

## ***Monitoring and Evaluation***



*Cutthroat Trout on the Wasatch-Cache National Forest*



## 8. Monitoring and Evaluation

Implementing regulations for the National Forest Management Act state “At intervals established in the plan, implementation shall be evaluated on a sample basis to determine how well objectives have been met and how closely management standards and guidelines have been applied. Based upon this evaluation, the interdisciplinary team shall recommend to the Forest Supervisor such changes in management direction, revision, or amendments to the forest plan as are deemed necessary.” (36 CFR 219.12(k))

The purpose of Forest Plan monitoring and evaluation is to evaluate, document, and report how well we are implementing the Forest Plan, how well the Plan is working, and if Plan purpose and direction remain appropriate. **Monitoring** determines actual conditions and circumstances and compares them with assumptions and expected or desired results. Second, **evaluation** examines the reasons for the conditions we find and where these do not match desired conditions, identifies potential alternative approaches.

### ***Types of Monitoring***

The monitoring identified in this Forest Plan is not all of the monitoring conducted on a National Forest. Other forms of monitoring, which address other laws, policies, and site-specific decisions are also on-going. Three categories of monitoring (FSM 1925.21) comprise both Forest Plan and individual project monitoring:

- **Implementation Monitoring**—Used to determine if plans, prescriptions, projects, and activities were implemented as designed and in compliance with the Plan;
- **Effectiveness Monitoring**—Used to determine if plans, prescriptions, projects, and activities are effective in accomplishing Plan goals, and objectives, and moving toward desired conditions; and
- **Validation Monitoring**—Used in cases of uncertainty to determine if initial data, assumptions, and coefficients used to predict outcomes in the development of the Plan are correct.

Most monitoring at the National Forest level is in the first two categories.

### ***Forest Plan Monitoring and Evaluation***

The following Tables display the Monitoring Plan for the Wasatch-Cache National Forest Revised Forest Plan. This monitoring reflects important decisions made in the Forest Plan. It includes 13 different areas of focus tied closely to key goals and objectives. For each area a series of questions are posed along with one

~~or more indicators that will be measured. In many cases annual measurement will need to be evaluated after multiple years to determine trends and in some cases the focus will shift after 5 years from implementation to effectiveness.~~

~~Expected precision and reliability of the monitoring for each area is included as required. (36 CFR 219.12(k)(4)) Two classes of precision and reliability are used:~~

- ~~➤ **Class A** has methods that are generally well accepted for modeling or measuring the resource or condition. Results are repeatable and often statistically valid. Reliability, precision, and accuracy are very good. The cost of conducting these measurements is higher than other methods. These methods are often quantitative in nature.~~
- ~~➤ **Class B** methods are based on project records, communications, on-site ocular estimates, or less formal measurements like pace transects, informal visitor surveys, air photo interpretation, and other similar types of assessments. Reliability, accuracy, and precision are good, but usually less than Class A. Class B methods are often qualitative in nature, but still provide valuable information on the status of resource conditions.~~

~~We expect to achieve monitoring and evaluation in each of the areas, but actual budget levels and funding mixes (amounts by “program areas” such as recreation, watershed, wildlife, timber, etc.) will affect accomplishment. We may see swings in relative emphasis tied to funding or current issues but we expect to be able to monitor and evaluate some movement toward goals and objectives in each focus area. We also expect that partnerships can be developed to accomplish more in monitoring and evaluation.~~

**Table ME-1. Wasatch-Cache National Forest Monitoring Plan**

What are we trying to find out? (Tie back to Issues, Topics, DFCs, Goals, Objectives, etc.)		Actions, effects or resources to be measured.		Measurement and Reporting Frequency	Precision and reliability
		Indicators	How to measure		
Implementation	(1) Education Information: Are we delivering key education/enforcement messages identified during plan revision to Forest employees and users? (Key Focus Areas are: OHV use, recreation user ethics, fire's role/hazardous fuels, noxious weeds, watershed health)	Degree to which key messages have been integrated into internal and external programs.	Number of products conveying key messages. (i.e. Publication Information products Presentations Public contacts)	Annual	Class B
	Are these effective? Do they provide resource protection and/or reducing recreation conflicts? Are users changing behaviors?	User groups assisting in protecting resources and educating other users.  Perceptions of recreation users with regard to conflicts.	Number of user groups and individuals involved.  Survey responses from users.	Annual  2 <sup>nd</sup> five years continue education and focus on effectiveness. Annual after first 5 years	Class B

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		Indicators	How to measure		
Implementation	(2) Recreational Opportunity: Are we providing recreation opportunities for both motorized and nonmotorized users while protecting and restoring watersheds and providing for needs of wildlife? Are conflicts between users being reduced?	Users routes and modes of transportation are identified; ROS adapted	Travel Management Plans updated for the Ogden, Logan and Salt Lake districts.	Annual until completed  Completed within 5 years	Class B
	It is assumed that if travel management plans are followed and designated routes are maintained, watersheds will be restored, wildlife provided for and user conflicts will be reduced.	Actions taken: — Signs installed — Maps Available — Enforcement occurring	— Percent area signed — Number of outlets for maps, — Staff contacts	Annual	Class B
	Are there a variety of quality recreational opportunities available? (Develop additional factors or criteria as needed—loop trails are just one.)	Loop Trails provided for all users.	Miles of loop trail (motorized /nonmotorized)	Annual	Class A
	Are users complying with Travel Management Plans?	Degree of compliance with designated routes.	non-compliance instances (trends).	Annual	Class B
Effectiveness	Are users helping to prevent or reduce their impacts, staying on designated routes?	Degree of user assistance.	Individuals assisting in compliance, education, and enforcement.	Annual	Class B

What are we trying to find out? (Tie back to Issues, Topics, DFCs, Goals, Objectives, etc.)		Actions, effects or resources to be measured:		Measurement and Reporting Frequency	Precision and reliability
		Indicators	How to measure		
Effectiveness and	(3) Vegetation Management: Are cover types (by ecological sections) trending toward Properly Functioning Conditions?	Patch size, cover type, and age class distribution.	Acres in cover types/age classes by ecological sections and cause of change (prescribed fire, wind throw, wildland fire use, mechanical treatment).	Annual  Evaluated at 5 year intervals.	Class B
Effectiveness   Implementation	(4) Fuels Reduction: Are fuels reductions in the urban interface protecting property and human health and safety? Is the public becoming more aware of the threat?	Reduction of hazardous fuels at the wildland urban interface and awareness of landowner responsibilities.	Acres of hazardous fuels treated along the urban interface compared with total acres of interface having fuels hazard.	Annual Evaluated at 5-year intervals.	Class A
	Have the number and size of unwanted wildland fires been decreased as a result of fuels reduction efforts along urban interface areas.	Fires in the urban interface within treated areas and nontreated area.	Number and size of unwanted fires within interface	Annually  Evaluated at 5-year intervals	Class A

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		Indicators	How to measure		
Implementation	(5) Rangeland Management: Are rangeland standards and guidelines being implemented and actions being taken to correct problems?	Key areas at DFC or moving towards DFC.	Percent of allotments administered to standard.	Annual for some portion of Allotments.	Class B
	The assumption is that when range standards and guidelines are being followed conditions will improve.	Monitor key areas.	Percent of permit holders actively involved in meeting standards.		
	Are noxious weeds infestations increasing or decreasing in number and/or size?	Documented non-compliance			
Effectiveness		Noxious weed infestations.	Number and size (acres) of existing and new infestations of noxious weeds.	Annual	Class B
			Acres of noxious weeds *Identified *Controlled *Reduced.		
	Are springs and wetlands associated with livestock watering functioning properly?	Water developments and spring sources condition.	Percent of “critical” areas —springs, wetlands	Annual	Class B



What are we trying to find out? (Tie back to Issues, Topics, DFCs, Goals, Objectives, etc.)		Actions, effects or resources to be measured:		Measurement and Reporting Frequency	Precision and reliability
		Indicators	How to measure		
	Do rangeland plant communities have desired species composition and is ground cover adequate?	Riparian and upland condition and trend.	protected and/or properly functioning. Acres meeting, moving toward, or not moving toward “Forest Plan Objectives” (desired conditions); relative proportion of verified vs. estimated acres reported	Annually 1 <sup>st</sup> year establish baseline work: designate remaining key areas, finalize riparian value classes; monitor utilization.	Both Class A and B
Effectiveness	(6) Recreation Concentrated Use Areas: Are we managing Concentrated Use Areas to provide for recreational amenities while meeting standards and guidelines for resource protection?	Concentrated Use Area’s actively managed.	Number of completed Concentrated Use Area Plans (1 plan to be developed every 3 years)	Annual update. Evaluated at 5-year intervals.	Class B
		Concentrated Use Area Plan	Documentation of meeting or	3 years after Concentrated	Class B

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		Indicators	How to measure		
	The assumption is that if plans are developed and implemented, recreation opportunities and resource protection will be provided.	implemented.	not meeting resource standards and recreational amenities.	Use Area plan implementation.	
Effectiveness   Implementation	(7) Major Trail Development: Are trail development efforts focused on development and management of Bonneville Shoreline, Great Western and Shoshone concept trails?	Trail constructed.	Miles of Bonneville Shoreline, Great Western and Shoshone concept trails developed.	Annually	Class A
	Are we working with the public and other agencies to complete these trails using partnerships and grants as much as possible?	Partnerships, grants, and volunteerism.	Numbers of participants.	Annually	Class B
	Are we minimizing impacts to big game winter range, adjacent property owners, and Wilderness?	UDWR Coordination: Property owner involvement.	Route segments with winter range and/or Wilderness mitigation?  Percent of property owners giving informed	Annually	Class B

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		Indicators	How to measure		
			consent.		
Implementation	(8) Management Indicator Species: Are forest management actions affecting Management Indicator Species (MIS) and what are the population trends and habitat relationships?	Active Goshawk territories.	Goshawk—Number of active territories	Annual update. Evaluated at 5-year intervals.	Class B
		Snowshoe hare presence and population index.	Snowshoe hare—Pellet counts along transects.	First 2 yrs Establish baseline. Annual update. Evaluated at 5-year intervals.	Class A
		Beaver populations across the Forest.	Beaver—Number of a active dams.	1-2-4 <sup>th</sup> order HUCs per year after baseline establishment.	Class A

What are we trying to find out? (Tie back to Issues, Topics, DFCs, Goals, Objectives, etc.)		Actions, effects or resources to be measured:		Measurement and Reporting Frequency	Precision and reliability
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	<p>Are the trends in populations and habitat reflective of species trends in general?</p>	<p>Cutthroat Trout population estimates</p> <p>Conditions of habitat:</p>	<p>Fish Condition index</p> <p>Changes in habitat in relationship with PFC monitoring described above (age class diversity and patch size) correlated to populations trends.</p>	<p>One 4<sup>th</sup> order HUC per year.</p> <p>Evaluate after 5 years.</p>	<p>Class A</p> <p>Class B</p>
Implementation	<p>(9) Endangered Species Act: Are we protecting Threatened and Endangered species and their habitat while implementing the Plan?</p>	<p>Terms and conditions or reasonable and prudent measures, which result from consultation (formal or</p>	<p>Numbers and types of mitigation or protection measures implemented, documented</p>	<p>Annually</p>	<p>Class B</p>

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		Indicators	How to measure		
		informal) under Section (7) (a) of the Endangered Species Act.	results.		
Effectiveness and	<p>(10) Resource Protection: Are we implementing terms and conditions, mitigation measures, BMPs, standards and guidelines, and are these effective on new and, where appropriate, existing projects?</p> <p>It is assumed that as mitigation measures, BMPs, and standards and guidelines are implemented on individual projects, their effectiveness will be evaluated and measures will be adjusted as needed to provide resource protection.</p>	Conditions on the ground (varies by nature of specific project) and effectiveness of measures applied.	Numbers and types of BMPs, standards, and guidelines implemented, documented results.	Stratified sampling of projects annually, representing management activities that commonly occur on the Forest.	Class B
Implementation	(11) User Density Thresholds: Are we approaching user density thresholds in areas mapped with Semi-Primitive ROS Class?	Party contacts in areas anticipated to reach threshold.	Average weekend number of party contacts per 8-hour period by area (trail or designated route).	Annual update. Evaluated at 5-year intervals.	Class B

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Implementation	(12) NFMA compliance: Are we complying with appropriate NFMA requirements?	{i} Stocking of lands;	{i} Trees/acre, over percent of area treated by tree species.	5 years from treatment.	Class A
		{ii} Lands suited for timber production;	{ii} Lands identified as not suited for timber production examined to determine if they have become suited;	10 years from ROD	Class B
		{iii} Harvest unit size limits;	{iii} Maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued.	5 years from treatment.	Class B
		{iv} Amount of destructive insects and disease	{iv} following management activities, use	5 years from treatment.	Class B

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		organisms.	report from Ogden Field Office.		
Effectiveness	(13) National Historic Preservation Act as amended: Are cultural resources being protected as the Forest Plan is implemented and are mitigation measures sufficient prevent damage to cultural resources from project activities?	Review up to 10% of projects in the field to determine if mitigation measures were effective at protecting the site.	Number of projects that protected cultural resources	Annually  Summarized every five years	Class B

## 8. Monitoring and Evaluation

The 2012 planning rule, which is found at 36 Code of Federal Regulations (CFR) 219, guides forest plan monitoring across the Forest Service. The Uinta-Wasatch-Cache National Forest conformance strategy focuses on addressing the purpose of the forest plan monitoring program as described in 36 CFR 219.12(a)(1), which includes the need for monitoring information that enables the responsible official to determine if a change in plan components in the plan area may be needed.

In addition, each forest plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following eight requirements, which are noted at 36 CFR 219.12(a)(5):

1. The status of select watershed conditions.
2. The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
3. The status of focal species to assess the ecological conditions required at 36 CFR 219.9.
4. The status of a select set of the ecological conditions required under 36 CFR 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.
5. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
6. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
7. Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
8. The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).

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### ***Types of Monitoring***

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### ***Forest Plan Monitoring and Evaluation***

The following tables display the monitoring plan for the Revised Forest Plan for the Wasatch-Cache National Forest. The forest plan monitoring program identified the plan monitoring questions and associated indicators. Monitoring questions and associated indicators must be designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives. Questions and indicators should be based on one or more desired conditions, objectives, or other components in the plan, but not every plan component needs to have a corresponding monitoring question.

Expected precision and reliability of the monitoring for each area is included as required. (36 CFR 219.12(k)(4)) Two classes of precision and reliability are used:

- **Class A** has methods that are generally well accepted for modeling or measuring the resource or condition. Results are repeatable and often statistically valid. Reliability, precision, and accuracy are very good. The cost of conducting these measurements is higher than other methods. These methods are often quantitative in nature.
- **Class B** methods are based on project records, communications, on-site ocular estimates, or less formal measurements like pace transects, informal visitor surveys, air photo interpretation, and other similar types of assessments. Reliability, accuracy, and precision are good, but usually less than Class A. Class B methods are often qualitative in nature, but still provide valuable information on the status of resource conditions.

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evaluate some movement toward goals and objectives in each focus area. We also expect that partnerships can be developed to accomplish more in monitoring and evaluation.

**Table ME-1. Wasatch-Cache National Forest Monitoring Plan**

Monitoring Question	Monitoring Item
Education and information: Are we delivering key education/enforcement messages to forest employees and users? (Key focus areas are: OHV use, recreation user ethics, fire's role/hazardous fuels, noxious weeds, watershed health.)	Number of key messages.
What is visitor satisfaction on Forest Service lands?	Level of visitor satisfaction.
Is adequate access to and across the forest being provided?	<ol style="list-style-type: none"> <li>1. Miles of classified road open for public use.</li> <li>2. Miles of motorized trail.</li> <li>3. Miles of non-motorized trail.</li> </ol>
Are vegetation conditions stable or moving toward desired future conditions?	Forested vegetation, extent of insect/disease infestations.
Fuels reduction: Are fuels reduction projects protecting property, human health and safety, and reducing the potential for unwanted fire effects (in the wildland-urban interface (WUI) and non-WUI)?	<ol style="list-style-type: none"> <li>1. Acres of hazardous fuels reduction in WUI and non-WUI.</li> <li>2. Fire behavior and opportunities for suppression.</li> </ol>
Fire management: Are natural ignitions being managed to accomplish resource management objectives?	<ol style="list-style-type: none"> <li>1. Percent of natural ignitions with identified resource management objective</li> <li>2. Percent of natural ignition acres with resource benefit.</li> </ol>

Monitoring Question	Monitoring Item
Rangeland management: What is the extent of the change of ecological conditions due to invasive species? Do rangeland plant communities have desired species composition and is ground cover adequate?	<ol style="list-style-type: none"> <li>1. Estimated acres infested with noxious weeds.</li> <li>2. Riparian and upland condition and trend.</li> </ol>
Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?	<ol style="list-style-type: none"> <li>1. Active goshawk territories.</li> <li>2. Cutthroat trout population estimates.</li> </ol>
Is there a change in species distribution across the forest?	Change from cold water to warm water species, change in terrestrial vegetation and species distribution.
Are forest management activities and/or natural events affecting ecological conditions that 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 concern?	<ol style="list-style-type: none"> <li>1. Mature forest conditions and population estimates (e.g., northern goshawk).</li> <li>2. Aquatic and riparian condition: In-stream channel conditions and population estimates (e.g., Bonneville cutthroat trout and Colorado River cutthroat trout).</li> <li>3. Habitat that contains other federally listed threatened and endangered species, conserve proposed and candidate species, documentation of alterations in habitat due to management actions and natural events.</li> </ol>
Are forest management activities and natural events affecting the ecological conditions of terrestrial and aquatic ecosystems?	<ol style="list-style-type: none"> <li>1. Aquatic habitat conditions.</li> <li>2. Riparian ecosystem conditions.</li> <li>3. Forested terrestrial ecosystem conditions.</li> <li>4. Non-forested terrestrial ecosystem conditions.</li> </ol>

Monitoring Question	Monitoring Item
Are forest management activities and natural events affecting watershed conditions?	<ol style="list-style-type: none"> <li>1. Aquatic habitat conditions.</li> <li>2. Air quality, trends of lichen biomonitoring sites.</li> <li>3. Changes in soil properties (physical, chemical, and biological) that result in the loss of the inherent ecological capacity or hydrologic function of the soil resource.</li> </ol>
NFMA compliance: Are we complying with appropriate NFMA requirements?	Stocking of lands.
Are timber management activities impairing soil productivity of the land?	Changes in soil properties (physical, chemical, and/or biological) that result in the loss of the inherent ecological capacity or hydrologic function of the soil resource. Specific indicators are amount of soil disturbance, change inorganic matter, or change in soil structure, soil temperature, A horizon depth.
Are goods and services being provided in accordance with forest plan goals and objectives?	<ol style="list-style-type: none"> <li>1. Number of lands special use permits.</li> <li>2. Number of recreation special use permits.</li> <li>3. Acres leased for oil and gas exploration and development.</li> <li>4. Level of permitted livestock grazing.</li> <li>5. Other forest products (e.g., fuelwood and Christmas tree permits).</li> <li>6. Total timber sale program quantity.</li> </ol>

Monitoring Question	Monitoring Item
National Historic Preservation Act as amended: Are cultural resources being protected as the forest plan is implemented and are mitigation measures sufficient prevent damage to cultural resources from project activities? Are historic properties receiving adverse effects from project implementation, vandalism, looting, and/or neglect.	Number of historic properties that received new adverse effects from looting, vandalism, and/or neglect.