
APPENDIX 11—MONITORING AND EVALUATION

INTRODUCTION

Management actions identified for the Pinedale planning area are based on studies and the best scientific and commercial information currently available. However, conditions may change during the life of the land use plan. Experience has shown that implemented management actions can be improved as new technology and new information become available. It is also possible that changes in land use will require a different management action to protect resources and avoid resource conflicts. To address the changing conditions and provide management flexibility that incorporates best management practices (BMP), the Pinedale Field Office (PFO) conducts monitoring and evaluation, which measures the effectiveness of existing actions through monitoring and application of new scientific research. Monitoring and evaluation analyzes the current resource conditions as a result of implemented actions and identifies and recommends alternatives or modified actions, as necessary, to reach established objectives and goals. This process provides the optimum means to check the effectiveness of management actions. Because the capability to execute the process at the optimum level can vary from year to year, monitoring will be prioritized. BLM would use data collected by other agencies, local governments, and other sources when appropriate and available.

Decisions

Management goals identified in the record of decision for the land use plan will provide the direction for managing each resource. These goals are the foundation for developing a monitoring system to track the results of the management actions (Table A11-1). Indicators that represent resource conditions or change are identified for monitoring. Performance standards are developed at the activity planning level as guided by the resource goals in the land use plan. Performance standards consider national and state established standards, such as the Standards for Healthy Rangelands (BLM 1997) and others that may have been developed for specific landscapes or resource conditions. Monitoring methods are selected and/or designed to read the indicators as scheduled in the resource monitoring table (Table A11-1). In addition, data sources for studies and scientific research are identified and selected for use before the process is implemented. Actions that are not producing desired results would be modified or replaced based on the assessment of the new data.

Data Collection

Monitoring methods are implemented to collect data that reveal any change in the indicators. Monitoring techniques consider when, where, and how often monitoring must be repeated. Because much of the monitoring data are collected by other federal and state agencies, a system must be established to regularly collect and coordinate these data. Scientific research results are the most elusive of all the data, and collection will require each resource specialist's close attention to new technology and the results of research that can be attributed to BMPs for a resource. Developing technologies or a better understanding of information needs may result in changes to the monitoring methods and in what is being measured. These adjustments will be addressed during the assessment step.

The data collected through monitoring provide a variety of information applicable to one or more resource uses. Therefore, monitoring methods should be designed to address as many uses as possible. This will increase the effectiveness and efficiency of the monitoring program by eliminating duplicative and conflicting information.

Data Analysis

The data collected from all monitoring, studies, and scientific results will be analyzed to determine the change that has occurred as a result of management actions. When a change in resource conditions has been identified, resource specialists and other agency specialists will consult to determine what use or action caused the change. Data analysis will be conducted on a predetermined schedule that considers the data collection frequency for detecting change. Data will also be recorded and organized to facilitate analysis to be used in assessing management actions.

Assessment

The analyzed data will be assessed to determine whether the resource conditions are meeting the planned goals and objectives as defined by the performance standards; whether a change has occurred, and if so, identify the cause; and what appropriate action should be taken to achieve the desired outcome of a management action plan objective. New technology and management methods will be reviewed to determine their applicability in modifying or replacing current management actions. In some cases, evaluation of monitoring data may indicate the need to change management goals, which would require reinitiating the National Environmental Policy Act (NEPA)/planning process. When the assessment shows that the goals are still valid but the outcome, as defined by the performance measures, is not being achieved, a change or modification in management actions is warranted. A change in either management goals or actions could require additional NEPA analysis. To the degree that those changes have been analyzed in the original NEPA document, no additional NEPA analysis would be required. If those changes have not been previously analyzed, supplemental NEPA documentation will be required.

The assessment will develop recommendations to be considered by management for continuation, modification, or replacement of current management actions. Because adoption of a new management action may require changes in the monitoring plan, the assessment will also evaluate the effectiveness of the monitoring and data collection methods and recommend continued use, modification, or elimination of those methods.

An interdisciplinary assessment team will be established for conducting a thorough and complete assessment. An assessment schedule should be developed that ensures management actions are evaluated before an irreversible resource condition occurs.

RESOURCE MONITORING TABLE

The resource monitoring table (Table A11-1) identifies the indicator that will be monitored to detect change in resource conditions, the method or technique of monitoring, the locations for monitoring, the unit of measurement for monitoring, the frequency and duration for monitoring, and the action triggers or thresholds that indicate the effectiveness of the management action.

Table A11-1. Resource Monitoring Table

Resource	Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Triggers
Air Quality	Air quality	Ambient air sampling and air quality modeling	Areawide	Parts per million	Hourly to 24-hour samples in accordance with standards	Samples exceeding National Ambient Air Quality Standards
	Gaseous and particulate critical air pollutants	Emission inventory	Areawide	Lbs/hr and tons/yr	Annually	Whenever detected
Cultural	National Register eligible sites	Site inspection	Areawide	Disturbance	Annually	Disturbance as a result of land uses or vandalism
Fire	Fire fuels	Site inspection	Wildland-urban interface and industrial interface areas	Acres	Annually	Presence of fire fuels that present a risk to communities and industrial sites
	Vegetation condition	Ecological site condition and trend studies	Vegetation types where there is a history of fire in the ecosystem	Representative sample	Annually	Vegetation growth trend is moving away from desired conditions for the vegetation type
	Resource and property damage	Fire behavior	Individual fire	Fire temperature, flame length, burn rate, and acres burned	While the fire is burning	Acres burned and fire intensity that exceed prescription
Forestry	Forest Health	Ecological site condition and trend	Forested lands	Representative sample area	Every 3 to 5 years	Disease, insect infestation, or encroachment of undesirable plant species threatens forest health
	Timber stands	Timber stand examination	Commercial forested areas	Board feet, age class, and damages	Every 10 to 20 years	Basal area growth does not meet timber type standards
Lands and Realty	Rights-of-way compliance	Site inspection	Areawide	Site	Annually	Non-compliance or non-use

Resource	Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Triggers
Livestock Grazing	Vegetation condition	Ecological site condition	All areas being grazed	Representative sample of grazed area	Every 2 to 10 years	Conditions are not meeting goals and objectives for vegetation community, and do not meet the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management
	Vegetation trend	Ecological site trend	All areas being grazed	Representative sample of grazed area	Every 3 to 5 years	No movement toward meeting objectives and goals for the vegetation type
	Forage utilization	Utilization study plot or site visit	All areas being grazed	Representative sample of grazed area	During or after area has been grazed	Deteriorating vigor of key plants
	Livestock numbers	Counts and site visits	All allotments	Number	Annually or when livestock are moved on or off the allotment	Numbers exceeding permitted numbers and overuse for vegetation condition
Minerals	Surface disturbance	Remote sensing or site inspection	Mineral development sites	Acres disturbed	Annually	Acres disturbed exceeding the range established for the area
	Compliance with authorization	Area inspection	Areawide	Compliance	During operations or annually	Non-compliance
Off-Highway Vehicles	Surface disturbance	Remote sensing or site visit	Site	Acres of disturbance	Annually	Disturbance exceeding the baseline, accelerated soil erosion occurring, and vegetation being removed.
Paleontology	Significant paleontological resources	Site inspection	Site	Degradation or loss of significant fossil resources	Annually	Loss or damage to significant fossil resources as a result of human or natural causes
Recreation	General recreation use	Inspection or remote sensing	Areawide with emphasis on dispersed recreation	Change over time and visitor days	Annually	When change is causing undue or unnecessary degradation of the site or area
	Concentrated recreation use	Inspect developed recreation sites or areas that have facilities	Recreation site	Condition of recreation site, facilities, and visitor days	Annually	When change is causing undue or unnecessary degradation of facilities and use areas

Resource	Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Triggers
	Compliance with commercial authorization	Administrative review, site inspection	Activity site	Permit stipulations, resource conditions, and site restoration	During and after an event	When non-compliance is determined or degradation of resources is occurring
Socioeconomic Data	Refer to the Pinedale Field Office Oil and Gas Development Social and Economic Monitoring Plan (Winthrop, 2008)					
Special Designations and Management Areas	Resource condition	Site visit or remote sensing	Special designation and management area	Amount of degradation or loss of resources	Every 1 to 5 years	Undue or unnecessary degradation or loss of resources as a result of human or natural causes
Transportation and Access Management	Roads and trails	Road and trail inspection through on site inspection or remote sensing	Areawide	Miles	Annually	Conditions represent a hazard to life and property
Vegetation	Trend	Appropriate method from the <i>National Range Handbook</i>	Areawide	Representative sample	Every 3 to 5 years	Vegetation change from the baseline or moving away from the desired ecological status
	Vegetation change	Photo points	Areawide	Representative sample of vegetation type	Every 2 to 10 years	Used in conjunction with other methods to detect both desirable and undesirable changes occurring to vegetation as a result of land uses
	Precipitation	Weather stations	Representative sample to detect precipitation patterns	Inches of precipitation	Monthly and annually	Insufficient precipitation for plant growth
	Noxious weed trend	Remote sensing or site visit	Areawide	Acres of established weeds and potential habitat areas	Continuously	Spreading or establishment of weed species in new areas
	Special Status Species	Site inspection	Special Status Species' habitats	Population and trend	Annually	A declining trend in populations

Resource	Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Triggers
	Wetland/riparian condition	Proper Functioning Condition (PFC)	Areawide	Stream miles and acres along with rating	Yearly	Ratings below PFC, defined by the ability of the wetland site to maintain itself and for riparian areas to withstand a 2-year storm event.
Visual Resource Management	Intrusions	Remote sensing or site visit	Class I and II areas	Impacts of an individual intrusion	Annually	Intrusion that exceeds the definition of the classification
Water Quality, Watershed and Soils Management	Surface water quality	Water sampling	All surface water	Mg/l and tons/day	Annually	Water quality does not meet state standards
	Ground water quality	Ground water sampling	Where land use activities are occurring	Representative sample of water quality	Annually	Water quality does not meet state standards and water is migrating from one aquifer to another
	Channel geometry	Riparian cross sections	Areawide	Change in stream channel (width, depth, side channel modification, and bank sloughing)	Every 1 to 3 years	Conditions are moving away from PFC
	Soil erosion uplands	Visual observation and surveyed erosion pins	Areawide where land use activities are occurring	Soil loss in tons per acre	Visual examination while land use activity is active and annual site surveys	When soil loss is accelerated beyond natural levels
	Soil erosion on stream banks and floodplains	Visual observation and surveyed erosion pins	Areawide where land use activities are occurring	Area affected in square feet or acres	Visual examination while land use activity is active and annual site surveys	Water table is shrinking beyond average precipitation fluctuations
	Soil compaction	Penetrometer or visual inspection	Area affected by land use activities	Pounds per square inch	1 to 2 times annually	Compaction restricts water infiltration and plant growth
	Soil compaction, porosity, permeability, and depth to water	Monitoring wells (peizometers)	Riparian areas	Depth to water table	Every 2 to 3 years	Accelerated streambank soil loss

Resource	Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Triggers
	Stream flow	Stream gauging stations	Areawide	Water volumes, times of flows, turbidity, pH, dissolved oxygen, and sediment loads	Monthly or during storm events	Trends indicate increased sediment load and deterioration in water quality
Wildlife and Fisheries	Big game seasonal habitat	Aerial and field inspections	Critical wildlife habitat areas	Numbers during occupancy periods	Annually	Downward trend in animal occupancy
	Special Status Species occupancy and productivity	Air and site inspections	Habitat areas and established buffer zones	Numbers during occupancy periods	Annually	A decline in numbers beyond the normal fluctuations
	Threatened and Endangered Species occupancy and productivity	Air and site inspections	Habitat areas and established buffer zones	Numbers during occupancy periods	Annually	A declining trend in populations
	Macroinvertebrate indicator species	Collecting macroinvertebrate species	Perennial streams	Species and condition of macroinvertebrates	Every 2 to 10 years	No presence of macroinvertebrates that represent good quality water in the stream
	Neo-tropical bird habitat	Site visit	Areawide	Numbers during occupancy period	Every 2 to 3 years	Declining trend in habitat occupancy
	Raptors	Site visit	Areawide	Nest occupancy rate	Every 2 to 5 years	Declining trend in nest site occupancy
	Sage-Grouse	Lek site visit	Lek sites	Number of male and females (occupied or unoccupied)	Annually	Declining trend in the number of males and females

