Chapter 4 – Monitoring and Evaluation

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Chapter 4 – Monitoring and Evaluation

Introduction

Monitoring and evaluation are required by the 2012 National Forest System Land Management Planning Rule to determine how well the 2006 Land and Resource Management Plan (2006 Forest Plan) is working. This Rule, commonly referred to as the 2012 Planning Rule (36 CFR 219), is consistent with other legal requirements, such as the National Forest Management Act.

The aim of monitoring is to have the ability to respond to changing conditions, to make appropriate changes based on new information or technology, and to test the effectiveness of the direction in the 2006 Forest Plan. This chapter provides programmatic direction for monitoring and evaluating 2006 Forest Plan implementation.

Monitoring Program Transition

The 2006 Forest Plan was authorized under the 2000 Planning Rule. As part of the transition process to be compliant with the 2012 Planning Rule, this chapter has been updated to include required monitoring items (36 CFR 219.12). The 2012 Planning Rule establishes a monitoring program that includes both plan level and broader-scale monitoring. This chapter outlines the plan level program. The broader-scale monitoring strategy will be developed by the Regional Forester for questions that can be answered at a geographic scale broader than a single Forest.

The 2012 Planning Rule requires incorporation of the following monitoring items. An administrative change to the Forest Plan in May 2016 allowed incorporation of following monitoring requirements.

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 ecological conditions.
4. The status of a select set of 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 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 USA 1604(g)(3)(c)).

Monitoring and Evaluation Strategy

Monitoring and evaluation are separate activities. **Monitoring** is the process of collecting data and information. **Evaluation** analyzes and interprets the information and data collected from monitoring. A key requirement of a monitoring strategy is that the public be given timely, accurate information about 2006 Forest Plan implementation. As directed by the 2012 Planning Rule, this is performed through the release of biennial, monitoring evaluation reports.

Monitoring tasks are scaled to the 2006 Forest Plan, program or project to be monitored. Each of these entails different objectives and requirements. Monitoring is not performed on every single activity, nor does it need to meet the statistical rigor of formal research. The monitoring program must be efficient, practical and affordable, and not duplicate the collection of data already underway for other purposes. Budgetary constraints affect the level of monitoring that can be done in a particular fiscal year. If budget levels limit the Forest's ability to perform all monitoring tasks, then those items specifically required by law would be given the highest priority. The minimum amount of legally-required monitoring is defined by the 2012 Planning Rule as outlined in the previous section.

Monitoring and evaluation keeps the 2006 Forest Plan up-to-date and responsive to changing conditions and issues. This process provides the feedback mechanism for adaptive management (see Figure 4-1). The results are used to identify when changes are needed to either the 2006 Forest Plan itself or the way it is implemented.

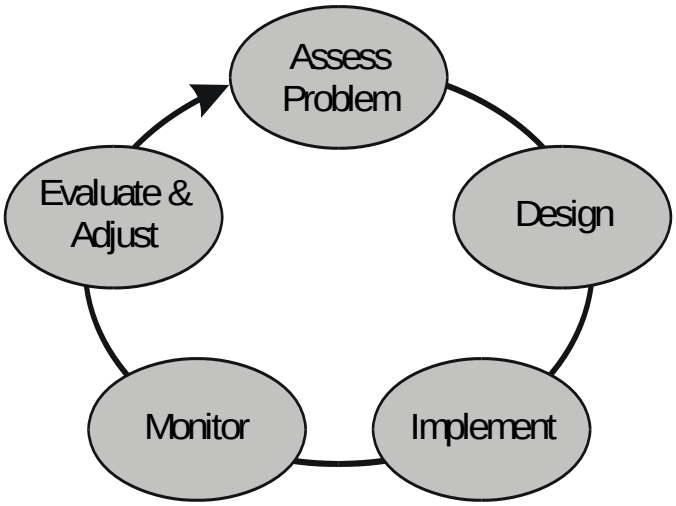
This monitoring and evaluation is designed to answer the following basic questions:

- **Did we do what we said we were going to do in an appropriate timeframe?** This question answers how well the direction in the 2006 Forest Plan is being implemented. The collected information from monitoring and evaluation efforts is compared to the goals, objectives, standards, guidelines and management area direction of the 2006 Forest Plan.

- **Did the 2006 Forest Plan's direction work how we intended?** This question answers whether the application of standards and guidelines is achieving the objectives, and whether objectives are achieving the goals.

- **Is our understanding and science correct?** This question answers whether the assumptions and predicted effects used to formulate the goals and objectives are valid.

Figure 1. Monitoring and evaluation provide a mechanism for adaptive forest management



Monitoring Methods and Requirements

The 2006 Forest Plan addresses several types of monitoring. These requirements fall into four broad categories:

Category 1	Required monitoring items [NFMA, and the 2012 Planning Rule (36 CFR 219.12).
Category 2	Attainment of goals and objectives
Category 3	Implementation of standards and guidelines
Category 4	Effects of prescriptions and management practices.

Required Category 1 monitoring items are mandatory components of every Forest Plan, whereas Categories (2) through (4) monitoring items are more flexible and are tailored to address issues raised through public scoping and interdisciplinary team review. The more prescriptive Standards and Guidelines (Category 3) will be addressed in the Monitoring Guide.

Monitoring methods categorize how precisely and reliably we measure monitoring items. The monitoring questions were developed by an Interdisciplinary (ID) Team to address 2006 Forest Plan management goals, objectives, standards, guidelines, assumptions and science. The annual monitoring plan identifies which items are measured, and how the monitoring questions are answered. The monitoring evaluation report analyzes and summarizes the monitoring results.

Monitoring is divided into two types of methods or classes: A and B, which are based on their relative precision and reliability.

- **Class A:** These methods are well-accepted for modeling or quantitatively measuring the resource or condition. Results have a high degree of repeatability, reliability, accuracy and precision. The cost of conducting these measurements is higher than other methods.

- **Class B:** These methods or measurement tools are based on a variety of techniques. Tools include project records, communications, on-site visual estimates or less formal measurements such as informal visitor surveys, aerial photo interpretation and other similar types of assessments. Class B methods are often qualitative in nature, but still provide valuable information on the status of resource conditions. Reliability, accuracy and precision are lower than Class A, as are costs.

Monitoring Guidelines and Components

Monitoring Framework

Many approaches to 2006 Forest Plan monitoring are currently being used throughout the Forest Service. The relationship between approaches is shown in Table 4-1, Monitoring Framework. However, each monitoring chapter must:

1. Meet the legal requirements of the planning regulations
2. Be consistent with corporate data standards and protocols
3. Be developed by an ID Team that addresses the ecological, social and economic dimensions of forest management in an integrated manner.

Table 4-1. Monitoring Framework

Forest Plan Monitoring (Chapter 4)	Monitoring Evaluation Implementation Guide	Monitoring Schedule	Biennial Monitoring Evaluation Review
Broad and Strategic Provides the overall monitoring strategy, including specific questions that need to be answered, what will be monitored, timetables for reporting, and other information.	***Focused and Technical*** Describes how, where, and when to accomplish the monitoring prescribed in the Forest Plan. It provides the specific methods, protocols and analytical procedures. The Monitoring Evaluation Guide is intended to be flexible and could be modified in response to new information, updated procedures, emerging issues, and budgetary considerations without amending the Forest Plan.	***Specific, Technical, and Prescriptive*** Identifies precisely what will be monitored, and where, when, and by whom. The Monitoring Schedule will be tied to the Forest Plan and Monitoring Guide.	***Specific, Technical, and Prescriptive*** The Ottawa's ID Team would review the monitoring evaluation results. Based on these findings they will recommend to the Forest Leadership Team changes (if any) to the Forest Plan, Monitoring Guide, or Forest Service Manual or Handbook.

Monitoring Prioritization

Within any agency or institution, necessary or desirable work demands often exceed available funding. Forest Plan monitoring is no exception. Consequently, a prioritization process for monitoring items would be developed to ensure efficient use of limited time, money and personnel. The following list of potential criteria may be used to set monitoring priorities:

- Is monitoring of a particular question or resource mandated by law or regulation?
- How do monitoring items relate to local public, government and tribal resource interests?
- Is there a high degree of uncertainty associated with management assumptions (management significance)?
- Is there a high degree of disparity between existing and desired conditions?
- Are proposed management activities likely to affect resources of concern (ecological significance)?
- How do monitoring items fit into national and regional Forest Service priorities?
- What are the consequences of not knowing resource conditions?
- Will monitoring respond to a key issue?

Monitoring priorities would be established each year utilizing the above criteria, information gained during the past year, and budgets.

There would be a great amount of monitoring information collected over time. If this information is not documented, so it can be easily retrieved, shared with the public and other stakeholders, or used by agency managers to foster better decisions, it is of limited value. Information management would consist of: (1) management of the collection and storage of data; (2) evaluation and interpretation of data; and (3) sharing information internally and externally.

Evaluation and Interpretation of Data

Evaluation is the process of transforming data into information. It is a process that brings together values, judgment, and reason with monitoring information, to answer selected questions. Successful adaptive management depends on this information to move the Ottawa toward the desired conditions. The Ottawa's ID Team will review the results of the monitoring evaluation reports and make recommendations for changes to the Forest Plan, Monitoring Guide, or Forest Service Manuals and Handbooks.

Biennial Monitoring Evaluation Report

The biennial monitoring evaluation report provides an opportunity to track progress toward the implementation of the 2006 Forest Plan decisions and the effectiveness of specific management practices. The focus of the evaluation is more internal to the Forest Service in providing immediate guidance to ongoing management. This evaluation is tied specifically to the questions identified for each monitoring element. The focus of this evaluation is on the individual Forest Plan monitoring elements specified in the following monitoring matrix section.

Public Involvement

The Forest Service mission "Caring for the Land and Serving People" will not be realized without public trust in our decision making process. Even though agency decisions will not consistently please everyone, using an open process for making decisions should foster public understanding of the rationale for individual decisions. The same principle applies to monitoring. Moreover, since our approach incorporates an adaptive strategy, frequent public feedback is necessary to facilitate monitoring activity prioritization, protocols, evaluation, and ultimately better informed decisions. Subsequently a strategy for involving the public and other agencies in Forest monitoring planning and execution will include partnerships with interest groups, volunteer groups, other federal, state and local agencies, Native American Tribes and universities. Different avenues of public involvement such as news releases, the internet, monitoring information trips for public, brochures, and public reports may be used.

Monitoring Matrix

Required and management direction monitoring are outlined in the matrix (see Table 4-3). The more prescriptive standards and guides will be addressed in the Monitoring Evaluation Guide. The main point for each monitoring item is the monitoring question and its associated indicator(s). Each monitoring question is derived from one or more monitoring drivers (legal requirements, desired conditions, objectives, etc.). Indicators are statements that are used in concert with the monitoring question to quantitatively or qualitatively measure trends.

Table 4-2 defines the components of the Monitoring Matrix. Not all the monitoring drivers, such as regulations, agency guidance and Forest Plan management direction are required to be monitored each year. Drivers that best answer the monitoring question for each resource area will be identified during the monitoring schedule process.

Table 4-2. Components of the Monitoring Matrix

Component	Definition
Resource Area	A quantitative or qualitative parameter that can be assessed.
Monitoring Question	Specific monitoring question(s) developed to ensure that monitoring and evaluation address information essential to measuring the Forest Plan. These questions relate to the different purposes and rationales for monitoring. There may be more than one monitoring question per resource area.
Monitoring Indicator	A characteristic which, when measured repeatedly, demonstrates trends; or a measure of the current state or quality of the associated monitoring question.
Monitoring Driver	Monitoring drivers identify reasons why we are monitoring a particular item. The following is a list of these drivers: (1) Legal and regulatory requirements and Forest Service Manual direction; (2) goals and objectives, which are assigned numerical and alphabetical characters as depicted in the Forest Plan; and (3) Validation of assumptions and predictions.

Component	Definition
Measurement Frequency/Evaluation Reporting Frequency	Measurement Frequency describes how often monitoring information is collected. Evaluation Frequency describes how often monitoring information is evaluated and reported
Category and Precision/Reliability Class	The four categories are defined on page 4-3 of this chapter. Two classes of precision and reliability are appropriate at the Forest Plan scale: Class A and Class B. See page 4-4 of this chapter for more information.

Table 4-3. Monitoring Matrix

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
All	1. How do actual outputs and services compare to those outputs and services projected in the Forest Plan?	a. Comparison of the projected and actual timber volume sold, by product. b. Comparison of the projected and actual acres harvested, by treatment method. c. Comparison of the projected and actual acres of forest treated annually.	NFMA. A quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan.	Annual/ Biennial	Category1 Class A
All	2. How close are actual costs to projected costs?	a. Comparison of the projected and actual timber management costs. b. Comparison of the projected and actual reforestation and timber sale improvement costs.	NFMA. Documentation of costs associated with carrying out the planned management prescriptions as compared with costs estimated in Forest Plan. Goal 14 and Objectives 14a and 14b of the Forest Plan.	5 Years/ 6 Years	Category1 Class A

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Social and Economic Vitality	3. To what extent do output levels and the mix of sawtimber and pulpwood compare to those levels projected?	a. Timber volume sold by product. b. Payments to counties.	NFMA. A quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan. Goal 37 of Forest Plan.	3 to 5 Years/ 4 to 6 Years	Category1 Class A
Insects and Disease	4. Are exotic insect and disease impacting achievement of objectives for restoring or maintaining healthy forest conditions?	a. Extent and severity of exotic insect and disease population levels based on results of detection flights. b. Results of emerald ash borer trap tree monitoring.	NFMA. Destructive insects and disease organisms do not increase to potentially damaging levels following management activities. Goal 37 of the Forest Plan.	Annual/ Biennial	Categories 1 and 2 Class A/B
Recreation	5. What is the status of visitor use and visitor satisfaction?	a. Number of visitors participating in recreation activities. b. Percentage of overall visitor satisfaction.	36 CFR 219.12(a)(5)(v)- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives. Goal 9 of the Forest Plan.	5 Years/ 6 Years	Category 2 Class A

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Recreation	6. How effective are forest management practices in managing OHV use for the protection of forest resources?	Percentage of road closure barriers breached leading to unauthorized use.	NFMA and Goals 1, 3 and 9; and Objectives 9b and 9c of the Forest Plan. Links to Monitoring Item 5: 36 CFR 19.12(a)(5)(v)- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	Annual/ 2-6 Years	Category 2 Class A/B
Timber	7. Are harvested lands adequately restocked after 5 years?	Number of acres certified as adequately restocked.	NFMA. Lands are adequately restocked as specified in the Forest Plan.	Annual/ Biennial	Category 1 Class A
Timber	8a. To what extent are timber management activities occurring on lands suited for timber production?	Number of acres managed by timber suitability class.	NFMA. Lands identified as not suited for timber production are examed at least every 10 years to determine if they have become suited; and that, if determined suited, such lands are returned to timber production.	10 Years/ 10 Years	Category 1 Class A
	8b. To what extent have conditions, or information, changed the classification of lands "not suited" for timber production to "suitable" for timber production?	Number of acres determined to be suited for timber production.			

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Timber	9. To what extent, and under what circumstances, are clearcuts and other openings created by even-aged management exceeding 40 acres?	Acres of temporary opening, managed to exceed 40 acres in size, by forest type.	NFMA. Maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued. Goal 28 and Objectives 28a and 28b of the Forest Plan.	Years 5 & 10/ Years 6 & 10	Categories 1 and 2 Class A/B
Soils	10. Is Forest Plan implementation resulting in impacts that may substantially and permanently impair the productivity of the land?	Extent of soil disturbance affecting soil function and soil productivity on managed lands.	36 CFR 219.12(a)(5)(viii) - The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 USC 1604(g)(3)(c)). NFMA - Documentation of the measured prescriptions and effects, including significant changes in productivity of the land. Goal 20 and Objective 20a of the Forest Plan.	Annual/ 2 to 6 Years	Category 1 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Vegetation	11. Are northern hardwood forest management activities promoting the regeneration of mid-tolerant tree species, specifically green and white ash, American basswood, Eastern white pine, Northern red oak, and yellow birch?	a. Difference in the number of seedling/sapling-sized, mid-tolerant tree species in managed and unmanaged northern hardwood forest stands. b. Comparison of the seedling/sapling-sized, mid-tolerant tree species component in the understory and overstory of managed stands.	36 CFR 219.12(a)(5)(iii) - The status of focal species to assess the ecological conditions required under 36 CFR 219.9. Goals 1, 2, 3, 20, 23, 27, 32, and 34; Objectives 1b-1e, 2a-2d, 2f, 3a, 20e, 27a, and 32a of the Forest Plan.	5 Years/ 6 to 10 Years	Category 2 Class B
Botany	12a. To what extent is Forest Plan implementation contributing or responding to non-native invasive plant species?	a. Number of acres with known non-native invasive plant infestations. b. Number of infested acres treated, by species. c. Acres of new non-native invasive plants found, by species.	Goals 1 and 8; and Objectives 3f, 8a-8d and 37c of the Forest Plan.	1 to 5 Years/ 2 to 6 Years	Category 2 Class B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Fisheries and Wildlife	12b. To what extent is Forest Plan implementation contributing or responding to non-native invasive animal species?	a. Number of acres with known non-native invasive animal infestations. b. Number of infested acres treated, by species. c. Acres of new non-native invasive animals found, by species.	Goals 1 and 8; and Objectives 3f, 8a-8d and 37c of the Forest Plan.	1 to 5 Years/ 2 to 6 Years	Category 2 Class B
Recreation	13. What amount of road routes and recreation trails are designated open for OHV riding and provide connections to other public trails?	a. Total number of miles open to OHV use. b. Number of system roads open to OHV use. c. Number of trails (non-system roads) open to OHV use. d. Number of miles of designated OHV route that connects to other public trails.	Goal 9, Objective 9c of the Forest Plan. Links to 36 CFR 219.12(a)(5)(v) - The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	1 to 5 Years/ 2 to 6 Years	Categories 1 and 2 Class A/B
Recreation	14. Is Forest Plan implementation consistent with the Recreational Opportunity Spectrum Objectives and Desired Conditions?	Number of miles of road per square mile of land, by management area.	Goals 9 and 10 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(v) - The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	2 to 5 Years/ 3 to 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Tribal Relations	15. To what extent is the Forest meeting its Federal Indian trust responsibility, including but not limited to, meeting the requirements of the memorandum of understanding, consulting with Tribes for Forest management, and actively seeking collaborative opportunities?	a. Number of notifications and consultations, e.g. documentation of NEPA notifications and consultations, National Historic Preservation Act (NHPA) and Native American Graves Protection and Repatriation Act (NAGPRA) consultations. b. Number of consultation meetings. c. Number of collaborative meetings and discussions.	Goal 5 and Objectives 5a to 5c of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	Annual/ Biennial	Category 2 Class B
Wilderness	16. Is wilderness management contributing to improvement or preservation of wilderness character and values?	Score from the wilderness stewardship performance plan, by wilderness area.	Goal 10 and Objectives 10a and 10b of the Forest Plan. Links to 36 CFR 219.12(a)(5)(v) - The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Wild and Scenic Rivers	17. To what extent is Wild and Scenic River (WSR) management contributing to the protection and enhancement of the WSR values?	a. Number of adult female wood turtles observed in each WSR reach.	Goals 20, 26 and 30 of the Forest Plan.	Biennial/ 2 to 4 Years	B
		b. Number of adult bald eagle territories present in each WSR reach.	Goal 26, Objectives a and b; and Goal 30 of the Forest Plan.	Biennial/ 2 to 4 Years	B
		c. Number of juvenile eagles fledged from active territories in each WSR reach.		Biennial/ 2 to 4 Years	B
		d. Lake sturgeon population estimate in the Sturgeon River.	Goal 20; Goal 32 and Objective a; Goal 34, Objective a; and Goal 35, and Objectives a-c of the Forest Plan.	4 to 6 Years/ 4 to 6 Years	B
		e. Number of juvenile lake sturgeon stocked into the Ontonagon River.		Annual/ 4 to 6 Years	B
Vegetation	18. To what extent are forest management activities restoring vegetation composition and spatial landscape patterns and moving toward desired conditions at the Forest, management area and other appropriate landscape scales?	Comparison of current and desired percentages of forest types, by management area.	36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. Goal 1 of the Forest Plan.	5 Years/ 6 Years	Categories 1 and 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Vegetation	19. To what extent are old growth forest conditions being classified consistent with management area objectives?	Comparison of current and desired percentages of old growth, by management area.	Goal 1 and Objective 1e of the Forest Plan. Links to 36 CFR 219.12(a)(5)(ii) - The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.	5 Years/ 6 Years	Category 2 Class A/B
Vegetation	20. To what extent are permanent upland openings being created and maintained to move towards desired conditions.	Comparison of current and desired percentages of permanent upland openings, by management area.	Goal 1 and Objective 1f of the Forest Plan. Links to 36 CFR 219.12(a)(5)(ii) - The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.	5 Years/ 6 Years	Category 2 Class A/B
Vegetation	21. To what extent are northern hardwood forest types being managed to work toward the desired mix of even-aged and uneven-aged stands?	Acres of the northern hardwood forest type harvested, by silvicultural method.	Goal 15 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	5 Years/ 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Vegetation	22. To what extent is the aspen forest type being maintained through regeneration activities to meet Forestwide and management area objectives?	a. Comparison of projected and actual acres of aspen regenerated at the Forestwide scale. b. Number of acres maintained in the 0 to 9 year age class at the Forestwide scale.	Goal 16 and Objective 16a of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	5 Years/ 6 Years	Category 2 Class A/B
Vegetation	23. To what extent are long-lived conifer forest types being increased or maintained through regeneration activities to meet Forestwide and management area objectives?	Acres of long-lived conifers regenerated, through natural and artificial reforestation, at the Forestwide and management area scale.	Goal 17 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	5 Years/ 6 Years	Category 2 Class A/B
Vegetation	24. To what extent are short-lived conifer forest types being maintained through regeneration activities to meet Forestwide and management area objectives?	Acres of short-lived conifers regenerated, through natural and artificial reforestation, at the Forestwide and management area scale.	Goal 17 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	5 Years/ 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Vegetation	25. To what extent is natural regeneration favored over artificial reforestation to meet Forestwide and management area objectives?	a. Number of acres planted by forest type, at the Forestwide scale.	Goal 18 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	5 Years/ 6 Years	Category 2 Class A/B
		b. Number of acres regenerated naturally by forest type, at the Forestwide scale.			
Aquatics	26. Status of Watershed Conditions				
Aquatics/ Riparian	26a. To what extent are we moving riparian areas towards desired conditions?	Acres of riparian habitat improved.	36 CFR 219.12(a)(5)(i) - The status of watershed conditions. Goals 2, 3, 20, 21, and 23 of the Forest Plan.	Annual/ 2 to 6 Years	Categories 1 and 2 Class A
Aquatics/ Fisheries	26b. To what extent are we restoring aquatic habitat connectivity?	a. Number of barriers removed for aquatic organism passage.	36 CFR 219.12(a)(5)(i) - The status of watershed conditions. Goals 2, 3, 20, 21, and 23 of the Forest Plan.	1 to 5 Years/ 2 to 6 Years	Categories 1 and 2 Class A
		b. Number of stream miles reconnected.		1 to 5 Years/ 2 to 4 Years	Categories 1 and 2 Class A

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Aquatic/ Fisheries	26c. Does the relative abundance, density, and species richness of aquatic macroinvertebrates within sampled reaches indicate plan objectives for stream water quality and habitat are being obtained?	Extent of change in aquatic macroinvertebrate abundance, density, and species.	36 CFR 219.12(a)(5)(i) - The status of watershed conditions. Goals 2, 3, 20, 21, and 23 of the Forest Plan.	Annual/ 2 to 4 Years	Categories 1 and 2 Class A/B
Multiple	27. Measurable changes on the planning area related to the effects of climate change.				
	27a. How is drought duration, severity, geographic extent or timing changing across the planning area on an annual basis?	The U.S. Drought Monitor rating for the planning area.	36 CFR 219.12(a)(5)(vi) - Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.	Annual/ 6 Years	Category 1 Class A
	27b. How are the timing and duration of winter weather conditions changing across the planning area on an annual basis?	a. The Accumulated Winter Season Severity Index (AWSSI) calculated for planning area based on daily measurements of maximum temperature, minimum temperature, snowfall and snow depth.		Annual/ 6 Years	Category 1 Class A
		b. Opening and closure dates of snowmobile trails.		Annual/ 6 Years	Category 1 Class B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
		c. Number of total days snowmobile trails are open.		Annual/ 6 Years	Category 1 Class B
Aquatics/ Watershed	28. To what extent is forest plan implementation affecting streams, lakes, ponds and wetlands and their associated riparian ecosystems?	Results of best management practices implementation and effectiveness monitoring in activity areas.	Goal 3, 20, 21, 22, 23, and 24 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(i) - The status of watershed conditions.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B
Wildlife and Fisheries	29. To what extent are the key habitat components in aquatic and terrestrial habitat being provided?	a. The extent of large woody material in streams	36 CFR 219.12(a)(5)(ii) - The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. Goals 2, 20, and 26 of the Forest Plan.	1 to 5 Years/ 2 to 6 Years	Categories 1 and 2 Class A/B
		b. The extent of terrestrial large woody material provided (snags and down wood).			
		c. The extent of low dense conifer regeneration in aspen regeneration harvest areas.			

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Wildlife/ Botany/ Fisheries	30. To what extent is forest plan implementation contributing or responding to the species of conservation concern and moving toward desired habitat conditions for these species?	Number of actions implemented from approved recovery plans, conservation strategies and/or Forest Plan direction.	Goals 26, 28, 29, and 31 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(iv) - The status of select set of the ecological conditions required under 219.9 to contribute to the recovery of federally listed threatened and endgered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.	Annual/ 2 to 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Wildlife	31. To what extent is forest management contributing to the conservation of threatened and endangered species and moving toward desired habitat conditions and population trends for these species?	Acres of suitable Kirtland's warbler habitat.	36 CFR 219.12(a)(5)(iv) - The status of 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. Goals 26, 28, 29, and 31 of the Forest Plan.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B
Wildlife	32. To what extent is forest management affecting the density of open roads within the Remote Habitat Area, and moving toward the Forest density objective of < 1.0 miles/square mile?	Miles of system road open to passenger vehicles per square mile of land within the remote habitat area.	Goal 31 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Wildlife	33. To what extent is forest management contributing to the development and maintenance of foraging and denning habitat, and connectivity of habitats for Canada lynx?	Acres surveyed in primary lynx habitat.	Goal 29 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(iv) - The status of select set of the ecological conditions required under 219.9 to contribute to the recovery of federally listed threatened and endgered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B
Minerals	34. Is the Forest providing minerals and mineral materials to help support economic growth?	Number of permits and authorizations processed.	Goal 36 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	1 to 5 Years/ 2 to 6 Years	Categories 2 and 3 Class A

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Lands	35. Has land ownership adjustment facilitated forest plan implementation?	a. Number of acres acquired into federal ownership. b. Number of acres exchanged out of federal ownership.	Goal 40 of the Forest Plan. Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	2 Years/ 2 to 6 Years	Categories 2 and 3 Class A/B
Fire	36. To what extent is forest management meeting hazardous fuels objectives?	Acres of treatment (mechanical and prescribed fire) to reduce hazardous fuel conditions.	Goal 8, 10, 26, 28, and 39; Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B
Fire	37. To what extent is wildland fire (natural and prescribed) used to maintain or mimic natural processes, and/or restore natural processes and functions to ecosystems?	a. Acres of treatment using wildfire as a tool to maintain or restore conditions, by forest type. b. Acres of treatment using prescribed fire to maintain or restore conditions, by forest type.	Goal 8, 10, 26, 28, and 39; Links to 36 CFR 219.12(a)(5)(vii) - Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	1 to 5 Years/ 2 to 6 Years	Category 2 Class A/B

Resource Area	Monitoring Question(s)	Indicator(s)	Driver(s)	Measurement Frequency/ Evaluation Reporting Frequency	Category and Precision/ Reliability Class
Engineering	38. To what extent are unneeded roads being decommissioned?	Miles of road decommissioned based on the Travel Analysis Process or other planning efforts.	Goal 41 of the Forest Plan. Travel Management Rule 36 CFR 212	Annual/ Biennial	Category 2 Class A