APPENDIX 17—MONITORING AND EVALUATION

INTRODUCTION

Management actions identified for the Rawlins Resource Management Plan Planning Area (RMPPA) are based on studies and the best scientific and commercial information 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 the resources. To address the changing conditions and provide flexibility that uses best management practices, the Rawlins Field Office (RFO) conducts monitoring and evaluation, which measures the effectiveness of existing actions through monitoring and application of new scientific research. Monitoring and evaluation not only analyze the current resource conditions as a result of implemented actions but also identify and recommend 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 conduct the process at the optimum level can vary from year to year, monitoring will be prioritized.

Decisions

Goals and objectives identified in the Record of Decision (ROD) for the Approved Resource Management Plan (RMP) provide the direction for managing each resource. These goals and objectives are the foundation for developing a monitoring system to track the results of the management actions. Indicators that represent resource conditions or change are identified for monitoring. Performance standards are developed at the activity planning level, 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 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 A17-1). In addition, data sources for studies and scientific research are identified and selected for use before the process is implemented.

Those actions that are not producing desired results would be modified or replaced based on the assessment of the new data. Where change can be accomplished through an administrative determination or a categorical exclusion, the RFO will make that decision through normal business practices. Changes that require amending the land use plan will follow the amendment process, including National Environmental Policy Act (NEPA) compliance and public input.

Following the ROD for the Approved RMP, as part of the implementation planning, a monitoring plan will be developed. In addition, monitoring plans will be developed with appropriate coordination with local, state, and other federal agencies and interested public parties during implementation activities and activity plan development.

Data Collection

Monitoring methods are implemented to collect data that detect any change in the indicators. Monitoring techniques consider when, where, and how often the monitoring will have to be repeated. Because much of the monitoring data are being collected by other federal and state agencies, a system should be established to regularly collect and coordinate this data. Scientific research, the most elusive of all the data, will require each resource specialist's close attention to new technology and the results from research that can be attributed to best management practices for a resource. Developing technologies or

better understanding of information needs may result in changes to the monitoring methods and what is being measured. This issue will be addressed during the assessment step.

The information collected through monitoring provides a variety of information that is applicable to one or more resource uses. Therefore, monitoring methods should be designed to address as many uses as possible. Existing monitoring and data collection from other federal, state, private, or educational institutions would be used where available. This action would increase the effectiveness and efficiency of the monitoring program by eliminating duplication and conflicting information.

Data Analysis

To further promote the adaptive environmental management process, the data collected from all monitoring, studies, and scientific results will be analyzed in a timely manner to determine the change that has occurred as a result of management action and to be a contributing factor to any modifications in existing monitoring requirements. Data will also be recorded and organized to facilitate analysis that will be used to assess management actions. When a change in resource conditions has been determined, 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. This schedule should take into consideration the data collection frequency for detecting change. Data will also be recorded and organized to facilitate analysis that will be used to assess 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, the cause of any change that occurs, and the appropriate action to take to achieve the desired outcome of a management action. New technology and management methods will be reviewed to determine their applicability for use in modifying or replacing current management actions. Occasionally, evaluation of monitoring data may indicate the need for changing the goals and objectives, which would require reinitiating the NEPA/planning process. Where the assessment indicates that the goals and objectives 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. 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 analysis would 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 collecting methods and will recommend continual use, modification, or elimination.

An assessment team that includes disciplines, expertise, and other agency involvement for conducting a thorough and complete assessment will be established. 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 A17-1) 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.

The actual indicator, amount, and frequency of monitoring will depend on the consideration of resource sensitivity, number of activities potentially affecting a resource, manpower, and funding. The actual monitoring plans would be developed during implementation activities and activity plan development.

Table A17-1. Resource Monitoring Table

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Air Quality					
Air quality	Ambient air sampling and air quality modeling	Area-wide	Parts per million	Hourly to 24-hour samples as per standards	Exceeding National Ambient Air Quality Standards. (The Bureau of Land Management (BLM) will inform the appropriate regulatory agencies [Wyoming Department of Environmental Quality, Air Quality Division [WDEQ-AQD] and Environmental Protection Agency [EPA] if dispersion modeling estimates a potential exceedence of the National Ambient Air Quality Standards [NAAQS] or Wyoming Ambient Air Quality Standards [WAAQS]. The regulatory agencies are responsible for determining whether an actual exceedence has occurred.)
Gaseous and particulate-critical air pollutants	Emission inventory	Area-wide	Pounds per hour and tons per year.	Annually	Whenever detected
Air Resources					
Climate	USHCN	SE Wyoming	°F, inches of precipitation	Continuous	None
Emissions	NO_X tracking	Oil & gas fields	TPY	Annual	None
Concentrations	SLAMS ambient sampling	Cheyenne, SE Sweetwater County	$\mu g/m^3$, ppm, ppb	Continuous	Criteria pollutant concentrations > NAAQS or WAAQS
Visibility	IMPROVE aerosol & optical	Snowy Range	dv, SVR, RcFM, etc	Weekly	Compliance with regional haze rule
Atmospheric deposition	CASTNet filter packs and NADP chemistry	Snowy Range	Kg/ha-yr	Weekly	Total deposition > thresholds
Cultural Resources					
National Register-eligible sites	Site inspection	Area-wide	Disturbance	Annually	Disturbance as a result of land uses or vandalism

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
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 fire is burning	Acres burned and fire intensity exceeds prescription
Forestry					
Forest health	Ecological site condition and trend	Forested lands	Representative sample area	Every 3–5 years	Disease, insect infestation, or encroachment of undesirable plant species threatens forest health
Timber stands	Timber stand exam	Commercial forested areas	Board feet, age class, and damages	Every 10–20 years	Basal area growth does not meet timber type standards
Lands and Realty					
Rights-of-way compliance	Site inspection	Area-wide	Site	Annually	Noncompliance or nonuse
Livestock Grazing					
Vegetation condition	Ecological site condition	All areas being grazed	Representative sample of grazed area	Annually	Conditions do not meet the goals and objectives for vegetation community or 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 3–5 years	Vegetation type not moving toward objectives and goals
Forage utilization	Utilization study plot or site visit	All areas being grazed	Representative sample of grazed area	During or after area has been grazed	Key plant vigor is deteriorating

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Livestock numbers	Counts and site visits	All allotments	Number	Annually or when the livestock are moved on or off the allotment	Exceeds permitted numbers and use for vegetation condition
Minerals					
Surface disturbance	Remote sensing or site inspection	Mineral development sites	Acres disturbed	Annually	Acres disturbed are exceeding the range established for the area
Compliance with authorization	Area inspection	Area-wide	Compliance	During operations or annually	Noncompliance
Off-Highway Vehicle					
Surface disturbance	Remote sensing or site visit	Site	Acres of disturbance	Annually	Disturbance has exceeded the baseline, accelerated soil erosion is occurring, and vegetation is being removed
Paleontological Resources					
Significant paleontological resources	Site inspection	Site	Degradation or loss of significant fossil resources	Annually	Loss or damage to significant fossil resources resulting from human or natural causes
Recreation					
General recreation use	Inspection or remote sensing	Area-wide, 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	Inspection of 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
Compliance with commercial authorization	Administrative review, site inspection	Activity site	Permit stipulations, resource conditions, and site restoration	During and after an event	When noncompliance is determined or degradation of resources is occurring

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Special Designations/Management Areas					
Resource condition	Site visit or remote sensing	Special Designation/Management Area	Amount of degradation or loss of resources	Every 1–5 years	Undue or unnecessary degradation or loss of resources as a result of human or natural causes
Transportation and Access Management					
Roads and vehicle routes	Road and vehicle route inspection through onsite inspection or remote sensing	Area-wide	Miles	Annually	When conditions represent a hazard to life and property
Vegetation					
Trend	Appropriate method from National Range Handbook	Area-wide	Representative sample	Every 3–5 years	Vegetation change from baseline or moving away from ecological status desired
Vegetation change	Photo points	Area-wide	Representative sample of vegetation type	Every 2–10 years	Used in conjunction with other methods to detect 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	Precipitation insufficient for plant growth during/after drought conditions
Noxious weed trend	Remote sensing or site visit	Area-wide	Acres of established weeds and potential habitat areas	Continuously	Weed species are spreading or becoming established in new areas
Special Status Species	Site inspection	Special Status Species habitats	Population and trend	Annually	When there is a declining trend in populations
Wetland/Riparian condition	Proper functioning condition (PFC)	Area-wide	Stream miles and acres along with rating	Yearly, following the Standards and Guidelines (S&G) schedule for locations	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 Resources					
Intrusions	Remote sensing or site visit	Class I and II areas	Impacts of an individual intrusion	Annually	When the intrusion exceeds the definition of the classification

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Water Quality, Watershed, and Soils					
General water quality	Water sampling surveys using the Beneficial Use Reconnaissance Program (BURP) Wyoming state protocol	Rivers and streams; locations selected to coincide with Standards and Guidelines schedule	Representative sample of water quality in standard units, depending on parameter	Yearly, following the S&G schedule for locations	When quality does not meet state standards or water quality can be improved by BLM management actions
Surface water quality of water bodies listed on state 303d list as threatened or impaired	Sampling and monitoring design depends on parameters that required listing	Watersheds where water bodies are listed	Typically includes coordination with other agencies and a developed water monitoring program	Seasonally, during period when water body is listed	When trend in water quality is not toward improving conditions for delisting
Project-specific surface water quality	Sampling, modeling, and/or monitoring design depends on parameters that could be impacted from project actions	Surface waters that may be impacted by BLM management actions	Representative sample of water quality in standard units depending on parameter or modeling results	Seasonally, during period when water body may be impacted	When quality does not meet state standards or water quality can be improved by BLM management actions
Groundwater quality	Groundwater sampling	Where groundwater resources are used (stock watering or water supplies for campgrounds)	Representative sample of water quality in standard units depending on parameter	Varies by project when they are established and campgrounds monthly	When water quality does not meet needs for uses
Groundwater resources, potentially impacted by resource development	Well monitoring, sampling, and modeling	Area-wide	Depth to groundwater, water quality parameters	Monitoring wells may collect continuously; frequency and duration driven by project specifics	A significant environmental impact not considered or disclosed in the NEPA process

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Channel geometry	Riparian cross-sections	Area-wide	Change in stream channel (width, depth, side channel modification and bank sloughing)	Every 1–3 years	When channel conditions could be improved by BLM management actions
Soil erosion uplands	Visual observation and surveyed erosion pins	Area-wide 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 or beyond those considered or disclosed in the NEPA process
Soil erosion on stream banks and floodplains	Visual observation and surveyed erosion pins	Area-wide where land use activities are occurring	Area affected in square feet or acres	Visual examination while land use activity is active and annually survey the site	Accelerated streambank soil loss
Soil compaction	Penetrometer or visual inspection	Area affected by land use activities	Pounds per square inch	1–2 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 2–3 years	Water table is shrinking beyond average precipitation fluctuations
Stream flow	Stream gaging stations	Area-wide	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
Wild Horses					
Horse numbers	Horse counts	Herd management areas	Number of animals	Annually	When numbers exceed established HML ranges
Horse blood	Blood sampling	Herd management areas	Blood analysis to determine animal health and genetic typing	When horses are gathered	Blood samples show deteriorating herd health or a genetic change

Indicator	Method or Technique	Location	Unit of Measure	Frequency and Duration	Action Trigger
Wildlife and Fisheries (in coordination with other federal and state agencies)					
Big game seasonal use and habitat condition	Aerial/field inspections and established/read browse transects	Crucial wildlife habitat areas	Numbers during occupancy periods and habitat condition	Annually	Downward trend in animal occupancy and habitat condition
Special Status Species occupancy/ productivity, and habitat condition	Aerial/field inspections and establish/read browse transects	Habitat areas and established buffer zones	Numbers during occupancy periods and habitat condition	Annually	Downward trend in animal occupancy and habitat condition
Threatened/ endangered species occupancy/ productivity, and habitat condition	Aerial/field inspections and establish/read browse transects	Habitat areas and established buffer zones	Numbers during occupancy periods and habitat condition	Annually	Downward trend in animal occupancy and habitat condition
Sage-grouse occupancy/ productivity, and habitat condition	Aerial/field inspections of leks and establish/read browse transects	Lek sites	Numbers during occupancy periods and habitat condition	Annually	Downward trend in the number of males and habitat condition
Macroinvertebrate indicator species	Collection of macroinvertebrate species	Perennial streams	Species and condition of macroinvertebrates	Every 2–10 years	When there is a declining trend in the abundance or diversity of macroinvertebrate species representing good water quality or a declining trend in appropriate macroinvertebrate metrics
Neotropical bird habitat	Site visit	Area-wide	Numbers during occupancy period	Every 2–3 years	Declining trend in habitat occupancy
Raptors	Site visit	Area-wide	Nest occupancy rate	Every 2–5 years	Declining trend in nest site occupancy