



Local Impacts of Fire:

A Sustainable Rangelands Roundtable

Criteria and Indicator Based Assessment

Fire and Rangelands

Fire is a natural disturbance factor as well as a valuable management tool for rangelands. It is a key ecological driver in many ecosystems, facilitating nutrient cycling and promoting the growth of grasses and forbs over woody species; periodic fire maintains a number of major grassland, shrub steppe, and savanna ecosystems. Where climate and vegetation favor burning, fire occurs frequently and species exhibit differing adaptive response mechanisms.



Saw palmetto stand in Florida maintained by fire. Photo credit: John Tanaka, Oregon State University.

Fire is a Local Disturbance Factor

Monitoring fires is critical if private and public land managers are to understand how fires impact natural ecosystems and their processes. Fire events are inherently local, occurring across landscapes occupied by different plant communities and land uses. Consequently, data sets describing fire must be tied to local conditions. Fire is one aspect of ecosystem health that needs to be aggregated from the management-unit level to broader scales if the associated indicator is to have utility for agencies and scientists.

SRR Indicator on Fire Integrity

The Sustainable Rangeland Roundtable (SRR) has one indicator addressing fire; *Integrity of Natural Fire Regimes* is included in the 10 indicators developed for the criterion, Conservation and Maintenance of Plant and Animal Resources on Rangelands. This indicator quantifies the area of rangeland burned each year, describing burned acres in terms of location, season, and fire intensity.

Whether the area of rangeland burned is within the historic range of variation for the ecological sites and landscapes where the fires occur is a research question that has not been wholly answered. However, the necessity of relating the extent of rangeland burned to an ecological integrity metric reinforces the fact that this indicator must be assessed at a local scale in order to be considered for regions and the Nation as a whole.

Use of Multiple Indicators

Experts recognize that human activities have shifted the season, intensity, and frequency of fire from historic patterns in a number of rangeland ecosystems. Scientists will be better equipped to address local land management concerns about using and fighting fire if they can associate fire behavior with related disturbance factors.

Additional SRR indicators affected by fire include:

- ❖ Annual productivity
- ❖ Ecosystem and landscape fragmentation
- ❖ Area and level of infestation by invasive weeds
- ❖ Presence and status of species of concern
- ❖ Presence and extent of representative species

- ❖ Area of rangeland with accelerated erosion
- ❖ Change in extent of bare ground

Furthermore, a number of economic and social indicators can be correlated with fire effects at a broader scale. A significant value of criteria and indicators for monitoring rangelands will be the enhanced ability to measure these various factors at different scales.



Photo credit: University of Nevada, Reno

Prescribed fire is a useful rangeland improvement tool in fighting the spread of invasive species like cheatgrass (above). Monitoring the spatial and temporal application of prescribed fire is equally as important as surveying wildfire on rangelands.

Fire Across Boundaries

Fire, like invasive species and other disturbances, ignores political, administrative, and land use boundaries. Consequently, assessing how natural fire regimes and prescribed burning transform ecosystems and rangeland-dependent communities will require protocols for measuring how the area and spatial and seasonal distribution of fire vary over all land management categories.

An advantage of a criteria and indicator set, applicable at multiple scales, is the emphasis on standardizing data collection programs across different agencies and organizations that monitor the status and trends of individual indicators. Whether looking at fire patterns in a county, state, region, or for all U.S. rangelands, a consistent set of agreed-upon indicators will make monitoring easier

and more statistically effective for researchers and land managers.

Data Collection & Monitoring Protocols

Presently, some data are available on acres burned at the regional-national level, but data collection methods and procedures are not standardized. Data about the precise location and seasonality of fires are largely unavailable.

Remote sensing technology has high potential for monitoring the extent and spatial distribution of fire across administrative borders. For example, scientists at the Goddard Space Flight Center are mapping fire activity worldwide using the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's TERRA satellite.



Map of Oregon fire created from MODIS data. Photo credit: FS Remote Sensing Applications Center)

Digital remote sensing data are especially useful because of their applicability at multiple spatial scales, including local management units. Thus, information about the area, spatial distribution, and seasonality of fires across administrative and political boundaries is uniformly collected and available for analysis and incorporation into management plans and practices.