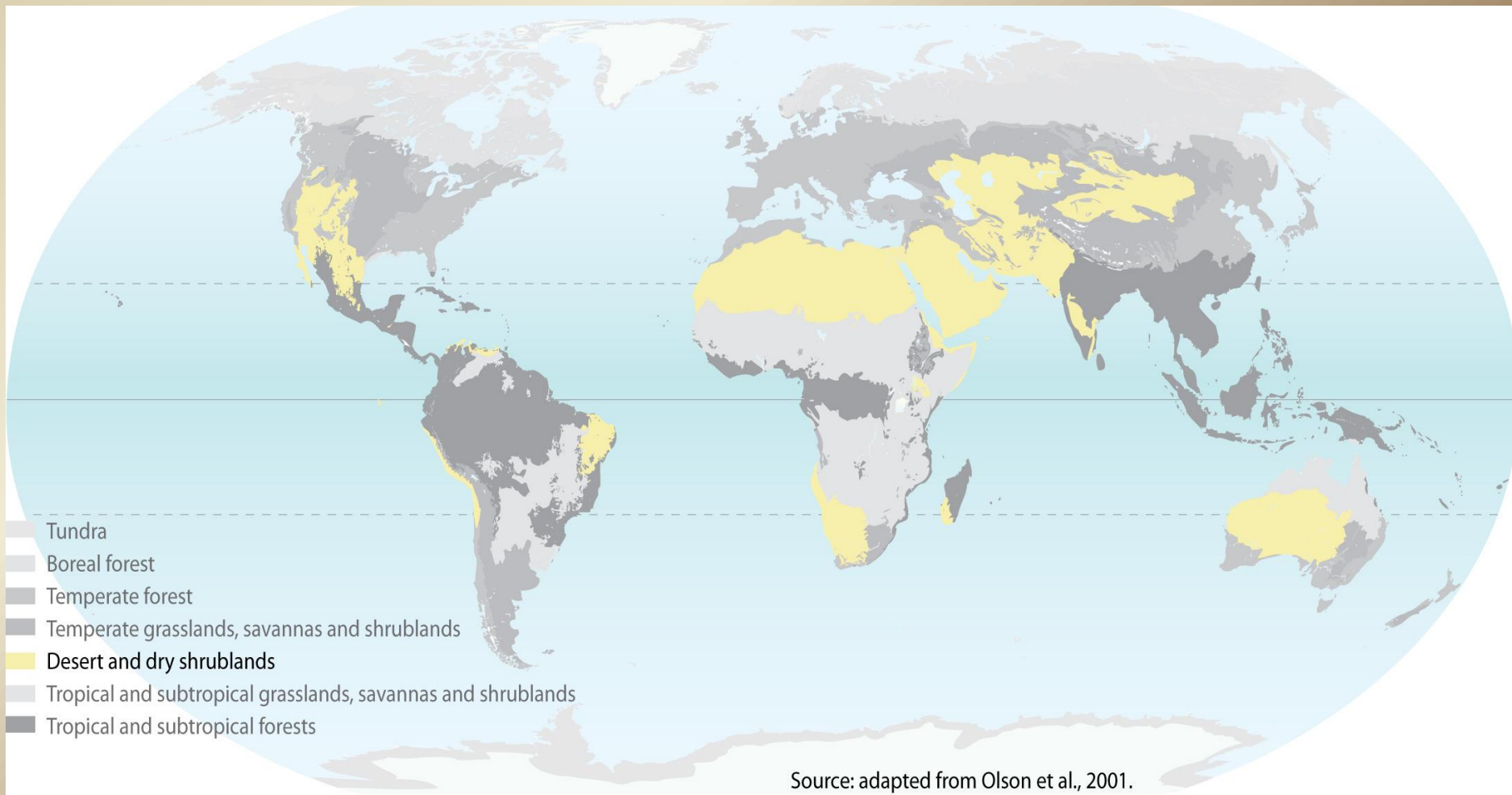


Importance of Shrub Reestablishment for Wyoming's Landscapes

Rachel Mealor, Extension Range Specialist

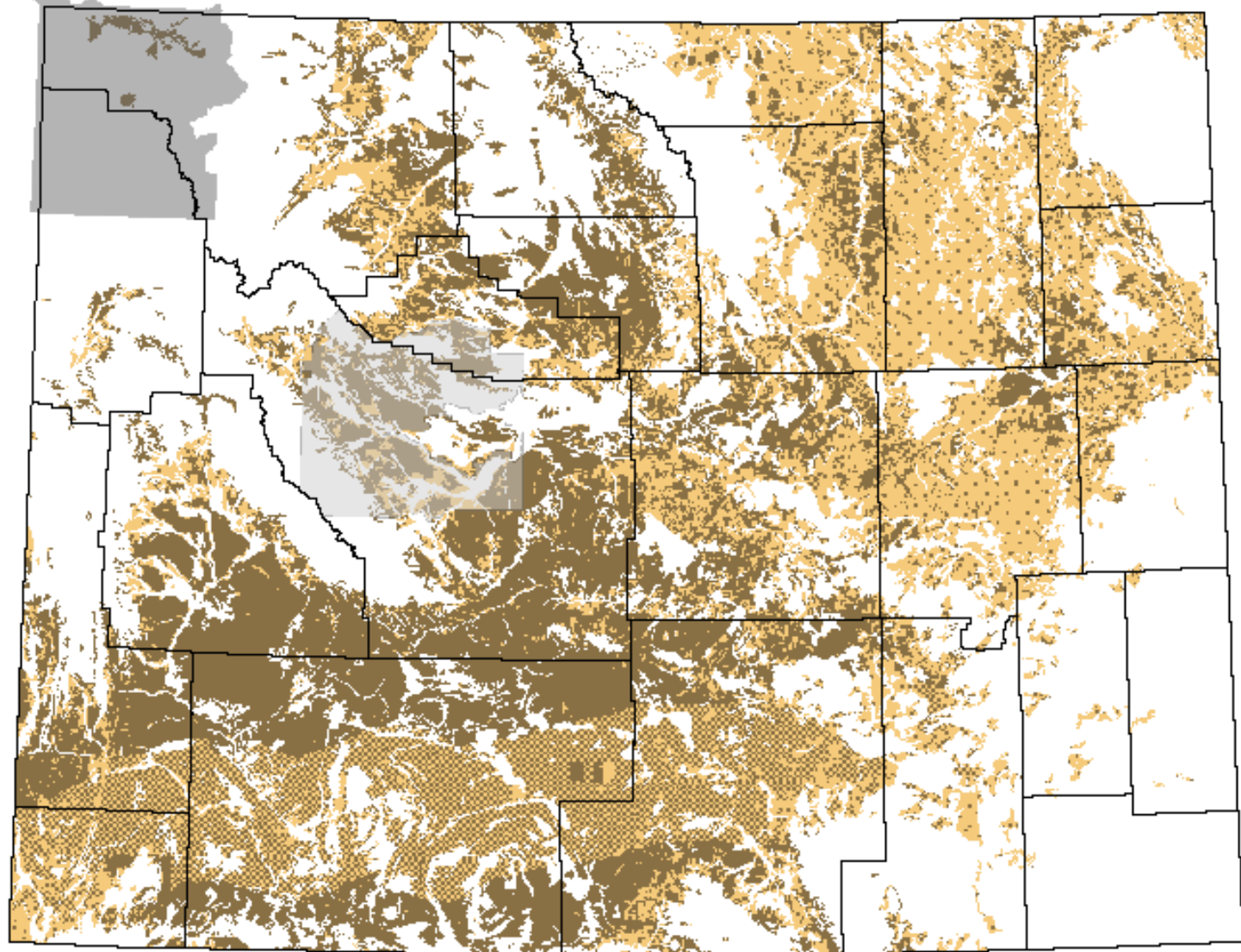
Why are systems dominated by shrubs?



Source: adapted from Olson et al., 2001.

Shrubs are usually dominant in habitats that place plants under considerable stress, such as:

- Drought or arid
- Nutrient-poor soils
- Fire regime
- Wind
- Poor soil aeration
- Winter cold short growing season



0 12.5 25 50 75 100 Miles

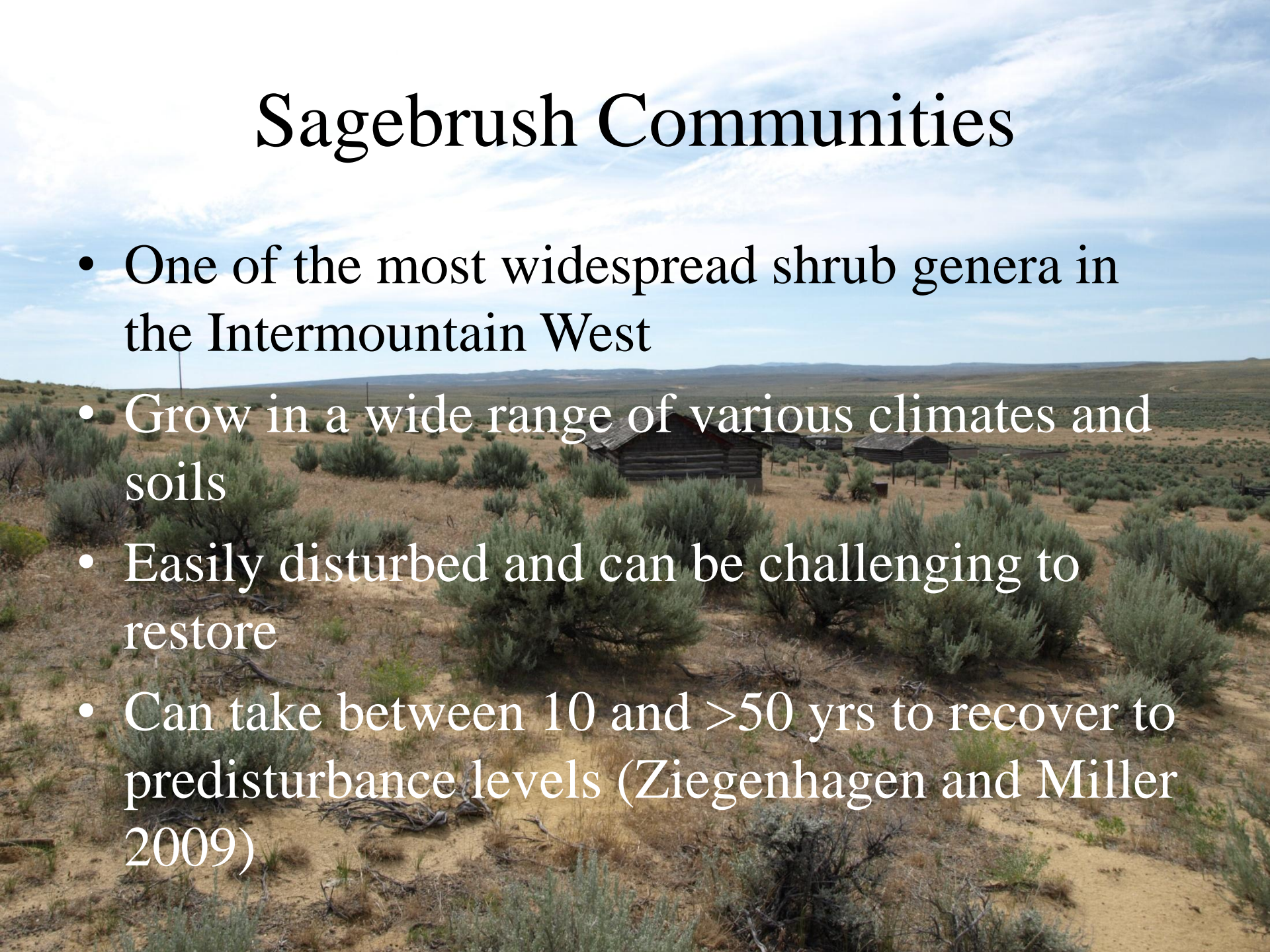
Nyssa Whitford
Nongame GIS Technician
Lander Regional Office
02-24-06

μ

- Sagebrush on Private Land
- Sagebrush on Non-private Land
- Counties
- Yellowstone National Park
- Wind River Indian Reservation

Distribution of sagebrush on both private and public lands in Wyoming (modified from [Merrell et al. 1996, BLM 2001]).

Sagebrush Communities

- One of the most widespread shrub genera in the Intermountain West
 - Grow in a wide range of various climates and soils
 - Easily disturbed and can be challenging to restore
 - Can take between 10 and >50 yrs to recover to predisturbance levels (Ziegenhagen and Miller 2009)
- 

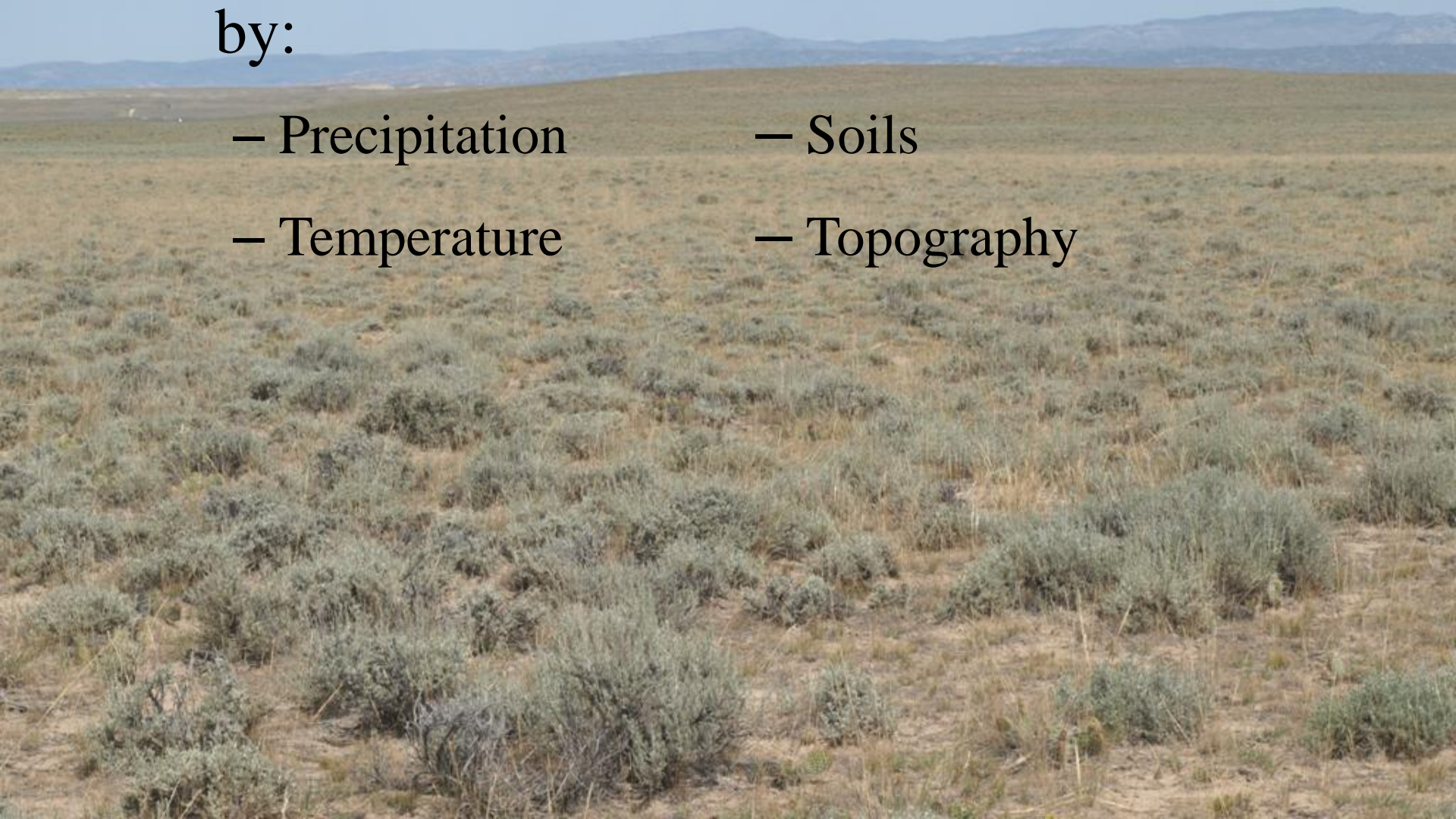
- Wyoming has VERY diverse landscapes
- Location of shrub communities is driven by:

- Precipitation

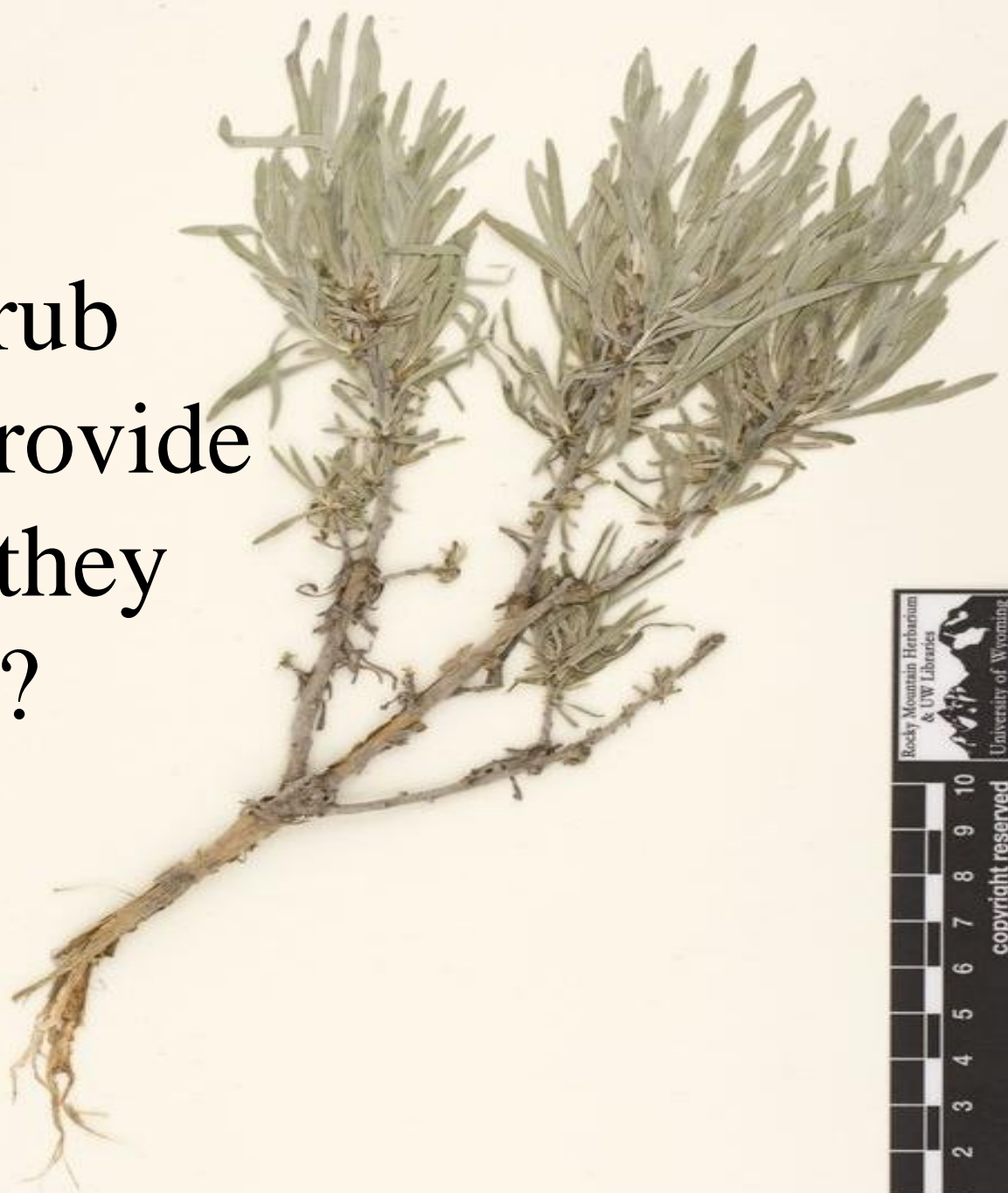
- Soils

- Temperature

- Topography



What do shrub communities provide and why are they important?



Taking a historical perspective, shrublands were the vegetation type that has been the most neglected, abused, and even cursed.



Durant AcArthur

McKell and Garcia-Moya 1989

Modern livestock producers and wildlife managers are aware of shrub values

- Benefits such as:
 - Animal feed
 - Erosion control
 - Wildlife habitat
 - Ornamentals
 - Maintaining ecosystem functions



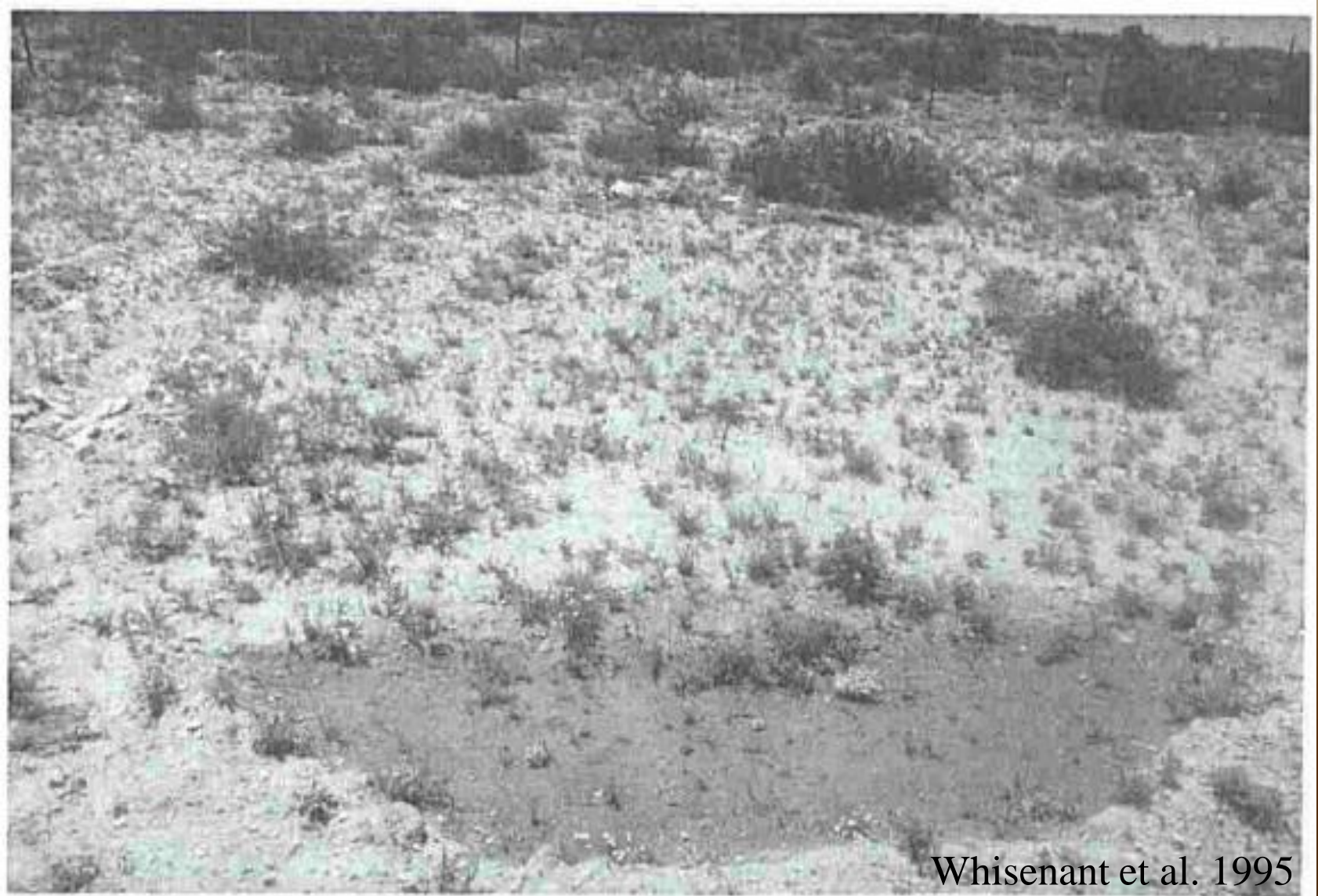
Browse and Forage Use

- Except for digestible energy, shrubs have higher values for protein, phosphorus, lignin, and carotene than grasses or forbs and are most important for fall and winter grazing (Cook 1972)
 - Grasses and forbs are not readily available, increasing shrubs forage value
- Species preference helps balance level of plant use

Erosion Control

- Shrubs have a deep rooted system and a spreading habit
- Study in Texas where microcatchment technologies were evaluated in the establishment of little-leaf leadtree and four-wing saltbush and their role in initiation of autogenic landscape restoration on a shallow site

Microcatchment basin showing initial site conditions and the pattern of water collection after precipitation event



Whisenant et al. 1995

Whisenant et al. 1995

- Microcatchments effectively captured runoff water that would have been lost to the site
- Soil organic matter content was significantly greater in microcatchment basins 32 months after transplanting than in unmodified sites
- Microcatchments and shrub reestablishment initiated autogenic successional processes leading to fertile islands
 - Greater herbaceous development around shrubs

Wildlife Habitat

- Sagebrush occupies ~50% of Wyoming's land area (Merrell et al. 1996, BLM 2001, Wyoming Sage-Grouse Working Group 2003).
- Sagebrush-associated vegetation types provide habitat for:
 - 87 species of mammals
 - 297 species of birds
 - 63 species of fish, reptiles and amphibians (Wyoming Interagency Vegetation Committee 2002)

| Common Name | Scientific Name |
|---------------------------|----------------------------------|
| Brewer's Sparrow | <i>Spizella breweri</i> |
| Greater Sage-Grouse | <i>Centrocercus urophasianus</i> |
| Sage Sparrow | <i>Amphispiza belli</i> |
| Sage Thrasher | <i>Oreoscoptes montanus</i> |
| Eastern red bat | <i>Lasiurus borealis</i> |
| pocket mouse | <i>Perognathus parvus</i> |
| pocket gopher | <i>Thomomys idahoensis</i> |
| Olive-backed pocket mouse | <i>Perognathus fasciatus</i> |
| Pallid bat | <i>Antrozous pallidus</i> |
| Plains pocket gopher | <i>Geomys bursarius</i> |
| Pygmy rabbit | <i>Brachylagus idahoensis</i> |
| Sagebrush vole | <i>Lemmiscus curtatus</i> |
| Spotted Bat | <i>Euderma maculatum</i> |
| Spotted ground squirrel | <i>Spermophilus spilosoma</i> |
| White-tailed Prairie Dog | <i>Cynomys leucurus</i> |

Sagebrush Ecosystems Species of Greatest Conservation Need in Wyoming (WGFD 2005)

Maintaining Ecosystem Functions

Shrubs create microsystems influencing temperature, nutrient cycles, wind speeds (reduced), add organic matter, thus adding stability to the plant-soil-animal complex



What might cause negative impacts to shrubland communities?

- Livestock grazing
- Weed invasion
- Wildfires
- Land conversion projects
 - Housing development
 - Natural resource extraction



What have we lost by removing shrubs in area that normally have them?

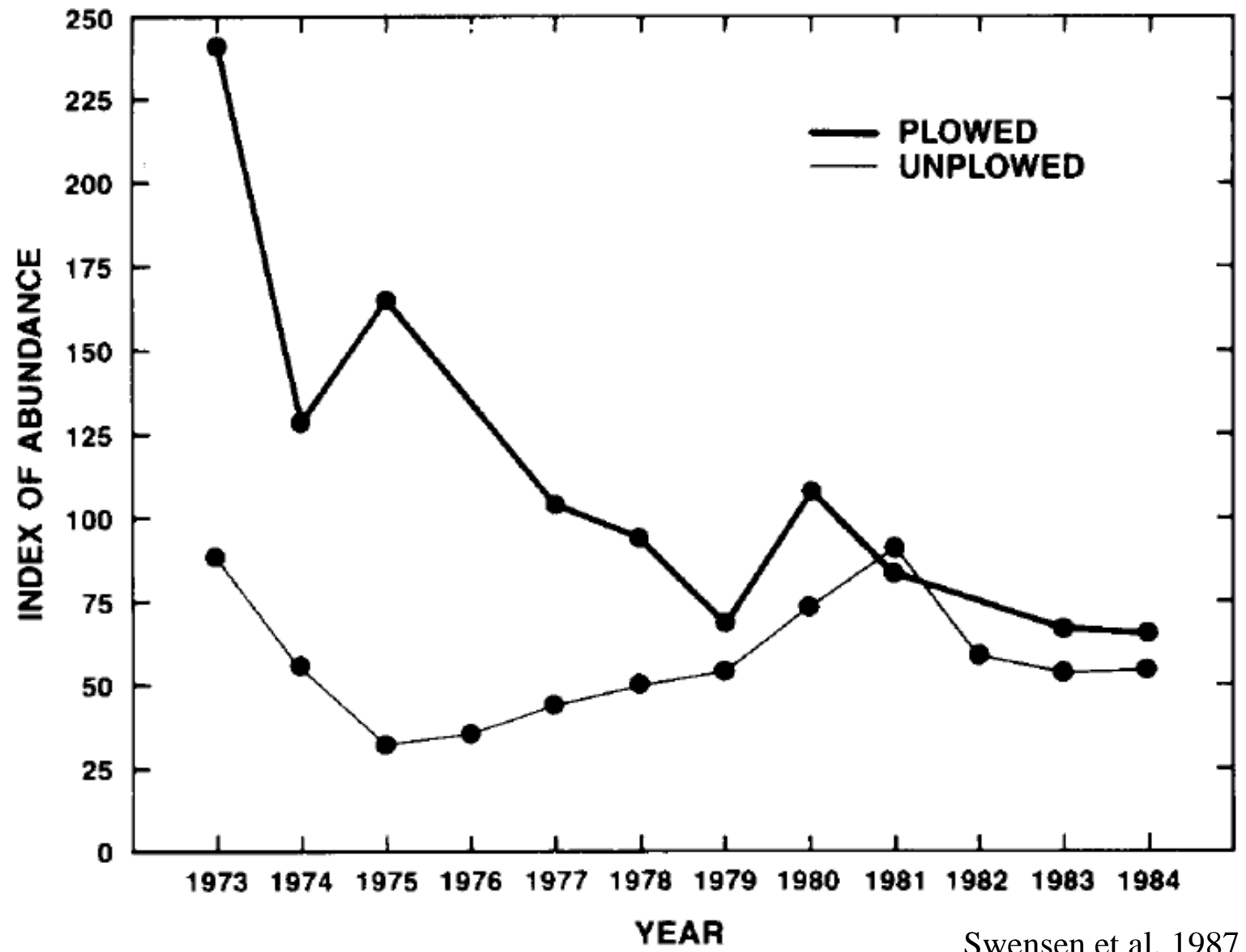
- Depends on backgrounds, experience, geographical location and economic impact of those shrublands



Wildlife



Population indices of sage grouse (number of lekking males in spring) on a plowed study area and an unplowed control area in south central Montana



Swensen et al. 1987

- Removal of sagebrush (plowing) from wintering areas greatly reduced sage grouse populations
 - 1973 to 1984 population index declined 73% from 241 to 65 lekking males
- Results suggested plowing is more harmful to sage grouse than spraying
 - Cultivated annually so sagebrush cannot reestablish

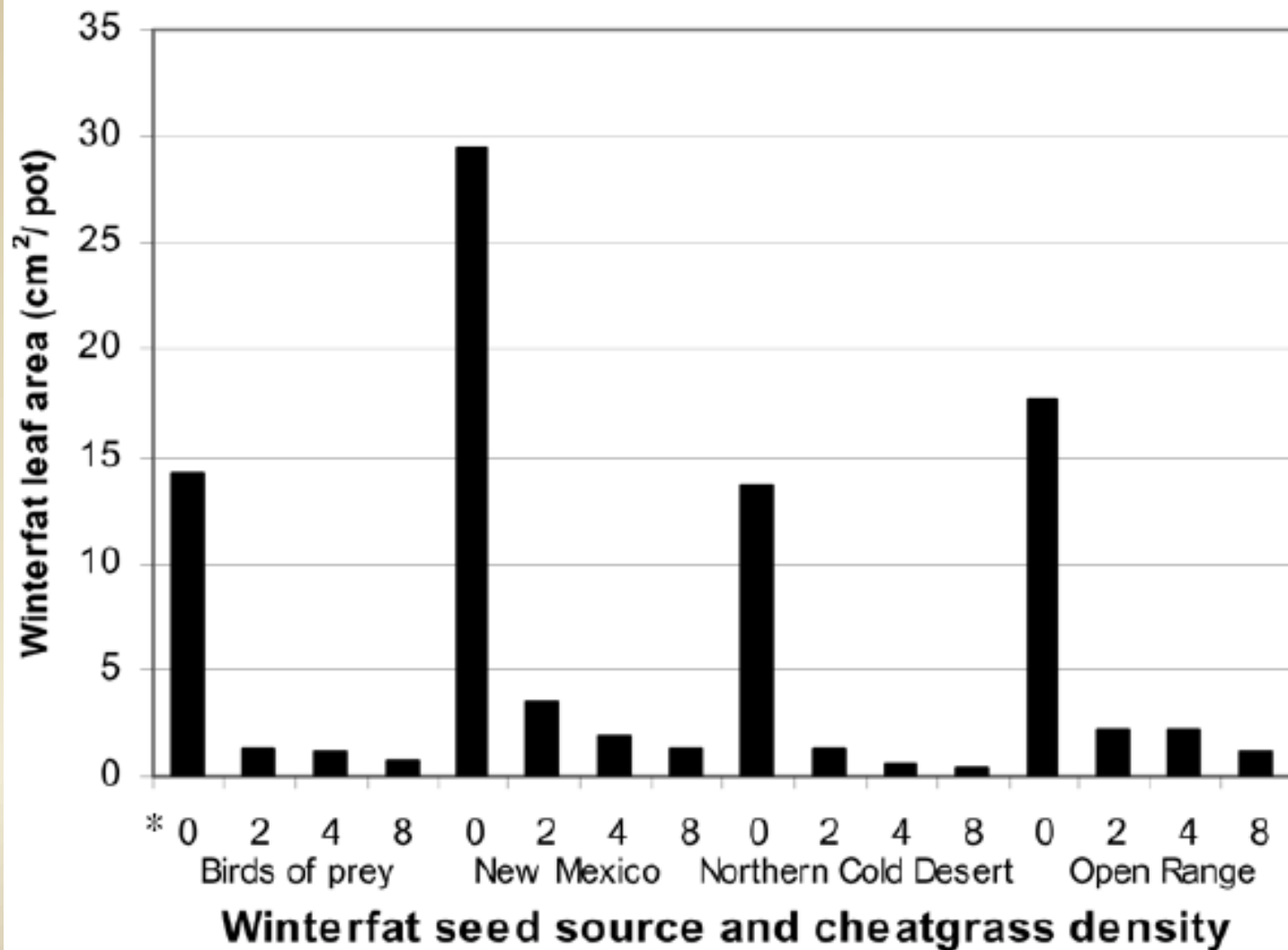


Weed Invasion



Vegetation Dynamics of an altered system

- Extensive loss of winterfat-dominated communities (southwest of Boise, ID) linked to shortened fire intervals due to cheatgrass
- Study to compare germination and seedling growth of 4 native winterfat collections with cheatgrass competition



Winterfat seedling leaf area by seed source and cheatgrass density per pot (2, 4, or 8 seedlings) after 21 weeks growth in greenhouse

* Number of cheatgrass seedlings per pot

Hild et al. 2007

- In the presence of cheatgrass at any competition level, growth of all 4 sources was reduced by at least **90%**
 - Winterfat seedlings are vulnerable to cheatgrass competition, even at very low densities
- Sites where cheatgrass densities are high following wildfires are likely to be problematic for winterfat establishment regardless of seed source

Conclusion

- Where shrublands are found
- Why important what role they serve
- What happens when they are no longer there
- Introduction and outline for important information to come



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Founded in 1893 by Aven Nelson, the Rocky Mountain Herbarium (RM) contains the largest collection of Rocky Mountain plants and fungi in existence with additional representation of the floras of other parts of the Northern Hemisphere. It ranks 17th in the nation with 825,000 specimens and is the largest facility of its kind between St. Louis, Missouri, and Berkeley, California. [Read more.](#)

- External Links**
- Department of Botany
 - Wyoming Natural Diversity Database
 - Wyoming Native Plant Society
 - UW Give on Line

- [RM Specimen Database](#)**
Access nearly 700,000 vascular plant specimen records from the Rocky Mountains and western North America.
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Complete checklists for the vascular plants of Wyoming and Colorado.
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Vascular Plants of Wyoming, Vascular Plants of Montana, Flora of the Black Hills, & Wyoming Birds.
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Vascular Plants of the Greater Yellowstone Area: An

- Recent News & Events**
- [Erwin Evert's death, publication of flora Greater Yellowstone Area](#)
 - [Completed - Comanche and Cimarron National Grasslands, Colorado/Kansas \(San Isabel NF; 2007-2009\)](#)
 - [Current - Vermejo Park, New Mexico/Colorado \(private funding; 2007-2009\)](#)
 - [Current - BLM Lands Peripheral to the Medicine Bow Mountains \(BLM, Wyoming; 2008-2010\)](#)

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New Thinking

Rocky Mountain Herbarium webpage

Questions?

A landscape of rolling hills under a sunset sky with a rainbow. The hills are covered in dry grass and are illuminated by the warm, golden light of the setting sun. A vibrant rainbow is visible in the sky on the right side of the image.

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