Summary

Proposed Changes to the Forest Plan Monitoring Program
to Comply with the Forest Service's 2012 Planning Rule

The following two questions/items are proposed to be deleted from the monitoring program:

1. *How close are projected costs to annual costs?*
   Justification for deletion: The initial rationale for this question was the 1982 Planning Rule, which has been replaced by the 2012 Planning rule. Further, the Forest Plan does not contain 'projected costs' making the comparison of projected with actual costs impossible.
2. *To what extent is Forest management moving toward desired habitat conditions for MIS and species associated with MIS habitats?*
   Justification for deletion: This question is no longer valid as written because there are no MIS under the 2012 Planning Rule.

The 2012 Planning Rule requires that each monitoring program contain indicators associated with the monitoring questions in the Forest Plan Monitoring Matrix. A column has been added to the revised Monitoring Matrix (as found in the proposed changes for Chapter IV of the Forest Plan) titled "Indicator" that identifies what is measured to answer each question.

Tables IV-3a and IV-3b have been combined to form one Table identified as Table IV-3. The 2012 Planning Rule requires a biennial evaluation of monitoring information; thus, the "Evaluation and Reporting Frequency" column was removed. The "Monitoring Driver" column was also removed from the table.

Question 31 was reworded to reflect the 15% soil productivity threshold is no longer used.
Question 38 was modified to better comply with 2012 Planning Rule monitoring components.
Questions 24, 32, 34, and 46 have been updated to clarify the monitoring question.

Key:
"Red" text represents proposed additions
"Struck-through" text represents proposed deletions.

MONITORING AND EVALUATION OVERVIEW

Monitoring and evaluation are separate, sequential activities. Monitoring involves collecting data by observation or measurement. Evaluation involves analyzing and interpreting monitoring data. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives, and outcomes of the forest plan have been met. Monitoring and evaluation keep the forest plan up-do-date and responsive to changing conditions and issues,

and provide the feedback mechanism for adaptive management (Figure IV-1). The results are used to identify if and when changes are needed to the forest plan or the way it is implemented.

Figure IV-1.
An Adaptive Management Learning Loop

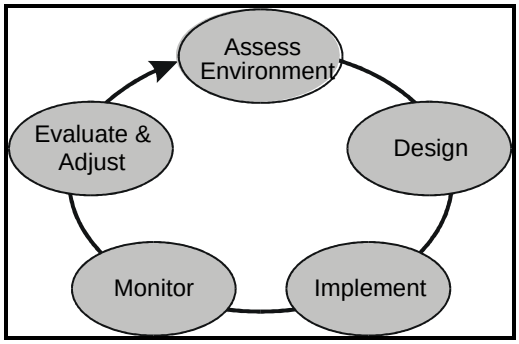
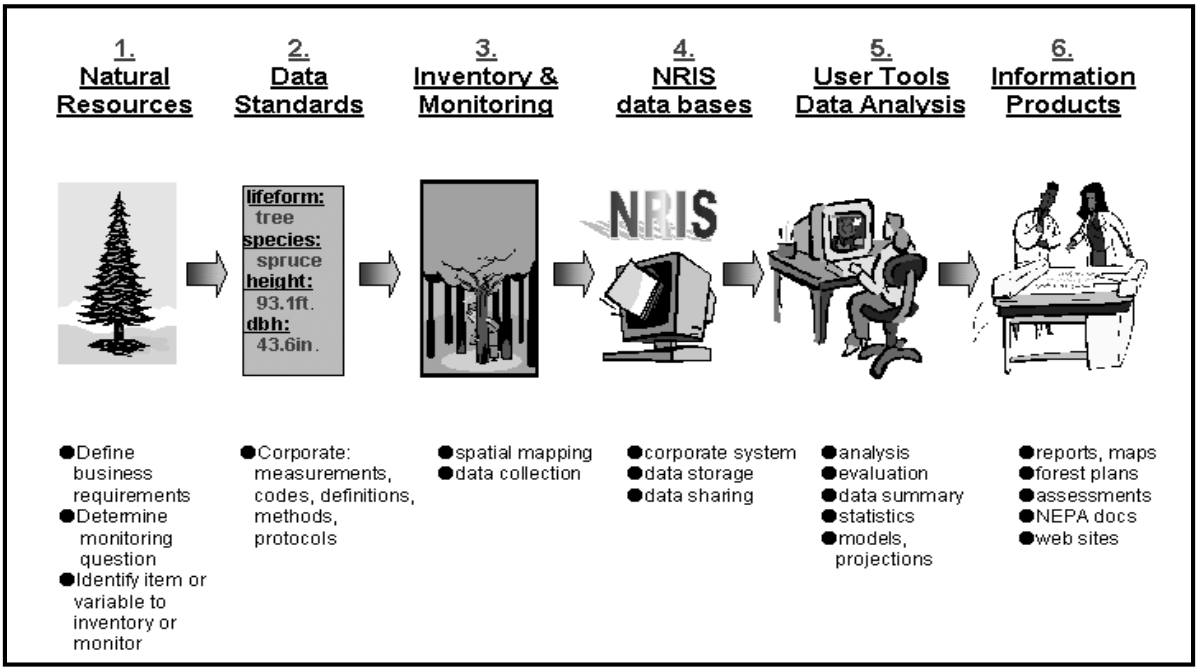


Figure IV-2. Steps in the Monitoring and Evaluation Process



Monitoring and evaluation involve more than just collecting and interpreting data. Data must be converted to useful information and stored in a form that is accessible to others. A plan for managing monitoring information over time is critical to a successful program (Figure IV-2).

Data will be designed and collected according to appropriate data standards and entered into corporate databases such as Automated Lands Program (ALP), Natural Resource Inventory System (NRIS), or Geographic Information System (GIS). The information can then be accessed

and analyzed to produce information products such as monitoring reports that would be available for internal and external review.

LEGAL AND REGULATORY REQUIREMENTS

The forest plan addresses several types of monitoring. These requirements fall into four broad categories:

- Category 1: Required monitoring items related to the National Forest Management Act,
- Category 2: Attainment of goals and objectives,
- Category 3: Implementation of standards and guidelines, and
- Category 4: Effects of prescriptions and management practices.

Category 1 monitoring items are mandatory components of the Forest Plan, whereas Category 2 through 4 monitoring items are more flexible and are tailored to address issues raised through public comments and interdisciplinary team review, as translated into Forest-wide direction and management practices. These items are more likely to change through time as indicated through monitoring evaluation results and recommendations. A more complete description of Category 1 through 4 monitoring items is shown in the Monitoring Matrix section.

MONITORING FRAMEWORK AND COMPONENTS

Monitoring Framework

Many approaches to Forest Plan monitoring are currently being used throughout the agency. However, each monitoring plan should: 1) meet the legal requirements of the planning regulations, 2) be consistent with corporate data standards and protocols, and 3) be developed by an interdisciplinary team that addresses the ecological, social and economic dimensions of Forest management in an integrated manner.

To meet these objectives, the Forest's monitoring framework has four components:

1. Forest Plan (Chapter IV) Direction that provides broad, strategic guidance.
2. A Monitoring and Evaluation Implementation Guide that provides specific, technical guidance.
3. An Annual Monitoring Schedule that outlines specific tasks for the current year.
4. A ~~Annual~~ Biennial Monitoring Evaluation Review that provides a forum to review current ~~year~~ findings and identify specific modifications if necessary.

The relationship between each is shown in Table IV-1.

Table IV-1. Monitoring Framework

Forest Plan Monitoring (Chapter 4)	Monitoring and Evaluation Implementation Guide	Annual Monitoring Schedule	~~Annual~~ Biennial Monitoring Evaluation Review
Broad and Strategic. Provides the monitoring requirements in the forest plan itself. It focuses on what is needed to monitor the forest plan. It 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 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, where, when, and by whom for the current or upcoming year. The Annual Monitoring Schedule will be tied to the Forest Plan Monitoring (Chapter IV) and the Monitoring Implementation Guide.	*Specific, Technical, and Prescriptive.* A Forest interdisciplinary team will review the current year's monitoring and evaluation results at the end of each calendar year. Based on these findings they will recommend to the Forest Leadership Team necessary 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. If budget levels limit the Forest's ability to perform all monitoring tasks, then those items specifically required by law or court order will be given the highest priority for implementation. Additionally, a prioritization process for Chapter IV and the Monitoring Implementation Guide items will be developed to ensure efficient use of limited time, money and personnel. Following is a list of potential criteria that may be used in the screening process:

- Is monitoring of a particular question or resource mandated by law or court order?
- Is there a high degree of uncertainty associated with management assumptions?
- Is there a high degree of disparity between existing and desired conditions?
- Are proposed management activities likely to affect resources of concern?
- How do monitoring items fit into national and regional priorities?
- How well do monitoring items fit with public comments and interests?
- What are the consequences of not knowing resource conditions?
- Will monitoring respond to a key issue?

Monitoring priorities will be established each year using the above criteria, information gained during the past year, and budgets. The prioritization process will be described within the Monitoring Implementation Guide.

Information Management

There will likely be a tremendous amount of monitoring information collected over time. If this information is not documented so it can easily be retrieved, shared with the public and other

stakeholders, or used by agency managers to foster better decisions, it is of limited value. Therefore, information management should consist of:

1. Management of the collection and storage of data,
2. Evaluation and interpretation of data, and
3. Sharing of information internally and externally.

Manage the Collection and Storage of Data

A Forest interdisciplinary team will work with Forest Service employees and cooperators to see that data are collected using standard methods found in the Monitoring Implementation Guide and are entered into the appropriate databases.

Evaluation and Interpretation of Data

Evaluation is the process of transforming data into information. It is a process of synthesis that brings together value, judgment, and reason with monitoring information to answer selected monitoring questions. Successful adaptive management depends on this information in order to move the Forest toward desired conditions.

A Forest interdisciplinary team will review the current year's monitoring and evaluation results at the end of each calendar year. Based on these findings, they will recommend to the Forest Leadership Team necessary changes (if any) to the Forest Plan, Monitoring Implementation Guide, or Forest Service Manual or Handbook.

The findings gathered through monitoring will be summarized in various reports (most notably the ~~annual~~ biennial Monitoring and Evaluation Report) and publications, and they will be shared internally and externally with cooperating agencies and organizations, interest groups, policy makers, and the general public.

~~Annual~~ Biennial Monitoring and Evaluation Report

The ~~annual~~ biennial Monitoring and Evaluation Report provides an opportunity to track progress toward the implementation of revised forest plan decisions and the effectiveness of specific management practices. The focus of the evaluation is providing short- and long-term guidance to ongoing management. The Monitoring and Evaluation Report should include components such as:

1. Forest accomplishments toward desired conditions and outputs of goods and services.
2. Forest Plan Amendment Status.
3. Status of other agency/institution cooperative monitoring.
4. ~~Summary of available information on MIS or comparable species/habitats.~~
5. Summary of large-scale or significant projects or programs.
6. Update of research needs.
7. Public participation/disclosure plan.

Public Involvement

The Forest Service mission 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, execution, and evaluation will be formulated each year. Partnerships with interest groups, volunteer groups, universities, and other federal, state and local agencies will be part of that strategy. Monitoring information trips are an option for the public to review monitoring findings and methods and address management implications. Other avenues of public involvement such as news releases, the internet, brochures, and public reports may also be used.

THE MONITORING MATRIX

Table IV-2 provides descriptions of the components that are used in The Monitoring Matrix, Table IV-3.

Table IV-2. Definitions of Components in 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 addresses 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 Driver~~	~~Drivers identify the reason(s) why we are monitoring a particular monitoring item. Following is a list of monitoring drivers: (1) Legal and regulatory requirements or Forest Service Manual direction, (2) Forest Plan direction, (3) Validation of assumptions and predictions, (4) Court rulings. Legal and regulatory drivers are described whereas desired conditions, goals, objective, and S and G's are referenced.~~
Monitoring Indicator	A characteristic which, when measured repeatedly, demonstrates trends; or a measure of the current state or quality of the associated Monitoring Question.
Measurement Frequency	Describes how often monitoring information is collected.
~~Evaluation and Reporting Frequency~~	~~Describes how often monitoring information is evaluated and reported.~~
Precision and Reliability	Two categories of precision and reliability are appropriate at the forest plan scale: Class A: Methods appropriate for modeling or quantitative measurement. Results have a high degree of repeatability, reliability, accuracy and precision. Class B: Methods based on project records, personal communications, ocular estimates, pace transects, informal visitor surveys and similar types of assessments. The degree of repeatability, reliability, accuracy and precision are not as high as Class A methods, but they still provide valuable information.

Table IV-3 ~~is in two parts. The first part, IV-3a,~~ displays monitoring items that are required through the NFMA~~. The second part of the table displays~~ and monitoring items that are tied to achieving Forest-wide direction and management practices found in Chapters II and III of the 2006 Forest Plan. There are undoubtedly items in this table that potentially overlap each other ~~or items found in Table IV-3a,~~ and we may adjust these in time as the monitoring plan is implemented and evaluated. This matrix and the Monitoring Implementation Guide are, to a certain degree, intended to be dynamic and flexible, as one of the important keys to an effective monitoring and evaluation plan is the ability to determine a need for change and to adapt to that need over time.

Table IV-3~~a.~~ Monitoring Matrix ~~- Required Monitoring Items~~

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
1. Outputs and Services	How close are outputs and services projected for Forest Plan implementation to actual outputs and services?	1. Percentage of each annual target that is actually accomplished, and 2. Annual progress toward meeting Forest Plan objectives.	A	Annual
~~2. Costs~~	~~How close are projected costs to actual costs?~~	See footnote[1]	~~A~~	~~Annual~~
3. Insects and Disease	Are insect and disease populations compatible with objectives for restoring or maintaining healthy forest conditions?	Acres affected by insect and disease outbreaks.	A/B	Annual
4. Insects, Diseases, and Disturbance Processes	To what extent is the Forest managing undesirable occurrences of fire, insect and disease outbreaks through prevention, suppression, and integrated pest management?	1. Acres treated to address insect or disease outbreaks. 2. Number and acres of wildfire incidents.	A/B	1-5 years
5. Recreation Motor Vehicles	To what extent is the Forest providing RMV opportunities; what are the effects of RMVs on the physical and social environment; and how effective are forest management practices in managing RMV use?	1. Miles of NFS roads open to public motorized use. 2. Number of off-road vehicle violations documented.	A/B	1-5 years
6. Forest Productivity	Are the effects of Forest management, including prescriptions, resulting in significant changes to productivity of the land?	1. Changes to National Forest System (NFS) lands. 2. Acres of Management Prescription area change	A/B	1-5 years

[1] Question 2 is proposed for deletion. The initial rationale for this question was the 1982 Planning Rule, which has been replaced by the 2012 Planning rule. Further, the Forest Plan does not contain 'projected costs' making the comparison of projected with actual costs impossible.

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
		that may affect land productivity. 3. Acres of management activities that may affect land productivity.		
7. Timber	Are regeneration harvest units adequately restocked after five years?	1. Stocking certification results. 2. Stocking survey results.	A	Annual
8. Timber	To what extent is commercial harvest occurring on lands suited or not suited for timber production? Is there any need to adjust the suitable timberlands on the Forest?	Acres of commercial harvest on lands suited vs. not suited for timberland.	A	10 years
9. Timber	Are even-aged harvest units, particularly clearcuts, exceeding the 40-acre size limit established under the NFMA? If they are, is there a need to adjust the size limit to better accommodate Forest Plan management objectives and practices?	Size of even-aged harvest units.	B	Years 5 and 10
~~10. Management Indicator Species (MIS)~~	~~To what extent is Forest management moving toward desired habitat conditions for MIS and species associated with MIS habitats?~~	See footnote[2]	~~A/B~~	~~Annual~~

[2] Question 10 is proposed for deletion. This question is no longer valid as written because there are no MIS under the 2012 Rule. MIS are being replaced by focal species (which the Forest will have to determine) that represent specific ecological conditions or ecosystems.

~~Table IV-3b. Monitoring Matrix - Forest Plan Direction Monitoring Items~~

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
11. Air Quality	To what extent is Forest management contributing or responding to air pollution effects on ecosystems and visibility?	1. Visibility, 2. Fine particulates in the atmosphere.	A/B	1-5 years
12. Air Quality	Are Air Quality Related Values of the Dolly Sods and Otter Creek Wildernesses improving over current adversely affected levels?	1. Visibility; 2. Acid neutralizing capacity 3. Exceedances of critical loads of air pollution.	A/B	1-5 years
13. Air Quality	What are the trends in ambient air pollutant concentrations near the Forest?	1. Sulfate and nitrate deposition 2. Counties or areas classified as nonattainment of the NAAQS 3. $PM_{2.5}$ trend compared to NAAQS standards.	A/B	1-5 years
14. Fire	To what extent is unwanted wildland fire on the Forest being successfully suppressed?	Number and size of wildland fire incidents.	A/B	1-5 years
15. Fire	How, where, and to what extent are desired fuel conditions being met by lowering Fire Regime Condition Classes 3 and 2?	Acres treated to reduce risk of catastrophic wildfire	A/B	1-5 years
16. Fire	How, where, and to what extent is prescribed fire being used to mimic natural processes, or maintain/improve vegetation conditions, or restore natural processes and functions to fire-adapted ecosystems?	Acres of prescribed fire implemented.	A/B	1-5 years
17. Fire	Are smoke management practices effective in protecting human health and public safety from potential adverse impacts of prescribed fire emissions?	1. NAAQS nonattainment areas 2. $PM_{2.5}$ trends	A/B	1-5 years
18. Heritage Resources	Are project-specific mitigation measures being followed as recommended in project designs? If so, are they providing effective protection for heritage resources?	Effects to heritage assets.	A	1-5 Years
19. Heritage Resources	Are heritage resources being affected in non-project areas from activities such as looting, OHV use, or erosion?	Change in site conditions	A	1-5 Years
20. Minerals	Are mineral exploration, development and production	Compliance with approved operating plan	A/B	1-5 years

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
	mitigation measures being followed and are they effective in reducing impacts?			
21. Minerals	How close are projected estimates of National Forest System land that could be impacted by natural gas development to actual amounts?	Acres of natural gas development compared to RFSD projected acres.	A	1-5 years
22. Minerals	Are minerals, especially energy-producing minerals, available for exploration, development, and production at predicted levels?	Percentage of MNF land available for federal leasing of natural gas exploration, development, and production.	A	1-5 years
23. Public Health and Safety	Are Forest facilities and recreation sites safe for employee and public use and enjoyment?	1. Recreation Site Condition Surveys 2. Facilities Condition Surveys 3. Percent of facilities that meet the requirements for National Protocol for Public Health and Safety	A	1-5 Years
24. Recreation	To what extent is the Forest providing a range of motorized and non-motorized recreation opportunities that incorporate diverse public interests ~~yet achieve applicable MP goals~~?	1. Miles of NFS road available for public motorized use 2. Miles of NFS trails, 3. National Visitor Use Monitoring Customer Satisfaction Surveys. 4. Percent occupancy for campground fee sites.	A/B	1-5 years
25. Recreation	To what extent are Forest management activities within the Recreation Opportunity Spectrum Objectives (ROS)?	Change in ROS classification.	A/B	1-5 Years
26. Recreation	To what extent do Forest recreation facilities and opportunities meet accessibility, cost, and maintenance needs to achieve resource and social objectives?	1. Percent of recreation facilities that meet accessibility requirements. 2. Recreation sites managed to standard, 3. Recreation special uses management to standard 4. Miles of NFS trails managed to standard.	A	1-5 years
27. Scenic Resources	Are forest management activities providing scenic quality as defined by the Scenic Integrity Objectives?	Number of projects that do not meet SIO objectives.	B	1-5 years
28. Special Uses	Does management of special forest products, recreation/wilderness, and other special use permits meet Forest Plan and agency direction?	1. Number of special use permits processed. 2. Number of special use permits administered to standard.	A/B	1-5 years

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
29. Transportation System	To what extent is the Forest, in coordination with other public road agencies, providing safe, cost effective, minimum necessary road systems for administrative and public use?	1. Miles of road improved 2. Miles of road maintained 3. Miles of road decommissioned vs. constructed.	A/B	1-5 years
30. Transportation System	To what extent are road and trails closures effective in prohibiting unauthorized motor vehicle use and associated impacts?	1. Number of gate closure violations reported. 2. Number of gate improvements.	A/B	1-5 years
31. Soils	~~Is soil detrimental disturbance associated with land management activities below the 15% soil productivity loss threshold?~~ Is detrimental soil disturbance occurring with associated land management activities?[3]	Soil Disturbance Class	A/B	1-5 years
32. Soils	Is acid deposition affecting soil quality ~~productivity loss~~ and if so, is it affecting land sustainability?	1. Acres of soil disturbance on high risk soils. 2. Project level soil chemistry data on high and moderate risk soils. 3. Forest water chemistry	A/B	1-5 years
33. Vegetation	Is timber harvesting sustainable over the long-term and maintained at predictable and dependable levels?	Volume and acres harvested over period.	A	1–5 years
34.Vegetation	To what extent is the Forest providing a range of vegetation communities ~~that address diverse public interests and needs while contributing~~ to contribute to ecosystem sustainability and biological diversity?	1. Acres of age class and forest types of the Forest. 2. Rare communities not captured in the broad forest types. 3. CASRI Community Structure data.	A/B	1-5 years
35. Vegetation Composition and Structure	To what extent are Forest management, natural disturbances, and subsequent recovery processes changing vegetation composition and structure?	1. Acres of ESH created 2. Acres of Stand Improvement. 3. Acres of natural disturbance that change forest stand structure. 4. CASRI community structure data.	A/B	1-5 years
36. Vegetation Composition and Structure	To what extent is the Forest meeting vegetation composition and age class objectives and desired	1. Changes in age class and forest types by MPs. 2. CASRI community structure data	A	5 Years

[3] Question 31 was reworded to reflect the 15% soil productivity threshold is no longer used.

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
	conditions for MPs 3.0, 4.1, and 6.1?			
37. Vegetation	Are non-native invasive plants located and treated to prevent or limit further spread?	Species and acres treated. Or Acres of non-native invasive plants located or treated.	A/B	1-5 years
38. Threatened and Endangered Species	To what extent is Forest management contributing to the protection and recovery of threatened and endangered species, or the conservation of proposed and candidate species?[4]	1. Acres of restoration or enhancement of ecological conditions for T&E, proposed, and candidate species. 2. Actions that contribute to the recovery of T&E species or conservation of proposed or candidate species (for example gate installations or cave closures) 3. Bat species presence, distribution and demographic information. 4. Presence and abundance of bat species at maternity caves (VBEB) and hibernacula. 5. Presence and persistence of CMS at known sites; presence in new sites.	A/B	1-5 years
39. Regional Forester Sensitive Species	To what extent is Forest management contributing to the conservation of sensitive species and maintaining or restoring their habitat conditions?	1. Acres and/or number of occurrences of sensitive species habitat enhanced or restored. 2. Acres and/or number of occurrences of sensitive species habitat adversely impacted by management activities. 3. Presence and demographics of WVNFS. 4. Presence and distribution of avian species.	A/B	1-5 years
40. Watershed, Riparian and Aquatic Ecosystem Health	To what extent are Forest management and other external influences, such as acid deposition, beneficially or adversely affecting water quality or quantity?	1. Water chemistry data. 2. Miles of stream listed as WV water quality impaired. 3. Stream temperature data. Also informed by soil chemistry data and air quality indicators.	A/B	1-5 years
41. Watershed, Riparian and Aquatic	To what extent is Forest management beneficially or adversely affecting soil erosion	1. Results of National Water Quality BMP monitoring protocol	A/B	1-2 years

[4] Proposed modifications to Question 38 are to better comply with the 2012 Planning Rule monitoring component.

Resource, Activity, Practice, Effect To Monitor	Monitoring Question	Monitoring Indicator	Precision and Reliability	Measuring Frequency
Ecosystem Health	and stream sedimentation processes?	2. Acres of sediment sources restored (i.e. road decommission, stream bank stabilization, etc.) 3. Percent of fines within spawning gravel.		
42. Watershed, Riparian and Aquatic Ecosystem Health	To what extent is Forest management beneficially or detrimentally affecting the physical conditions of aquatic ecosystems, including riparian ecosystem function and health?	1. Aquatic Ecological Unit Inventory data. 2. Aquatic organism passage improved 3. Wild brook trout biomass and size class distribution. 4. Percent of fines within spawning gravel 5. Acres of wetland enhanced. 6. Miles stream enhanced. 7. Acres of riparian habitat enhanced	A/B	1-5 years
43. Wildlife, Fish, and Plants	To what extent is Forest management influencing the viability of native and desired non-native species, or otherwise affecting species composition and habitat productivity?	1. Acres of habitat enhanced or restored 2. Wild brook trout biomass and size class distribution 3. Also see indicators for question 42.	A/B	1-5 years
44. Wildlife and Fish Non-native Invasive Species	To what extent is management on Forest lands influencing populations of terrestrial or aquatic non-native species that threaten native ecosystems?	Species and acres/occurrences of invasive species treated.	A/B	1-5 years
45. Wildlife Habitat: Retained Features	Is Forest management providing adequate habitat diversity and structure through maintenance or enhancement of snags, culls, leave trees, and downed woody debris?	Acres of management activities that result in the loss, maintenance, or creation of habitat diversity and legacy features such as snags and downed woody debris.	A/B	1-5 years
46. Wildlife Habitat: Social and Recreational Opportunities	To what extent is the Forest providing ~~adequate~~ habitat ~~to meet the demand~~ for wildlife and fisheries related to social and recreational opportunities?	Acres and/or miles of habitat enhanced, maintained, or restored for species of social and recreational interest.	A/B	1-5 years