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FSH 1909.12 – LAND MANAGEMENT PLANNING HANDBOOK

CHAPTER 30 – MONITORING

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Digest:

30 – Revises chapter in its entirety. Changes chapter caption from “Public Participation and Collaboration” to “Monitoring.” Removes codes, captions, and obsolete direction and establishes codes, captions, and sets forth new direction throughout the chapter.

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This chapter describes requirements and procedures for the plan monitoring program, broader-scale monitoring strategies, and the biennial evaluation of monitoring information. Monitoring includes testing assumptions, tracking changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives.

30.2 - Objectives

The objectives of plan monitoring are to:

1. Enable the Responsible Official to determine if a change in plan components or other plan content applicable to the plan area may be needed.
2. Inform the management of resources on the plan area, through means such as testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives.
3. Focus monitoring on priority management questions and related core information.
4. Improve the integration and scalability of monitoring information.
5. Provide the information essential for achieving the Agency's mission and business needs that fulfills information quality guidelines for objectivity, utility, and integrity.
6. Support an adaptive land management planning process that includes social, economic, and ecological evaluations.
7. Ensure monitoring information is relevant scientific information (FSH 1909.19, zero code, sec. 07).
8. Ensure quality and consistency of information.
9. Ensure information is timely and accessible.

30.3 - Policy

Plan monitoring must:

1. Be coordinated through a strategic process that addresses information needs related to business requirements;
2. Use a criteria-based approach and framework for information management and related business operations; and

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3. Foster and realize opportunities for collaboration, cooperation, and coordination across Forest Service deputy area programs and with Agency partners, including the public; local, State, and other Federal agencies; and nongovernmental organizations.

30.4 - Responsibilities

1. The Responsible Official:
 - a. Develops the plan monitoring program as part of the plan.
 - b. Develops a strategic, effective, and useful plan monitoring program.
 - c. Coordinates with the Regional Forester in the designing the monitoring questions, indicators, and protocols.
 - d. Coordinates with the Station Director of Research and Development in designing the monitoring questions, indicators, and protocols.
 - e. Coordinates with State and Private Forestry through the specialists of the staffs of the Regional Forester and Northeastern Area Director for State and Private Forestry in the designing the monitoring questions, indicators, and protocols.
2. The Regional Forester develops the broader-scale monitoring strategy for plan monitoring program questions that can be answered best at a geographic scale broader than one plan area.

30.5 - Projects, Activities, and Monitoring

Project monitoring is a valuable means of understanding the effects of projects and activities. Project monitoring can provide useful information to adapt future project plans to improve resource protection and restoration. Project and activity monitoring may be used to gather information for the plan monitoring program, and plan monitoring information may inform the development of specific projects and activities. However, the Responsible Official has the discretion to strategically select which projects to monitor and the monitoring questions related to those projects that will best inform the monitoring program, test assumptions, track changing conditions, or evaluate management effectiveness.

31 - MONITORING

(3) *Monitoring.* Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness (§ 219.12). The monitoring program includes plan-level and broader-scale monitoring. The plan-level monitoring program is informed by

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the assessment phase; developed during plan development, plan amendment, or plan revision; and implemented after plan decision. The regional forester develops broader-scale monitoring strategies. Biennial monitoring evaluation reports document whether a change to the plan or change to the monitoring program is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. (36 CFR 219.5).

This chapter focuses on the monitoring phase of the planning framework, complementing the previous chapters in this Handbook. Chapter 10 of this Handbook provides guidance for the assessment phase that is used to inform the monitoring design. Chapter 20 of this Handbook provides guidance for the land management planning process, where the plan monitoring program questions and associated indicators are developed and established as part of the plan.

Monitoring forms the basis for continuous improvement of the plan and provides information for adaptive management (see FSH 1909.12, zero code, sec. 05) of the plan area. The purpose of monitoring in an adaptive management framework is to facilitate learning to support determinations on whether changes are needed. Biennial evaluations use plan area and broader-scale monitoring to develop information that helps the Responsible Official determine if and where changes are needed in plan components, other plan content, and projects and activities. Monitoring also provides feedback to prioritize and improve the plan monitoring program and broader-scale monitoring strategy.

Two monitoring approaches are used for monitoring the plan area to determine whether the land management plan needs to be changed:

1. The plan monitoring program identifies the monitoring questions and associated indicators for monitoring the plan.
2. Broader-scale monitoring information is used to address relevant plan monitoring questions that are best answered at a larger geographic scale.

The plan monitoring program consists of a set of monitoring questions and associated indicators to evaluate whether plan components are effective and appropriate and whether management is effective in maintaining or achieving progress toward desired conditions and objectives for the plan area. The supervisor of the administrative unit (plan area) is responsible for implementing the plan monitoring program.

Any additional information for the plan monitoring program may be documented in a separate monitoring guide that would set out methods for data collection, how the data is stored, responsibilities for managing monitoring information, and the schedule of monitoring and evaluation activities during the planning period. In addition, an annual monitoring work plan may be developed to identify the work for the fiscal year.

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Regional Foresters develop a broader-scale monitoring strategy (sec. 33 of this Handbook) to answer and manage plan monitoring questions common to two or more plan areas in the Region. Conversely, the Regional Forester may identify an issue common to several plan areas and require that the plan monitoring programs for those areas include specific questions and indicators to address the issue.

Broader-scale monitoring strategies may be comprised of questions and indicators or may also include a description of protocols, data management, responsibilities, and partnerships for the questions and indicators.

The Agency regularly works in partnership with other entities, including Tribes, States, Federal agencies, nonprofits, business, and communities. For monitoring, the Agency often develops partnerships with people, organizations, agencies, and communities to work together on data collection and evaluation.

The broader-scale monitoring strategy may use existing National and Regional monitoring efforts to answer plan monitoring questions common to two or more plan areas.

Monitoring plans and strategies are constrained by the fiscal and technical capabilities of the Agency, and should use available information sources and partnerships to expand these capabilities. The scope and scale of the monitoring program should be designed to give strategic, effective, and useful information for the plan area. This chapter does not address protocols for data management; see FSM 1940, “Inventory, Monitoring and Assessment Activities,” for additional information.

31.1 - Best Available Scientific Information for Monitoring

The Responsible Official shall document in the decision document for the plan how the best available scientific information is used to inform development of the plan monitoring program. Documentation should identify what best available scientific information was used, explain the basis for the determination of the best available scientific information, and describe how it was applied (see 36 CFR 219.3 and FSH 1909.12, zero code, sec. 07). See section 32.1 of this Handbook for other information that may be used in developing the plan monitoring program.

31.2 - Public Participation for Monitoring

The Responsible Official shall provide opportunities for the public to participate in developing the plan monitoring program during the development or revision of plans. The intent of public participation is to:

1. Develop a common understanding of and support for the monitoring questions and associated indicators,
2. Provide opportunities to design and carry out multi-party monitoring,

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3. Learn of other monitoring information available, and
4. Improve the plan monitoring program.

See FSH 1909.12, chapter 40, section 42.14 for guidance about public participation related to monitoring.

31.3 - Tribal Consultation for Monitoring

Consultation with Tribal officials from federally recognized Tribes and Alaska Native Corporations during the plan development phase must include consultation on the development of the plan monitoring questions and associated indicators. See 36 CFR 219.4 and FSH 1909.12, chapter 40, section 43.3.

32 - PLAN MONITORING PROGRAM

(a) *Plan monitoring program.* (1) The responsible official shall develop a monitoring program for the plan area and include it in the plan. Monitoring information should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed. The development of the plan monitoring program must be coordinated with the regional forester and Forest Service State and Private Forestry and Research and Development. Responsible officials for two or more administrative units may jointly develop their plan monitoring programs.

(2) The plan monitoring program sets out 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 plan components in the plan, but not every plan component needs to have a corresponding monitoring question.

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

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1. The Responsible Official shall:
 - a. Identify monitoring questions and associated indicators that meet the monitoring requirements of the Planning Rule (36 CFR 219.12) to support adaptive management.
 - b. Use the best available science to inform the plan monitoring program.
 - c. Provide opportunities for public participation, collaboration, and multi-party monitoring in the development and implementation of monitoring for the plan area.
 - d. Make data sets and results transparent, and available to the public, unless it is not appropriate to do so because of requirements to protect certain information, such as the location of some archaeological resources or sacred sites.
 - e. Design relevant questions and associated indicators to measure management effectiveness and assess progress towards the desired conditions or objectives.
 - f. Design relevant questions to test relevant assumptions, track relevant conditions over time, and measure management effectiveness.
 - g. Design relevant questions in light of National and Regional Agency monitoring priorities.
 - h. Provide for the collection and public reporting (except for sensitive data) of plan monitoring data on a regular basis.
2. The Responsible Official should:
 - a. Build from existing National and Regional monitoring efforts and external monitoring efforts to design and carry out monitoring for the plan.
 - b. Coordinate complementary or overlapping monitoring efforts with other agencies and partners to gain efficiencies for monitoring across the landscape
 - c. Coordinate with Forest Service Research and Development when reviewing scientific information, identifying and using information from relevant scientific studies, evaluating monitoring methods and protocols, identifying potential monitoring benefits from research natural areas, experimental forests and research programs, and designing and carrying out monitoring.
 - d. Include relevant information and knowledge gained through project and activity monitoring.
 - e. Provide information that can be used to develop projects or activities.

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f. Facilitate learning and support adaptive management.

32.1 - Developing the Plan Monitoring Program

The process for developing the plan monitoring program should start early in the planning process. The Interdisciplinary Team may identify potential monitoring questions and indicators during the assessment phase when they identify current conditions and trends, but they shall develop the monitoring questions and associated indicators during the plan development phase, with public involvement.

The Responsible Official has discretion to set the scope, scale, and priorities for plan monitoring within the financial and technical capabilities of the administrative unit, but shall include one or more monitoring question(s) and associated indicator(s) for the eight items set out in the Planning Rule at 36 CFR 219.12(a)(5).

(5) Each plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following:

- (i) The status of select watershed conditions.**
- (ii) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.**
- (iii) The status of focal species to assess the ecological conditions required under § 219.9.**
- (iv) The status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.**
- (v) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.**
- (vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.**
- (vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.**
- (viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)). (36 CFR 219.12(a))**

Social, economic, and cultural sustainability must also be addressed in the monitoring program because sustainability is an inherent part of several of the required monitoring items (sec 32.13f of this Handbook).

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The number of monitoring questions and indicators is not fixed; however, all the items in 36CFR219.12(a)(5)(i) through (viii) must be covered. The plan monitoring program may include additional monitoring questions and associated indicators for other topics not listed in the rule, as the Responsible Official deems appropriate. A range of monitoring techniques may be used to carry out the monitoring requirements.

Plan components form the basis for developing the monitoring questions and associated indicators in the plan monitoring program (secs. 32.11 and 32.12 of this Handbook). Guidance on plan components is found in FSH 1909.12, chapter 20, sections 22 through 22.52. The plan area's distinctive roles and contributions within the broader landscape may be used to focus and prioritize monitoring questions and indicators. Plan components may be worded to provide for integrated monitoring questions. For example, equestrian or ATV use can be related to soil and water quality impacts and, therefore, could be monitored together, where appropriate.

Use best available scientific information to inform the development of the plan monitoring program (sec. 31.1 of this Handbook). National inventory and monitoring protocols (see FSM 1940) should be used to provide standard data collection, where appropriate, to provide consistency across the Agency. The Responsible Official should take into account existing internal and external inventory, monitoring, and research programs, such as reviewing existing corporate databases, protocols, and monitoring efforts with internal and external partners or other efforts where data sets might be available to help determine how monitoring should be done to answer relevant monitoring questions. Otherwise, the Responsible Official has discretion to determine the methodology and level of precision needed to achieve credible monitoring information, ranging from statistically tested methods to documented observation and professional judgment.

The Responsible Official should use available public and governmental information where it is relevant and appropriate to develop the plan monitoring program. Scientists have published many publications about the effects of land management. If research has shown that the effects of current practices are known, there is no need to select questions and indicators to verify such effects. Monitoring should address uncertainty.

The Responsible Official should take a strategic approach and focus monitoring on priority management questions. The Responsible Official should consider a variety of information sources. Information may include traditional ecological knowledge, land ethics, cultural issues, and sacred and culturally significant sites. The Responsible Official shall protect the confidentiality of sensitive information when required by law.

Information may come from project and activity monitoring. In addition, when it is appropriate to do so, the Responsible Official may use existing monitoring plans, such as those developed under the Collaborative Forest Landscape Restoration Program, to inform the development of monitoring questions and indicators.

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Exhibit 01 identifies a simple model of a possible plan monitoring program that includes selected hypothetical plan components to monitor, monitoring questions, and indicators associated with each question. The categories and examples are provided to demonstrate the plan component/monitoring relationship and are not required monitoring program content.

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32.1 – Exhibit 01

Example: Plan Monitoring Program

Conservation and Maintenance of Soil and Water Resources		
Selected Plan Components	Monitoring Questions	Indicators
<p>Desired Condition: Watershed conditions are properly functioning.</p> <p>Objective: 50,000 acres in (named) priority watershed(s) improved to xx condition within yy years of plan approval</p>	<p>Are the priority watershed conditions functioning properly?</p> <p>Are riparian buffers providing for increased diversity of amphibian species?</p>	<p>Percentage of or amount of: forest cover, riparian area tree and shrub distribution, aquatic biota composition, aquatic habitat continuity, disturbed area condition (roads, trails, firelines), area of unstable soils.</p>
<p>Desired Condition: Surface water quality meets or exceeds State standards for aquatic biodiversity and beneficial downstream uses.</p> <p>Standard: Project design must meet or exceed applicable best management practices (BMPs) prescriptions to mitigate nonpoint-source pollution.</p>	<p>What percentage of surveyed streams is in a non-impaired condition?</p> <p>Are BMPs effective in mitigating nonpoint source pollution?</p>	<p>Macroinvertebrate Aggregated Index for Streams score for benthic macroinvertebrates.</p> <p>Qualitative observations to determine if BMPs are carried out and effective in mitigating nonpoint source pollution.</p>
Conservation of Biological Diversity		
Selected Plan Components	Monitoring Questions	Indicators
<p>Desired Condition: Healthy longleaf ecosystems, with longleaf pine overstory, natural fire return intervals, open mid-story with park-like appearance, and diverse understory of native grasses, legumes and other forbs, appropriately distributed across their native ranges.</p> <p>Objective: To restore 10,000 acres of longleaf ecosystem mid-story within 10 years of plan revision. In addition to annually maintain with prescribed fire 10 to 30 percent of the 150,000 acres of longleaf ecosystems that currently meet overstory desired conditions.</p>	<p>What progress has been made toward maintaining and restoring desired conditions so that native longleaf ecosystems occupy appropriate sites?</p> <p>Are desired understory effects (structure and composition) resulting from prescribed fire under varied fire return, timing, and severities?</p>	<p>Changes in tree abundance, tree age and size distribution, distribution of ecosystem indicator plants, status of red-cockaded woodpecker and gopher tortoise populations in longleaf ecosystems.</p> <p>Understory species composition and distribution, changes in midstory and overstory densities, fire frequencies/season/flame lengths, scorch heights, litter depths, shrub and tree mortality.</p>

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32.1- Exhibit 01—Continued

Conservation of Biological Diversity		
Selected Plan Components	Monitoring Questions	Indicators
<p>Desired Condition: Alpine ecosystems sustain their diversity and maintain the attributes and processes that allow them to provide watershed values, habitat for native biota, panoramic vistas, and solitude. They display a diverse composition of desirable native plant species and vegetation communities. Invasive plant species are absent or rare.</p>	<p>Are plant communities of alpine ecosystems being protected, maintained, and restored?</p>	<p>Areal extent of plant community of alpine ecosystems.</p> <p>Presence of fragmentation characteristics such as patch size, edge, and proportion of habitat interior.</p> <p>Status of disturbance processes that shape the community.</p> <p>Status of invasive species within and near these communities.</p>
Maintenance and Enhancement of Recreational Benefits		
Selected Plan Components	Monitoring Questions	Indicators
<p>Desired Condition: Recreation settings and opportunities provide high visitor satisfaction, meeting current and future public demands in sustainable ways.</p>	<p>Are the current recreation settings and opportunities moving toward desired recreation settings and opportunities?</p> <p>What is the trend in visitor use and satisfaction?</p>	<p>Recreation opportunity spectrum: acres, location, and distribution (mapped).</p> <p>Satisfaction levels from USDA Forest Service national visitor use monitoring survey results by single administrative unit.</p>
Maintenance and Enhancement of Social, Economic and Cultural Benefits		
Selected Plan Components	Monitoring Questions	Indicators
<p>Desired Condition: Positive contribution of multiple uses, ecosystem services, infrastructure, and NFS operations to the economic, social, and cultural vitality of communities within the broader landscape while providing these values for people of all income, ethnic and age groups.</p>	<p>1. Are the communities and their economies in the plan's area(s) of influence experiencing changes that can be associated with the management of the plan area?</p> <p>2. To what extent are young people, people of low income and members of minority groups engaged in a meaningful way in plan monitoring and implementation?</p>	<p>Levels of production of multiple uses including timber, grazing and recreational visits.</p> <p>Assessments of effectiveness of outreach activities to specific groups (for example, estimates of visits by targeted audiences)</p> <p>Economic effects on the surrounding communities from recreational uses.</p>

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32.11 - Selecting Monitoring Questions

Monitoring questions should focus on providing the information necessary to evaluate whether plan components are effective and appropriate and whether management is being effective in maintaining or achieving progress toward the desired conditions and objectives for the plan area. A monitoring question is not necessary for every desired condition, objective, or other plan component, as long as there are sufficient questions that cover plan components related to the eight topics set out at 36 CFR 219.12 (a)(5); see section 32.13 of this Handbook.

When selecting monitoring questions, the Interdisciplinary Team should provide rationale for the selected set of questions and ensure that the questions will provide useful information for future planning.

The plan monitoring program must be within the financial and technical capability of the Administrative Unit. For example, the Interdisciplinary Team must not include a question if they cannot identify a measurable, efficient, and cost-effective indicator or indicators for the question.

The Interdisciplinary Team may select as many monitoring questions as appropriate, within the financial and technical capabilities of the Unit. The capabilities of the Unit may include the resources of partners, multiparty monitoring, and the broader-scale monitoring strategy. However, if resources of partners or multiparty monitoring cease to be available, the Responsible Official shall change the monitoring program to eliminate the monitoring that depends on support from partners or multiparty monitoring.

The monitoring questions should be developed after considering the following:

1. What specific elements of desired conditions and objectives should be monitored to determine progress in achieving them in the plan?
2. What specific elements of standards and guidelines should be monitored to evaluate the effectiveness of the standards and guidelines?
3. Is there a high degree of uncertainty associated with management assumptions, are there information gaps, or are there changes in the plan area that should be validated or tracked for the desired conditions and objectives?
4. Can monitoring questions contribute to a broader understanding of the relationship between the plan area and the lands surrounding it, in light of the plan area's distinctive roles and contributions within the broader landscape?
5. Can information for questions or indicators be provided through broader-scale monitoring programs or data sets available from sources other than the administrative unit?

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6. Can partnering or multi-party monitoring increase the Agency's ability to answer a monitoring question that may not be feasible to answer otherwise, or address a monitoring question of high public interest?
7. Can the question help test relevant assumptions or track relevant changes?

32.12 - Selecting Monitoring Indicators

Indicators are quantitative or qualitative variables that can be measured or described and, when observed periodically, show trends in conditions that are relevant to the associated monitoring questions (see FSM 1905 for the definition for "indicator"). The plan monitoring program must include at least one indicator for each monitoring question. The Interdisciplinary Team shall choose indicators that:

1. The Forest Service by itself or with partners can afford and commit to collecting the associated data,
2. Are practical, measurable, and relevant to answering the monitoring questions for the plan area,
3. Are responsive to or will inform management activities.

Whenever possible, indicators should use the same units of measurement as standardized data stored in Forest Service corporate data systems, such as Natural Resource Manager (NRM), or in official sources from other public agencies, such as the Bureau of Census, to facilitate consistency and understanding of conditions across the landscape.

If indicators are selected because of the availability of external data sets from other parties, the Responsible Official may want to set up an agreement with the parties to ensure data quality, availability, and duration. The Responsible Official shall also advise all parties that data provided to the Forest Service in all phases of the planning process is subject to the Freedom of Information Act.

Consider selecting indicators that are useful to answering more than one monitoring question. For example, monitoring questions related to maintaining or restoring longleaf pine ecosystem integrity, can be relevant to monitoring recovery of federally listed species (red-cockaded woodpecker, gopher, tortoise, and others), and ecological condition of species of conservation concern (Bachman's sparrow).

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32.13 - Content of the Plan Monitoring Program

32.13a - Identifying Monitoring Questions and Indicators for Select Watershed Conditions

When developing the monitoring question(s) and selecting their associated indicator(s) for plan components related to water resources and watershed conditions in the plan area, the Interdisciplinary Team should consider:

1. The appropriate geographic scale relevant to water resources and watersheds in the plan area. The geographic scale may extend beyond the plan area where appropriate, and may include source areas for both surface and subsurface water that flows into the plan area, and receiving areas for water that flows off the plan area.
2. Potential influences on water resources and watershed conditions from both within and beyond the plan area, including the location, distribution, and aggregate effects of land uses, projects, activities, atmospheric deposition, and other stressors.
3. The general quality of surface and ground water across the plan area and available information on its spatial and seasonal variability.
4. Watersheds and aquifers that serve as public drinking water supplies, including designated municipal watersheds as defined in FSM 2542.
5. Plan components that require the use of national best management practices for water quality (FSH 1909.12, ch. 20, secs. 23.11e and 23.12c) and their relevant monitoring protocols.
6. Relevant information and data sources from Forest Service sources and other Federal, State, and local agencies, Tribes, partners, and others as appropriate.
7. The role, location, and contribution of water resources, including stream courses, waterbodies, groundwater, and associated riparian areas.
8. The nature and extent of existing and reasonably foreseeable future water withdrawals and associated infrastructure and uses is affecting sustainability of aquatic ecosystem integrity and human uses.
9. Whether water availability, quality, and flows or timing of flows is sustaining the biotic and abiotic integrity of aquatic ecosystems, including groundwater-dependent ecosystems.
10. Designated impaired or contaminated waters within or next to the plan area.

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11. Selecting monitoring questions and associated indicators that describe processes in a watershed. The intent is to identify risks to watershed condition, such as identifying which road segments contribute the most sediment to streams.

Monitoring questions and indicators should be based on the plan components for key ecosystem characteristics of the plan area (see FSH 1909.12, ch. 10, sec. 12) related to water resources and watershed conditions (key ecosystem characteristics such as water quantity, quality, timing, and distribution).

Desired conditions and objectives for priority watersheds identified in the plan for maintenance or restoration (36 CFR 219.7(f)(1)(i)) and the Watershed Condition Framework (USDA Forest Service, FS-977, May, 2011) may inform watershed-based plan monitoring. When developing monitoring questions and indicators associated with watersheds, the Interdisciplinary Team should ensure they are consistent with, and build upon, the work accomplished through the framework process.

See FSM 2500, associated handbooks, and technical guides for more information related to water resources and watershed conditions.

32.13b - Identifying Monitoring Questions and Indicators for Ecological Conditions Related to Terrestrial, Riparian and Aquatic Ecosystems, and At-risk Species

The Responsible Official has discretion to choose a select set of ecological conditions to be monitored for ecosystems and at-risk species. The “select set” should be important ecological conditions, including key ecosystem characteristics that may be monitored in a direct and efficient way. Monitoring questions are not required for every plan component for at-risk species, nor are species-specific monitoring questions required for every at-risk species. Monitoring a select set of important ecological conditions required by a select set of species at risk, along with monitoring for ecosystems and watershed conditions, will give the Responsible Official information about the effectiveness of the ecosystem and species-specific plan components related to the ecological conditions monitored.

The monitoring indicators should measure the effectiveness of plan components (both ecosystem and species-specific components) designed to maintain or restore the ecological conditions and key ecosystem characteristics necessary to provide for diversity of plant and animal communities and contribute to the recovery of, conserve, or maintain the viability of at risk species within the plan area.

Watershed condition and the status of water resources are integral to the ecological integrity of the terrestrial, riparian, and aquatic ecosystems within the plan area. Section 32.13a of this Handbook gives direction for monitoring the status of watershed conditions. The monitoring questions and associated indicators related to the status of watershed conditions contribute to the

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monitoring of ecological conditions associated with the terrestrial, riparian, and aquatic ecosystems within the plan area.

Ecological conditions may relate to habitat requirements for at-risk species (FSH 1909.12, ch.10, sec. 12.5 and ch. 20, sec. 23.13). Monitoring questions and associated indicators for the status of select ecological conditions and key ecosystem characteristics (36 CFR 219.12(a)(5)(ii)) may overlap with those needed for at-risk species (36 CFR 219.12(a)(5)(iv)). These two Planning Rule requirements for monitoring should be considered together when developing monitoring questions and associated indicators. The same monitoring question and associated indicator(s) may be able to support both requirements.

1. When determining the method(s) for monitoring the selected set of ecological conditions and key ecosystem characteristics, the Interdisciplinary Team should consider:
 - a. The availability of ecological system information or data from sources such as Natural Resource Manager, Forest Inventory and Analysis, or other agencies and partners, where relevant and practicable.
 - b. Using both remotely sensed information and data collected from the field where appropriate.
 - c. Existing monitoring strategies and data, such as those related to listed species recovery plans or biological opinions that adequately address the monitoring questions being asked.
 - d. Choosing methods that provide for the collection and combination of data that is useful at the plan or broader scale monitoring levels.
2. When developing monitoring questions and selecting associated indicators relevant to ecosystem integrity, ecosystem diversity, and at-risk species, the Interdisciplinary Team may consider:
 - a. Selecting, as appropriate, monitoring questions and associated indicators for ecological conditions and key ecosystem characteristics at both the ecosystem and species-specific levels of the terrestrial, riparian, and aquatic ecosystems in the plan area.
 - b. Focusing monitoring questions and associated indicators for at-risk species on ecological conditions, species-specific indicators and possible thresholds related to relevant listing factors and other key risk factors, stressors, and threats that have contributed to the current status of the species.
 - c. Selecting the appropriate geographic scale relevant to the question(s) to be answered.

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- d. Identifying potential influences on the ecological conditions and key ecosystem characteristics being monitored from sources both within and beyond the plan area, including the location, distribution, and aggregate effects of land uses, projects, activities, and other stressors.
- e. Selecting monitoring questions and indicators from broader-scale monitoring strategies of the Forest Service and collaborative planning with other agencies and partners relevant to ecosystem integrity, ecosystem diversity, and at-risk species of the plan area to facilitate consistency and understanding of conditions across the landscape.
- f. Selecting monitoring questions and associated indicators designed to show effect of stressors, like climate change, geologic processes, fire, and the absence of fire for fire-dependent ecosystems. These indicators may be appropriate for establishing thresholds of change to provide early warnings of ecosystem response to stressors.

32.13c - Identifying Monitoring Questions and Indicators for the Status of Focal Species

Every plan monitoring program must identify at least one focal species and one or more monitoring questions and associated indicators to track the status of the identified focal species. The purpose for tracking the status of focal species over time is that focal species are indicators of ecological integrity and they provide insight into the following:

1. Integrity of and risks to ecological systems on which focal species depend or that they influence, in the case of keystone species of ecological engineers,
2. Effects of management on those ecological systems, their conditions, and risk factors,
3. Effectiveness of the plan components to provide for ecological integrity and maintain or restore ecological conditions, and
4. Progress towards achieving desired conditions and objectives for the plan area.

Focal species represent a part of the monitoring requirements for ecological sustainability and diversity of plant and animal communities. “It is not expected that a focal species be selected for every element of ecological conditions” (77 FR 21233, April 9, 2012). Focal species should be selected to monitor when doing so is feasible and they are the best way to track whether ecological integrity and ecosystem diversity is being maintained or improved. Monitoring focal species is intended to address situations where they provide more useful information or are more efficiently monitored than monitoring other potential indicators. Focal species are to be carefully selected and monitored when the key ecological indicators of composition, structure, function, and connectivity are either unavailable or difficult to monitor. There may be situations where key ecological indicators could be monitored directly, but monitoring focal species as an overall

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measure of composition, structure, function, and connectivity may be a more appropriate indicator of integrity.

Focal species are not selected to make inferences about other species. Focal species are selected because they are believed to be indicative of key characteristics of ecological integrity and are responsive to ecological conditions in a way that can inform plan decisions. A focal species could be a keystone species, an ecological engineer, an umbrella species, a link species, or a species of conservation concern, but it need not be any of these species categories. Monitoring questions should relate the species to the ecological condition and reason for its selection, and indicators may include affected attributes of the species, such as presence or occupancy, habitat use, reproductive rate, and population trends.

The requirement for the Responsible Official to monitor focal species allows discretion to determine the most appropriate method and geographic scale for monitoring, within the financial and technical capabilities of the unit. Some focal species may be monitored at scales within and beyond the plan area boundary, while others may be more appropriately monitored and assessed within the plan area only.

The Responsible Official has discretion for determining the monitoring design used to assess the status of focal species. The design and methodology for monitoring focal species should reflect the best available scientific information and the ecological conditions for which the species is being selected.

1. The process of selecting focal species may include the following:
 - a. Identifying (FSH 1909.12, ch. 10, sec. 12.1 and ch. 20, sec. 23.11) the plan-related ecological conditions or key ecosystem characteristics to be monitored.
 - b. Identifying system drivers, threats, and stressors related to those characteristics or conditions.
 - c. Identifying gaps in monitoring indicators for key ecological characteristics.
 - d. Identifying well-recognized keystone species, ecological engineers, and other species with strong ecological interactions with these ecosystems.
 - e. Considering the sensitivity of a species to changing ecological conditions or the species' utility in reflecting progress toward or maintenance of desired ecological conditions.
 - f. Considering efficacy of monitoring the species for determining changes in the ecological conditions or key ecosystem characteristics.

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- g. Considering the ability for the species to be a more direct and effective measure of ecological characteristics of interest than other potential monitoring indicators.
 - h. Considering the ability of the selected species to provide data for multiple purposes.
 - i. Considering the Agency's ability to effectively and efficiently monitor the species within its technical and financial capabilities.
2. Exhibit 01 shows the relationship between ecological conditions for longleaf pine terrestrial ecosystems and monitoring the status of key ecosystem characteristics and focal species. The example identifies possible plan monitoring program questions and associated indicators, and shows how the following topics are related:
- a. Desired ecological condition,
 - b. Monitoring question,
 - c. Potential key ecosystem characteristics,
 - d. Possible focal species, and
 - e. Scale to monitor.

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32.13c – Exhibit 01

**Longleaf Pine Forest Ecosystem Example
for Monitoring Status of Key Ecosystem Characteristics and Focal Species**

Desired Ecological Conditions (to be maintained or restored):

Vegetation patterns are primarily a product of frequent and low-intensity fires and management resulting in relatively open, park-like pine stands eventually dominated by native, fire-dependent longleaf pine communities with patches of uneven-aged and two-aged structure. Desirable conditions reflect a mosaic of plant communities dependent upon moisture conditions. Drier sites are upland pine dominated by longleaf pine, with few mid-story shrubs and a relatively continuous understory of wiregrass, oaks, and herbaceous plants (for example, grasses, composites, legumes, and other forbs). Patches of medium to large hardwoods are scattered throughout.

On wetter sites, pine flatwoods include slash, loblolly, and pond pine; understory vegetation is dominated by palmetto and gall berry. Along drainages and basins are black gum, cypress, and red maple with titi and wax myrtle along the margins. Areas with larger, older trees are interspersed with small, variable patches of younger trees, saplings, seedlings, or small openings. Individuals and clumps of large, old (relic) longleaf pine trees are well-distributed across the landscape.

Birds include Bachman's sparrow, brown-headed nuthatch, red-bellied woodpecker, red-cockaded woodpecker and southeastern kestrel. Mammals include black bear, bobcat, gray fox, raccoon, and white-tailed deer. Gopher tortoise occurs along with numerous other species that share their burrows. The black racer, fence lizard, narrowmouth toad, and oak toad are also found here. Basin wetlands support salamanders and frogs, snakes (including cottonmouths and mud snakes), barred owls, and wood ducks.

(The desired amounts of these indicators for the plan area (acres, percentages, trees/acre, number of suitable red-cockaded woodpecker nest cavity sites/area, fire frequencies, and so forth) would be established in the desired conditions and or objectives for the specific plan.)

Monitoring Questions:

1. Is the plan area moving toward the compositional and structural desired conditions for longleaf pine ecosystems according to plan objectives?
2. Does the longleaf pine ecosystem in the plan area provide a full array of habitat types across varied topography and hydrologic conditions necessary to sustain populations of native wildlife species?
3. Do disturbance events occur at a spatial and temporal scale conducive to developing the appropriate ecosystem structure?

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32.13c – Exhibit 01 -- Continued

(The following list provides potential key ecosystem characteristics (indicators for this monitoring question) and possible focal species that may be used to monitor these ecological conditions.)

Potential Key Ecosystem Characteristics (Indicators):

- Distribution and spatial extent of the longleaf pine forest type.
- Presence, abundance, and spatial distribution of large (>12”) old (>80 years) pine trees.
- Frequency, extent and spatial pattern of prescribed and natural fire
- Understory species composition

Possible Focal Species to select from (Reason for selection and potential indicator and monitoring method):

- Gopher Tortoise - keystone species for longleaf ecosystems responsive to numerous stresses; changes in the number of active burrows. Monitoring may include burrow counts every 2 to 3 years.
- Red-cockaded Woodpecker - endangered species associated with desired conditions for longleaf pine communities; changes in number of active cavity tree cluster sites. Monitoring for this species may include annual cavity cluster sites and surveys.
- Bachman’s Sparrow - species of conservation concern associated with desired grassy understory conditions; changes to suitable habitat occupied. Monitoring for this species may include occupancy rates estimated by song bird surveys conducted every 2 to 3 years in sample areas randomly selected in established habitat conditions.

Scale (most appropriate for monitoring): multiple plan areas, plan area wide, management area

Note: The Interdisciplinary Team must document the selection of focal species, monitoring questions, and indicators from the potential key ecosystem characteristics and possible focal species that have been identified for an ecosystem.

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32.13d - Identifying Monitoring Questions and Indicators for Visitor Use, Visitor Satisfaction, and Recreation Objectives

The plan monitoring program must contain one or more monitoring questions and associated indicators addressing the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

1. The purpose for monitoring recreation is to evaluate:
 - a. Progress towards achieving desired conditions and objectives for sustainable recreation, and
 - b. Contributions of multiple uses, ecosystem services, infrastructure, and unit operations to social and economic sustainability.
2. The Responsible Official shall identify one or more monitoring questions, such as:
 - a. What is the status and trend of visitor use, visitor satisfaction, and progress toward meeting recreation objectives in the plan?
 - b. Are the current recreation settings and opportunities in the plan area meeting or moving toward desired recreation settings and opportunities identified in the plan?
 - c. Are the recreational objectives identified in the plan being achieved and are they sustainable?
 - d. Is the set of recreation opportunities effective for connecting people with nature?
 - e. Was the set of recreation opportunities successfully designed to reduce or minimize user conflict?
 - f. How are the recreation settings and opportunities contributing to the plan's desired condition(s) and objective(s) for ecological, social, and economic sustainability?
 - g. Are existing scenic resources meeting or trending toward desired conditions for scenic resources?
 - h. Is the recreation opportunity spectrum on the plan area supporting a sustainable set of recreation opportunities to meet current and future demands?
 - i. Do the demographic characteristics of visitors demonstrate the plan is meeting a desired condition of increased visits from young people, those with low incomes, and members of minority groups?

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The recreation opportunity spectrum (FSM 2310) and the scenery management system may be used for monitoring recreational settings, sustainable recreation opportunities, and scenic character to the extent that they are applied in plan components (FSH 1909.12, ch. 20 secs. 23.22b and 23.22g). USDA Forest Service national visitor use monitoring survey results by single administrative unit may be used for visitor-related monitoring. See USDA Forest Service national visitor use monitoring program web page at <http://www.fs.fed.us/recreation/programs/nvum/>. The Infrastructure (Infra) recreation site module may be used to monitor opportunities of recreation sites, facilities, and interpretive services. (See also FSH 1909.12, ch. 10, sec. 13.4 for relevant assessment content which may inform the monitoring program.)

The interpretive services component of the Infra module and the Forest Service program, NatureWatch, may be used together to collecting data for monitoring whether the plan provides opportunities to connect people to nature.

32.13e - Identifying Monitoring Questions and Indicators for Climate Change and Other Stressors

The plan monitoring program must contain one or more monitoring questions and associated indicators to determine whether there are measurable changes on the plan area resulting from climate change and other stressors. This monitoring requirement may relate to other monitoring requirements or to interacting stressors that individually or collectively may be affecting the plan area. Interacting stressors may include fire, insects, invasive species, loss of spatial connectivity, disruption of natural disturbance regimes, geologic hazards, water withdrawals and diversions, and changes in social, economic, and cultural conditions that affect the plan area, among others.

1. When developing monitoring questions and indicators to determine potential impacts on the plan area, the Interdisciplinary Team may consider the following:
 - a. Plan area vulnerabilities to projected climate changes and other associated stressors, especially those that are tied to the implementation of plan components.
 - b. Coordinating monitoring needs for the plan with Forest Service climate change monitoring requirements.
 - c. Existing monitoring that addresses the status of stressors within the plan area, such as watershed condition monitoring, soil disturbance monitoring, and ongoing forest inventories, repeated over time, that detect changes in forest composition and structure.
 - d. Broader-scale monitoring strategies of the Forest Service and other agencies for climate data and monitoring impacts beyond the planning area. National monitoring programs, such as air monitoring and climate change research, can provide information and be incorporated into monitoring for the plan area.

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- e. Ecosystem characteristics that may change over time (such as a change in precipitation amount or timing) and may be affected by stressors, such as insects, disease, fire, or changes in social, economic and cultural conditions that affect the plan area.
 - f. Addressing uncertainty, filling important information gaps, or, in combination with monitoring information related to ecosystem dynamics (see para. 1e) providing early warnings of ecosystem response to climate change or other stressors. Potential indicators include direct and indirect impacts of changes in natural disturbance regimes, including uncharacteristic drought, flooding, wind, and storm frequency and severity. Indirect impacts may include insect outbreaks and wildfires in areas impacted by drought, or the spread of invasive species in areas where forest cover is lost due to flooding or fire.
 - g. Vegetation communities likely to be among the first affected by climate change, to help identify opportunities for managing their adaptation.
2. Examples of monitoring questions include:
- a. What stressors are impacting the plan area?
 - b. Are there trends in stressors and if so how are they affecting the plan area?
 - c. How are these stressors affecting progress towards achieving or maintaining the plan's desired conditions or objectives?
 - d. Are plan components effectively designed to reduce or adapt to the various projected stressors?

32.13f - Identifying Questions and Indicators to Monitor Progress toward Meeting Desired Conditions and Objectives

The intent of the Rule requirement to monitor progress toward meeting desired conditions, objectives, or other plan components, including those for providing multiple-use management opportunities is to cover matters not specifically listed in 36 CFR 219.12(a)(5).

To carry out this intent, the plan monitoring program must contain one or more questions and associated indicators addressing the plan contributions to communities, social and economic sustainability of communities, multiple use management in the plan area, or progress toward meeting the desired conditions and objectives related to social and economic sustainability.

Management of the plan area contributes to the area(s) of influence outside the plan area by providing multiple uses, ecosystem services, and infrastructure, and by direct management operations of the administrative unit. The area of influence is defined in FSH 1909.12, zero

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code, section 05. See FSH 1909.12, chapter 10, section 13.1 for a discussion of how the plan area contributes to the area of influence.

The purpose for monitoring social, cultural, and economic indicators is to:

1. Inform managers and the public of changes in social, cultural, and economic conditions that are influenced by the plan.
2. Monitor contributions of the management of the plan area toward meeting social, cultural, and economic attributes of desired conditions.
3. Provide feedback for adaptive management toward expected and potential contributions to social and economic sustainability.

The Interdisciplinary Team may design social, economic, and cultural monitoring in partnership with other agencies, Tribal, State and local governments and partners, where appropriate and should consider plan component-based monitoring questions, similar to those contained in exhibit 01.

External data may be best available information for monitoring of social and economic sustainability. Such external data is available using the Economic Profile system and other systems available on the TIPS website at <http://www.fs.fed.us/emc/nfma/TIPS/index.shtml>.

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32.13f – Exhibit 01

Sample Social, Economic and Cultural Monitoring Questions

1. Are projects and activities achieving the desired contribution to social, cultural, and economic conditions in the area(s) of influence?
 - a. Is the identified contribution to social and economic sustainability in the desired conditions being achieved?
 - b. Are the related plan objectives being met?
 - c. Are the levels of resource outputs (such as recreation visits, grazing animal unit months, timber harvest) being achieved?
2. What changes are occurring in the social, cultural, and economic conditions in the plan area(s) of influence that could affect the plan-related contributions?
 - a. What are the changes occurring in population demographics (for example, minority populations, age demographics, lifestyles, or attitudes)?
 - b. What are the changes occurring to local economies (for example, composition and distribution of employment, wages, Federal payments to local governments, poverty levels)?
 - c. What cultural changes are occurring (for example, cultural events associated with specific communities, changing patterns of tourism and recreation, health and safety, subsistence use of resources)?
 - d. Are these changes related to the management of the plan area or the land management plan?

32.13g - Identifying Monitoring Questions and Indicators Related to Productivity of the Land

This section is about meeting the rule requirement at 219.12 (a)(5)(viii), to do monitoring with respect to determining 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)). To comply with this requirement, the Interdisciplinary Team should focus on key ecosystem characteristics in the plan area related to soils and soil productivity identified in the assessment and planning process. Productivity is defined as the capacity of National Forest System lands and their ecosystems to provide various renewable resources in certain amounts in perpetuity. For the purposes of this subpart, productivity is an ecological term, not an economic term (36 CFR 219.19).

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This monitoring requirement at 219.12 (a)(5)(viii) comes from the NFMA requirement that there be research regarding the effects of timber management systems on the productivity of the land, and that such research is to be based on continuous monitoring and assessment in the field. The Planning Rule at 36 CFR 219.19 defines the term “management system” as a timber management system, such as even-aged management or uneven-aged management. Forest Service Research and Development began the long-term soil productivity program in 1989 to help address this requirement of the National Forest Management Act of 1976 to examine the long-term consequences of soil disturbance on fundamental forest productivity through a network of experiments (Powers 2006).

When developing monitoring questions and establishing indicators with respect to the productivity of the land, the Interdisciplinary Team may consider the following:

1. Soil quality monitoring that may include disturbance monitoring as well as measures of chemical and biological properties, and physical properties beyond soil disturbance that relate to plan component effects. Soil quality monitoring guidance is found in FSM 2551.6, and soil disturbance monitoring protocols are described in General Technical Report RMRS-GTR-WO-82a.
2. Coordinating with Forest Service Research and Development to obtain results from the long-term soil productivity study and other applicable studies for the Region around the plan area (to the extent that results are available) and to solicit input to the monitoring design and information related to loss of organic matter and carbon and soil compaction.
3. Plan components developed for timber management practices to protect soil (36 CFR 219.11(d)(3) and to meet the requirements of 36 CFR 219.11(d)(2), that timber can only be harvested where soil, slope, or other watershed conditions would not be irreversibly damaged.
4. Differentiating between timber management and stressors (such as climate change or acid deposition) and their respective effects on soil productivity.

32.2 - Documenting the Plan Monitoring Program

The Responsible Official should document the reasons for selecting the monitoring questions and associated indicators in the planning record.

The plan monitoring program may only include monitoring questions and indicators. Information regarding implementation of the plan monitoring program may be documented in a separate monitoring guide for the unit that includes guidance on items such as:

1. The data to be considered, used, or collected for the indicators and any specific methods for data collection (protocols).

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2. Information about the data to be used (metadata).
3. How the data are to be managed, analyzed, and evaluated to determine whether the plan components need to be changed.
4. Who is responsible for managing the data collection and other monitoring tasks for the Administrative Unit.
5. The schedule of monitoring and evaluation activities during the planning period.
6. Partnerships and their roles with respect to particular monitoring task.

An annual monitoring work plan may be used to identify monitoring work, including the anticipated resources for carrying out the plan monitoring program.

32.3 - Transitioning to the Plan Monitoring Program

... Where a plan's monitoring program has been developed under the provisions of a prior planning regulation and the unit has not initiated plan revision under this part, the responsible official shall modify the plan monitoring program within 4 years of the effective date of this part, or as soon as practicable, to meet the requirements of this section. (36 CFR 219.12(c)(1).

By May 9, 2016, or as soon as practicable, every unit that has not started a plan revision under the 2012 Planning Rule must have a plan monitoring program as part of the land management plan that meets the requirements in 36 CFR 219.12(c). While developing these monitoring questions and indicators, units must meet the other related rule requirements: documenting how the best available scientific information was used to inform monitoring (36 CFR 219.3), involving the public (36 CFR 219.4(a) and 219.16(c)(6)), establish an interdisciplinary team (36 CFR 219.5(b), and updating the planning record (36 CFR 219.14(b)).

Modifying a plan's monitoring program does not require any other change to the plan; that is, a plan need not be amended nor revised simply to facilitate monitoring pursuant to the Rule.

1. When transitioning to the plan monitoring program requirements in 36 CFR 219.12(a), the Responsible Official:
 - a. Must modify the existing monitoring program by adding, deleting, modifying, and replacing questions and indicators as necessary to meet the requirements of 36 CFR 219.12(a)(5) through administrative changes after public notice of the intended changes to the monitoring program and consideration of public comments (see 36 CFR 219.7(f) and 219.13(c)).

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- b. Should notify the public of the expected date of the first biennial monitoring evaluation report (to be published no later than 2 years from the date of the new monitoring program).
 - c. Should coordinate the transition of the plan monitoring program with the development of broader-scale monitoring strategies to the extent possible (see sec. 33 of this Handbook).
 2. When transitioning to the plan monitoring program requirements in 36 CFR 219.12(a), the Responsible Official should:
 - a. Coordinate across the Agency and with partners so that questions and indicators can be consistent or complementary with other monitoring approaches.
 - b. Assess the extent to which the current monitoring program already includes questions and associated indicators related to the items listed in 36 CFR 219.12(a)(5) for the plan monitoring program, identifying gaps in the existing monitoring program, and identifying items that are no longer needed because they do not answer questions relevant to the plan.
 - c. Use broader-scale monitoring information where available, such as national visitor use monitoring and forest inventory analysis data, to help develop efficient questions that can be answered with ongoing data collection efforts to the extent that available data is collected and synthesized in a format or methodology appropriate for the scale of the monitoring question.

Two requirements of 36 CFR 219.11(a)(5) need further guidance because they set out monitoring requirements (for species of conservation concern and focal species) that have no counterpart in the prior planning rule under which existing plans were developed.

“Species of conservation concern” is a new category of species that did not exist before the 2012 Planning Rule. There is no requirement for species in this category to be identified and monitored before a plan is revised under the rule. However, if the Regional Forester has identified species of conservation concern for the plan area, ecological conditions for these species should be considered for monitoring under 36 CFR 219.12(a)(5)(iv) for the transition. In the absence of identified species of conservation concern, the Responsible Official may choose to include or retain a monitoring question and indicator for ecological conditions associated with species that the Responsible Official has reason to think are likely to be identified as species of concern in a future plan revision.

The Responsible Official should select focal species and make focal species a part of the monitoring program as described in section 32.13c of this Handbook. For existing plans that do not include components for ecological conditions as required by 36 CFR 219.9, focal species and

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their questions and indicators should be selected to assess the existing plan's desired ecological conditions for plant and animal communities.

When transitioning to the plan monitoring program, if a required item of 36 CFR 219.12(a)(5) cannot be met without a plan amendment or plan revision, the Responsible Official may make a finding that it is not practicable to modify the plan monitoring program to meet that particular item by May 9, 2016. In such a case, the modification of the plan monitoring program would be completed when the plan is revised unless a plan amendment adds plan components that would make monitoring to meet the requirements feasible.

There may be other, unit-specific reasons why accomplishing the monitoring program transition is not practicable by May 9, 2016. Such reasons could include unanticipated circumstances such as major fires, litigation, or other events that create major demands on the unit's work force.

At the time the proposed modified monitoring program is issued for public review and comment, the Responsible Official should notify the public of any delays, the reason for the delay, and the conditions for completing the transition for any of the requirements of 36 CFR 219.12 (a)(5) that are found to be not practicable for transition by May 9, 2016.

32.4 - Changing the Plan Monitoring Program

(c) Administrative changes . . .

(1) A substantive change to the monitoring program made outside of the process for plan revision or amendment may be made only after notice to the public of the intended change and consideration of public comment (§ 219.16(c)(6)).

(2) All other administrative changes may be made following public notice (§ 219.16(c)(6)). (36 CFR 219.13).

A change to a monitoring question or an indicator is a substantive change to the plan, which may be made administratively but only after the public has an opportunity to comment. The Responsible Official makes administrative changes. The Responsible Official shall provide the public notice of, and an opportunity to comment on, proposed changes to the plan monitoring program and consider public comments on the proposal. The notice may be through any method the Responsible Official deems appropriate such as posting on a webpage, use of emails, or in the biennial monitoring evaluation report (FSH 1909.12, ch. 40, sec. 42.14).

A correction of clerical error, a nonsubstantive change to the plan monitoring program, requires only advance notice. See FSH 1909.12, chapter 20, section 21.51.

A change to a monitoring guide or annual monitoring work plan is not a change to the plan monitoring program nor other administrative change of the plan and does not require public notification.

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Because the broader-scale monitoring strategy is comprised of questions and indicators from plan monitoring programs, a change of the broader-scale monitoring strategy questions and indicators would require a change of the relevant plan monitoring programs.

33 - BROADER-SCALE MONITORING STRATEGY

This section refers to broader-scale monitoring as it applies to land management plans.

(b) *Broader-scale monitoring strategies.* (1) The regional forester shall develop a broader-scale monitoring strategy for plan monitoring questions that can best be answered at a geographic scale broader than one plan area.

(2) When developing a monitoring strategy, the regional forester shall coordinate with the relevant responsible officials, Forest Service State and Private Forestry and Research and Development, partners, and the public. Two or more regional foresters may jointly develop broader-scale monitoring strategies.

(3) Each regional forester shall ensure that the broader-scale monitoring strategy is within the financial and technical capabilities of the region and complements other ongoing monitoring efforts.

(4) Projects and activities may be carried out under plans developed, amended, or revised under this part before the regional forester has developed a broader-scale monitoring strategy. (36 CFR 219.12)

The purpose of the broader-scale monitoring strategy is to answer plan monitoring questions common to two or more administrative units that can best be answered at a geographic scale larger than one plan area.

The Regional Forester is responsible for developing a broader-scale monitoring strategy. Two or more Regional Foresters may jointly develop a strategy to cover more than one Region.

The broader-scale monitoring strategy can be a simple set of questions and indicators or a more complex strategy with substrategies, with monitoring questions and indicators, and the areas to which they apply, that differ from each other. A substrategy may focus on monitoring questions and indicators for a specific resource, program, issue, geographical area, or other topic. Substrategies may vary substantially to reflect different levels of scope, scale, and extent. The Regional Forester may use existing monitoring programs at the National and Regional levels, such as national visitor use monitoring and forest inventory analysis, as broader-scale monitoring substrategies.

33.1 - Developing the Broader-scale Monitoring Strategy

Regional Foresters are encouraged to work together with each other and with their Forest Supervisors to achieve appropriate scales for monitoring across the landscape to supply

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information for the plan monitoring program questions and indicators, in coordination with both internal and external partners.

The Regional Forester shall coordinate with relevant Agency officials (including those in Forest Service State and Private Forestry and Research and Development), partners, and the public. It is also important to coordinate with other land managers to address broader-scale planning questions from National Forest System plan monitoring programs.

A broader-scale monitoring strategy should be developed to provide consistent and complementary information to answer questions common to two or more plan areas. Broader-scale monitoring should be developed where it would be more efficient than monitoring limited to an individual plan area to inform the management of resources, including testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining desired conditions or objectives.

The Regional Forester may require that one or more plan monitoring programs include specific questions and indicators needed for the broader-scale monitoring strategy.

1. Considerations in developing a broader-scale monitoring strategy include:
 - a. Identifying the monitoring questions and associated indicators from the plan monitoring programs that are best addressed at a larger scale than a plan area, and
 - b. Determining the National Forest System lands, whether within or beyond Regional boundaries, in which each monitoring question and associated indicator would apply. Different monitoring questions may apply over different areas.
2. A broader-scale monitoring strategy can be developed in a number of ways, including:
 - a. The Regional Forester and Forest Supervisors may jointly identify the questions and indicators.
 - b. The Regional Forester may request that one or more Forest Supervisors recommend questions and indicators.
 - c. The Regional Forester may base the broader-scale monitoring strategy on existing National and Regional monitoring efforts, working with one or more Forest Supervisors to review and adjust relevant questions and indicators.
 - d. The Regional Forester may adopt programs or portions of programs from external partners.
 - e. The Regional Forester may jointly identify questions and indicators with the external partners, the public, and Forest Supervisors.

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- f. The Regional Forester may combine any of these options or use other methods .
3. To the extent practicable, the Regional Forester must take into account:
 - a. Existing internal and external inventory, monitoring, and research programs, such as reviewing existing corporate databases, protocols, and monitoring efforts with internal and external partners or other efforts where data sets might be available to help determine how monitoring should be done to answer relevant monitoring questions.
 - b. Opportunities to coordinate with other Forest Service units, government entities, scientists, the public, and federally recognized Indian Tribes and Alaska Native Corporations to carry out broader-scale monitoring.

Exhibit 01 identifies possible approaches for developing a broader-scale monitoring strategy and examples of elements that could be placed in a broader-scale monitoring strategy. A broader-scale monitoring strategy could include elements developed through a combination of these approaches or others.

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33.1 - Exhibit 01

Examples for Developing Broader-scale Monitoring Elements

Possible Approaches for Developing Monitoring Elements or Substrategies	Examples of Broader-scale Monitoring Elements or Substrategies
<p>Broader-scale monitoring substrategies developed from existing National and Regional monitoring. Regional Foresters establish a broader-scale monitoring program for meeting national and Regional priorities, which collects data that answers plan monitoring questions.</p>	<p>National visitor use monitoring surveys, migratory bird surveys, multi-forest ESA-listed species data collection efforts related to recovery efforts (for example, northern spotted owl or red-cockaded woodpecker).</p>
<p>Broader-scale monitoring substrategies developed by the Region, in conjunction with the Forests. The Regional Forester consults with the Forest Supervisors to identify needs for broader-scale monitoring across the relevant plan areas. The Forest Supervisors provide the common plan monitoring questions, coordinating with the Region to identify elements for the broader-scale monitoring strategy to help address these common questions.</p>	<p>Regions 8 and 9 forest inventory analysis (FIA) vegetation intensified plot strategy, that is based on cumulative information needs identified from forest plan monitoring questions and other local forest information needs.</p>
<p>Broader-scale monitoring substrategies adopted from external partners. Regional Foresters adopt broader-scale monitoring programs or portions of programs developed by external partners to obtain data answers plan monitoring questions.</p>	<p>U.S. Geological Survey (USGS) National Streamflow Information Program, EPA class I air monitoring, USGS National Water Quality Assessment Program, county noxious weed monitoring programs, National Ecological Observatory Network.</p>

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33.1 - Exhibit 01—Continued

Possible Approaches for Developing Monitoring Elements or Substrategies	Examples of Broader-scale Monitoring Elements or Substrategies
<p>Other broader-scale monitoring substrategies developed with partners and the public. Regional Foresters jointly develop a broader scale monitoring strategy with partners and the public to monitor key issues across multiple plan areas that may also address plan monitoring questions.</p>	<p>In the past, the Pacific Northwest Region developed a broad-scale monitoring strategy to address several issues that are found across coastal and Cascade Range National Forests. These issues concern declining trends in old forest habitat, declining trends in spotted owls and marbled murrelets, watershed health, and information and the distribution of a number of other lesser known plant and animal species. The monitoring strategy was collaboratively developed with substantial science input to develop rigorous protocols and methods for each major topic of the program. A number of Federal agencies, including Bureau of Land Management, National Park Service, Fish and Wildlife Service, and National Marine Fisheries Service have been involved in the development, execution, and evaluation of the monitoring strategy.</p>

33.2 - Documenting the Broader-scale Monitoring Strategy

The Regional Forester shall document the broader-scale monitoring strategy for the Region and make it publicly available.

1. Documentation for a broader-scale monitoring strategy may include:
 - a. Identifying the appropriate monitoring questions and associated indicators for broader-scale monitoring for planning, and the appropriate scale and units where these would apply.
 - b. Identifying information available, including methods, protocols, and sample designs to be used across multiple plan areas (including corporate applications used to store data and conduct analysis).
 - c. Describing how the broader-scale monitoring is to be carried out.

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- d. Describing how the broader-scale monitoring results will be provided to the Forest Supervisors for the plan monitoring programs requiring the information.
 - e. Including a feedback mechanism to improve the efficiency and effectiveness of the broader-scale monitoring strategy, looking at the best available scientific information and opportunities to collaborate with partners and the public.
2. The results of the broader-scale monitoring strategy are given to the public as follows:
- a. The Forest Supervisor shall include in the unit biennial monitoring evaluation report an evaluation of relevant broader-scale monitoring information as the information becomes available.
 - b. The Forest Supervisor should include in the unit biennial monitoring evaluation report a discussion of any changes to the broader-scale monitoring program that is relevant to the unit (see sec. 34 of this Handbook).
 - c. The Regional Forester shall make the documented results from the broader-scale monitoring strategy developed under the requirement of 36 CFR 219.12(b) publicly available on at least a 5-year cycle. Results may be documented in a variety of forms, including data, summaries, reports, and papers. .

34 - BIENNIAL EVALUATION OF THE MONITORING INFORMATION

- (d) *Biennial evaluation of the monitoring information.* (1) The responsible official shall conduct a biennial evaluation of new information gathered through the plan monitoring program and relevant information from the broader-scale strategy, and shall issue a written report of the evaluation and make it available to the public.**
- (i) The first monitoring evaluation for a plan or plan revision developed in accordance with this subpart must be completed no later than 2 years from the effective date of plan decision.**
 - (ii) Where the monitoring program developed under the provisions of a prior planning regulation has been modified to meet the requirements of paragraph (c)(2) of this section, the first monitoring evaluation must be completed no later than 2 years from the date the change takes effect.**
 - (iii) The monitoring evaluation report may be postponed for 1 year in case of exigencies, but notice of the postponement must be provided to the public prior to the date the report is due for that year (§ 219.16(c)(6)).**
- (2) The monitoring evaluation report must indicate whether or not a change to the plan, management activities, or the monitoring program, or a new assessment, may be warranted based on the new**

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information. The monitoring evaluation report must be used to inform adaptive management of the plan area.

(3) The monitoring evaluation report may be incorporated into other planning documents if the Responsible Official has initiated a plan revision or relevant amendment.

(4) The monitoring evaluation report is not a decision document representing final Agency action, and is not subject to the objection provisions of subpart B. (36 CFR 219.12)

The purpose of the biennial evaluation is to:

1. Make the information obtained from monitoring available to the public in a form that is readily understandable.
2. Transform monitoring data into information that supports adaptive management and so that the Responsible Official may consider making changes to the plan, management activities, or the plan monitoring program itself; or to begin a new assessment.

Evaluation of monitoring results should be limited to conclusions that are supported by the data. It is acceptable to say that the data are unclear, or that they do not indicate a (statistically significant) trend. Each biennial evaluation should build on the biennial evaluations that precede it. The Responsible Official should evaluate data collected from both the plan area and the broader-scale monitoring strategy that is relevant for the questions identified in the plan monitoring program. The evaluation may also identify any changes to the plan monitoring program that may be needed, including adjustments that would reflect changes in the availability of financial and technical resources.

Exhibit 01 identifies potential questions that may be used to evaluate the results of the monitoring information to see if there is a need to change the plan.

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34 - Exhibit 01

Example of Possible Monitoring Evaluation Questions

Is there new information from plan monitoring with respect to the following:

1. Desired Conditions related to the monitoring questions -
 - a. Are the desired conditions still valid?
 - b. Are the monitored desired conditions still achievable?
 - c. Are we making progress toward achieving, or maintaining monitored desired conditions? If not, what is preventing this?

2. Objectives related to the monitoring questions -
 - a. Are the objectives still valid to achieve the desired conditions?
 - b. Are the monitored objectives being achieved? If not, what is preventing this?
 - c. Do the objectives need to be adjusted or changed to better achieve the desired conditions?

3. Standards and Guidelines related to the monitoring questions -
 - a. Are the standards and guidelines still effective in making sure projects will not prevent achievement of the desired conditions and objectives?
 - b. Do the monitored standards and guidelines need to be adjusted or changed to ensure projects will not prevent achievement of the desired conditions and objectives?
 - c. Are additional standards or guidelines needed to address changing conditions or new threats?

4. Suitability of Lands for Uses related to the monitoring questions -

Is the identification of lands suitable for uses still appropriate based on desired conditions and existing conditions in the plan area?

5. Management Areas, Geographic Areas, or Designated Areas related to the monitoring questions -

Is there a need to adjust boundaries, plan components, or management for these areas?

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When preparing the monitoring evaluation report, the Responsible Official shall review the results of the monitoring evaluation and indicate whether there is a need to change the plan.

1. Based on the evaluation of the information gathered through the plan monitoring program, including relevant information from the broader-scale monitoring strategy, the Responsible Official shall document findings regarding these issues:

- a. Whether a change may be needed to the plan;
- b. Whether a change may be needed to the management activities;
- c. Whether a change may be needed to the monitoring program; or
- d. Whether an assessment may be needed to determine if there is a preliminary need for change.

2. The Responsible Official may:

- a. Briefly describe the monitoring activities conducted during the two year monitoring period being evaluated.
- b. Document the evaluation of the information obtained from the both the plan area and the broader-scale monitoring strategy to answer the relevant monitoring and evaluation questions. Some evaluations may conclude that more monitoring data is needed.
- c. Briefly describe new best available scientific information, if any, for plan monitoring program questions and indicators. If there is new best available scientific information, determine whether that best available scientific information indicates that the question, indicator, or protocol, or other aspect should be changed. Indicate if there is no new information to date.
- d. Document how public participation has been involved in the monitoring effort if relevant.
- e. Document rationale if monitoring data has not been collected or evaluated as scheduled.
- f. Document any actions taken on findings or conclusions from the previous biennial evaluation report, as relevant and appropriate.
- g. Document whether the monitoring results indicate that changes in plan components or monitoring should be proposed, or whether any changes in management activities consistent with the plan are warranted.

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The Responsible Official shall issue a monitoring evaluation report, inform interested parties about the availability of this report, and provide meaningful opportunities for participation in the review of the results (see FSH 1909.12, ch. 40, sec. 43).