SRR Ecological Assessment Indicators: Selection and Monitoring Techniques

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Ranch Assessment Indicators

- **Soils** - Bare soil cover, Soil aggregate stability
- **Water** - Surface water frequency, Volume
- **Plants** - Key species, Invasives
- **Fire –** Wildfire, Prescribed fires
- **Riparian** Areas - Extent and condition
- **Animals** - Population estimates of wildlife/fish/feral species important to the rancher
- **Productive capacity** - Forage utilization, Pounds of domestic meat produced, Pounds of harvestable materials produced

Why these indicators?

- Resource base and off-take
- Long term trends, short term annual use
- Harvest of products, kinds/ levels
- Impacts of use

Soils - Cover, Aggregate Stability

- Fundamental resource sustaining plant growth and habitat for organisms

SOIL -General Approach

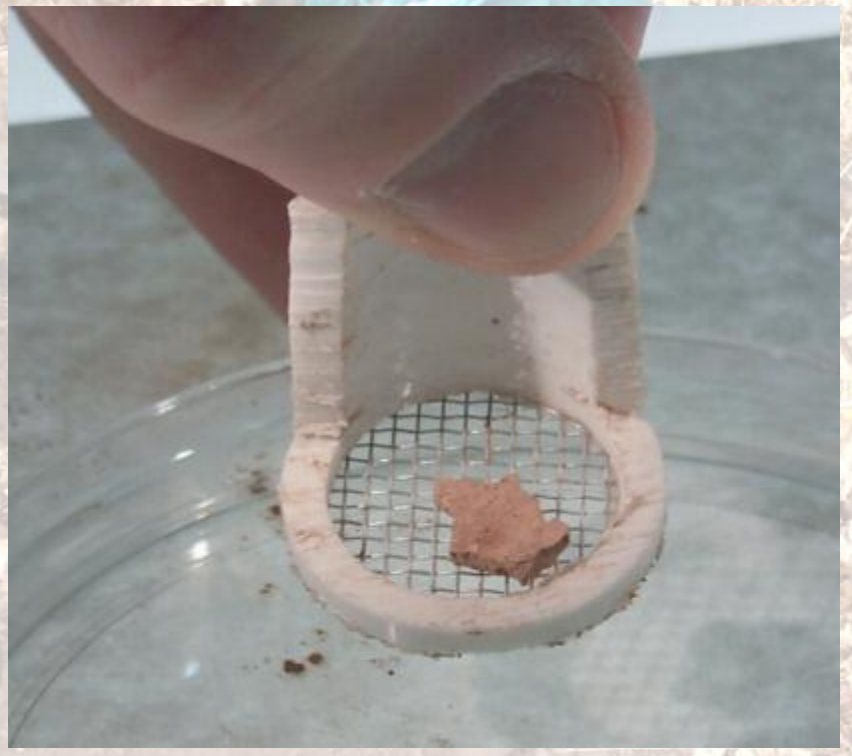
- Pertinent to watershed values, runoff, erosion, and infiltration
- Plant growth
- Easy to measure

SOIL-Specific methods

- Ground Cover- line point intercept

SOIL-Specific Methods

- Aggregate stability- test kit developed by ARS Jornada Experiment Station



SOILS- Assessment

- Ground Cover is expected to address the exposure of the surface to the action of raindrops or overland flow.
- Aggregate stability addresses the ability of the soil surface to resist the impact of raindrops or over land flow.
- For these purposes, increase in cover or stability is expected from better management.

Surface Water Availability

- Water is vital to livestock and most wildlife production and aquatic habitat values

Water - General Approach

- The availability, frequency of occurrence, distribution, and volumes of water regulate plant growth, habitat values and most activities on a ranch.
- Records from the past, current conditions, and future expectations are documented and assessed.

Water – Specific Methods

- Frequency or duration of surface water (TIME)
  - season and length of time that reliable water is available
  - water rights, storage capacity, flow rates, and locations
  - Aquatic values sustained

Water – Specific Methods

- Volume of water available (AMOUNT)
  - adequate storage (depth, volume, etc.) in existing stock ponds and tanks
  - adequate flow from a well and/or storage capacity
  - enough water, sufficiently distributed, to assist in attaining adequate grazing distribution

Water - Assessment

- For a ranch, the amount, quality, reliability, and distribution of water for livestock use and wildlife is paramount for optimizing values.
- Aquatic resources such as a fishery can be valuable for recreation or enterprises.

Plant indicators - Cover of Key Species, Invasives

- Plants are the primary production system and the resource that sustains most economic activities on ranches.
- Invasive species disrupt natural ecosystems, often reduce productivity, and are expensive to manage.

Plant indicators- General Approach

- For most monitoring objectives, measuring ground cover of key species or life forms provides adequate indication of trends in important resource values.
- Invasive plant species are more appropriately mapped and areal extent determined to facilitate rapid treatment of emergent infestations.

Plant indicators - Specific Method

- Ground Cover- line point intercept

Plant Indicators - Specific Method

- Invasive species - Mapping of locations of individual small infestations and circumference of larger infestations
- Global positioning satellite technology facilitates locating and acreage of these infestations

Plant indicators - Assessment

- Cover of key species would generally be expected to maintain or increase in abundance. Decreases would indicate that management needs changing. Utilization levels or season of use may be correlated.
- New spot infestations of invasives should be treated to limit further spread. Existing larger infestations are lower priority but must also be treated.

Wildfire and Prescribed fires

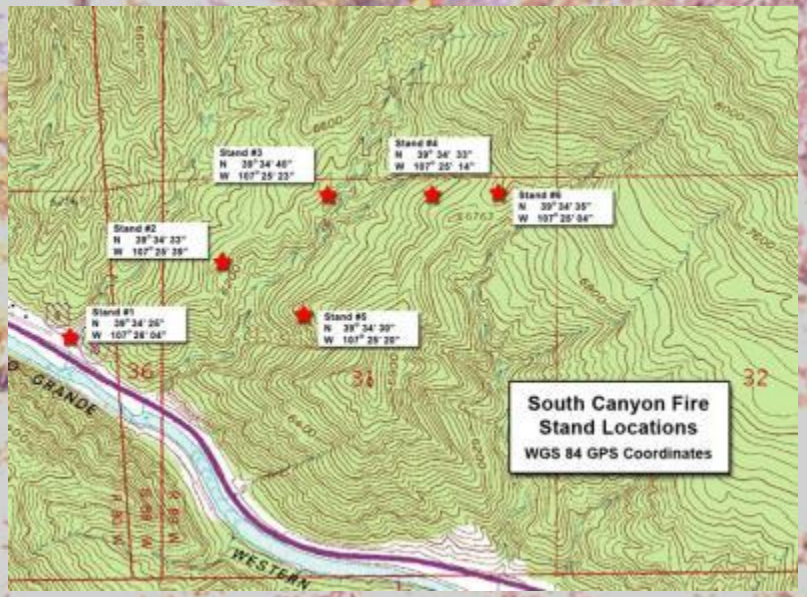
- Many ecosystems require fire for maintenance of normal function and composition.
- Other systems, such as those invaded by cheatgrass, may have crossed thresholds of composition, and have accelerated fire return intervals that limit our ability to restore the rangeland to native species.

Wildfire and Prescribed fires - General approach

- Mapping fire extent and frequency provides an indication of the need for fire management.

Wildfire and Prescribed Fires - Specific Method

- Global positioning satellite technology facilitates locating boundaries and acreage of areas burned.



Wildfire and Prescribed Fires - Assessment

- In systems where wildfire is prevalent or prescribed burning is practiced, mapping fire extent and frequency will provide indications of the need for better fire control or for prescribed burns.

Riparian Areas - Extent and Condition

- Riparian area condition is indicative of the past efficacy of grazing animal management.
- Riparian condition affects many wildlife and aquatic habitat values.

Riparian Areas Extent and Condition - General Approach

- The Properly functioning condition procedure can be used to provide a preliminary assessment of condition.
- Composition of wetland obligate grasses, sedges and shrubs that are either tolerant of water or require large amounts of water to thrive are appropriate indicators of trend in condition.

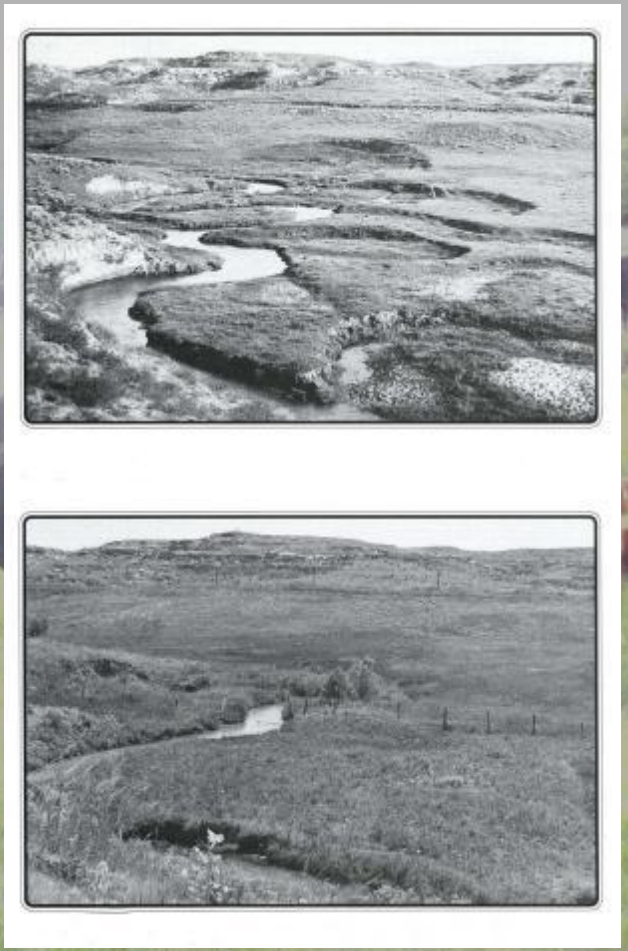
Riparian Areas Extent and Condition - Specific method

- The (Winward) greenline technique provides percent cover of plant community types along the edge of streamside vegetation and a rating of their value for streambank protection.
- The occurrence of various plant community types at intervals along transects following the edge of the vegetation nearest the water in the stream is recorded.


GREENLINE

Riparian Areas Extent and Condition - Assessment

- Stream bank condition and some aquatic values are inferred from the amount of the bank that has no vegetation or inappropriate vegetation.
- Increases in obligate aquatic plant species and the amount of bare bank are indicative of improvement in grazing management.



Animal Indicators - Population Estimates

- Wildlife, fish, or feral species important on the ranch may be indicative variously of economic opportunities, potential damage issues, or of ecosystem health.
- Hunting or fishing provides economic opportunity.
- Exotic wildlife species frequently cause damage, but some as well can be hunted.

Animal Indicators - General Approach

- The purpose of this indicator is to follow trends in specific key species population levels (abundance) of species with population measured in terms of general trends.

- Economic indicators

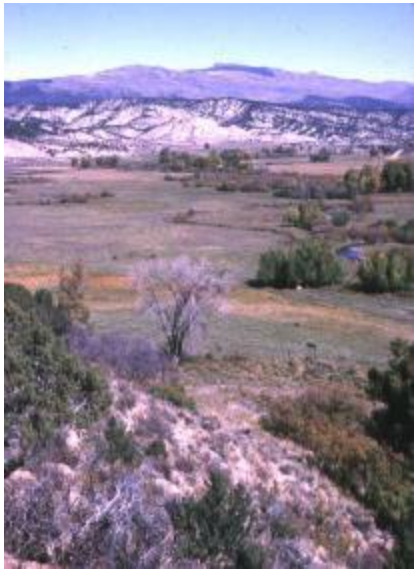
Animal indicators - Specific methods

- Pellet counts
  - Deer: Best on winter range
- Transects
  - Pheasants: Cock calls in spring
  - Turkeys: Record winter concentrations
- Wildlife monitoring camera

Animal Indicators - Assessment

- Objectives:
  - Maintain or increase population levels of beneficial species.
  - Reduce undesired exotics, like hogs.

- Increased populations through improved habitat



Animal Indicators - Assessment

- Those with trophy game management operations may be interested in sex/age ratios and trophy status of individuals.

Animal Indicators - Assessment

- Potentially endangered species may be managed to selected population levels (Cooperative Conservation Agreement with Assurances - CCAS).

Productive Capacity

- Key consideration in designing a monitoring program and crafting business plan goals.
- Carrying Capacity is directly related to forage production:
  - $\int$ Productivity = Biomass
  - Forage Biomass x % Use = Available Forage
  - Use = *f* (Palatability, Season, Range Condition)

Forage Utilization

- Utilization is an annual use measure to trigger animal movements, assure soil protection, or assure adequate forage/cover for wildlife.

- Measurements:
  - percent of forage used
  - Residual biomass
  - Animal use days

Forage Utilization Methods

- Landscape Appearance Method
- Stubble height, other measures of residual forage, e.g., Robel pole
- Animal-Use Days
- Utilization Cages (Before/After Grazing)

Pounds of Red Meat or Other Product

- A diversified operation might produce meat animals (cattle, sheep, goats, bison), hunting or other recreational opportunity.
- Record the amount produced and sold using appropriate currencies, i.e. pounds of commodity meats, numbers of purebred animals, hunter/recreation days, number of trophy hunts depending on how the product is offered/priced.

Assessing the Indicators as a Complete Suite; Does Integration Change Interpretation?

- Optimization of resource use may require tradeoffs in outputs of goods and services.
- Monitoring objectives may be different or contrary in a multiple use format to those when single use management is the goal.
- The suite of indicators viewed together should be more effective.