

# Monitoring

This section describes monitoring that will be conducted to determine how management is affecting resources, and whether we are achieving RMP objectives (effectiveness monitoring).

The monitoring program has three purposes; to help us:

- Determine the extent to which we are implementing the actions described in the RMP (implementation monitoring),
- Understand how management is affecting resources, e.g., are we achieving plan goals and objectives (effectiveness monitoring), and
- Identify where we should continue and where we may need to make changes in management, and determine whether plan goals and objectives are still relevant and important (validation monitoring).

This monitoring plan defines two scales of monitoring: monitoring of long-term trends, and monitoring of the effectiveness of specific actions.

Long-term monitoring will focus on the objectives which the plan is designed to achieve. The purpose of this level of monitoring is to determine whether resource conditions and user experiences in the planning area are improving, remaining the same, or declining over time.

The second scale of monitoring focuses on project or activity level monitoring. At this scale, monitoring will examine how well specific management direction has been applied on the ground and how effectively it produces expected results. Monitoring at broader levels will measure how successfully projects and other activities have achieved the objectives for those management areas.

Findings obtained through monitoring, together with research and other new information, will provide a basis for adaptive management changes to the plan. The monitoring program itself will not remain static. It will be periodically evaluated to ascertain that the monitoring questions and standards are still relevant, and will be adjusted as appropriate. Some monitoring items may be discontinued and others may be added as knowledge and issues change with implementation.

The monitoring process will collect information in the most cost-effective manner, and may involve sampling or remote sensing. Monitoring could be so costly as to be prohibitive if it is not carefully and reasonably designed. Therefore, it will not be necessary or desirable to monitor every management action or direction. Unnecessary detail and unacceptable costs will be avoided by focusing on methods. The level and intensity of monitoring will vary depending on the sensitivity of the resource or area and the scope of the proposed management activity. The accomplishment of any monitoring project is dependent upon budgets and national, regional, and local allocations of resources.

The following table provides general direction for elements to monitor, and provides suggestions for specific monitoring methods and frequency. These lists are suggestions and are not comprehensive. Monitoring techniques change quickly, and newer methods may often be both more accurate and more economical. Any methods which will adequately answer the monitoring questions may be used; professional judgment will be used to determine monitoring frequency and methodology that is appropriate to the scope of the issues and environmental conditions.

Some of the monitoring program listed in this table is already in place or is part of a continuing base program. New monitoring activities will only be added if funding becomes available.

The monitoring purposes described in the table relate directly back to the RMP management objectives for each monitoring element.



**Table 15: Monitoring**

Monitoring element	RMP objective	Purpose of monitoring	Suggested methodology
		<p>V-1 Determine changes in health, diversity and productivity of native plant communities, including special status plants and plants of traditional cultural significance.</p> <p>Determine success in meeting vegetation management objectives.</p>	<p>Conduct periodic measurements of plant composition, vigor, and productivity, as well as measurement of the amount and distribution of plant cover and litter. Monitor herbaceous or woody utilization, actual use, and climatic conditions to determine the effectiveness of established tools in meeting objectives. Monitoring of existing condition of vegetation would consist of identifying ecological sites, determining ecological status, determining soil types, vegetation mapping, baseline inventory, and assembling existing basic information. Procedures used (and frequency of use) would be primarily those in BLM Technical References 1734-7 and 4400-5.</p> <p>Measure trends in vegetative production, structure, and composition, soil/site stability, watershed function, and integrity of biotic community. Use the rangeland health assessment process prescribed in the most current versions of Interpreting Indicators of Rangeland Health (USDI-BLM, 2000b), Rangeland Health Standards and Guidelines (USDI-BLM, 1997), and BLM Manual 4180 and Handbook H-4180-1 guiding implementation of the rangeland health standards.</p>
			<p>Also use monitoring as described in hydrology section.</p>
		<p>V-2 Document changes in presence and abundance of noxious weed populations, particularly in areas where ground disturbances have occurred.</p>	<p>Conduct annual monitoring for new noxious weeds, concentrating in areas where ground disturbing activities have occurred, and where the public or agency personnel have reported sightings. Visit known noxious weed sites which are identified for treatment, and evaluate for effectiveness of control (annually). Visit known sites not identified for treatment on a rotational basis over three years. For all known sites and any newly discovered sites, locate with a global positioning system (GPS) unit, photograph, measure, and determine the need for future treatment. Survey all burned areas (natural and prescribed) over 20 acres for noxious weeds for three years following the burn.</p>
		<p>V-5 Determine extent to which rehabilitation is: a) conducted in areas with greatest opportunity of success, and b) supported by data at appropriate scales.</p>	<p>Evaluate sub-basin assessments and project level analyses conducted on District, and determine if appropriate data was available and utilized. Determine rehabilitation success (as described under other objectives); compare to rehabilitation success; and evaluate if additional data would have had an effect on choice of area or rehabilitation success.</p>
		<p>V-6 Determine amount of involvement of local stakeholders and small businesses in helping BLM accomplish resource management objectives.</p>	<p>Document participation with communities, local stakeholders, and small businesses when BLM is involved in public outreach efforts. Examples include: Community Wildfire Protection Plans, public meetings to present proposed projects, tours to evaluate and monitor project implementation results, stewardship contracting opportunities for local operators, and volunteer projects with service clubs, schools, youth groups, and correction crews.</p>

**Table 15: Monitoring (continued)**

Hydrology		H-1 H-2 H-3 H-4	Measure trend in upland and hydrologic function.  Determine changes in soil productivity and amount of accelerated soil erosion. Measure changes in the ability of soil and plant conditions to support infiltration and soil moisture storage, and to maintain or improve water quality, water quantity, and balanced timing and duration of flow.  Determine change in surface and ground water quality.
Air Quality	AQ-1	Compare water quality to state standards and BLM objectives for watershed function.  Document trends in air quality as a result of BLM actions.	
		<ul style="list-style-type: none"> <li>- Conduct Proper Functioning Condition Assessment TR 1737-9 and TR 1737-15 (assessment for streams) and TR 1737-11 and TR 1737-16 (assessments for lakes/wetlands) to assess the functionality of riparian and wetland areas.</li> <li>- Measure the amount and distribution of plants across a channel cross-section using riparian transects; document visual changes over time on the condition of the stream corridor using photo points.</li> <li>- Use Aquatic Habitat Inventories conducted by ODFW to measure channel condition parameters such as habitat units (pool, riffle, glide), channel shade, active channel height, active channel width, floodprone width, substrate, percent actively eroding bank, instream wood, and vegetation type and cover.</li> <li>- Use upland photo points and vegetative transects to document changes in surface cover that promotes infiltration and reduces overland flow.</li> </ul>	
		Measure stream temperature, as a 7-day average of daily maximums.	
		Utilize Oregon Department of Forestry air quality monitoring to measure background pollution levels and emissions during fire events and determine whether BLM actions may affect national ambient air quality standards.	

**Table 15: Monitoring (continued)**

			<b>Wildlife</b>
W-1	Determine trends in health, diversity, and productivity of populations of special status wildlife species, and the habitat on which they depend.	Monitor BLM proposed and authorized actions to ensure they are consistent with the Bureau's Special Status Species Policy (6840) and to ensure they are consistent with the objectives and guidelines outlined in the RMP.  Periodically assess the effectiveness of a sampling of different vegetation treatments and disturbance actions to determine effectiveness of management decisions.	
W-2	Measure changes in amount of special habitat features.	Monitor BLM proposed and authorized actions to ensure they are consistent with the objectives and guidelines outlined in the RMP.  Periodically assess the effectiveness of management actions that occur in special habitats or potentially could affect special habitat features. For example, monitoring the effectiveness of seasonal closures during the winter at caves closed to protect hibernating Townsend's big-eared bats.	
W-3	Measure changes in distribution and abundance of species of focus.	In conjunction with other private, state or federal agencies, continue to monitor wildlife populations associated with source habitats in the planning area. Do this at several scales: <ul style="list-style-type: none"> <li>- For individual species such as bald and golden eagles, sage grouse, deer, elk and pronghorn.</li> <li>- Groups of species associated with source habitats such as shrub-steppe, juniper and ponderosa pine.</li> <li>- For individual species and groups of species at a regional scale such as bald and golden eagles, Townsend's big-eared bat, raptors, neotropical migratory songbirds, and bats associated with caves.</li> </ul>	Periodically determine the adequacy of existing data (i.e., species, habitats, etc.) for supporting management decisions.
W-4	Determine changes in health, diversity, and productivity of populations of native plants and animals.	Also, monitor riparian habitat condition on an allotment basis during allotment evaluations or during rangeland health assessments as part of determining properly functioning condition.  Periodically monitor, at a watershed or subwatershed scale, habitat conditions to determine their suitability to support species associated with those habitats. Use this information to identify existing conditions and to aid in determining trends.	Monitor BLM proposed and authorized actions to ensure they are consistent with the objectives and guidelines outlined in the RMP.  Also monitor forage production and wildlife allocations on an allotment basis during allotment evaluations or during rangeland health assessments.

**Table 15: Monitoring (continued)**

		FF-1	Document management response to wildland fires.	Document instances of use of heavy equipment for fire suppression in ACECs, WSAAs, RNAs, and whether such equipment was restricted to existing roads and trails.
		FF-2	Measure changes in soil and vegetation (including weed) response to burned area rehabilitation.	Determine pre-fire condition and post-fire condition by monitoring plant community composition and trend in burn areas to determine natural recovery, responses from seed planting, and weed and cheatgrass invasion. Monitoring methods may include photo points, density, cover, frequency plots, and ocular estimates.
		FF-3	Determine trends in ecosystem health and susceptibility to extreme fire behavior.	Use FIREMON ( <a href="http://fire.org/firemon/">http://fire.org/firemon/</a> ), a fire effects monitoring and inventory protocol, and/or recent version of Interagency fire effects monitoring guidance.
<b>Fire &amp; Fuels</b>		FF-4	Determine changes in fire behavior, resource values, and recreational opportunities before and after hazardous fuels treatments in wildland urban interface areas	Evaluate post-treatment fire behavior in wildland urban interface areas, including effects on: a) human safety, b) success of suppression. Periodically review treatments to determine effects on recreation opportunities, wildlife habitat and corridors, visual quality, air and water quality, and public access.

**Table 15: Monitoring (continued)**

		Special Management Areas
SMA-1	Determine trends in "relevance and importance" criteria for ACECs, and in the values for which the ACECs were designated.	Collate existing base information and develop additional baseline inventories of plant communities following "Research Natural Areas; Baseline Monitoring and Management" (USDA-FS, 1984). Periodically monitor the impacts of management actions on resource values, including the health of RNA plant community cells. This will be done using such techniques as photo points, line intercept transects, ocular surveillance, study plots, and value points.
SMA-2	Measure change in public awareness of ACEC values.	Pecks milkvetch ACEC. Make periodic visits related to apparent threats and trend, wildfire, and other factors. Collect qualitative observations, estimate of the number of plants, documentation of threats and other information. Take photographs. Long-term monitoring consists of 16 macropLOTS (1 meter wide, 100 or 200 meters long) encompassing four distinct populations (four macropLOTS per population). These were established by The Nature Conservancy and are re-read approximately every five years by BLM. Data concerning plant size and reproductive status was originally collected; now the data consists mostly of simple census.
SMA-3	Determine District contribution towards national system of RNAs.	Powell Butte RNA/AECEC. Establish permanent plots conforming to RNA monitoring protocol (Pacific Northwest Research Station, USFS) in cooperation with the Natural Areas Association. Re-read these plots as needed. Monitor a) Insect infestations, b) Invasion or spread of exotic plant species, c) Juniper bough harvesting near the RNA, d) Research/education use, and e) Visitor/recreation use
SMA-4	Document trends in wilderness characteristics in WSAs. Measure biologic, scientific, cultural and geologic values/resources of significant caves, and availability of research, interpretation and education opportunities.	Horse Ridge RNA/AECEC. Establish permanent plots, conforming to RNA monitoring protocol (Pacific Northwest Research Station, USFS) in cooperation with the Natural Areas Association. Re-read these plots as needed. During a natural fire, monitor daily to insure prescribed parameters are followed. Within two weeks of fire, map the extent of the fire and document other information such as extent of disturbance, if any, resulting from suppression activities, apparent mortality of the vegetation and any damage to perimeter fence. Re-visit in subsequent years to document changes in vegetation, regeneration, weeds, etc. Monitor a) Condition of boundary fence and signs, b) Insect infestations, c) Invasion or spread of exotic plant species, d) Juniper bough harvesting near the RNA, e) Research/education use, and f) Visitor/recreation use.
SMA-5	Document trends in nominated values for caves which have been determined significant.	WSAs: Follow direction within the existing policy for WSAs (USDI-BLM 1995). Monitor WSAs at least once per month during the months the area is accessible by the public, or more frequently if necessary because of potential use activities or other resource conflicts. Use aerial surveillance, on-the-ground surveillance, visitor contact, permit compliance checks, and other methods as appropriate.
		Establish program for monitoring caves. Conduct periodic inventories that monitor trends such as: 1) rates of visitation, 2) evidence of human activities such as excavation, graffiti, fire rings, broken cave formations, and 3) population numbers of key species such as bats (including hibernacula and maternity roost use). Monitoring would also track changes in access to cave sites, including condition of roads, trails and parking areas and their size, condition and distribution. Also use monitoring as described in W-2, Wildlife section and in A-1, A-2, Archeology section.

**Table 15: Monitoring (continued)**

Livestock Grazing	
LG-1	Determine trends in forage made available for livestock grazing.  Measure changes in level of conflict between livestock grazing and other uses and values on public land, and with adjacent landowners.  Document trends in health and sustainability of rangeland ecosystems (also see suggested monitoring methodology for Vegetation, above).
	Collect actual use reports from grazing permittees (report includes livestock numbers, pasture use, turnout and gather dates).  Maintain central log of verbal and written public inquiry/complaint regarding conflicts. Complete "Grazing Matrix" checklist (document potential conflicts) for an allotment when a permittee expresses intent to transfer or relinquish the permit.
	Grazing allotments in the planning area have been assigned to a management category so management efforts and funding can be directed to areas of greatest need. The three categories are I (Improve), M (Maintain), and C (Custodial), based on: (1) Present resource conditions, (2) Forage production and potential, (3) Potential conflicts with recreation and other users, (4) Potential conflicts with adjacent land use or busy roads, (5) Presence of important habitat, high priority watersheds, or other important resources, (6) Current livestock grazing management, and (7) opportunity for positive economic return on investment.  In "I" category allotments, examine trend plots (see next paragraph) every five years, and record utilization data (key forage plant method, USDI BLM 1989) every other year. In "M" allotments, determine trend every 10 years, and utilization every five years. Monitoring in "C" allotments is limited to periodic inventories and observations to measure long-term resource condition changes.  Measure trend by noting changes in composition, density, cover, production, vigor, age class, and frequency of the vegetation and related parameters of other resources. Use step-point nearest plant, nested frequency line intercept, photo plots, Parker three-step, and other methods as appropriate.  On a periodic basis, evaluate every allotment using the "Healthy Rangelands Standards and Guidelines" (see Vegetation monitoring, above). Currently, this is expected to occur about once every 10 years.

**Table 15: Monitoring (continued)**

		<b>Minerals</b>
MN-1	Determine trend in availability of leasable, locatable and mineral material prospecting, exploration and development.	Conduct annual review of maps and other records showing areas available for leasable, locatable, and mineral materials.
MN-2	Determine effects on resource values from mineral prospecting, exploration and development. Measure level of conflict between mining (commercial and recreational) and other uses and adjacent landowners.	Monitor mining operations to ensure compliance with 3803, 3809, and other regulations and conditions of approval, especially preventing "unnecessary or undue degradation" of disturbed areas in coordination with state regulating agencies. Periodically inspect mining claim activities, including quarterly inspections for all operations using cyanide, biannual inspections for all other active operations, and more often in areas with a high potential for greater than usual impacts.  Periodically inspect leasable mineral activities and applicable resource attributes. Determine compliance with applicable laws, regulations, lease(s) conditions, and exploration and development plans.
MN-3, 4	Document availability of recreational rockhounding and decorative stone collection opportunities.	Maintain log of phone calls and other complaints received from miners or from others concerning mining activity. On an annual basis, review concerns received and determine where problems are concentrated or increasing, compared to the year before.  Conduct annual review of maps and other records showing areas available for recreational rockhounding and decorative stone collection. Compare with requests received for these uses.

**Table 15: Monitoring (continued)**

		Forest, Range, and Woodland Products		Visual Resources		Recreation Resources	
		Military	MU-1 MU-2	VR-1	FP-1	FP-2	FP-3
FP-1	Document trends in availability of forest, range and woodland products.				Record accomplishments for providing wood products and special forest, range, and woodland products in the Timber Sale Information System database and in MIS reporting.		
FP-2	Determine trends in hazards to people and facilities from hazard trees or trees possessing other defects.				Document phone calls, letters, and other contacts with adjacent land owners and users of public lands when they are reporting hazard trees that threaten public safety or property. Survey recreation facilities, roads, and other frequently visited locations on public lands annually for hazard trees. Incorporate hazard tree surveys and evaluation with all vegetation management projects.		
FP-3	Document District contribution to helping manage health and function of forest, meadow and riparian ecosystems within La Pine State Park.				Document requests from Oregon Parks and Recreation Department to help manage the timber and vegetation resource within La Pine State Park. Include La Pine State Park in larger watershed or landscape-level vegetation monitoring plans when appropriate and cost-effective.		
MU-1 MU-2	Verify implementation of OMD's mitigation activities and procedures for protecting public safety.				Conduct site inspections, monitor resource impacts of individual training exercises, determine compliance to standards (e.g., water and air quality per Federal and State law), and collect and evaluate information from other agencies. Conduct independent and cooperative surveys with OMD including the Integrated Cultural Resources Management Plan and Integrated Natural Resources Plan		
VR-1	Determine changes in effects to character of landscape in each VRM Class area.				Periodically review resource area NEPA decisions to ensure that BLM's VRM Contrast Rating Process is being used and the VRM Classes identified in the Upper Deschutes RMP are being used.		
R-1 R-2 R-3 R-4 R-5 R-6					Conduct monitoring, including periodic patrols to check boundaries, signing, and visitor use; to ensure visitor compliance with rules and regulations; to establish baseline data and observation points to determine current impacts from recreational use, and to develop studies to help determine appropriate levels and patterns of recreational use and the influences of other resource uses. Focus field monitoring on visitation levels, compliance with rules, regulations, and permit stipulations for specific sites, dispersed uses, and prescribed standards and guidelines. Use visitor surveys, traffic counters, surveillance at developed recreation sites, documentation of user conflicts, and photo documentation of the changes in resource conditions over time. Monitoring may also include collection of data from visitor comments and complaint or information request calls or emails. Use monitoring data to manage visitor use, develop plans and projects to reduce visitor impacts, and to provide appropriate facility or transportation system design.		

**Table 15: Monitoring (continued)**

		<b>Transportation &amp; Utilities</b>
TU-1	Document new or modified rights-of-way for transportation corridors and communication/energy sites, and compare to recognized need for such ROWs.	Review ROWs for compatibility with other ROWs in the same areas.  Monitor use on existing ROWs, placing emphasis on most used routes. Monitoring will be accomplished through the terms and conditions of the grant. Emphasize improvements on selected heavy use routes.
TU-2	Determine how integrated, functional, safe and efficient the transportation system is. Monitor how it supports approved land uses, provides links between communities, reduces conflicts with adjacent landowners, and balances public access needs with resource protection.	Periodically review BLM road and ROW inventory sources for increases in the number of ROWs and compare to the number of new routes.  Periodically check that developed roads are available to all communities and routes are planned to public and private lands where the road will cross public lands.
TU-3	Determine level to which appropriate mitigation measures are included in ROWs.	Review terms and conditions of ROW every five years. Comparing actual effects to predicted effects.
TU-4	Monitor the extent to which the long-term transportation system meets <b>military's</b> specific training objectives, maximizes benefits to other users (including recreation use of public lands), and minimizes impact to natural resources.	Inspect site and conduct independent and cooperative surveys with OMD including: a) the Integrated Cultural Resources Management Plan and Integrated Natural Resources Plan, b) recordation of compliance to standards established pursuant to applicable Federal and State law such as for water and air quality, c) collection and evaluation of information from other agencies, and d) evaluate resource impacts of individual training exercises.  Hold annual meetings between BLM and OMD as provided for in the lease, to a) review adequacy of and compliance with the terms and conditions of the lease, and b) come to agreement on future actions suggested in studies and research described above.
TU-5	Determine effects on regional transportation system needs and ecological and recreational values resulting from consolidation of transportation and utility systems.	Review regional transportation and utility systems against existing and predicted needs, in cooperation with local governments, agencies, and ROW holders. Review effects to ecological and recreational values (see suggested monitoring under affected resource value).
TU-6	Determine changes in amount of and requests for administrative access.	Maintain log of administrative access requests and authorizations. Periodically review number and evaluate any unmet needs.

**Table 15: Monitoring (continued)**

		Land Ownership	Public Health & Safety
LO-1 LO-2 LO-3	Monitor the number of acres of high public resource values retained in or added to public ownership, and the acres of these lands transferred to other ownership through exchange or disposal.	Verify the number of acres of Z-1, Z-2 and Z-3 lands in public ownership. Compare existing ownership patterns with RMP objectives.	
LO-4	Monitor District contribution of public land to meet community needs.	Compare existing ownership patterns with RMP objectives. Periodically meet with communities to review progress in meeting those needs, and identify any new needs.	
LO-5	Monitor changes in land ownership patterns and the consequent effects on land management efficiency, wildlife habitat connectivity, and recreational access.	Verify wildlife habitat connectivity and compare to RMP objectives.	
LO-6	Monitor change in number of conservation easements.	Verify each easement, including year initiated, location, public acres affected, and other details.	
LO-7	Monitor the extent to which withdrawn lands are being used consistent with the purpose for which the lands were withdrawn.	Periodically conduct reviews of withdrawn lands within the planning area.	
PHS-1 PHS-2 PHS-3 PHS-4 PHS-5	Document trends in the number of reports of firearm discharge: a) towards public land visitors, b) in non-motorized use areas on public land and into residential areas adjacent to public land, and c) causing damage to facilities or natural/cultural resources.	Periodically review BLM law enforcement data from incident reports and assess the number of firearm discharge related incidents occurring on BLM administered public lands. Periodically track the number of firearm discharge closures processed by Deschutes or Crook County for subdivisions and whether these closures match restrictions on adjacent BLM administered lands.	
PHS-6 PHS-7	Document change in number/amount of illegal dumping of residential, commercial, industrial, and hazardous waste, and associated changes in public health and safety, recreation opportunities, and risk of wildland fire.	Periodically review BLM law enforcement data from incident reports and assess trends in the number/amount of illegal dumping of residential, commercial, industrial, and hazardous waste. Periodically review BLM expenditures per year for disposal of abandoned automobiles.	

**Table 15: Monitoring (continued)**

		Archaeology
A-1	Determine changes in condition of archaeological resources, with special attention to "at-risk" significant archaeological resources.	In collaboration with the Archaeological Society of Central Oregon (ASCO), continue on-the-ground monitoring of identified sites to determine condition, impacts, deterioration, and use of such sites. Priority for site monitoring will be based on: 1) site significance or site's potential to yield significant information to determine its eligibility to the National Register, 2) the severity of threat to a site, 3) the immediacy of threat to a site.
A-2	Visit Wagon Road and Tumalo Canal ACECs quarterly and twice yearly (respectively) to monitor cultural resource values. Monitor "at-risk" archaeological sites at Redmond Caves, Steelhead Falls, and Pictograph Cave twice yearly. All information resulting from site visits will be entered into the resource area cultural resource database.	Visit other cultural resource sites within the planning area on a periodic basis, at a minimum of 10 sites annually. Monitor the condition of the site and document any disturbance or deterioration of the site, and enter information into the cultural resource database. If a site is considered eligible to the National Register of Historic Places, initiate consultation with the State Historic Preservation Officer, when necessary, to determine the appropriate action to stop site deterioration or apply mitigation measures. Work with BLM law enforcement in the case of criminal removal of site materials.
A-3	Document trends in availability of interpretive opportunities provided by District for the public to learn about and enjoy heritage resources.	Every two years, update list of heritage resource interpretive opportunities provided on District.