

**FSH 2209.21 – RANGELAND ECOSYSTEM ANALYSIS AND MONITORING HANDBOOK
CHAPTER 30 – ANNUAL MONITORING FOR HERBIVORE USE**

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The objective of monitoring and evaluation is to test, under actual use, the predictions made during the planning process. Rangeland monitoring of herbivore use and/or disturbance is a form of implementation monitoring, i.e., it verifies whether the treatment or action actually occurred. Such monitoring can determine the attainment of goals, objectives, standards and management practices initiated through the implementation of management practices; these are typically detailed in the Rangeland Project Description document and/or Biological Opinion and Forest Plan. The question being answered with this type of monitoring is “Did we do what we said we were going to do?” Implementation monitoring often generates questions that lead to effectiveness and validation monitoring, as described in section 41.1. It may be applied to a variety of resources depending on the allotment objectives. Evaluation of annual use and disturbance facilitates the determination of needed modifications and improvements in the management program.

Considerable attention must be given to evaluation follow up during the years following allotment management implementation. Usually this phase – the “debugging period” – will extend through the first full cycle of the management system. Once the grazing and monitoring is operating fairly smoothly and opportunities for improvement found and applied little change should be needed.

No monitoring program should be considered as static and final. Objectives are subject to periodic change. Environmental conditions and management efforts by permittees are dynamic and consistently changing over time. For these and other reasons, evaluation follow up must be continued indefinitely so that appropriate adjustments in the program can be made in an adaptive process..

Implementation monitoring will be performed to accomplish the following:

1. Check on compliance with the annual plan of use.
2. Gather data and information on actual results of the grazing prescription.
3. Check results against the predicted and/or prescribed management objectives for the allotment. If the objectives are not being met, determine what changes are needed
4. Make needed changes and improvements in the management scheme and the development program.
5. Make appropriate changes, if any, to next year’s plan of use, including but not limited to carrying capacity.
6. Gather information needed for interpretation of both apparent and long-term trends.

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32 – MONITORING AREAS

Implementation monitoring is more commonly associated with the concept of Key Area or in the case of PACFISH/INFISH, Designated Monitoring Area (DMA). Key Areas and DMAs should be selected and approved by an interdisciplinary team with permittee consultation. Monitoring areas can be identified permanently using Benchmark Areas (discussed in section 42), or annually depending on fluctuations in the environmental settings or changes in livestock management.

Monitoring areas should be sufficient to interrupt the resource being impacted. The monitoring plot size should be representative of those areas being used and most likely to be used and also represent the goals and objectives set to measure impacts to the specific resource. Avoid placing monitoring locations on sites with multiple impacts; e.g., along roads or near dispersed campsites, trails, or livestock gates, fences or water troughs.

Consider the following factors when determining the location of implementation monitoring:

1. When monitoring is intended to gauge or interpret annual compliance standards associated with the area goals and objectives, its location should be similar to those used for benchmark condition and trend studies (Chapter 4).
2. When monitoring is associated with a biological assessment or biological opinion, its location(s) should be in accord with the NEPA documents for the area involved.
3. When monitoring is set to assure compliance with prescribed standards, locate sites where livestock will meet compliance standards first.

32.1 Key Areas

Key areas reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, watershed area, etc., depending on the management objectives being addressed.

32.11 Selecting Key Areas

The most important factors to consider when selecting key areas are the management objectives found in forest plans, coordinated resource management plans, allotment management plans, biological assessments, biological opinions and/or other activity plans. Proper selection of key areas requires appropriate stratification. Statistical inference can only be applied to the stratification unit. An interdisciplinary team should be used to select these areas. Input should be sought from permittees and other interested publics. Poor information resulting from improper selection of key areas leads to misguided decisions and improper management.

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When selecting key areas the following should be considered. A key area:

1. Should be representative of the stratum in which it is located.
2. Should be located within a single ecological site and plant community.
3. Should contain the key species where the key species concept is used
4. Should be capable of, and likely to show, a response to management actions. This response should be indicative of the response that is occurring on the stratum.

The number of key areas selected to represent a stratum ideally depends on the size of the stratum and on data needs. In practice the number of areas is limited by funding and personnel constraints.

Key areas should be accurately delineated on aerial photos, on maps and/or recorded on GPS. It is also helpful to mark locations with a fence posts or metal stakes and take location photographs for future identification.

32.2 Designated Monitoring Area

A designated monitoring area (DMA) has been defined in Pacfish/Infish Biological Opinion (PIBO) implementation monitoring. It is a location in riparian areas and along the stream banks of a livestock grazing unit where monitoring takes place. DMAs are not “key areas” under the classic definition used in this handbook, rather they are areas representative of grazing use specific to the riparian area being assessed and should reflect what is happening in overall riparian areas as a result of on-the-ground management actions. DMAs should not reflect an average amount of use in all riparian areas of the stream reaches in the pasture. Instead, they should reflect typical use where livestock enter and use vegetation in riparian areas immediately adjacent to the stream. DMAs may be selected where livestock use exceeds the apparent average use of riparian areas in the pasture if, for example, the assumption is made that condition at the monitoring site reflects higher use on than other stream segments within the pasture and the DMA meets objectives, then the rest of the pasture is also meeting the objectives.

Small livestock concentration areas, such as trail crossings and water gaps (usually less than 30 meters (100 feet) in length) should not be considered as a DMA. If these sites cause resource problems, they should be treated as a site and not as part of the overall livestock management.

The following criteria are used to select DMAs:

1. DMAs represent riparian areas used by livestock. Select the site based on the premise: that if proper management occurs on the DMA, the remainder of the riparian areas within a pasture or use area will also be managed within requirements.
2. Select sites that are representative of use, not an average for the stream within the pasture or allotment. For example, if livestock use one-half mile of a stream reach in the pasture

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and one mile is not used because it is protected by vegetation, rock, debris, or topography, the DMA location should represent the stream reach that livestock actually use.

3. Monitoring sites should have the potential to respond to and demonstrate measurable trends in condition resulting from changes in grazing management. Livestock trails associated with livestock use of a riparian area may be included in the DMA.
4. Avoid selecting sites where vegetation is not a controlling factor, such as riparian zones with cobble, boulder, and bedrock-armored channels.
5. Do not place DMAs in streams with greater than four percent gradient unless they have distinctly developed flood plains and vegetation heavily influences channel stability.
6. Avoid putting DMAs at water gaps, or locations intended for livestock concentration, or areas where riparian vegetation and streambank impacts are the result of site specific conditions (such as along fences where livestock grazing use is not *representative* of the riparian area). These local areas of concentration may be monitored to address highly localized issues, but they should not be considered as representative of livestock grazing management over the entire riparian area within the grazing unit, and are therefore not generally chosen as DMAs.

Additional information concerning PIBO Monitoring Streambanks and Riparian Vegetation – Multiple Indicators (Technical Bulletin No. 2005-2) is located at http://www.id.blm.gov/techbuls/05_02/index.htm

33 APPROVED MONITORING METHODS

Proper planning is by far the most important part of a utilization, residue, or disturbance study. A clear and careful elucidation of objectives should first be developed before any methods are selected. There can be a temptation to jump to an attractive method or set of methods before clarifying objectives. Avoid this since it can result in much wasted effort.

When selecting appropriate monitoring protocol the manager must identify the activity plan allotment management goals. Methods obtaining biomass measurements can be useful in shaping carrying capacity estimates for allotments, although we caution this is not the only data needed for a livestock management plan. If the goal is to maintain range vegetation in a satisfactory condition, and this is to be accomplished by assuring annual percent utilization standards are not exceeded, annual implementation monitoring should employ a method which collects percent utilization. If management guidelines stipulate maintaining a certain stubble height, a method to verify this must be used. In general, biomass utilization measurements are related to carrying capacity and livestock management plans, and stubble height and browse methods are related to a measure of ecosystem function (e.g., low stubble height or heavy browse may indicate impaired riparian function).

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Most protocols applicable for herbivore use can be located in the Interagency Technical Reference “Utilization Studies and Residual Measurements” 1734-3. This interagency technical reference provides the basis for consistent, uniform, and standard utilization studies and residual measurements that are economical, repeatable, statistically reliable, and technically adequate. While not all inclusive, this reference does include the primary study methods used across the West. Described methods include twig length measurement, stubble height, comparative yield, paired plot, ocular estimate, key species, height weight etc. Copies are available from the Bureau of Land Management, National Business Center, BC-650B, P.O. Box 25047, Denver, Colorado, 80225-0047, the BLM web page at <http://www.blm.gov/nstc/library/techref.htm>, or the Regional Office Vegetation Management Staff.

The following descriptions are a few methods commonly applied to determine vegetation utilization or environmental impacts. Each method described has its own specific data collection methods, tools, recording criteria and data analysis protocol. The specifics for each method should be obtained from the manual.:

Cole Browse Method:

The Cole Browse Method is used to collect utilization data on browse species. This method provides data on age and form class, availability and hedging, estimates utilization, and growth and use indexes for the browse component of the plant community. These data are used to make annual utilization and trend estimates. Separate transects are run for different browse species.

Extensive Browse Method:

With the Extensive Browse Method, pace transects are run to collect vegetation data. This method provides data on utilization, species composition, age classes, availability, and hedging for the browse component of the plant community.

Residual Stubble Height Method:

The Residual Stubble-Height Method measures stubble height or height (in centimeters or inches) of herbage left ungrazed at any given time. This method, because of its simple application, is becoming a well accepted method for expressing rangeland use.

This method would be used after stubble height standards for specific plant communities had been developed. An example, a stubble height of 4 inches might be specified to provide streambank protection, to trap sediments, and to rebuild degraded stream channels in riparian areas. This method is often prescribed in biological assessments and biological opinions in the Pacific Northwest Region.

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Paired Plot Method:

Under the Paired Plot Method, forage from protected and unprotected plots is clipped and weighed at the end of the use period. The difference between those two weights represents the amount of forage consumed or otherwise destroyed during that period.

Ocular Estimate Method:

With the Ocular Estimate Method, utilization is determined along a transect by ocular estimate. The percentage by weight of forage removed is determined for individual plants of the key species or from all plants of the key species within small quadrats.

Key Species Method:

In the key species method (formally the modified key forage plant method) utilization levels are based on an ocular estimate of the amount of forage removed by weight on individual key species and observations are recorded in one of seven utilization classes.

Height-Weight Method:

The Height-Weight Method involves the measurement of heights of ungrazed and grazed grasses or grasslike plants to determine the average utilization. Measurements of plant heights recorded along transects are converted to percent of weight utilized by means of a utilization gauge (Lommasson and Jensen 1943). The utilization gauge is developed from height-weight relationships curves. The method provides a mechanical tool which can be used for training, checking personal judgment, and promoting uniformity of results between examiners, as well as for determining percent utilization.

A utilization gauge developed by the U.S Forest Service, Rocky Mountain Forest and Range Experiment Station can be obtained from Colorado State University.

Grazed-Class Method:

The Grazed-Class Method uses photo guides of key species to make utilization estimates. These estimates reflect herbage removed but also show herbage remaining.

The following are sources of existing photo guides:

- (1) University of Arizona, Cooperative Extension Service and Agricultural Experiment Station, Tucson Arizona 85721. Bulletin A-73
- (2) University of Idaho, College of Forestry, Wildlife and Range Science, Moscow, Idaho 83843. Station bulletin 54
- (3) Montana State University. Forage Use – A tool for Planning Range Management. Extension Service. July 1988.

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- (4) Kenny and Clary. 1994. A Photographic Utilization Guide for Key Riparian Graminoids. USFS GTR-308

Landscape Appearance Method

The Landscape Appearance Method uses ocular estimate of forage utilization based on the general appearance of the rangeland. Utilization levels are determined by comparing observations to written descriptions of utilization classes.

33.2 - Monitoring Streambanks and Riparian Vegetation – Multiple Indicators

The “Monitoring Streambanks and Riparian Vegetation – Multiple Indicators”, Technical Bulletin No. 2005-2 (Cowley, E. and Burton, T) located at http://www.id.blm.gov/techbulbs/05_02/index.htm) was developed to provide monitoring protocol specific to the PIBO. The purpose of this monitoring protocol is to provide an efficient suite of riparian monitoring procedures that, along with current livestock grazing management practices including timing, frequency, and duration of grazing, can be used to determine whether the vegetation and streambanks are responding to livestock grazing management as anticipated.

This monitoring protocol addresses seven indicators for stream-associated riparian areas. Four of the indicators are used for long-term effectiveness monitoring. They include a modified Greenline, modified Woody Species Regeneration, Streambank Stability, and Greenline-to-Greenline Width. The other three indicators provide data and information to determine whether the current season’s livestock grazing is meeting planned stocking levels, grazing intensity and duration, and criteria for livestock use in riparian areas. The protocol includes a Landscape Appearance criterion, modified for livestock use on woody plants, modified Stubble Height, and streambank alteration described by Cowley (2004).

Parts or all of the monitoring protocol described in Monitoring Streambanks and Riparian Vegetation – Multiple Indicators are appropriate when designing or conducting PIBO monitoring.

33.3 Riparian Streambank Alteration

Streambank alteration occurs when large herbivores, i.e., elk, moose, deer, cattle, sheep, goats, and horses walk along streambanks or across streams. The animals’ weight can cause shearing that in turn results in direct breakdown of the stream bank and widening of the stream channel. It also exposes bare soil, increasing the risk of erosion to the streambank. Animals walking along the stream bank may increase the amount of soil exposed to the erosive affects of water by breaking or cutting through the vegetation and exposing roots and/or soil. Excessive trampling

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causes soil compaction resulting in decreased vegetative cover less vigorous root systems, and more exposure of the soil surface to erosion. (Cowley, E. and Burton, T. 2005)

Streambank alteration should not be confused with streambank stability defined by Rosgen (1996) as the stable dimension, pattern, and profile such that, over time, channel features are maintained and the stream system neither aggrades nor degrades. Streambank alteration measurements are considered implementation validation for streambank stability and cover monitoring.

The streambank alteration methods most commonly used are explained in “Monitoring Streambanks and Riparian Vegetation – Multiple Indicators”, Technical Bulletin No. 2005-2 (Cowley and Burton 2005), available online at http://www.id.blm.gov/techbuls/05_02/index.htm

Additional methods may be developed and approved for use.

33.4 Additional Monitoring Sources

If federally listed species are present, additional monitoring protocols may be prescribed in the Biological Assessment or Biological Opinion.

State Interagency Monitoring Handbooks may supplement this Regional Handbook.

34 – RANGELAND MONITORING REPORTING

34.1 INFRA Reporting

Annual reporting of implementation monitoring will be through the INFRA database located on the I-Web.net at <http://i-web.wo.fs.fed.us/>. Data entry at this site requires a e-authentication password. The following record areas will be updated annually by the last Friday of October:

- “Managed to Standard” will be reported in the RMU/Allotment section under Mgmt/Analysis Record tab.
- “Permittee Compliance” will be reported in the RMU/Allotment/Pasture section under RMU tab.
- “Grazing Monitoring” will be reported in the RMU/Allotment/Pasture/Monitoring section under the Grazing Monitoring tab.
- “Pasture Compliance” will be reported in the RMU/Allotment/Pasture/Monitoring section under the Pasture Compliance tab.

This database may be amended to require additional data entry fields so check requirements.

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34.2 Northwest Forest Plan Reporting

The Northwest Forest Plan implementation monitoring for threatened and endangered species is located at <http://www.reo.gov/monitoring/implementation/index.htm>.

34.3 Interior Columbia Basin Reporting

The Interior Columbia Basin reporting guidance for the implementation of the Biological Assessments and Biological Opinions for PACFISH/INFISH is prescribed through the Interagency Implementation Team. Direction for monitoring and the current R6 2210 PIBO Implementation Monitoring Guidance letter for monitoring and reporting are located at http://www.fs.fed.us/rm/boise/teams/techtran/projects/pac_infishhome.htm

35 - PROPER USE DETERMINATIONS

Identify management objectives for each grazing unit based on type of available resource, potential impacts from activity, areas where impacts are likely to occur or affects from activities are most expressed. Unless site specific proper use determinations are made all rangeland management units will apply standards outlined in the forest plan. From this establish proper use criteria during the rangeland project decision, other NEPA decisions, Section 7 consultation requirements under Endangered Species Act (ESA), or other applicable direction.

Assure prescribed standards are complementary to forest plan direction. In most cases percent utilization is prescribed in the forest plan if the site specific prescription is expressed in stubble height make sure neither standard is exclusionary and the more limiting standard is used.

32.1 - Proper Use Criteria

Establish proper-use criteria in writing for each rangeland management unit. See Exhibit 01 for a sample of proper-use criteria. Options can include (1) Percent utilization/stubble height (residual left) on key species on the greenline, (2) Percent utilization or stubble height on selected key species and/or the amount of bare ground within the riparian zone but away from the greenline, (3) riparian woody browse utilization or incidence of use, (4) Percent utilization or stubble height or incidence or use of key woody species on uplands, (5) proper use as described as time and place such as livestock near riparian after a certain date (6) amount of annual streambank alteration or (7) any other measurable factor on a particular site. Proper-use criteria should be easily observable and measurable. It should also take into account season, duration, frequency, and intensity of use, as well as biotic factors such as plant phenology.

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Identify whether proper use will be read. Most proper use monitoring often identifies readings to be either a “point in time” or an “end of season.” The point in time method identifies standards will not be exceeded during any period at which the activity is occurring. End of season monitoring occurs at the end of the grazing season or the end of the growing season.

Proper-use criteria are part of each rangeland project decision. Long-term trend studies are supplemental information to determine if the proper-use criteria are correct in meeting desired conditions. If long-term condition and trend information indicates proper use does not reflect resource goals proper use criteria should be modified.

Factor identifying the appropriate level of grazing can include the degree of use of key species in riparian areas, residual stubble height needed to capture or retain sediment into spawning habitat, degree of use allowed on critical wildlife habitats (e.g., big game winter ranges, calving areas, nesting areas, and brooding areas), impacts to TES plant species and their habitats, esthetics, time and place restrictions, and so forth. Appropriate descriptors should be used to help identify limiting factors and help design and monitor the studies necessary to determine when proper use has been reached.

Develop proper-use criteria from interdisciplinary input; e.g., fishery surveys, stream surveys, rare plant and animal surveys, vegetative trend analysis, research findings, coordination requirements, observations, and good judgment. Proper-use criteria should be based on factors limiting ecosystem function or production. Where similar soils, ecological types, and coordination requirements extend over an entire rangeland management unit, a given set of proper-use criteria may be applicable to an entire management unit. On the other hand, where a mosaic of streams, soils, vegetation types and coordination requirements exist, it is necessary to develop separate criteria for each important situation. On some rangeland management units, it may be necessary to establish more than one set of proper-use criteria.

Interdisciplinary teams should observe the following when setting up limiting factors and proper-use criteria:

1. Soil, water and vegetation are the basic resources. The condition of these three resources must be maintained or improved.
2. Assure the needs of legislated or Regional Forester designated resources are met such as threatened, endangered, and sensitive species, archaeological resources, special management areas such as Wilderness, Wild and Scenic Rivers or Research Natural Areas etc..
3. Once these needs are met consider special resource needs identified through the forest plan or other management documents such as livestock forage, fish, rare plant, and wildlife habitat, recreation and esthetics.

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Tradeoffs must be recognized and displayed. For instance, rarely does a rangeland area look as good from an esthetic standpoint immediately after being grazed as it looked prior to grazing. Therefore, if grazing is to be allowed, some esthetic values are foregone. How much grazing will be allowed may depend upon how sensitive the area is from an esthetic and/or resource value standpoint. Big game winter ranges, calving and fawning areas, riparian zones, sage grouse habitat, rare plant sites and habitat, and high use recreation areas are examples of other areas where coordination is needed. All of these areas where coordination is needed might require tradeoffs to some degree.

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32.1 - Exhibit 01

SAMPLE
PROPER-USE CRITERIA

Bear Creek C&H Rangeland Management Unit

Prepared: June 16, 2006

By: JOHN BROWN

The management objectives for Bear Creek C&H Rangeland Management Unit are to:

1. Maintain or improve the mid-seral rangeland condition in riparian areas of management area #1.
2. Maintain or improve the late-seral condition of the *Festuca idahoensis* and *Poa secunda* vegetative areas in Bear Creek management area #2.
3. Retain soil stability in management unit #5.
4. Protect spawning areas for anadromous fish riparian habitat in management unit #4.
5. Maintain or improve late-seral shrub communities on the big game winter range located in management unit #3 and #4.

As a result of observation and trend study results, proper use criteria :

1. On benchmarks (reference area/key area) 1, 2, and 7 (meadow types in management unit #1), a grazing standard is met when the average residual vegetation is approximately 4 inches or no more than 45 percent utilization measured as a point in time. Paired cages showed lowered vigor and production at all plot sites where this use was exceeded.
2. The sagebrush benches in lower Bear Creek (management unit #2), with slopes under 10 percent--benchmarks 3, 4, 5, and 6--are on moderately deep to deep basalt soils with low erodibility. The key species *Festuca idahoensis* and *Poa secunda* should be grazed with a remaining minimum residual of 3 inches: Regardless of species, no more than 50 percent collective utilization will be authorized on grass and forb species or 20 percent on shrub species. Measurements are collected at a point in time.
3. Within management unit number 5, coarse-textured granitic soils on slopes above 20 percent become unstable when trampling disturbance exceeds 15 percent. In this unit, soil disturbance becomes a limiting factor before forage utilization. Proper use in this unit will, therefore, be indicated by soil disturbance not exceeding 15 percent. Ground cover will not be less than 20 percent measured at the end of the season.
4. The riparian area in management unit #4 contains spawning areas for anadromous fish. Cattle concentrate in this area due to the vegetation and easy access to water. In order to maintain fish habitat, at least 80 percent canopy cover will be maintained over stream banks and browse

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incidence of willows will be limited to 30 percent. Where grassland ecosystems are within 100 feet of streams, stubble height will be maintained at a minimum of 3 inches, in order to protect riparian function. Whichever of these measures are reached first will determine the date of proper use. Livestock will not be in this management unit after spawning begins, or no later than August 15. Measurements will be conducted at a point in time.

5. Management units #3 and #4 are on critical deer and elk winter range. It is, therefore, necessary to leave adequate feed in these two units. At any point in time assure total utilization does not exceed 40 percent on shrub species. In order to do this use will not exceed 15 percent of annual leaders before October 1. Whichever of these species reaches proper use first will determine the proper use for livestock. If winter utilization studies show shrub use exceeds the prescribed 40 percent utilization, allowable use prior to October 1 will be adjusted. Measurements will be conducted at a point in time.

6. In all areas do not exceed general utilization standards prescribed for grass, forb and shrub or exceed soil disturbance standards set in the Bear Creek C&H Allotment Management Plan.

Data to support the above criteria are filed in section 5 of the Bear Creek Allotment Management Plan folder and consists of grazing analyses of the benchmarks, soil evaluations, and wildlife and fishery habitat studies.