

APPENDIX E

MONITORING RANGELAND

What is Rangeland Monitoring

The process of observing actual grazing use on a pasture, ranch or allotment, and noting the affects of that use on the range.

THE PURPOSE IS TO SEPARATE MYTH FROM REALITY.

What A Planned Monitoring Effort Should Do:

1. Identify the nature of grazing use.
2. Identify other influences which affect the range.
3. Provide for interpretation of changes identified.
4. Determine if progress toward management objectives is being made, and if not, then
5. Provide directions for re-planning of both management objectives and/or monitoring methods if progress is not detected.

Grazing Plans or Allotment Management Plans

As the purpose of a monitoring effort is to measure progress from a baseline condition towards a defined objective, it is essential that a well-written grazing management plan be formulated.

The information required to write the grazing plan objectives will come from:

1. The goals established by the range (ranch) managers(s).
2. Goals or objective found in Resource Management Plans or 'RMP's" (BLM), or Forest Service "Forest Plans" conservation plans.
3. Other similar plans of a broad nature, such as CRM projects, stewardship efforts, etc.

IMPORTANT!

Comments and General Guides:

Inflexible grazing plans with objectives" accepted" by all' 'interested parties" rarely work. This must be carefully considered when operating within the framework of a CRM-stewardship program. Fixed plans do not produce management, as there is no such thing as an "ideal" or

"cookbook" procedure that applies to all situations. Positive changes result from the skills and dedication of land managers in the interpretation of PERTINENT information, and not from large amounts of routinely collected data. Unfortunately, few land managers are trained in "testing" the appropriateness of the various procedures developed for monitoring, or in the interpretation of data collected.

TESTING THE MANAGEMENT (GRAZING) PLAN OBJECTIVES

For each objective:

ASK:

1. Is the plan objective well enough defined to be understood by all concerned?
2. Does it describe current or historical use?
3. Does it state current composition and range condition?
4. Does it describe site potential in terms of precipitation, soil type, etc.?
5. Does it describe what the targeted composition and condition should be?
6. Does it define what has to occur to change the site from _____ to _____?
7. Does it state the time allowed for the desired change to occur?
8. Can the desired changes actually be made in the time allowed?
9. Can the desired changes be made by changes in grazing alone?
 - a. Can the desired changes be made without accompanying management changes in wildlife use?
 - b. Can the desired changes be made considering ORV and recreation use?
10. Are provisions allowed for drought, emergency- use, changes in wildlife populations and initial misinterpretation or inadequate baseline data?
11. Does it provide provisions for re-planning if progress is not detected?

*NOTE: "A provision for "MAXIMUM ALLOWABLE USE" is frequently included in a grazing plan. This provision is a product of agency directives or guides, historical utilization, off-site research and, at worst, manager prejudice. None of these are acceptable. Because of annual variation and lack of scientific documentation relating degree of utilization to other management measures, it is recommended that it not be included in a plan."

If these questions, as they apply, cannot be answered "yes", then the plan is not realistic and needs to be re-written.

Establishing Monitoring Objectives

A deliberate effort must be made to establish a monitoring plan before any "on the ground" procedures are attempted. There are some good reasons for this.

1. Everything cannot be measured. Monitoring is expensive in terms of field time and money.
2. Monitoring's purpose is to gather information that is specific for a management objective. It must be planned to meet specific needs.
3. "If you don't know where you are going, how do you know when you get there?"

TIME SPENT IN DEVISING A PLAN MAY SAVE MANY TIMES THE AMOUNT LATER WHEN THE FIELD WORK BEGINS.

Setting Objectives

The monitoring objectives may be based on the following:

1. The total management plan for the ranch or allotment (AMP's, personal plans, etc.)
2. Resource Area Management plans, Forest plans and Coordinated Resource Planning documents. (These were alluded to in the previous section.)

However, the monitoring efforts that are stated as objectives in the board plans listed in #2 are really generalized goals and will usually prove to be of little value. An actual example is:

"The will conduct variable intensity use supervision and monitoring. Monitoring will evaluate vegetative production utilization and trend, and other information necessary to develop management objectives." (Actual Quote)

This purpose is to measure everything, everywhere, all the time. If your monitoring objectives resemble this, revise them and get objective-specific.

Baseline Data Monitoring and Assembling of Pertinent Information

If no grazing or allotment plan is available, then the first monitoring objective will have to address the generation of baseline data on which specific objectives can be based. The written objective will be much broader in scope and the field work likely time-consuming. Not all the information required need come from field monitoring, however. Records may exist which will be adequate. The baseline data monitoring objective might address the following (the sources listed are not inclusive):

<u>Subject</u>	<u>Source</u>
1. Historical use	Ranch or agency records
2. Maps	SCS or other agencies
3. Weather records	SCS, Extension publications
4. Soils and potential	SCS, other agencies; records or field work
5. Vegetation types and location, Stocking rates, Range sites for inventory purposes	Agency records; EIS's, RMP's or Forest plans may have some broad data. Field monitoring
6. Recreational use	Game and Fish Dept.
7. Wildlife Use (also check management plans)	Game and Fish Dept.
8. Water Resources	Ranch and agency records
9. Improvements and Location	Ranch and agency records

Note that the important baseline information is not restricted to vegetation.

The baseline data need not apply to the entire ranch or allotment if critical areas, or those of concern, can be identified. This involves some prioritization, and this may be based on obvious needs for data relating to:

1. Water development - Livestock distribution
2. Sagebrush control
3. Livestock and wildlife conflicts concerning forage, space or cover
4. Use of riparian areas
5. Proposed fencing
6. Reduction in AUM's
7. Proposed wildlife management plans which include expanding populations
8. Proposed recreational use

*Note: The above items could also be used as prioritized to collect information in cases where it is necessary to expedite efforts. **BUT A PLAN IS STILL NEEDED.***

Later on, an example of a monitoring objective is given for a specific management objective. This can be altered for more general use in securing baseline data.

AS WITH SPECIFIC OBJECTIVES, THE FIRST STEP IS TO DECIDE WHAT NEEDS TO BE SAMPLED TO DETERMINE WHAT THE CURRENT RANGE CONDITION IS AND TO DEVELOP A MONITORING PLAN TO DETECT FUTURE CHANGES AND TRENDS.

Securing baseline data may take time, but it is not advisable to develop Management Plans without it. Too often, terms like "Estimated Trend - Downward" are used when there is not data to support the statement.

Setting Specific Objectives

Monitoring objectives can be written after the following considerations are addressed:

1. The uses of the range (allotment) are defined, considering proposed season of use by livestock and historical (or planned) use by wildlife.
2. The characteristics of the vegetation, soils and climate have been assembled or investigated.
3. The management objectives of all concerned "resource management agencies" have been determined and a listing of notation made of:
 - a. "Key" vegetation species they have selected as indicators of trend or where used, the DPC;
 - b. Areas of concern, i.e., riparian, etc. and
 - c. The management level is determined for the allotment or ranch. For examples, the BLM uses M, I and C to determine management priorities, and HRM Practitioners "rate or score" areas for relative production and needs.
4. If "key" indicators are specified, then:
 - a. Where are they found (may take frequency monitoring)?
 - b. Are they different for wildlife than for livestock?
 - c. What other species should be included in the monitoring?

Note: Ranchers operating entirely on deeded land (or some in the Section 15 provision of the Taylor Grazing Act) may only be concerned with progress toward "total" density and productiveness of perennial forage (see #5). Agencies or land managers may be using the "key" species as indicators of trends toward or away from certain vegetative goals. Perhaps a more desirable and more useful procedure would be to define objectives in terms of a "DESIRED PLANT COMMUNITY (DPC)". This plant community, selected from several that may occupy a site, becomes the goal for the vegetative condition best suited to meet plan objectives.

5. If total production only is important, then:
 - a. What major species are important to recognize and record?
 - b. What other information needs apply?
 - * Average distance between perennial plants (total density)
 - * Percent of total composition made up of annual plants of all types
 - * Undesirable or poisonous plants
 - * Percent seedlings
 - * Percent decadent or dead plants

All of these are important indicators of TREND
 - c. When will the monitoring be done?

6. What water resource information is needed?
 - a. Estimates of effective precipitation
 - * Bare ground and soil crusting
 - * Litter cover and type
 - * Living cover and canopy
 - b. Erosive actions occurring
 - c. Water table measurements

7. What other supporting information is needed for documentation?
 - a. Recreational use
 - b. Private rights violations
 - c. Depredation by wildlife
 - d. Trespass livestock
 - e. Records of agency visits, phone calls and correspondence

8. How much data needs to be collected (and time devoted) to measure or satisfy:
 - a. Vegetative trends
 - b. Ranch or agency management plan objectives
 - c. Agency directives concerning key species or critical areas
 - d. Environmental concerns
 - e. Supportive documentation in an appeals hearing or court?

9. What modifications, adjustments or considerations are included in the plan to address drought, blizzards or other short-term weather influences?

10. Is it understood what changes have to be detected in order to satisfy progress toward the grazing plan objective, and what methods will be used?
 - a. Data on key species only
 - b. Utilization records. When and what
 - c. Production or yield. When and what
 - d. What can be grouped as "perennial grasses", etc.

11. How will the effects of range developments or changed grazing practices be evaluated with reference to:
 - a. Implementation of a planned or rotation grazing system
 - b. Burning
 - c. Water developments
 - d. Rest or deferment
 - e. fencing
 - f. Animal impact, and the
 - g. Effect imposed on utilization patterns.

12. Are the monitoring procedures and associated timing selected to measure production, capable of measuring changes resulting from management defined in the grazing objective, considering:
 - a. Yield before utilization
 - b. Total annual yield, both grazed and ungrazed

c. Utilization at appropriate times considering seasonal demands by livestock and wildlife?

13. Are the monitoring methods selected capable of measuring changes in trend, composition and utilization with confidence and usefulness for future planning?

EXAMPLE

Grazing Plan or AMP Management Objective
with Accompanying Monitoring Objectives
(Baseline data has been secured)

I. Management Objective For:

Allotment: Robber's Roost

Pasture: Horse Thief

Size: 3840 acres (6 sections. 2 deed, 4 BLM)

Precipitation zone: 7-10"

Soil types: Coyote sandy loam; See soil maps

Wyoming gravely sand: See soil maps

Control: 4 wire barb on south, west and east boundaries, natural scarp barrier on north

Stock water:

1. Drilled wells located in SE1/4 or SE 1/4 of Section 16 and NW 1/4 of NE1/4 of Section 20 (see map)
2. Stockwater ponds located near center of Section 17 in Coyote Wash and in NE NE 1/4 of Section 19 (see map)
3. Horse Thief Creek runs intermittently from March to July diagonally from the SW corner of Section 21 northeasterly toward and through Section 17 (see map).

Note: See appendix/or map with locations and cooperative agreements where applicable.

II. Grazing History

Historical use: Continuous use by cows and calves (280) from July 15th to September 15th

Allotted AUM's: 576

Vegetation Survey:

1. Composition studies. Permanent CSA transects located near the stockwater pond in Coyote Wash on Horse Thief Creek near headcut in Section 21 and 1/4 mile south of the drilled well in Section 16.

2. Key species designated for tracking trend are;

Poa secunda	Sandberg's bluegrass (POSE)	Upland
Koeleria Cristata	Prairie Junegrass (KOCR)	Upland

Carex nebraskensis	Nebraska sedge)	(CANE 2)	Riparian
Deschampsia cespitosa	Tufted Hairgrass	(DECA 5)	Riparian

3. Frequency of key species (see pattern map)

4. Range condition: Fair

5. Management class:

BLM - I category

Game and Fish Dept. - Deer, SSF, Elk crucial winter range

Owner - Priority pasture within allotment for developments, and implementation of planned use by livestock and wildlife

Areas of Concern:

1. Utilization of total riparian area of Horse Thief Creek is estimated at 80% on grasses and sedges. Cattle and wildlife use (paired Plot method) with willow use estimated as moderately to severely hedged (Cole Browse method).
2. Utilization in dry (intermittent) drainage areas entering Coyote Wash is estimated at 70% on grasses (Ocular Estimate Method)
3. Under-utilization in the whole north half of Section 18. Dead or decadent grasses estimated to comprise 24% of total vegetative cover. (2 line transects of 300 yards with 100 measured points) (see map for locations).
4. Heavy use by wildlife on the portions of Horse Thief Creek for 2 miles up and down the creek water it intersects the corner of Sections 17 and 21:
 - a. Deer use May through September
 - b. Elk use November through April

Monitoring of willow use, using Stadia Board and photos, taken from May 15 to April 15, 1987-1990, showed hedging to increase from moderately to severely hedged. (see photo records attached).

III. Action Plan for Management Objective #1 (Utilization of Riparian Area)

A. Livestock Control

1. Herding by riders daily to move cattle into upland range during daytime hours. It is expected that some "programming" of the cattle to move themselves will occur.
 - a. This effort will be supported by a spring development located 1/2 mile SW of the intersection of Sections 17 and 21 (see map and attached plan). Done under a cooperative agreement with BLM (see attachment). Cattle will

2. A riparian pasture consisting of 400 acres, and constructed to exclude cattle only, will be created along the portions of Horse Thief Creek described in Concern #4, where cattle and wildlife are using the area most heavily. It is expected that the condition rating will improve without excluding wildlife, with fence so constructed.

a. This pasture will be opened for cattle use for the period July 15 to July 31, or until utilization monitoring indicates 60% use. Cattle will then move to other areas of the Horse Thief Pasture for the planned period.

b. The leasee will be primarily responsible for estimating utilization and for fence maintenance.

B. Current Condition and Composition

Juncus balticus	Baltic Rush	(WBA)	34%
Deschampsia cespitosa	Tufted Hairgrass	(DECA 5)	14%
Hordeum brachyantherum	Meadow barley	(HOBR 2)	20%
Carex nebraskensis	Nebraska sedge	(CANE 2)	12%
Poa pratensis	Kentucky bluegrass	(POPR)	15%
Miscellaneous			5%

Target Composition of Key Plants

Carex nebraskensis	Nebraska sedge	(CANE 2)	35%
Deschampsia cespitosa	Tufted hairgrass	(DECA 5)	25%

C. To accomplish the composition objective, the percent increase in the key species is:

Carnex nebraskensis	Nebraska sedge	(CANE 2)	23%
Deschampsia cespitosa	Tufted hairgrass	(DECA 5)	11%

Six grazing seasons are allowed for this change (1991 to 1997)

D. Monitoring Objective and Techniques

To measure total growing season production with accompanying utilization by both cattle and wildlife, and for changes in composition.

Note: Except where noted the monitoring techniques given below are to be located both inside and outside the riparian pasture.

1. Paired plots will be used to measure production and utilization. Production data being obtained prior to cattle turn-in and season use by wildlife.

2. Composition and trend data will be obtained using 2 line transects with identification of all important species identified in baseline monitoring. (Bi-annually 1992, 94, 96, & 98) Readings to be made prior to utilization.
3. Two permanent, wildlife-proof, 5x5 enclosures will be located to measure long term:
 - a. change in composition with no utilization
 - b. willow recruitment
 - c. plant health
 - d. production
4. Production data will be obtained using 1.96 sq. ft. frames with results recorded on an air-dry basis.
5. Actual use will be reported by Lessee to BLM for both the riparian pasture and the allotment.
6. Frequency data will not be recorded, as it is expected that change will occur uniformly.
7. Acceptable utilization within the riparian pasture will be estimated by employment of a power fence located at the south end of the riparian pasture. Use at an estimated 20% will be allowed in 1991 to 1993 and 80% use in 1994 to 1997. Special handling of cattle will be required. Estimates of utilization will be based on an ocular method, considering both percent use of individual plants and by percent of plants grazed. Changes in the management plan based on the "test" area will be made in 1998.
8. Visual estimates of recreational use will be made in July, September and October and photo records made of impacts.
9. Photo records using procedures outlined in the BLM Rangeland Monitoring Manual TR4400-4 will be made for all cages and enclosures. Additional photos will be made of transect lines as directed in the procedures for the method used.

NOTE: The other objectives listed would be written up in a similar manner. If the monitoring is carried out as planned, little will be left to estimates or guesses.

The monitoring committee listed below will cooperate in the field monitoring processes, and meet annually in October to review progress and make needed changes in either the management or monitoring objectives:

1. I.M. Concerned - BLM
2. Friendly County Agent - U.W.
3. Bambi Moore - Wyoming Game and Fish
4. Dusty Rhodes - Leasee
5. Olin Conservation - Local Conservation District
6. Grant Agie - Department of Agriculture
7. D.C. Wiseuse - Soil Conservation Service
8. Brown Trout - Wildlife Organization

Description of Monitoring Procedures Used to Evaluate Range Condition

YIELD (Biomass)

Yield describes how much production is measured and may describe total for all vegetation, or restricted to selected species. This data is associated with setting stocking rates, or estimating AUM's or Animal Days per Acre (HRM).

1. Normally measured at normal peak of production
2. Valuable only if done at time of utilization when it can reflect usable amounts and associated quality
3. Most helpful when done just prior to and immediately following utilization.

Problem:

1. Yields fluctuate annually due to amounts and timeliness of precipitation
2. Fluctuations far exceed those caused by changes in grazing management
3. Prediction equations which relate yield to precipitation at any particular time are not reliable for annual predictions.

COVER (Total plant and litter cover)

Cover measurements are widely used to evaluate watershed conditions, as "total cover" is a valuable measure of range stability.

1. Cover measurements are used when the management objective includes concern for erosion, run-off, or potential for effective precipitation.
 - a. The method used may ignore frequency measurements.
2. Cover can be measured for any or all of the following characteristics:
 - Basal - Amount of surface covered by plant bases
 - Estimates of litter amount and type

 - Aerial - Canopy over the soil surface (Canopy is sensitive to annual fluctuation).
3. Reported in both categories as a percent of total soil surface covered.
4. General view photos are useful for long-term evaluations

DENSITY (Number of plants in a measured area)

Counting the number of individual plants per area of measure, such as plots, frames, transect lines.

1. Density is a more stable indicator of range than yield or cover, because the number of perennial plants in a given area remains relatively constant, even with variation in plant sizes.
2. Disadvantages are:
 - a. Identification: Single-stemmed grasses are relatively easy, but bunch grass characteristics create problems where underutilization, crowding, etc. is a factor.
 - b. Density is calculated for each species as a percent of all others counted. A plant of any size thus equals "one count", and this does not give an accurate estimation where "range condition" is being evaluated. However, where distances from the "hit" point on a permanent line transect is measured to the nearest perennial plant, a better indication of "total" density and associated "condition" is being estimated (HRM procedure).

FREQUENCY (Species dispersion)

This is a measure of the occurrence of a designated species identified in a series of sampling areas or transect lines. The number of plants or sizes are ignored. It is a measurement of where a species occurs and characterizes the vegetation of a specific area.

1. Methods are simple and rapid (each species counted once per plot)
2. Widely used by agencies because it is time-efficient
3. Data obtained is difficult to interpret for composition without extensive experience in similar habitats.
4. Disadvantages:
 - a. Sensitive to plant size, density and dispersion under natural conditions.
 - b. Results dependent on extent of sampling
 - c. Sensitive to non-random dispersion patterns of any species.

FREQUENCY MEASURES MUST NOT BE USED TO CALCULATE PERCENTAGE COMPOSITION DATA.

PATTERN MAPPING ("Use" or utilization mapping)

This important tool for grazing management is often overlooked. It is needed to identify distribution problems, and is a basis to justify water development, burning, fencing and changes in seasonal use.

1. At the end of each grazing season or period, a range inspection tour is taken to map the degree of grazing use within the pasture. Areas with excessive use and those with light or non-use should be especially noted and mapped.
2. As the map is being made, notes on precipitation, use periods, number of livestock, wildlife use, frosts, etc. are of great importance in evaluating range performance and utilization.
3. Photo records of problem areas are imperative!

NOTE: Utilization sampling is not a substitute, as these methods are designed especially for use in specified situations defined in the monitoring plan and useful only in limited-sized areas.

Estimating Stocking Rates by ADA Method

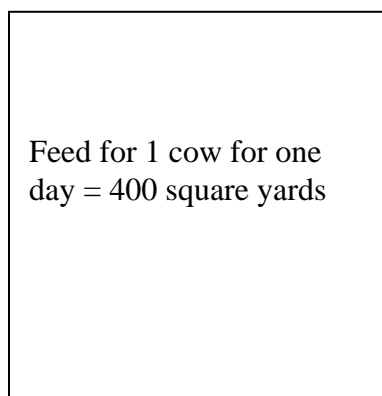
ADA is a measure of feed available in one acre (Animal Days per Acre). The following procedure describes a method of estimating feed available (Stocking rate) within one acre. The results obtained can then be extrapolated to any size pasture.

Procedure

1. Locate representative area. Mark a base location as a point of observation.
2. Scan the surrounding area and determine how much would be necessary to feed one cow for one day. (Adjust estimation for pairs, stockers, etc., assuming a dry cow - 1.0 (A.U.). Consider lbs. of air dry feed, so adjust mentally for forage dry matter content.
3. After estimating the area required, step off one side of an estimated square area in yards.
Calculate square yards in the area.
4. Determine how much such units are in one square acre. The result will be "Animal Days per Acre" (ADA).
5. This can be converted roughly to AUM's by dividing by 30. Example: 10 ADA divided by 30 = .3 AUM's.

EXAMPLE

20 steps (yards)



1. 4840 (square yards in acre) divided by 400 = 12 ADA.
2. 1 acre will graze an animal unit (equalizing one) for 12 days, or 12 units for one day.

3. A 1280 acre pasture will provide 15,360 ADA (1280 x 12 ADA per acre).

This would feed:

512 cows for 30 days or 512 pairs for 23 days

4. AUM's = 12 ADA divided 30 = .40 AUM's or 2.5 acres per AU per month.

Additional Calculations Using ADA's

A. Assume an agency estimation is .4 AUM's (or an estimate is obtained by clipping a known area).

$$.4\text{AUM} \times 30 = 12 \text{ ADA}$$

$$4840 \text{ divide } 12 \text{ ADA} = 403 \text{ square yards to feed one animal unit}$$

Find the square root of 403. It equals approximately 20 years. On visual examination, will this be enough to feed one unit for one day?

B. Assume 1280 acres are available and you have 512 cows (Dormant season). You want to graze the area for one month. Is there enough feed? $1280 \text{ divide } 512 = 2.5 \text{ acres needed}$. $2.5 \text{ acres divide } 30 \text{ days} = .83 \text{ acres/day}$. $4840 \times .083 = 400 \text{ square yards} = 20 \text{ steps}$. Is there enough forage to feed a cow for a day?

NOTES:

1. If in doubt, "fail" the estimation. Re-step a larger area. May also need to include a drought reserve or enough for a late "grass-up".

2. When considering a pasture, make several estimations and account for non-use areas in final ADA calculations.

3. To avoid over-grazing of individual plants, estimate area liberally, especially when grass is growing rapidly. If grass is approaching or in dormancy, estimate more conservatively.

C. After stepping off an area and estimating that it would take 1225 square yards (35 x 35) to feed a cow for one day, then an acre would feed four cows for one day or one cow for four days ($4840 \text{ divide } 1225 = 4$).

How many acres to feed the cow for one month?

$$1 \text{ acre divide } 4 \text{ days} = .25 \text{ acre/day}$$

$$.25 \times 30 \text{ days} = 7.5 \text{ acres/month}$$