S U S T A I N A B L E R A N G E L A N D S R O U N D T A B L E

SRR UPDATE

Promoting the social, ecological, and economic sustainability of rangelands through the development and widespread use of the criteria & indicators for rangeland assessments, and by providing a forum for dialogue on sustainability of rangelands.

YEARLY UPDATE OF SRR SPRING 2005

Sustainable Rangelands Roundtable Criteria and Indicators for Standardized Inventory, Monitoring, and Reporting

The conservation and sustainable management of our natural resource base is critical. Ten governments, including the United States, agreed to the Santiago Declaration and are participating in the Working Group on Criteria and Indicators (C&I) for the Conservation and Sustainable Management of Temperate and Boreal Forests. This "Montreal Process" Working Group was formed in Geneva, Switzerland in June 1994 to develop and implement internationally agreed criteria & indicators.

Rangelands comprise ~ 70% of the earth's land surface. Rangelands and the people who are connected to these lands face increased pressures to long-term sustainability. The development of "Criteria and Indicators" for the conservation and sustainable management of rangelands is a high priority and is receiving increased international attention. Without an effective way to accurately monitor social, ecological and economic aspects of rangeland sustainability, it is difficult to measure progress toward sustainability. Consistent, standardized baseline information is needed to provide a common language for assessment and planning that will lead to proper and effective decision making.

The Sustainable Rangelands Roundtable had its formal beginning in 2001. Participants have included rangeland scientists and managers, ecologists, sociologists, economists, policy and legal experts, environmental advocates, agency staff, and industry representatives. Today the group has over 100 participants, representing more than 50 organizations. Funding has been provided by Colorado State University, the Agricultural Research Service, Forest Service, Natural Resources Conservation Service, Bureau of Land Management, and US Geological Survey. Though funding was important, the volunteered time and effort of participants has been the most valuable contribution. Over 4 years, the group has held 19 2-day meetings. Between meetings, participants help with special projects, like the conceptual model, trade exhibits, presentations and symposia like this SRM meeting.

A comprehensive set of "Criteria and Indicators" has been suggested by the Sustainable Rangelands Roundtable. In 2003, participants collaborated to identify 64 indicators, categorized under 5 criteria, and released them as part of the group's First Approximation Report on Criteria and Indicators for Sustainable Rangelands.

The 5 criteria are summarized as follows:

- Conservation and maintenance of soil and water resources on rangelands.
- Conservation and maintenance of plant and animal resources on rangelands.
- Maintenance of productive capacity on rangelands.
- Maintenance and enhancement of multiple social & economic benefits to present & future generations.
- Legal, institutional, and economic frameworks for rangeland conservation and sustainable management.

In keeping with the Sustainable Rangelands Roundtable mission, SRR aims to promote widespread use of criteria and indicators and to provide a forum for dialogue on rangeland sustainability. Material presented in this brief summary will be further detailed in the 'Progress Report' to be produced for distribution by the Sustainable Rangelands Roundtable in Spring 2005.

SRR C & I and the Agricultural Research Service (ARS)

The Agricultural Research Service (ARS) is the in-house research arm of the USDA. The ARS mission includes providing knowledge and technologies to farmers, ranchers, and other land managers to help manage the Nation's land in a productive and fully sustainable manner. Core to these developing technologies is an in-depth understanding of ecological processes as they relate to the management and conservation of rangeland, pasture, and forage resources. New understandings and technologies being developed at over 35 ARS locations include an array of indicators within SRR Criterion 1 (Soil & Water), 2 (Plant & Animal Resources), and 3 (Productivity Capacity).

Specific to Criterion 1 are new technologies and advanced understandings that are being developed for inventorying and monitoring changes in soil organic matter content (Indicator 1) and soil microbial activity (Indicator 3). This is important because both of these "soil quality/health" indicators are believed to be tied closely to the ecological sustainability of rangelands. Extensive efforts are also being expended to understand and accurately assess the effects that varying amounts of bare ground/foliage cover (Indicator 4) have on long-term sustainability as well as the impact that varying management tactics have on rates and amounts of water and wind erosion (Indicator 5), water quality (Indicator 7) and overall hydrologic function (Indicator 9).

Developmental technologies related to Criterion 2 include refined use of remote sensing and other rapid, broad based technologies for monitoring changes in amount (Indicator 1), type (Indicator 2), and landscape level distribution patterns (Indicator 4) of rangelands, riparian areas within rangelands (Indicator 7), and rate, extent, and pattern of invasive weed infestations (Indicator 8). Likewise, similar technologies are being used to monitor sustainability as it relates to changes in Criterion 3 indicators such as aboveground biomass (Indicator 1) and annual productivity (Indicator 2).

The linkages between ARS and SRR are more subtle than the linkages between SRR and the Nation's premier land management agencies such as the US Forest Service (FS), Bureau of Land Management (BLM), and the Natural Resource Conservation Service (NRCS). This is because ARS research efforts are focused on developing new understandings and technologies for use in inventorying and monitoring the ecological health and sustainability of the Nation's rangeland ecosystems at a variety of scales, whereas FS, BLM, and NRCS are charged with actually inventorying, monitoring, and assessing the ecological health and well-being of our Nation's rangelands. Thus, the linkage between these land management agencies and SRR is obvious, direct, and critical to accomplishing like-minded land management goals and objectives. But these linkages are no more compelling than those between ARS and SRR as manifested through the continual exchange of ideas relative to: 1) the scientific merits of varying criteria and indicators, and the challenges associated with the technical capacity required to; 2) accurately inventory and monitor changes in varying indicators in a timely manner; and 3) accurately summarize and precisely interpret said monitoring data. These linkages SRR are critical as new rangeland inventorying and monitoring challenges emerge and new understandings and associated technologies are developed to effectively meet these challenges.

SRR C & I and the U.S. Environmental Protection Agency (EPA)

The U.S. Environmental Protection Agency's Environmental Monitoring & Assessment Program (EMAP) has been developing a set of spatial or landscape metrics for a 12-state area (Arizona, Colorado, California, Nevada, Utah, Wyoming, Montana, Idaho, North Dakota, South Dakota, Oregon, & Washington) with the aim of assessing ecological conditions of terrestrial ecosystems across this large region. One of the primary goals of this project is to link observed conditions of terrestrial systems to surface water conditions, as well as to measure potential stressors and biophysical conditions that might account for observed conditions. The project includes all terrestrial biome-types, including forests, woodlands, and rangelands.

Advances in computer technology and geographic information systems (GIS), and new spatial databases derived from remote sensing and other sources (for example, the National Land Cover Database or NLCD) make it possible to calculate a relatively large number of landscape metrics at relatively fine scales (30 meters). Many of these spatial databases have attributes that can be related to important attributes of ecosystems that relate to condition … for example, attributes related to structure and function. Field data (e.g., measures of surface water quality) are used to validate conditions, improve metric interpretation, and to develop spatially distributed, landscape models that link watershed and riparian metrics to observed watershed and riparian metrics to observed water quality conditions in surface waters. Once quantitative relationships are developed, it is then possible to apply the model to the spatial data to evaluate potential surface water conditions across the entire region.

Examples of landscape metrics being used in the project include: (1) the proportion of different land cover types, (2) road density and distance to the nearest road, (3) agricultural areas on steep slopes (> 3%), (3) human population density, (4) a topographic position index (to look at the influence of near-site topography), (5) a U-Index (the amount of anthropogenic cover), (6) an N-Index (the amount of natural land cover), (7) roads crossing streams, and (8) an index of fragmentation of natural cover types. The project is also developing and applying spatial models, including a modified soil loss model and a grazing intensity model. These models use a combination of spatial data on topography, soils, hydrology, vegetation, and precipitation to evaluate spatial patterns of erosion and grazing pressure. Land cover, road, human census, digital elevation (DEM), stream network, geology, soils, and climate data are among the types of spatial databases used to generate metrics and to run models. Data on surface water conditions come from EMAP stream survey samples, the USGS NAWQA program, and from STORET. Additionally, the US EPA Landscape Ecology group in Las Vegas, in collaboration with the USDA Agricultural Research Service in Tucson, Arizona, has developed user-friendly GIS extensions that generate landscape metrics at different scales (Analytical Tools Interface for Landscape Assessments or ATtILA) and that run spatially distributed watershed models to evaluate run-off and sedimentation (Automated Geospatial Water Assessment or AGWA tool). Results of these models are then combined with landscape metrics and compared against observed stream water quality at a range of scales (watershed, riparian zone, near-site) using multivariate and Bayesian statistical techniques.

Metrics and indicators generated by the Western EMAP project relate primarily to Criterion 1 of the Sustainable Rangeland Roundtable Criteria and Indicators for Sustainable Rangelands, and in particular, indicators related to: (1) Area and percent of rangeland with a significant change in extent of bare ground, (2) percent of surface water on rangeland areas with significant deterioration of their chemical, physical, and biological properties from acceptable levels, and (3) area and percent of rangeland with accelerated soil erosion. The group has focused on the surface water aspect because of EPA's role in protecting and enhancing the Nation's water resources, and because there are few studies that have linked terrestrial ecosystem conditions to surface water conditions in the western US. For future information on the Western EMAP Pilot project go to either:
http://www.epa.gov/emap/west/index.html
http://www.epa.gov/nerlesd1/land-sci/western-us.htm.

SRR C & I and the Forest Service

The Forest Service has a legal mandate under the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) to produce a decennial assessment of the status in supply, demand, and trends of renewable resources coming from all forests and rangelands of the United States. The Agency also has a legal requirement for monitoring for purposes of research, planning, and management embedded in several laws, including the Forest and Rangelands Research Act of 1978.

The first comprehensive RPA Assessment was published in 1980. The chapter on rangelands focused upon range condition and the future supply and demand for rangeland forage. The Assessment estimated that about one half of all rangelands in the 48 conterminous states were in fair to good condition. It projected that a 46 percent increase in demand for forage between 1980 and 2030 would increase pressures to expand livestock grazing on both publicly and privately owned rangelands. The 1990 Rangeland Assessment technical document, alternatively, concluded that private rangelands could satisfy demands for increased forage over the next 50 years, thus allowing public land managers to accommodate an expanding public interest in natural and other amenity values. The 2000 Assessment (http://www.fs.fed.us/rm/pubs/rmrs_gtr68.html) also examined rangeland health and productive capacity, showing that rangeland health, although measured differently over the 20 years, had clearly improved during this time in most regions. All three Assessments relied upon a patchwork of data and models available at the time from various agencies and other sources.

Different issues from those of 20 years ago are having major effects on the status and trends of rangelands and their use. Some of the most prominent factors include invasive species, fragmentation by exurban development, and increasing demand for clean water and other ecosystem services. Another fundamental shift has been an expansion in the criteria for assessing rangelands from ecological measures alone to a triad of ecological, economic, and social aspects. These include soil and water conservation, maintaining native plant communities and animal populations, maintaining productive capacity, maintaining long-term socioeconomic benefits derived from rangelands, and maintaining a legal, institutional, and economic framework for rangeland conservation and sustainable management.

The Sustainable Rangelands Roundtable has identified 64 indictors that are correlated with the five criteria listed above. Participants in the Roundtable recognized, however, that financial and technical limitations will rule out comprehensive assessments using all 64 indicators, so they recently converged upon a set of 26 core indicators that can be monitored and reported upon to some extent. Although the RPA calls for recurring assessments of "renewable resources," the law does not limit their extent, which means that the Assessment can report upon trends in all relevant social, economic, and legal variables needed to assess regional and national trends pertaining to U.S. rangelands.

Complicating both the RPA and the SRR, no U.S. national plot-based monitoring system is in place to allow the estimation of biotic and abiotic indicators of rangeland sustainable management not obtainable by remote sensing. The Forest Service collects data under its Forest Inventory and Analysis (FIA) Program from a sampling grid that includes all forests and woodlands on both federal and non-federal lands. The FIA grid does not extend onto non-forested lands, however. The only U.S. national-level sampling program on rangelands is the National Resources Inventory (NRI). Carried out by USDA-NRCS, the NRI grid does not extent onto federal rangelands, leaving a large monitoring gap. Until this gap is somehow closed, monitoring trends on all rangelands will be problematic.

SRR C & I and the USDA Natural Resources Conservation Service (NRCS)

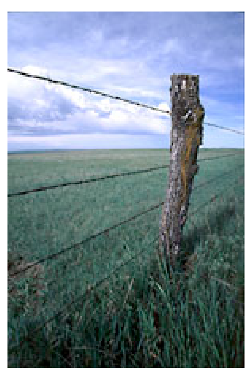
The primary emphasis of the USDA Natural Resources Conservation Service (NRCS) is to conserve, maintain, and improve our natural resources, particularly on private lands. Some of the SRR criteria and indicators are identical or similar to those in use by NRCS while other criteria and indicators are not used. Historically, the NRCS framework for conservation planning and natural resource management has been soils, water, air, plants, and animals (SWAPA). This effectively skews the mission and efforts of NRCS towards the first three of the SRR criteria: "Conservation and Maintenance of Soil and Water Resources of Rangelands","Conservation and Maintenance of Plant and Animal Resources on Rangelands", and"Maintenance of Productive Capacity on Rangelands". For the indicators of these three criteria, the primary NRCS inventory and monitoring program is the National Resources Inventory (NRI). Of current note, NRCS is in the midst of a special three-year NRI specifically on rangelands. Other minor inventories are conducted as part of traditional conservation planning.

There are several potential standards against which these inventories are compared. The primary standard is the ecological site description. The institutional housing for these descriptions is the Ecological Site Information System (ESIS). However, many descriptions have not currently been entered in this storage system. Instead, many descriptions are located in the electronic Field Office Technical Guide (eFOTG). Another standard is the soil survey. The primary location is the National Soil Information System (NASIS). This database, however, is primarily for users internal to the soil survey program. Soil survey information is available to the public through the NRCS Soil Data Mart. Occasionally, standards (site descriptions or soil survey) have not been completed, or are significantly outdated. In such cases, the only standard of comparison for NRI data are earlier NRI data.

NRCS also collects data on indicators not currently accepted by SRR. Significant among these is a sizable amount of climate data. Fairly unique to NRCS are programs addressing soil climate (SCAN data network) and snow-pack (SNOTEL data network). However, there are many other sources for climate and weather data, especially for precipitation and temperature. Many of SRR's criteria and indicators are directly affected by climate. By following weather and climate trends (relatively low-cost and available) as a surrogate, the correlated trend of other indicators (potentially high-cost or currently undeveloped) can be predicted.

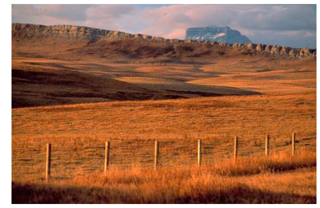
SRR C & I and the Bureau of Land Management (BLM)

The BLM has been entrusted with stewardship responsibility for the multiple-use management of natural resources on nearly 262 million acres of public land, much of which is rangeland. The BLM has legal mandates for national-level (BLM-wide) reporting of rangeland condition and trend in rangeland condition. These legal mandates are The Federal Land Policy and Management Act (FLPMA) of 1976, and the Public Rangelands Improvement Act (PRIA) of 1978.



How does BLM comply with FLPMA and PRIA regarding national-level reporting of range condition and trend? BLM reports percent of rangeland acreage by ecological status, by state, in 2 publications: USDI-BLM's annual Public Land Statistics, and BLM's Annual Report. If looked at over a series of years, the ecological status data in these reports have been interpreted as trend in rangeland condition over time. Several problems with BLM's way of reporting rangeland condition have surfaced, relating to the scientifically-obsolete concept of ecological status, the lack of rangeland condition data on all BLM-administered rangelands, and the old (more than 20 years) age of much of the data.

Given these problems, BLM is considering a"course correction". Two courses are being considered. The first course is identifying a minimum set of aquatic, riparian, and upland rangeland indicators which could be <u>quantitatively</u> reported nationally for land health. SRR indicators are being seriously considered here. For example, bare ground, invasive plants, and aquatic macroinvertebrates, 3 indicators from SRR, will likely be in the final minimum set. BLM will have a need for data sets and data collection methods for these indicators.

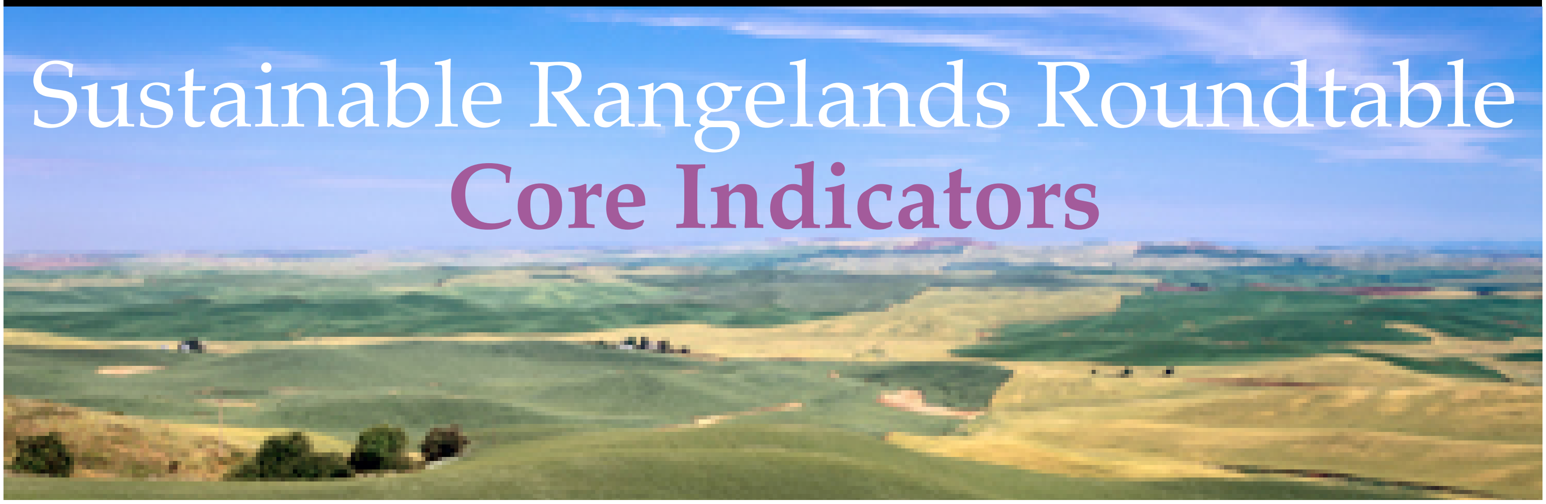


SRR will serve BLM's need here because SRR has been identifying the currently available data sets for all of its 64 indicators, and SRR is sponsoring a workshop in May 2005 on indicator data sets and data collection methods.

The 2nd course is a roll up of BLM's Land Health Standards data from the field office level to the state office level to a BLM-wide level, resulting in a <u>qualitative</u> report of land health at the national level. Land Health Standards are ecologically-based goal statements that BLM gauges resource conditions against, to identify needed changes in land uses such as livestock grazing. Suites of indicators are associated with each Land Health Standard and are measured to evaluate whether Standards are being achieved. Although these suites of indicators were identified prior to SRR, many of these indicators are the same as those identified by SRR. BLM field offices currently have discretion to measure select indicators out of the suite available, but BLM is considering requiring at least a minimum set of aquatic, riparian, and upland indicators be part of all Land Health Standard assessments and in all land use plans. Some SRR indicators will likely be included in the minimum set.

In summary, BLM regards SRR indicators as credible. BLM currently is in the process of making course corrections for future national-level (BLM-wide) reporting of land health. For quantitative reporting using a minimum set of aquatic, riparian, and upland indicators, and for qualitative reporting using Land Health Standard assessments, BLM intends to use some SRR indicators.

Sustainable Rangelands Roundtable
Core Indicators



I. Conservation & maintenance of soil and water resources

Soil-based

1. Area and percent of rangeland soils with significantly diminished organic matter and/or high Carbon:Nitrogen (C:N) ratio.
4. Area and percent of rangeland with a significant change in extent of bare ground.
5. Area and percent of rangeland with accelerated soil erosion by water or wind.

Water-based

6. Percent of water bodies in rangeland areas with significant changes in natural biotic assemblage composition.
7. Percent of surface water on rangeland areas with significant deterioration of their chemical, physical, and biological properties from acceptable levels.
9. Changes in the frequency and duration of surface no-flow periods in rangeland streams

II. Maintenance and conservation of plant and animal resources on rangelands

12. Rangeland area by plant community.
14. Fragmentation of rangeland and rangeland plant communities.
17. Extent and condition of riparian systems.
18. Area of infestation and presence/absence of invasive and other non-native plant species of concern.
20. Population status and geographic range of rangeland-dependent species.

III. Maintenance of productive capacity on rangelands

21. Rangeland aboveground phytomass.
23. Number of domestic livestock on rangeland.

IV. Maintenance and Enhancement of Multiple Economic and Social Benefits to Current and Future Generations

27. Value of forage harvested from rangeland by livestock.
32. Rate of return on investment for range livestock enterprises.
33. Number of conservation easements purchased.
39. Index of social structure quality.
43. Sources of income and level of dependence on livestock production for household income.
44. Employment diversity.
47. Value produced by agriculture and recreation industries as percent of total.
48. Employment, unemployment, underemployment, and discouraged workers by industrial sector.
49. Land tenure, land use, and ownership patterns by size classes.
50. Population pyramid and population change.

V. Legal, institutional and economic framework for rangeland conservation and sustainable management

59. Professional Education and Technical Assistance. Extent to which laws, regulations, and guidelines, institutions, and organizations provide for professional education and the distribution of technical information and financial.
60. Land Management. Extent to which land management programs and practices support the conservation and sustainable management of rangelands.
63. Measuring and Monitoring. Extent to which agencies, institutions and organizations devote resources to measuring and monitoring changes in the condition of rangelands.
64. Research and Development. Nature and extent of research and development programs that affect the conservation and sustainable management of rangelands.

Integrate Social and Economic Indicators with Ecological Indicators for Rangeland Monitoring?

Who would want to do that?

Ecological systems (such as watersheds, prairies, and forests) and processes (such as reproduction, growth, death, decomposition, succession, migration, adaptation, water cycles, nutrient cycles, carbon cycles, etc.) provide the biological interactions underlying ecosystem health and viability. Social and economic infrastructures and processes (such as demand, investment, depreciation, management, social regulation, production, consumption, social interaction, institutional processes, etc.) provide the framework or context in which rangeland use and management occurs, and in which rangeland health improves or deteriorates. All these systems and processes interact and feed back on each other to change stocks of natural and human capital and conditions over time.

An integrated conceptual framework has been developed to explicitly recognize and highlight that ecological and natural resource processes affect and are affected by social and economic processes, capacities, and capitals. An example of such effects is extractions from rangelands that provide goods, ultimately for human use. Forage is extracted by livestock and wildlife. Various plants are extracted from rangeland ecosystems for herbal and medicinal uses, among others. Water is extracted from rangeland ecosystems for irrigation and human consumption. Such extracted products are demanded by people and enter into the production of goods and services, supporting jobs and lifestyles among other things. They are used, consumed or traded, and contribute to social capacity, economic capital, and to human well-being (both of individuals and of communities that depend on rangelands). As part of the extraction process, biomass is removed affecting the stock of natural resource capital. Byproducts of extraction, extraction processes, and the resulting production processes affect biophysical conditions through such mechanisms as generation of waste products, soil erosion, succession of species, etc. These effects are driven largely by economic demands for goods and services, fueled by underlying preferences and social norms and expectations.

Beyond those relatively straightforward extractions from rangeland ecosystems are extractions of habitat and rangeland itself. Increasing and migrating human populations encroach on rangeland. Use changes from grazing and open space to residential development and subdivision resulting in fragmentation of habitat. Basic changes occur in the composition of species as development takes place and landscaping replaces many of the native plants, exotic and invasive species might be introduced and spread, and native wildlife species might become pests and nuisances leading to their removal from parts of the ecosystem, among other effects. These effects are largely driven by population processes and by social norms and preferences for lifestyles, balanced by management and social regulation.

Likewise, social and economic processes affect and are affected by biophysical conditions and natural resource capital, and by ecological and natural resource processes. Ecosystem services refer to a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life. These ecosystem services are used by humans, whether they recognize it or not, and contribute to human well-being. Human use of rangelands and rangeland ecosystems can profoundly affect the extent and quality of ecosystem services produced by rangelands. Human population processes can affect the amount and integrity of rangelands available to produce ecosystem services, which over time affects human well-being.

Indicators are intended to provide measures of key variables that will inform and facilitate monitoring and periodic assessment of the condition and functioning of rangeland ecosystems over time. Because human actions and influences can affect the extent and condition of rangelands, it is important to monitor human use of rangelands and the human influences on rangeland condition. Such uses and influences are, in turn, driven by underlying social and economic conditions and processes. Monitoring those driving conditions and processes will allow decision makers insight into how and why impacts on rangelands occur, and allow the possibility of proactive management to prevent or mitigate rangeland degradation or to enhance rangeland health and sustainability. It is also important to understand how changes in rangeland ecosystems affect the well-being of communities that depend on them.

Sustainable Rangelands Roundtable -- Indicator #18

Area of Infestation and Presence/Absence of Invasive and Non-Native Plant Species of Concern

What is the indicator?

Invasive species have been defined as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health" (Exec. Order #13112, 1999). These species have been shown to negatively impact native biodiversity, ecosystem functions/processes, animal and plant health and human economies (Carey, 2003).

Why is it important?

The presence of these noxious or invasive species within rangeland systems is an indicator of past or current weaknesses of the system and a degradation of the functions and processes associated with "healthy" ecosystems. Invasive species, typically, have high growth rates and reproductive potential with dispersal mechanisms that allow them to readily move across a landscape. As the extent of these invasions expand across the landscape, changes within functions and/or processes may result in an irreversible decline in the overall productivity of the rangeland system. Pimentel et al. (1999) estimated that major environmental damages or losses in the USA, attributed to invasive species add up to over $138 billion per year and that 42% of current Threatened/Endangered species are at risk primarily because of non-indigenous species.

What does the indicator show?

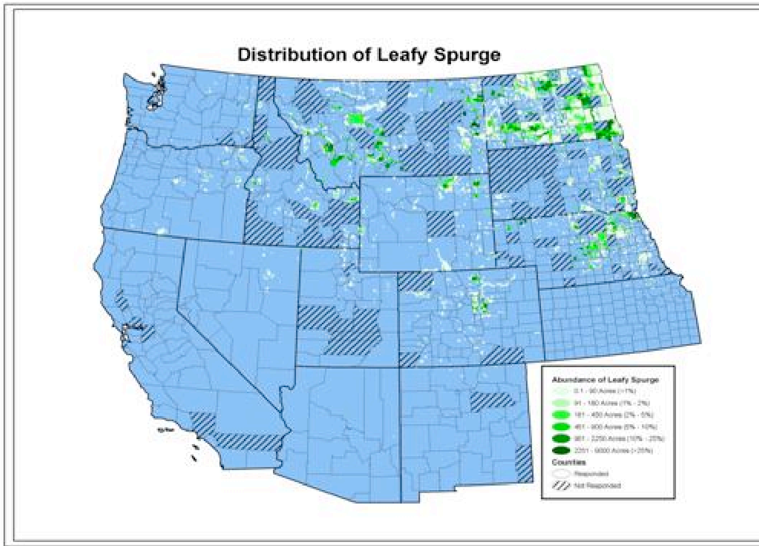
Depending on data availability and the desired scale of user, the "Invasive Species" indicator is designed to track the presence/absence and the area of infestation of invasive or non-native species of interest on rangelands over time. The information gained from monitoring the indicator will provide information for land managers in development of strategies to combat these invasive and noxious weeds.

Illustration of indicator through two invasive species:

The following provides an illustration using two species; however, ultimately, the indicator will be based upon datasets providing information for all species classified as invasive.

Limitations, Data Gaps and Related Issues:

At this time, there are no centralized databases that provide extensive information for all invasive species throughout the United States. Many individual states or regional collaborations collect data and maintain databases on specific species, especially plants (see the illustrations). Databases are maintained by organizations such as NRCS (National Resource Conservation Service), Natureserve, HEAR (Hawaii Ecosystems at Risk). International efforts are supported by organizations such as GISP (Global Invasive Species Program), IUCN, IABIN and NABIN. Efforts at making the existing databases interoperable have led to limited success. However, efforts being led by FICMNEW, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, (comprising agencies from within USDA, USDOI, USDOT, USDOD, USDOE, USEPA) are working towards the development of more thorough and centrally located data that would be a significant source of information in the application of the indicator. NISC (National Invasive Species Council) maintains the invasivespecies.gov website that serves as a centralized location for information on invasive species. Further actions should be made to expedite the development of a national database for invasive species.



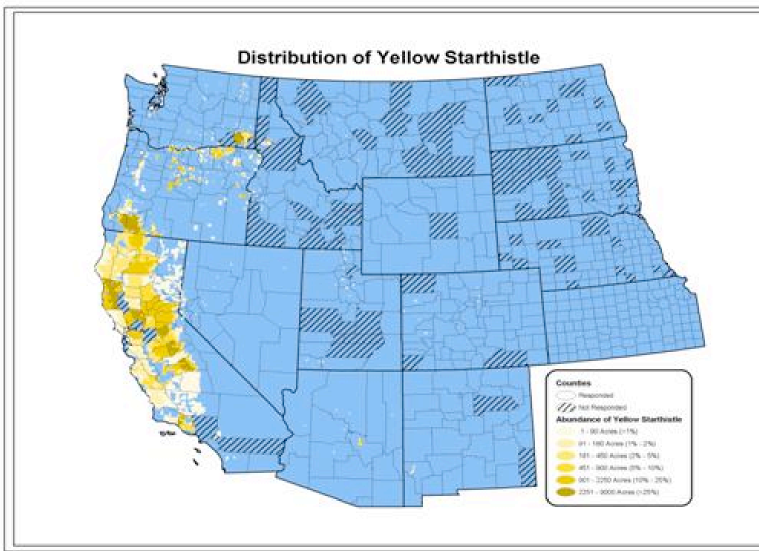


Figure 1
Maps Depicting the Distribution and Abundance of Leafy Spurge (Euphorbia esula) and Yellow Starthistle (Centaurea solstitialis) in the Western United States.

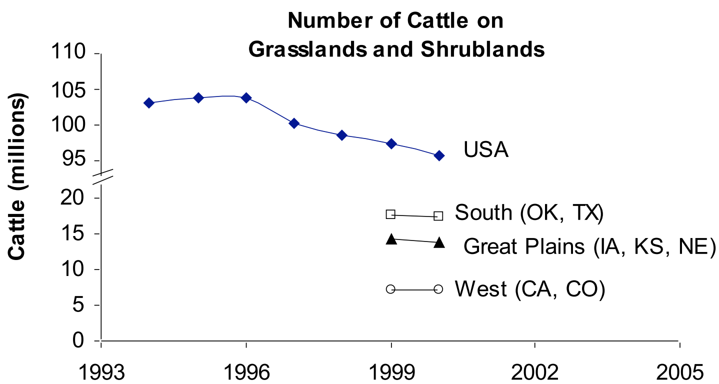
Eric Lane - Project Leader: Western Weed Coordinating Committee - organization running the project, Lakewood CO. Additional funding for this project from the Center for Invasive Plant Management

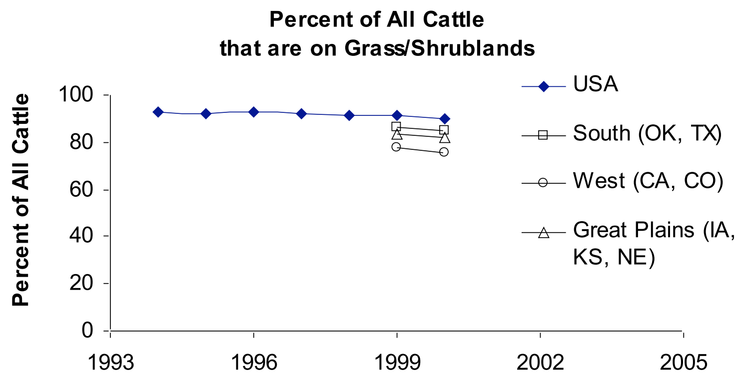
Sustainable Rangelands Roundtable -- Indicator #23

Number of Domestic Livestock on Rangeland

What is the indicator & why is it important?

Cattle production is one of the most important economic uses of grasslands and shrublands, and remains an important part of the social fabric of many parts of the West. The annual per capita consumption of beef has remained constant over the past decade, but, with an increasing U.S. population, demand for beef is expected to slowly increase. The number of cattle on grasslands and shrublands is a direct indicator of the degree to which these lands produce this important commodity. The fraction of all cattle that are on grasslands and shrublands (as opposed to those in confined feeding operations or feedlots) has remained steady within a range of 90 to 93 percent during the reporting period.





What does the indicator show?

The number of cattle on grasslands and shrublands declined nationally from 103 million in 1994 to 96 million in 2000. This change reflects the bottoming of a cattle cycle. The U.S. cattle inventory has undergone cycles lasting roughly 10 years since the 1880's. According to other data, the U.S. national herd size has stayed fairly constant over the past two cycles and is expected to remain so in the next decade. Collectively, the seven states shown above have about 40 percent of all U.S. cattle on grasslands and shrublands during the summer.

How to Interpret these Data:

These data are intended to represent the degree to which grasslands and shrublands are used for raising cattle. Since many cattle spend some time on feedlots for finishing prior to slaughter, we have chosen to report cattle that are feeding on grasslands or shrublands, including pastures, in July as the most representative of overall conditions. In winter, some cattle are placed on croplands to consume plant products left behind. More importantly, the digestibility and amount of protein of grass plants decline greatly in winter, so the forage supply on grasslands and shrublands is inadequate. Thus, in many regions, ranchers must feed hay to cattle in winter.

Limitations, Data Gaps and Related Issues:

These data are from reports produced by USDA National Agricultural Statistics Service (NASS). The data may be obtained from their on-line data base at http://www.usda.gov/nass/. NASS obtains data using surveys to farmers, ranchers, and feedlot owners.

Cattle numbers on grasslands and shrublands are estimated by subtracting the number of cattle on feed from total cattle numbers in July. Total cattle numbers include cows that have calved, bulls, heifers, steers, and calves. Most calves have not weaned by July; however, increased forage consumption by lactating cows compensates for it as an indicator of grassland/shrubland use. The number of cattle on feed includes steers, heifers, cows, and bulls. NASS estimates for cattle on feed in July underestimates true numbers because the data only include animals in feedlots holding at least 1000 animals. We don't expect this difference to be substantial because many smaller feeding operations are found on farms and ranches where livestock are not confined in summer. Past cattle numbers are limited by a lack of feedlot data prior to 1994 and total cattle numbers by state between 1981 and 1998.

Photo from http://www.nps.gov/para/photos/Cows_Diamond.jpg