

Sagebrush includes several species and subspecies. Two subspecies of big sagebrush are the most abundant: Wyoming and mountain. Identifying subspecies of sagebrush can help you understand site potential, resilience and restoration practices. Other shrub species can help you identify past land use history and site potential. For example, a high proportion of rabbitbrush may indicate past disturbance; greasewood may indicate saline soil conditions.

2 Understand threats



3 Understand states: **See back**

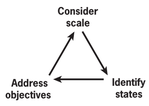
4 Choose appropriate scale and delineate states

Now it's time to delineate states. Use the back of this guide to determine states and the examples in this panel to help decide at which scale to map. The appropriate scale for mapping states depends on your management objectives—there is no perfect answer. Map units should be small enough to feasibly manage, and large enough for management to matter in meeting objectives.

A tale of two pastures: An example comparing management and mapping

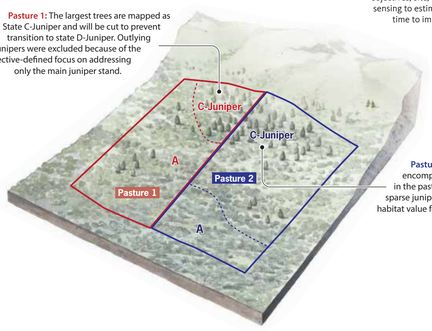
Pasture 1 objective: Maintain livestock forage within native plant community by controlling juniper encroachment.

Pasture 2 objective: Improve pasture for sage-grouse habitat by removing encroaching juniper.



Mapping is an iterative process. Consider objectives, site, and scale collectively. Use remote sensing to estimate map units and dedicate field time to important or ambiguous units.

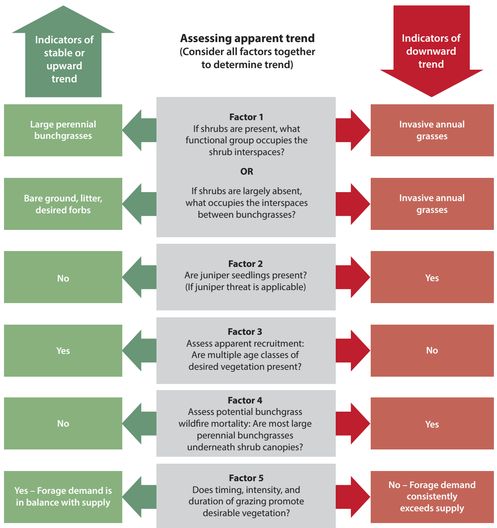
Pasture 1: The largest trees are mapped as State C-Juniper and will be cut to prevent transition to state D-Juniper. Outlying junipers were excluded because of the objective-defined focus on addressing only the main juniper stand.



Pasture 2: State C-Juniper encompasses all juniper present in the pasture because even sparse juniper cover can lower habitat value for sage-grouse.

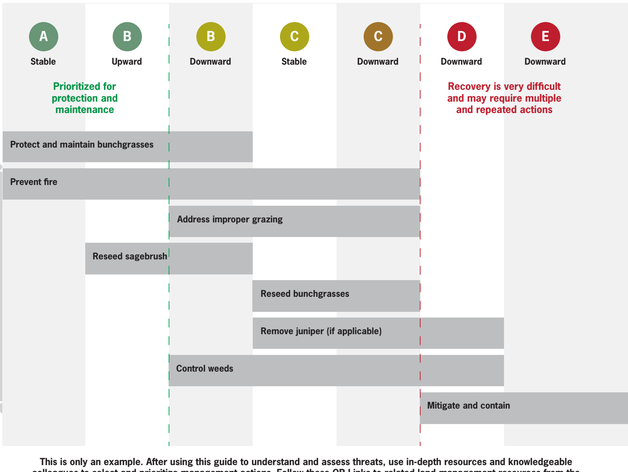
5 Assess apparent trend

Use these factors collectively to determine the apparent trend of a site. Apparent trend will help you determine what monitoring or actions are needed, if any. Decide if the trend is upward, stable, downward or unclear. Unclear trends will likely require additional monitoring.



6 Identify management actions

Select and prioritize management actions for each site based on the state, apparent trend and management objectives. The example below shows how a user might manage for increasing the biotic resistance and resilience of a site.



This is only an example. After using this guide to understand and assess threats, use in-depth resources and knowledgeable colleagues to select and prioritize management actions. Follow these QR Links to related land-management resources from the Bureau of Land Management and The Natural Resources Conservation Service.

BLM Assessment, Inventory and Monitoring
http://aim.landscapetoolbox.org/design/indicators-methods

NRCS Sage Grouse Initiative
http://www.sagegrouseinitiative.com

The Nature Conservancy
http://www.nature.org

SageSHARE
http://sageshare.org/

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3 Understand states

Use the decision tree, photographs and illustrations to determine and differentiate states. Recognize that reality will be more complex than the detail used in this framework.

START

Are threats expressed?
Is juniper present? Are invasive annual grasses typically more dominant than perennial grasses (invasive annual grass cover generally greater than a 1:1 ratio with perennial grass cover)? Or both?

- **No** (Annual grass threat only) → **Is sagebrush well represented?** (Generally >10% cover)
  - **No** → **D** IAG → Invasive annual grass dominated
  - **Yes** → **C** IAG → Sagebrush with invasive annual grass understory

  Invasive annual grass threat

- **Yes** → **Is juniper present?**
  - **No** → **Is sagebrush well represented?** (Generally >10% cover)
    - **Yes** → **A** All → Sagebrush with perennial grass understory
    - **No** → **B** All → Perennial grassland

    Minimal threats expressed
  - **Yes** → **Is an invasive annual grass threat expressed?**
    Are invasive annual grasses typically more dominant that perennial grasses (invasive annual grass cover generally greater than a 1:1 ratio with perennial grass cover)?
    - **No** → **Is sagebrush well represented?** (Generally >10% cover)
      - **Yes** → **C** Dual/Juniper → Sagebrush with perennial grass understory and encroaching juniper
      - **No** → **Is a perennial understory largely intact?** (Generally >5% cover and/or more than 5 plants/m²)
        - **Yes** → **D** Juniper → Juniper woodland with perennial grass understory (on deep soils)
        - **No** → **E** Juniper → Juniper woodland with extensive bare ground (on shallow soils)

      Juniper threat
    - **Yes** → **Is juniper canopy cover well-developed?** (Generally >10% cover)
      - **No** → **D** Dual → Invasive annual grass dominated with juniper threat
      - **Yes** → **E** Dual → Juniper woodland with invasive annual grass understory

      Dual threat

Elevation	< 4,000 feet	4,000–5,500 feet	> 5,500 feet
Precipitation	< 10 inches	10–15 inches	> 15 inches
Resilience	Lower resilience after disturbance		Higher resilience after disturbance
Resistance	Low resistance to invasive annual grasses		High resistance to invasive annual grasses

Designed by Matt Cobb and Kelly Finan. Illustrated by Kelly Finan. Photos from The Nature Conservancy.