

National Resources Inventory Rangeland Resource Assessment

Regional Interpretation

Great Plains

October 2010



About the Data

Estimates presented here are based upon rangeland data collected on-site as part of the National Resources Inventory (NRI). Rangeland is defined by the NRI as a *Land cover/use* category on which the climax or potential plant cover is composed principally of native grasses, grasslike plants, forbs, or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. This includes areas where introduced hardy and persistent grasses, such as crested wheatgrass, are planted and such practices as deferred grazing, burning, chaining, and rotational grazing are used, with little or no chemicals or fertilizer being applied. Grasslands,

Overview: The Great Plains region includes the most productive rangelands in the United States due in large part to generally reliable summer precipitation, a long growing season, and deep, fertile soils. Rangelands in this region are typically dominated by grasslands. Some of the best rangeland and farmland in the world is found in the Great Plains of the United States. These areas supported large herds of bison and other grazing animals prior to European settlement. Today, much of this land has been converted to rain-fed and irrigated crop production. Where rangelands remain, they typically occur on areas that are marginally suitable for crop production.

When the area was first being settled in the late 1800s, periods of adequate rainfall attracted large numbers of settlers. However, periodic droughts occurred, causing economic recessions and turning fields into dry wastelands. This happened several times in the 1800s and early 1900s, with the worst dust bowls occurring in the Depression years of the 1930s. Major droughts occur approximately every 20 years (1890s, 1910s, 1930s, 1950s, and 1970s). The 1990s witnessed yet another period of serious drought conditions, especially in the southern Great Plains with some of the hottest and driest conditions that this region has ever experienced.

Soil and Site Stability: Soil and site stability shows little departure from reference condition throughout most of the Great Plains (Figure 1). The combination of high precipitation and relatively deep, fertile soils when compared to many rangelands in the United States contribute to a high level of resilience. These factors support a highly productive plant community that allows the land to resist degradation and recover quickly when degradation does occur. High levels of plant productivity are usually

savannas, many wetlands, some deserts, and tundra are considered to be rangeland. Certain communities of low forbs and shrubs, such as mesquite, chaparral, mountain shrub, and pinyon-juniper, are also included as rangeland.

These results are based upon NRI rangeland data collected in the field on rangeland during the period 2003-2006. Current estimates cover non-Federal rangeland in 17 western states (extending from North Dakota south to Texas and west) and to a limited extent in Florida and Louisiana.

Quality assurance and statistical procedures are designed/developed to ensure data are scientifically legitimate. Irrespective of the scale of analysis, margins of error must be considered. Margins of error (at the 95 percent confidence level) are presented for all NRI estimates.

associated with low amounts of bare ground and negligible intercanopy gaps (Figures 2 and 3), even when the land is degraded. Well-developed soils high in organic matter, plant and litter decomposition, root biomass, and associated fungi contribute to high aggregate stability.

Figure 1. Non-Federal rangeland where soil and site stability shows at least moderate departure from reference conditions

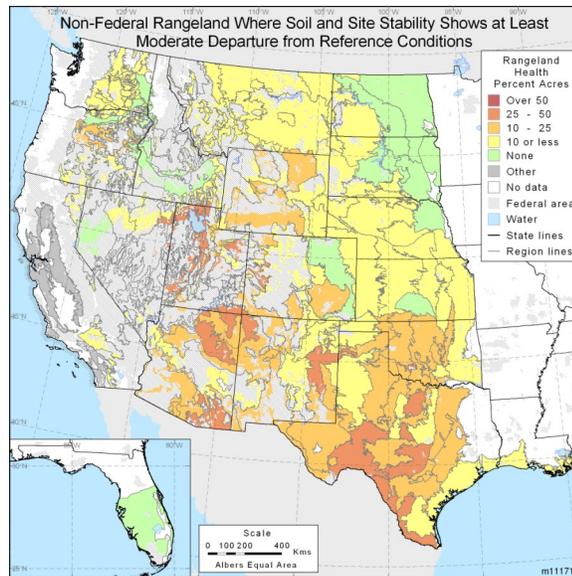
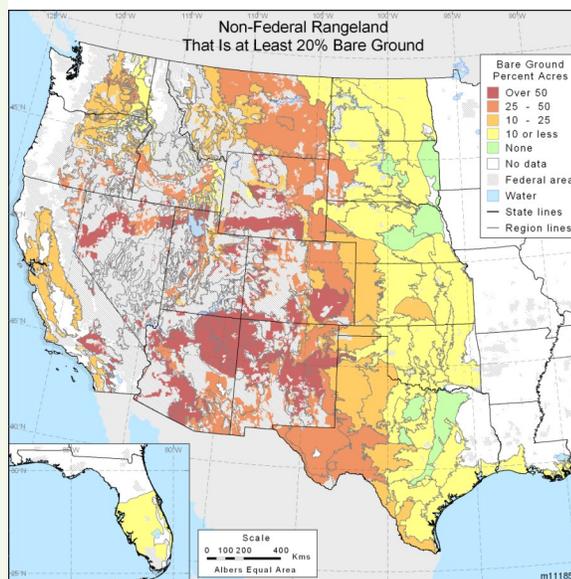


Figure 2. Non-Federal rangeland that is at least 20% bare ground



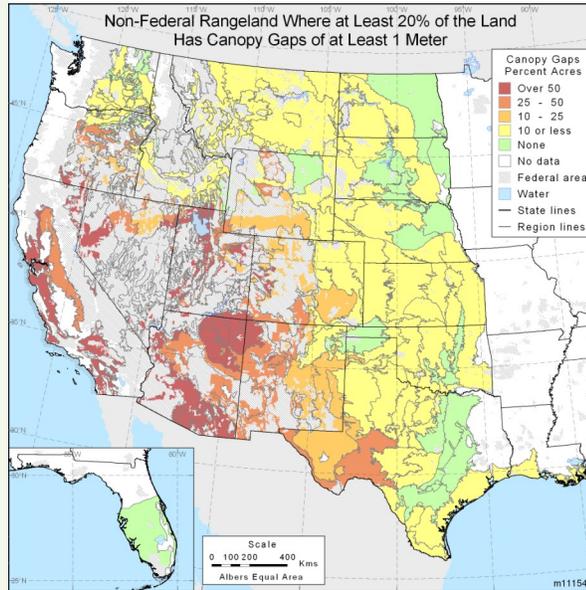
About the Protocols

The findings presented here are derived using data collected for four field protocols:

Rangeland health data are used to assess three broad attributes (soil and site stability, hydrologic function, and biotic integrity). Data collectors compare biological and physical characteristics of the sample site and record degrees of departures from reference conditions based on comprehensive materials describing the ecological site.

Line point intercept data are utilized in summaries of non-native plant species, non-native invasive herbaceous species, native invasive woody species, and bare ground. Line point intercept data are collected along two intersecting 150-foot transects centered on each sample location. Data collectors record plant species, litter, lichen,

Figure 3. Non-Federal rangeland where at least 20% of the land has canopy gaps of at least 1 meter



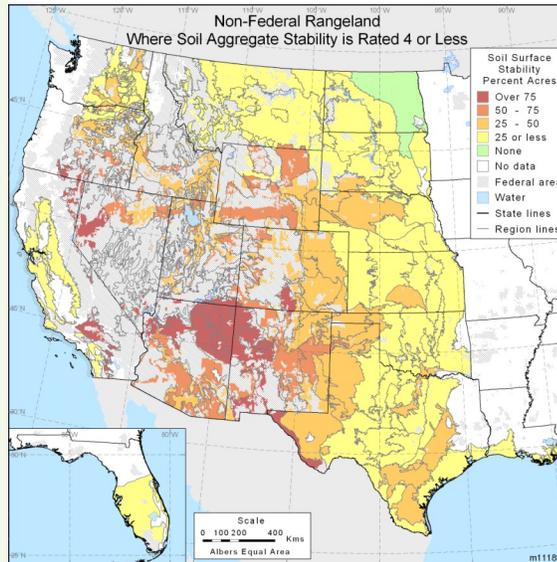
In the Great Plains, soil aggregate stability is typically lower in the Sandhills of western Nebraska and Badlands of southwestern South Dakota (Figure 4) compared to other areas of this region. Somewhat lower stability occurs ‘naturally’ in these areas due to their lower potential to form stable soil aggregates; the Sandhills are formed on relatively coarse sandy soils, and the soils of the Badlands have high levels of salt, which makes soil aggregates disperse more easily. However, less than 10 percent of the non-Federal rangeland acres in these areas had at least moderate departure for soil and site stability (Figure 1).

moss, rock fragment, bedrock, and/or bare soil present at each 3-foot interval.

Line intercept for intercanopy gaps data are used to identify areas with large foliar intercanopy gaps which have more exposure to erosion and may provide opportunity for invasive plants to become established. Data collectors record lengths of plant intercanopy gaps along the two intersecting 150-foot transects.

Soil aggregate stability is a recognized indicator of soil quality and rangeland health. Data collectors immerse soil surface peds collected at the sample site in water and subject the soil peds to five dipping cycles. Soil stability is rated based on the outcomes of these water exposure techniques. Ratings range from 1 (very unstable) to 6 (very stable).

Figure 4. Non-Federal rangeland where soil aggregate stability is 4 or less, indicating less stable soil.



Some of the southwestern parts of this region showed more significant departures from reference conditions for soil and site stability. There are at least two possible explanations for this difference. One is that these areas are more fragile, receive less precipitation and are the driest areas of the Great Plains. They are associated with lower plant production and therefore, less residual cover and litter. As a result, these lands are more prone to wind erosion. The second explanation is that many parts of Kansas, Oklahoma, and eastern Colorado were cultivated prior to and during the Dust Bowl years (1930's) and drought periods (1950's, 1970's, and 1990's) before reverting to rangeland. Less resilient ecological sites may still exhibit the effects of these events.

Hydrologic Function: The same factors that explain why most of the land in the Great Plains shows little departure from reference condition for soil and site stability also explain why hydrologic function is at or near potential throughout most of this region. Relatively high precipitation and deep soils support productive plant communities, maintaining a high degree of soil cover even when they are degraded (Figure 5). In some areas, significant

About the Maps

The maps are constructed with NRI rangeland data collected in the field on rangeland during the period 2003-2006. The mapping regions are based on Common Resource Area (CRA) boundaries; in some cases CRAs were combined to include more sample sites. Regions without non-Federal rangeland are described as “No data”. Areas of Federal land are depicted with cross-hatching. Legend categories differ by map theme (e.g., rangeland health, invasive plant species, etc.)

Rangeland Health Maps

The rangeland health maps present the percent by classes (none, <10%, 10-25%, 25-50%, and >50%) of non-Federal rangeland where rangeland health attributes have at least moderate departures from the reference conditions. An additional

increases of invasive exotic and native plants (e.g., eastern redcedar, *Juniperus virginiana* L., Figure 6) have resulted in increased rates of runoff and erosion.

Figure 5. Non-Federal rangeland where hydrologic function shows at least moderate departure from reference conditions

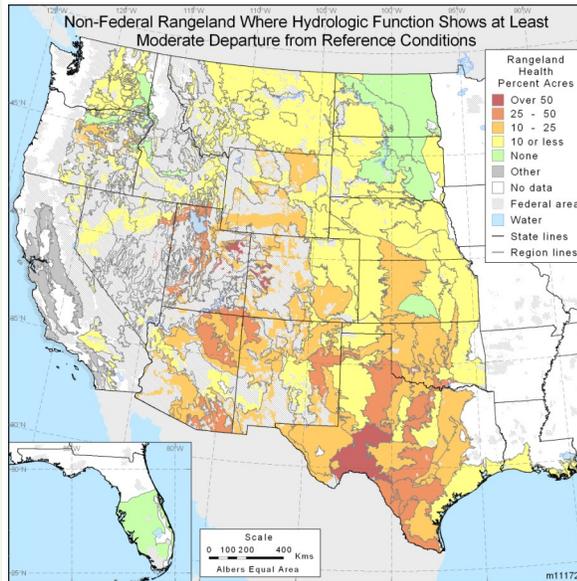
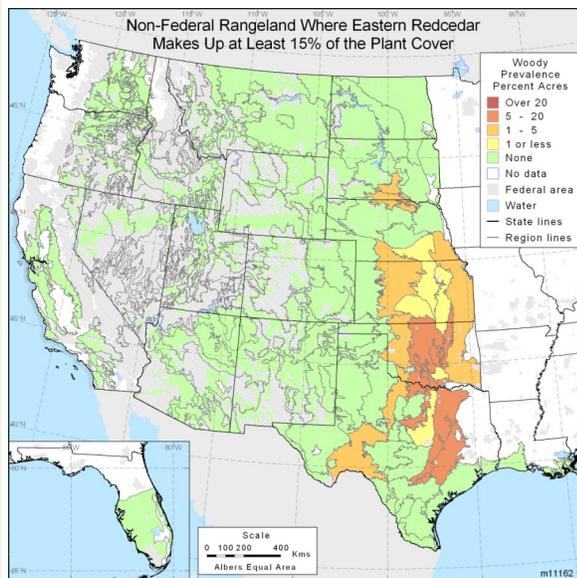


Figure 6. Non-Federal rangeland where Eastern redcedar is at least 15 percent of the plant cover



category, referred to as “Other”, represents areas for which the ecological site descriptions are under development and there is no reported rangeland health data.

Invasive Herbaceous and Woody Species Maps

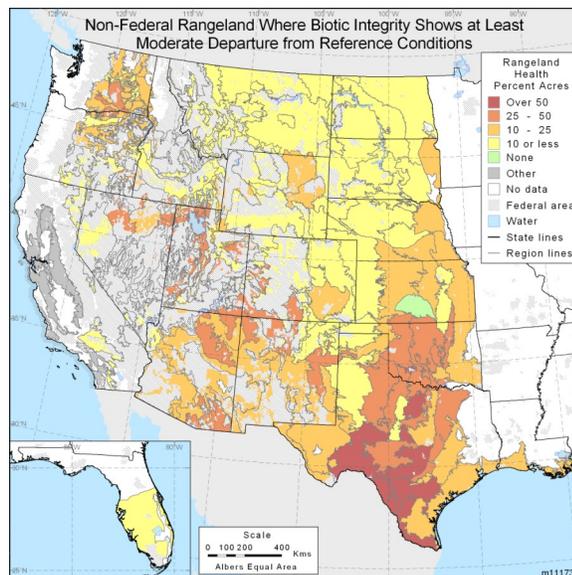
The maps display the percent by classes (None, 1% or less, 1-5%, 5-20%, and over 20%) of non-Federal rangeland where non-native invasive herbaceous species groups and native invasive woody species groups are present or make up at least 15, 30, or 50 percent of the plant cover.

Bare Ground and Foliar Canopy Gap Maps

The bare ground and canopy gap maps present the percent by classes (none, 10% or less, 10-25%, 25-50%, over 50%) of non-Federal rangeland for the average proportion of bare ground; where

Biotic integrity: Of all of the attributes, biotic integrity showed the greatest departure in this region (Figure 7), largely due to the high density and cover of invasive plants, including exotic herbaceous (Figures 8-12) and native woody species (Figures 13-15). Many of the non-native species were accidentally introduced and are tenacious. Although many exotic species are considered to negatively affect ecosystem services, others have more benign effects. Several introduced species, such as annual brome grasses, Kentucky bluegrass (*Poa pratensis* L.), and Canada thistle (*Cirsium arvense* (L.) Scop.), are now so widespread that complete eradication would be expensive, if not impossible. Invasive species data included in this report provide an objective starting point for focusing efforts on management and control.

Figure 7. Non-Federal rangeland where biotic integrity shows at least moderate departure from reference conditions



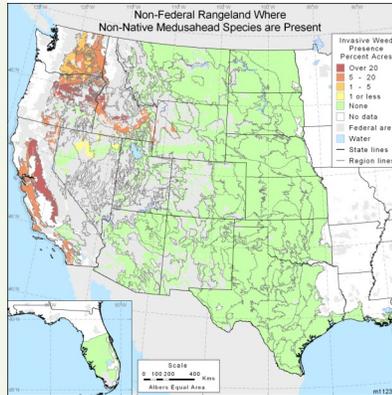
at least 20, 30, 40, or 50 percent is bare ground; where at least 20 percent of the area is covered with intercanopy gaps of at least 1 or 2 meters in size; and where at least 20 percent of the area is covered with intercanopy gaps of at least 1 or 2 meters in size and intercanopy gaps are at least 50 percent bare ground.

Soil Aggregate Stability Maps

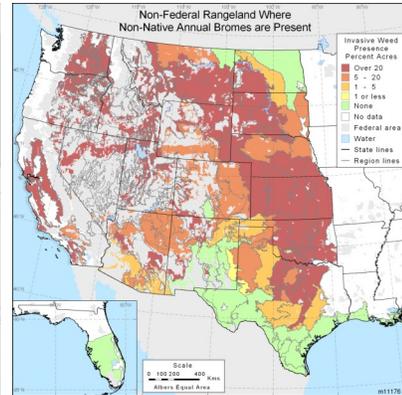
The soil aggregate stability maps present the percent by classes (none, 25% or less, 25-50%, 50-75%, over 75%) of non-Federal rangeland where soil aggregate stability ratings are 4 or less, indicating less stable soil.

Figures 8-12. Non-Federal rangeland where non-native invasive herbaceous species are present

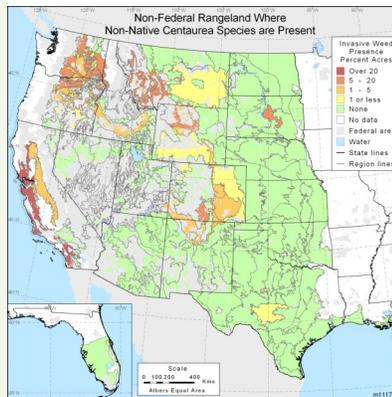
8. Medusahead



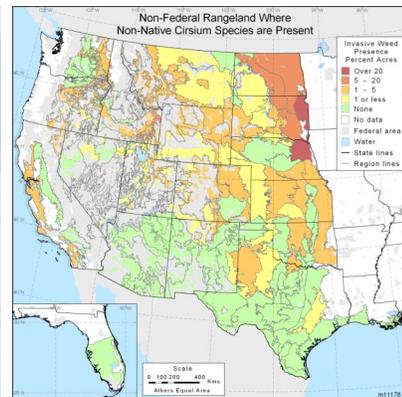
9. Annual bromes



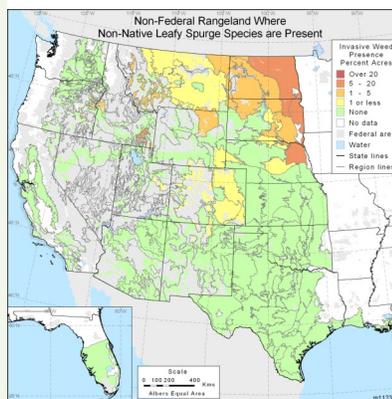
10. Centaurea



11. Cirsium



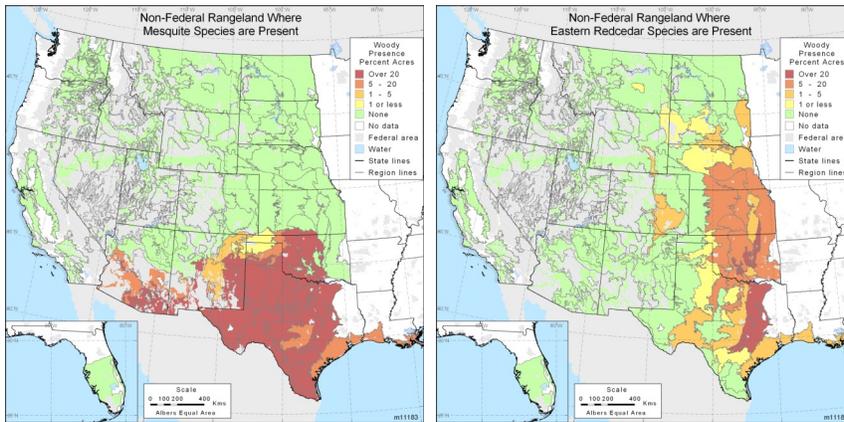
12. Leafy spurge



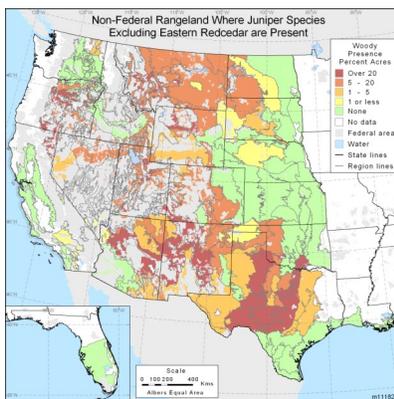
Figures 13-15. Non-Federal rangeland where native invasive woody species are present.

13. Mesquite

14. Eastern redcedar



15. Junipers other than eastern redcedar



More Information

For more information about the NRI, visit <http://www.nrcs.usda.gov/technical/NRI/>

Send comments and questions to the NRI Help Desk (nri@wdc.usda.gov).