

Chapter 4

MONITORING

INTRODUCTION

Monitoring includes testing assumptions, tracking changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives. Monitoring information should enable the Forest to determine if a change in plan components or other plan management guidance may be needed, forming a basis for continual improvement and adaptive management. The plan monitoring program identifies the monitoring questions and associated indicators for monitoring the plan. The monitoring program consists of a set of monitoring questions and associated indicators to evaluate whether plan components are effective and appropriate and whether management is effective in maintaining or achieving progress toward desired conditions and objectives for the plan area.

The monitoring program uses two monitoring approaches, implementation and effectiveness. Implementation monitoring determines if the practices, i.e., plan components, we said we would do were implemented. Effectiveness monitoring determines how well a particular practice helps to achieve a project objective and helps to determine the rate at which desired conditions are being achieved. Implementation and effectiveness-type monitoring actions will be used to determine whether the land management plan needs to be changed.

Broader-scale monitoring information is used to address relevant plan monitoring questions that are best answered at a larger geographic scale. Broader-scale monitoring strategies may be comprised of questions and indicators or may include a description of protocols, data management, responsibilities, and partnerships for the questions and indicators.

The plan monitoring program will be coordinated and integrated with relevant broader-scale monitoring strategies to ensure that monitoring is complementary and efficient, and that information is gathered at scales appropriate to the monitoring questions (36 CFR 219.12).

The plan monitoring program addresses the most critical components for informed management of the Forest's resources within the financial and technical capability of the agency. Every monitoring question links to one or more goals, desired conditions, objectives, standards, or guidelines. However, not every plan component has a corresponding monitoring question.

This monitoring program is not intended to depict all monitoring, inventorying, and data gathering activities undertaken on the Forest; nor is it intended to limit monitoring to just the questions and indicators listed in table 39. Consideration and coordination with broad-scale monitoring strategies, multi-party monitoring collaboration, and cooperation with state agencies where practicable will increase efficiencies and help track changing conditions beyond the Forest boundaries to improve the effectiveness of the plan monitoring program. In addition, project and activity monitoring may be used to gather information for the plan monitoring program if it will provide relevant information to inform adaptive management.

- The monitoring program sets out the plan monitoring questions and associated indicators. It is comprised of a monitoring guide and a biennial evaluation report.

- The monitoring guide provides detailed information on the monitoring questions, indicators, frequency and reliability, priority, data sources and storage, and cost.

Biennial monitoring evaluation reports will document whether a change to the plan or change to the monitoring program is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. The monitoring evaluation report will summarize plan monitoring results and will incorporate broad-scale monitoring information to answer the relevant monitoring and evaluation questions. The monitoring evaluation report is used to inform adaptive management of the plan area. The monitoring report will be made available to the public.

Some kinds of monitoring indicators will require longer time frames for thorough evaluation of results, but a biennial review of what information has been collected will ensure timely evaluation to inform planning. The biennial monitoring evaluation does not need to evaluate all questions or indicators on a biennial basis, but must focus on new data and results that provide new information regarding management effectiveness, progress toward meeting desired conditions or objectives, changing conditions, or validation (or invalidation) of assumptions.

Table 39 is the monitoring program. This table displays the monitoring questions, the reference to forest plan direction, the indicator(s) for answering the monitoring question and the frequency of measure. Monitoring questions are used to evaluate whether management is moving toward, moving away from, or maintaining desired conditions. The references to forest plan direction provide a link between the monitoring question and the forest plan. The forest plan references may not include all relevant direction, but rather the primary direction that is addressed by the monitoring question. Indicators are the specific resource measures used in answering the monitoring questions. Frequency of measure is the timeframe for collecting data on each indicator. The associated evaluation process determines if the observed changes are consistent with the forest plan and the effectiveness of implementation. Evaluation reports will be produced biennially (as per 2012 Rule, 36 CFR 219.12(d)). Not all questions or indicators will be reported in the biennial Monitoring Evaluation Report.



Mountain biking along Kettle Crest

MONITORING AND EVALUATION

Monitoring Component: this provides a monitoring program that evaluates how the on-the-ground management is maintaining or making progress toward desired conditions and objectives of this plan. The Plan provides the items to be monitored per the monitoring and evaluation requirements found at 36 CFR 219.12 of the 2012 Rule. Details on methodology, data storage, and responsibility are not considered plan components and are not included in the plan.

Information, science, and unforeseen circumstances continually change over the life of a plan. The major mechanism for reacting swiftly and efficiently to new information, science, or circumstances is provided through a monitoring program for the plan. These include:

1. Monitoring to determine whether plan implementation is achieving multiple use objectives;
2. Monitoring to determine the effects of the various resource management activities within the plan area on the productivity of the land;
3. Monitoring of the degree to which on-the-ground management is maintaining or making progress toward the desired conditions and objectives for the plan;
4. Adjustment of the monitoring program, as appropriate, to account for unanticipated changes in conditions.

These evaluations are an integral part of answering key planning questions such as the state of social, economic, and ecological conditions and trends, and the need for an amendment or revision.

Specific monitoring items, such as measuring frequencies, methodologies, precision, and reliability are identified in the annual monitoring guide.

MONITORING QUESTIONS

Monitoring questions ask whether management in the plan area is maintaining or progressing toward desired conditions and meeting objectives. Monitoring questions may be designed to pertain directly to desired conditions or to relate to objectives or guidelines. Monitoring information in the plan set of documents may be changed or updated as appropriate. Such changes and updates require a plan amendment or revision.

Monitoring questions can also identify or enumerate the ties between ecosystem resilience and ecosystem services. Ecosystem services are the products of functioning ecosystems that benefit people.

Monitoring questions identify specific Plan direction to monitor and evaluate. The monitoring questions specify the information that is essential for measuring Plan accomplishments and effectiveness. The associated evaluation process determines whether the observed changes are consistent with the desired conditions and what adjustments may be needed, if any.

Monitoring questions are designed to address the requirements at 36 CFR 219.12 (a)(5) which states that monitoring programs must contain one or more monitoring questions to address the following (see table 39):

- (i) the status of select watershed conditions.

(ii) the status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.

(iii) the status of focal species to assess the ecological conditions required under § 219.9.

(iv) the status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.

(v) the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

(vi) measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.

(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.

(viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land

Monitoring identified in this section does not include monitoring conducted in compliance with other laws, policies, and site-specific decisions.

EVALUATION

The information gained through monitoring and evaluation may be the catalyst for plan revisions or amendments.

FOREST PLAN MONITORING QUESTIONS

Table 39. Monitoring questions

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Landscape Features and Dynamics				
Vegetation	MON-VEG-01: To what extent are management activities and natural disturbance processes trending toward desired conditions for structure/structural stage and fire regime condition class (FRCC), and increasing resistance and resiliency to disturbance factors including climate change? This includes vegetation size classes, down wood, snags.	FW-DC-VEG-02, FW-DC-VEG-03, FW-DC-VEG-04, FW-DC-VEG-05, FW-DC-VEG-11, FW-DC-VEG-12, FW-DC-VEG-14; FW-OBJ-VEG-01, FW-OBJ-VEG-02, FW-OBJ-SCE-01; MA-DC-FR-01; MA-DC-GR-01	<p>MON-VEG-01-01: Acres treated to meet FW-OBJ-VEG-01</p> <p>MON-VEG-01-01a: Acres treated to respond to forest disease pathogens.</p> <p>MON-VEG-01-02: Acres burned through prescribed and wild fire</p> <p>MON-VEG-01-03: Acres of forest by structure and vegetation type compared to the desired condition</p> <p>MON-VEG-01-04: Snags and down wood by watershed</p> <p>MON-VEG-01-05: Number of acres influenced by insects</p>	<p>Annual</p> <p>Every 5 years (review of FRCC across the Forest)</p> <p>Every 5 years</p> <p>Every 5 years</p> <p>Every 5 years</p>
Vegetation	MON-VEG-02: Have management activities met forest plan objectives and trended toward desired conditions for invasive terrestrial plant species?	FW-DC-VEG-06, FW-DC-VEG-07, FW-DC-IS-01; FW-OBJ-IS-01, FW-OBJ-IS-02, FW-OBJ-IS-03; FW-GDL-IS-01, FW-GDL-IS-02, FW-GDL-IS-03	<p>MON-VEG-02-01: Acres of non-native invasive plants treated</p> <p>MON-VEG-02-02: Extent and number of sites of new non-native invasive plant species</p>	<p>Annual</p> <p>Annual</p>
Vegetation	MON-VEG-03: To what extent are management activities moving hazardous fuels toward desired conditions within WUI?	FW-DC-VEG-11, FW-DC-VEG-12, FW-DC-VEG-13, FW-DC-VEG-14; FW-STD-VEG-01	MON-VEG-03-01: Acres of hazardous fuel treatments within the WUI	Annual

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Vegetation	MON-VEG-04: To what extent is the Forest meeting forest plan objectives and trending toward desired conditions to provide a mix of timber products in response to market demands?	FW-OBJ-VEG-01	MON-VEG-04-01: MMBF offered and MMBF sold annually	Annual
Vegetation	MON-VEG-05: To what extent is the Forest meeting NFMA requirements and desired conditions on size of harvest openings?	FW-STD-VEG-03, FW-STD-VEG-04	MON-VEG-05-01: Number of even-aged regeneration harvest units exceeding 40 acres in size and category for exceeding	Annual
Vegetation	MON-VEG-06: To what extent are regeneration units restocked to trend toward vegetation desired conditions?	FW-STD-VEG-05	MON-VEG-06-01: On lands suitable for timber production, percent of acres with regeneration harvest that are adequately restocked within 5 years of harvest	Annual
Vegetation	MON-VEG-07: Have lands that are not suitable for timber production become suitable?	FW-STD-VEG-03, FW-STD-VEG-06	MON-VEG-07-01: Acres of land suitable for timber production.	Every 10 years
Vegetation	MON-VEG-08: Have destructive insects and disease organisms increased to potentially damaging levels following management activities?	FW-DC-VEG-02, FW-DC-VEG-03, FW-DC-IS-01, FW-DC-IPM-01; FW-STD-IPM-01	MON-VEG-08-01: Acres affected by insect and disease organisms.	Every 5 years
Vegetation	MON-VEG-09: Are actual outputs and services consistent with those projected by the plan?	FW-OBJ-VEG-01; FW-STD-VEG-03; FW-DC-RFP-02	MON-VEG-09-01: Acres of active management. MON-RFP-01-01: MMBF offered annually.	Annual

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Watershed	MON-WTS-01: Are management actions contributing to improved watershed condition class within focus, key, and priority watersheds, and other watersheds identified for restoration?	FW-DC-WR-01, FW-DC-WR-02, FW-DC-WR-03, FW-DC-04, FW-DC-WR-05, FW-DC-WR-06, FW-DC-WR-07, FW-DC-WR-08, FW-DC-WR-18, FW-DC-WR-19; FW-OBJ-WR-03, FW-OBJ-WR-04, FW-OBJ-WR-05, FW-OBJ-WR-06, FW-OBJ-WR-07, FW-OBJ-WR-08, FW-OBJ-WR-09, FW-OBJ-WR-10, FW-OBJ-WR-11; FW-STD-WR-01, FW-STD-WR-02, FW-STD-WR-03, FW-STD-WR-04; MA-OBJ-RMA-01, MA-OBJ-RMA-02, MA-OBJ-RMA-03; MA-STD-RMA-03, MA-STD-RMA-04, MA-STD-RMA-05, MW-STD-RMA-07, MA-STD-RMA-07, MA-STD-RMA-08; MA-GDL-RMA-03, MA-GDL-RMA-04, MA-GDL-RMA-05, MA-GDL-RMA-06, MA-GDL-RMA-07, MA-GDL-RMA-08, MA-GDL-RMA-09, MA-GDL-RMA-10	MON-WTS-01-01: Change in watershed condition class	Every 5 years

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Watershed	MON-WTS-02: Are management actions reducing road impacts to watershed and aquatic habitat function and water quality within all watersheds across the Forest? Within Key, Focus, and Priority Watersheds?	FW-DC-WR-17; FW-OBJ-WR-03, FW-OBJ-WR-06; FW-STD-WR-04, FW-STD-WR-05; FW-GDL-WR-04; MA-DC-RMA-04; MA-OBJ-RMA-02; MA-STD-RMA-05, MA-STD-RMA-06, MA-STD-RMA-07; MA-GDL-RMA-04, MA-GDL-RMA-05, MA-GDL-RMA-06, MA-GDL-RMA-07, MA-GDL-RMA-08, MA-GDL-RMA-09, MA-GDL-RMA-10	MON-WTS-02-01: Miles of roads treated that are a high risk to watershed and aquatic habitat function.	Annual
Watershed	MON-WTS-03: Are management actions improving key riparian processes within Riparian Management Areas?	MA-DC-RMA-02; MA-OBJ-RMA-01, MA-OBJ-RMA-02, MA-OBJ-RMA-03; MA-STD-RMA-01, MA-STD-RMA-04, MA-STD-RMA-05, MA-STD-RMA-06, MA-STD-RMA-07	MON-WTR-03-01: Acres or miles of watershed restoration activities accomplished, by subwatershed MON-WTR-03-02: Percent of subwatersheds trended toward an improved condition.	Annual Every 5 years (PIBO EM-comparison of reference conditions, WCF)
Watershed	MON-WTS-04: Are water resources and RMA standards, guidelines, and best management practices (BMPs) being implemented at project sites? Are standards, guidelines, and BMPs effective at achieving desired conditions?	All WR and RMA standards and guidelines	MON-WTR-04-01: Number of BMP evaluations completed and identification of BMPs that were implemented correctly and incorrectly, and identification of BMP effectiveness	BMP annual
Watershed	MON-WTS-05-01: What is the status and trend of water quality?	FW-DC-WR-05, All WR and RMA standards and guidelines	MON-WTR-05-01: Miles of state-listed impaired waters, miles of waters under an approved TMDL and WQIP.	Annual (WADoE 303(d) list, TMDLs, WQIP implementation and monitoring.)

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Aquatic Habitat	MON-AQH-01: Are management activities across the Forest contributing to the viability of riparian and wetland-dependent TES and focal species?	FW-DC-WR-02, FW-DC-WR-03, FW-DC-WR-05, FW-DC-WR-12, FW-DC-WR-13; FW-OBJ-WR-01, FW-OBJ-WR-02, FW-OBJ-WR-03, FW-OBJ-WR-04, FW-OBJ-WR-05, FW-OBJ-WR-06, FW-OBJ-WR-07, FW-OBJ-WR-08, FW-OBJ-WR-09, FW-OBJ-WR-10, FW-OBJ-WR-11; FW-STD-WR-05; FW-GDL-WR-04; MA-OBJ-RMA-01, MA-OBJ-RMA-02, MA-OBJ-RMA-03; MA-STD-RMA-07	MON-AQH-01-01: PIBO EM, updated Aquatic Ecological Condition (AEC), Stream channel morphology surveys in monumented reaches MON-AQH-01-02: Acres or miles of treatments to improve hydrologic, aquatic, and riparian function	Every 5 years (PIBO EM, updated Aquatic Ecological Condition (AEC)), stream channel morphology surveys), invasive species database. Annual
Aquatic Habitat	MON-AQH-02: Are management actions improving conditions within Riparian Management Areas where livestock grazing is permitted?	FW-OBJ-WR-07; MA-DC-RMA-03; MA-STD-RMA-08, MA-STD-RMA-09, MA-STD-RMA-10, MA-GDL-RMA-12, MA-GDL-RMA-13, MA-GDL-RMA-14	MON-AQH-02-01: Acres of improvement within designated monitoring area locations. MON-AQH-02-02: Allotments meeting annual grazing management indicators	Annual, Every 5 years in conjunction with MON-WTR-03-02 above (PIBO EM & R-6 stream surveys) Annual (PIBO & Forest monitored designated monitoring areas)
Aquatic Habitat	MON-AQH-03: Are management actions preventing the spread of aquatic invasive species?	FW-DC-WR-12; FW-OBJ-WR-01, FW-OBJ-WR-02; FW-STD-WR-02, FW-STD-WR-03; FW-GDL-WR-02, FW-GDL-WR-03; MA-GDL-RMA-11	MON-AQH-03-01: Acres of non-native invasive aquatic habitat treated MON-AQH-03-02: Number of sites of new non-native invasive aquatic species	Annual (R6 stream WIT); Every 5 years (PIBO EM)

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Soil	MON-SOIL-01: To what extent have plan components prevented irreversible damage to soil conditions?	FW-DC-SOIL-01, FW-DC-SOIL-02; FW-OBJ-SOIL-01; FW-GDL-SOIL-01;	MON-SOIL-01-01: Number of harvest units surveyed and percent that meet the Regional Soil Quality Standard, post-harvest (FSM, R6 Supplement No. 2500.98-1)	Annual
Federally listed species	MON-FLS-01: To what extent is forest management contributing to the conservation of federally listed species and moving toward habitat objectives?	FW-DC-WL-02, FW-DC-WL-03, FW-DC-WL-04, FW-DC-WL-05, FW-DC-WL-06, FW-DC-WL-07, FW-DC-WL-08, FW-DC-WL-09; FW-OBJ-WL-02, FW-OBJ-WL-03; FW-STD-WL-02, FW-STD-WL-03, FW-STD-WL-04, FW-STD-WL-05, FW-STD-WL-06, FW-STD-WL-07, FW-STD-WL-08, FW-STD-WL-09, FW-STD-WL-10, FW-STD-WL-11; FW-GDL-WL-04, FW-GDL-WL-05, FW-GDL-WL-06, FW-GDL-WL-07, FW-GDL-WL-08, FW-GDL-WL-09, FW-GDL-WL-10, FW-GDL-WL-11, FW-GDL-WL-12	<p>MON-FLS-01-01: Grizzly Bear: progress toward achieving and maintaining standards for percent core area, open motorized road density (OMRD) and total motorized road density (TMRD) within each Grizzly Bear Management Unit.</p> <p>MON-FLS-01-02: Canada lynx: changes in lynx habitat as a result of moving toward the desired conditions for vegetation through vegetation management, prescribed fire, or natural disturbance that is consistent with the historical range of variability</p> <p>MON-FLS-01-03: Woodland caribou: maintenance of seasonal habitat components of well-connected, large blocks of late-successional forest at or above current levels.</p> <p>MON-FLS-01-04: Woodland caribou: management of motorized winter recreation at or below current levels so that woodland caribou are not displaced from suitable habitat within the caribou recovery area.</p>	<p>Annual</p> <p>Every 5 years by lynx analysis unit</p> <p>Every 5 years by forest management projects proposed in recovery area, measured at the caribou management unit scale</p> <p>Annual (caribou habitat monitoring report)</p>

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Focal species	MON-Focal-01: Are habitat trends for Focal species consistent with the Desired Conditions and objectives?	FW-DC-VEG-03, FW-DC-VEG-04; FW-OBJ-WL-05; FW-STD-WL-01, FW-STD-WL-12; FW-GDL-WL-15, FW-GDL-WL-18, FW-GDL-WL-19; MA-DC-RMA-03; MA-STD-RMA-08, MA-STD-RMA-09, MA-STD-RMA-10; MA-GDL-RMA-12, MA-GDL-RMA-13	MON-FOCAL-01-01: White-headed Woodpecker: number of acres treated to provide large diameter tree habitat and move toward desired vegetation conditions by providing late-open structure	Annual
			MON-FOCAL-01-02: Northern goshawk: number of acres surveyed and nests located	Annual
			MON-FOCAL-01-03: Black-backed woodpecker-Snag habitat: snag densities by size class and vegetation type	Every 5 years by watershed (5 th field)
			MON-FOCAL-01-04: MacGillivray's warbler: condition of riparian habitats within grazing allotments.	Every 5 years by watershed (5 th field)
			MON-FOCAL-01-05: Wildlife General: Monitor progress toward meeting road density desired conditions by watershed/grizzly bear management unit.	Every 5 years

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Wildlife	MON-WL-01: Have management activities met forest plan objectives and maintained or improved habitat to achieve desired terrestrial habitat conditions?	FW-DC-WL-02, FW-DC-WL-03, FW-DC-WL-04, FW-DC-WL-05, FW-DC-WL-06, FW-DC-WL-07, FW-DC-WL-08, FW-DC-WL-09, FW-DC-WL-12, FW-DC-WL-13, FW-DC-WL-14; FW-OBJ-WL-02, FW-OBJ-WL-03, FW-OBJ-WL-04, FW-OBJ-WL-05, FW-OBJ-WL-06; FW-STD-WL-02, FW-STD-WL-05, FW-STD-WL-06, FW-STD-WL-07, FS-STD-WL-08, FW-STD-WL-09, FW-STD-WL-10, FW-STD-WL-12; FW-GDL-WL-01, FW-GDL-WL-04, FW-GDL-WL-05, FW-GDL-WL-06, FW-GDL-WL-09, FW-GDL-WL-11, FW-GDL-WL-13, FW-GDL-WL-14, FW-GDL-WL-16, FW-GDL-WL-17	MON-WL-01-01: Acres of terrestrial habitat restored or enhanced. Also see results for MON-VEG-01-01 through MON-VEG-01-05	Annual

Resource	Monitoring question	Reference to Forest Plan direction	Indicator	Frequency of measure
Social Systems				
Access and Recreation	MON-AR-01: What are the trends in visitation forestwide, and are visitors satisfied with the facilities, access, services, and perception of their safety?	FW-DC-AS-01, FW-DC-AS-02, FW-DC-AS-03, FW-DC-AS-04, FW-DC-AS-05, FW-DC-AS-06; FW-OBJ-AS-01, FW-OBJ-AS-02, FW-OBJ-AS-03; FW-GDL-AS-05; MA-DC-ARS-01, MA-DC-ARS-02, MA-DC-ARS-03, MA-DC-ARS-04, MA-DC-ARS-05, MA-DC-ARS-06, MA-DC-ARS-07; MA-OBJ-ARS-01, MA-OBJ-ARS-02; MA-GDL-ARS-01, MA-GDL-ARS-03	MON-AR-01-01: Visitor use and trends in use forestwide	Every 5 years (NVUM)
Access and Recreation	MON-AR-02: What is the trend in mountain bike use in recommended wilderness and is that use impacting the wilderness characteristics of the forest's recommended wilderness areas.	MA-DC-RW-01, MA-DC-RW-02, MA-DC-RW-03; MA-STD-RW-01, MA-STD-RW-02, MA-STD-RW-03, MA-STD-RW-04; MA-GDL-RW-01, MA-GDL-RW-02, MA-GDL-RW-03	MON-AR-02-01: Assess mountain bike use through trail registration trend analysis. MON-AR-02-02: Identify new user-created mountain bike trails or impacts (i.e. hill climbs, accelerated growth of banked turns) to natural or special features along existing trail systems in recommended wilderness caused by mountain bike use.	Annual 20% of all trail miles open to mountain bike use within recommended wilderness will be monitored annually for new or recurring impacts from mountain bikes. Reported cases of user-created routes within recommended wilderness will be investigated annually.