

CHAPTER FOUR

Monitoring and Evaluation

Forest Plan Monitoring Under The 2012 Planning Rule

Introduction

The 2012 Planning Rule includes a requirement that all Forests that are not in plan revision update their forest plan monitoring within four years, or as soon as is practicable (36 CFR 219.12c). This document updates our forest plan monitoring to meet this requirement of the 2012 rule.

The Role of Monitoring under the 2012 Planning Rule

The NFMA requires “continuous monitoring and assessment in the field” to evaluate “the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land” (16 USC 1604(g)(3)(C)). The 2012 rule includes a three-part iterative cycle of assessment, planning, and monitoring in a continuous feedback loop. Monitoring is meant to support the assessment process and evaluate plan implementation over time. This planning framework is designed to “inform integrated resource management and allows the Forest Service to adapt to changing conditions, including climate change, and improve management base on new information and monitoring” (§ 219.5 (a)).

Specific Requirements for Monitoring under the 2012 Rule

A monitoring plan will consist of “monitoring questions and associated indicators” which “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” (219.12 (a)(2)). The monitoring program must also be “coordinated with the regional forester and Forest Service State and Private Forestry and Research and Development” (§ 219.12 (a)(1)) and support and align with a broader-scale monitoring program, to be developed at the regional level, that will address monitoring questions at a geographic scale broader than one plan area (§ 219.12 (b)). Furthermore, in developing the monitoring plan, the responsible official should also provide opportunities for public participation, “taking into account the skills and interests of affected parties”, as well as the scope, methods, forum and timing of those opportunities (§ 219.4 (a)).

Monitoring may involve evaluating: if standards and guidelines are implemented (implementation monitoring); if management actions and standards and guidelines are effective in achieving goals and objectives (effectiveness monitoring); the long term trend and condition of key resources (condition or surveillance monitoring). At a minimum, the plan monitoring program must contain one or more monitoring questions and associate indicators addressing the following eight items (see §219.12[a][5][i-viii]):

- (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)).

Biennial Monitoring Report

A monitoring evaluation report is to be produced and made available to the public every two years (§ 219.12 (d)). It “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 information... [and] must be used to inform adaptive management of the plan area” (§ 219.12 (d)(2)). The monitoring program and evaluation report are part of the administrative record (§ 219.14 (b)) and the Forest Supervisor must document “how the best available scientific information was used to inform planning, the plan components, and other plan content, including the plan monitoring program” (§219.13 (a)(4)).

Monitoring Plan Components

The following section details the specific components of the monitoring plan. Specific monitoring items are organized by the required categories of monitoring questions identified in the planning rule (§ 219.12), with at least one monitoring question and indicator for each category. For each question, there will be a brief description of the desired condition or objective each monitoring item is associated with, followed by the question, a description of the specific indicator or metric used to answer or evaluate the monitoring question, the data source or measurement protocol associated with the monitoring item, and finally, a rationale or justification for the specific monitoring indicator and protocol. This will ensure that the requirements for best available science are met.

The Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) considered several factors when selecting appropriate monitoring questions and indicators. In line with the 2012 Planning Rule, questions and indicators were chosen because they: (1) test relevant assumptions made in the plan, (2) track relevant changes within the planning area, and/or (3) measure management effectiveness and progress toward achieving or maintaining the plan’s desired conditions or objectives. Many of the questions involve major underpinning assumptions made in the plan, so that monitoring can be an efficient

and effective tool to inform the need for changes in the plan. Time scale was also considered when selecting monitoring questions. The monitoring plan focuses on indicators where meaningful change can be detected in a relatively short amount of time and can therefore indicate whether changes are needed in the plan in a relatively rapid manner and be reported in the biennial monitoring report. Indicators that may take a longer time to show meaningful change/trends are also important and will be monitored and considered in the monitoring plan.

For the ARP Monitoring Plan each question is followed by the Forest Plan goal, objective, standard or guideline that the monitoring question is associated with, followed by a description of the specific indicator(s) or metric used to answer or evaluate the monitoring question and finally the frequency of reporting. Data sources, methodology/protocols for monitoring are not included for brevity. Many of these sources of data or protocols are nationally or regionally proven and well established. This will ensure that the requirements for best available science are met.

Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP)
 Forest Plan Monitoring Questions
 May 2016

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>i. Status of select watershed conditions</i>			
<p>1. What are the watershed conditions and has progress been made toward improving watershed conditions on the ARP?</p> <p>FP: Goal 1, 5, 6, 7 (p.4); Objectives 1,7, 10 (pp. 4-6)</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>5. Protect the basic air, soil and water resources.</p> <p>6. Bring all sixth-level watersheds to a functional condition.</p> <p>7. Maintain or improve water quality, stream processes, channel stability and aquatic management indicator species habitats, and riparian resources, while providing for municipal and agricultural uses.</p> <p style="text-align: center;">Objectives:</p> <p>1. Obliterate approximately 440 miles of system roads, trails and “ways” to improve Forests and Grassland wildlife habitat effectiveness and watershed condition by 2007.</p> <p>7. Improve the watershed condition of up to six sixth-level watersheds as shown in the following table by 2007.</p> <p>10. Treat 49 to 160 acres of non-point pollution on Forest lands annually. Priority will be given to Class II and III watersheds and streams which are not fully supporting uses designated by the State of Colorado. Major sources of pollution include abandoned mines as well as human-induced sedimentation.</p>	<ul style="list-style-type: none"> • Number and percent of watersheds in each condition class • Number and acres of watershed improvement projects completed including essential projects identified in Priority Watershed Restoration Action Plan. • Miles of roads/trails decommissioned • Miles of user-created roads/trails obliterated • Number of aquatic organisms structures installed 	<p>Status: 2 years</p> <p>Trends: 6 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>ii. Status of select ecological conditions including key characteristics of terrestrial and aquatic systems</i>			
<p>2. Air quality related values</p> <ul style="list-style-type: none"> • What are the conditions and trends for water quality in the Indian Peaks and Rawah Wilderness Areas? <p>FP: Goal 1, 5 (p.4); Objective 4 (p. 5)</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>5. Protect the basic air, soil and water resources.</p> <p style="text-align: center;">Objectives:</p> <p>4. Improve four Air Quality Related Values (water, soil, visibility and flora) that are at risk to a maintenance or higher level of protection by the next planning period.</p>	<ul style="list-style-type: none"> • Water chemistry of high mountain lakes from atmospheric deposition (e.g., acid rain) 	<p>Status: 2 years</p> <p>Trends: 6 years</p>
<p>3. Has the ARP made progress toward assuring adequate representation of the full range of structural stages of community types across the Forests and Grassland?</p> <p>FP, Goal 1, 3, 8 (p. 4); Goal 34 (p.16); Objective 12 (pp. 6-7)</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>3. In ponderosa pine and Douglas-fir forests, manage existing old growth and mature forests to retain and encourage old-growth qualities.</p> <p>8. Provide a range of successional stages of community types across the Forests and Grassland landscapes that: maintains ecosystem integrity</p> <p>34. Maintain, and restore where necessary, the compositional, structural and functional elements which will perpetuate diversity.</p> <p style="text-align: center;">Objectives:</p> <p>12. Manage acres of Forests and Grassland structural stages to obtain the range of stages shown in Tables 1.4 and 1.5.</p>	<ul style="list-style-type: none"> • Forest composition, structure, and spatial heterogeneity 	<p>Status: 2 years</p> <p>Trends: 6 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<p>4. What are the status and trends related to noxious plants on the ARP?</p> <p>FP, Goal 1 (p. 4); Standard/Guideline 129, 131, 132, (p. 33)</p>	<p>Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>Standards:</p> <p>129.(ST) Control undesirable nonnative and noxious plants throughout the Forests, with priority given to new species (new to Colorado or the ARNF-PNG), and to wilderness areas.</p> <p>131. (ST) For all proposed projects or activities, determine the risk of noxious weed introduction or spread, and implement appropriate mitigation measures.</p> <p>132 (GL) Develop a noxious-weed and pest-management program that addresses awareness, prevention, inventory, planning, treatment, monitoring, reporting and management objectives</p>	<ul style="list-style-type: none"> List of identified species occurring on ARP Acres of targeted species treated 	<p>Status: 2 years</p> <p>Trends: 6 years</p>
<p>5. Are management activities protecting/maintaining/promoting healthy, resilient aquatic, riparian and wetland ecosystems across the ARP?</p> <p>FP Goal 1,7 (p. 4); Goal 6 (p 13); Goal 34 (p.16); Objectives 8, 9, (p 5); Standard 7 (p 13)</p>	<p>Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>7. Maintain or improve water quality, stream processes, channel stability and aquatic management indicator species habitats, and riparian resources, while providing for municipal and agricultural uses.</p> <p>6. Activities that have the ability to affect the continuity of structure, composition, and function within riparian ecosystems shall be managed to sustain riparian areas.</p> <p>34. Maintain, and restore where necessary, the compositional, structural and functional elements which will perpetuate diversity.</p> <p>Objectives:</p> <p>8. Obtain stream flows sufficient to sustain aquatic life and maintain stream processes on an additional one to five segments of stream channels by 2007.</p> <p>9. Improve channel stability on 10 to 40 miles of streams by 2007.</p> <p>Standard:</p> <p>7. (ST) In the water influence zone next to perennial and intermittent streams, lakes and wetlands, allow only those actions that maintain or improve long term stream health and riparian ecosystem condition.</p>	<ul style="list-style-type: none"> Aquatic, riparian and wetland ecosystem status and condition 	<p>Status: 2 years</p> <p>Trends: 6 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>iii. Status of focal species to assess the ecological conditions required under § 219.9</i>			
<p>6. What are the status of species that depend on/or influence Forest or Grassland ecosystems?</p> <p>FP Goal 1 (p. 4)</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p>	<ul style="list-style-type: none"> • Forest Species: To be determined but likely to be avian species and tree squirrel representing various ecotones • Grassland Species: Black-tailed prairie dog 	<p>Status: 2 years</p>
<i>iv. Status of a select set of the ecological conditions required under § 219.0 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.</i>			
<p>7. What is the status and trend of populations and habitat of Threatened, Endangered, Proposed, Candidate, and Sensitive Species (TEPCS) and Species of Conservation Concern on the ARP?</p> <p>FP Goal 1, 4 (p 4); Standard 50 (p 18) and 101</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>4. Establish an upward trend for threatened, endangered or sensitive plant and animal species (TES), and maintain sensitive species through management activities that recognize TES habitat needs across all levels or scales.</p> <p style="text-align: center;">Standards:</p> <p>50. Manage activities to avoid disturbance to sensitive species which would result in a trend toward federal listing or loss of population viability.</p>	<ul style="list-style-type: none"> • Rotating TEPCS species monitoring: occurrence of species; habitat quantity and quality; and connectivity <ul style="list-style-type: none"> ○ TEPC will vary by species, such as Preble’s meadow jumping mouse, Canada lynx, greenback cutthroat trout ○ Species of conservation concern to be determined 	<p>Status: 2 years</p> <p>Trends: 6 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>v. Status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives</i>			
<p>8. What are the status and trends of visitor satisfaction on the ARP?</p> <p>FP Goal 1 (p 7); Objective 5 (p. 8)</p>	<p style="text-align: center;">Goals:</p> <p>1. Provide quality developed, dispersed, and wilderness recreational opportunities within the resource capacity of the area.</p> <p style="text-align: center;">Objective:</p> <p>5. Provide a satisfactory recreational experience for at least 70 percent of Forests and Grassland visitors annually, as determined from comment forms that show ratings of “acceptable” or higher.</p>	<ul style="list-style-type: none"> • Visitor measured satisfaction levels • Number of visitors to the ARP • Changes in recreation demands 	<p>Status and Trend: Every 6 years</p>
<i>vi. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area</i>			
<p>9. What stressors are impacting the ARP? Can any trends in these stressors be related to climate change?</p> <p>FP: Goal 1 (p 4)</p>	<p style="text-align: center;">Goal:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p>	<ul style="list-style-type: none"> • Extent and severity of wildfire and flood • Timing, type and amount of precipitation (rain/snow) • Extent of insect and disease outbreaks • Changes in stream temperature 	<p>Status: 2 years Trends: 6 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>vii. Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities</i>			
<p>10. What are the status and trend on the ARP to reduce the risk of wildfire?</p> <p>FP: Goal 1 (p 4); Objective 11 (p 6)</p>	<p style="text-align: center;">Goal:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p style="text-align: center;">Objective:</p> <p>11. Reduce the number of high risk/high value, and high and moderate risk acres by 2,000 to 7,000 acres annually. Both mechanical and prescribed fire treatments may be used.</p>	<ul style="list-style-type: none"> • Number of acres treated, treatment types, location by WUI and non-WUI 	<p>Status: 2 years</p> <p>Trends: 6 years</p>
<p>11. How are management activities on the ARP affecting local employment and income?</p> <p>FP: Goal 1 (p 4)</p>	<p style="text-align: center;">Goal:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p>	<ul style="list-style-type: none"> • Range contributions and effects to local employment and income • Timber contributions and effects to local employment and income • Recreation contributions and effects to local employment and income • Mineral developments contributions and effects to local employment and income 	<p>Status: 2 years</p>

Monitoring Questions	Forest Plan Direction	Indicators	Frequency of Reporting
<i>viii. Effects of each management system to determine that they do not substantially and permanently impair productivity of the land</i>			
<p>12. What are the status and trends of soil productivity and hydrologic function?</p> <p>FP: Goals 1,5 (p 4), Goal 14 (p14); Standard 19 (p14)</p>	<p style="text-align: center;">Goals:</p> <p>1. Manage the Forests and Grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.</p> <p>5. Protect the basic air, soil and water resources.</p> <p>14. Manage the soil resource, Forest Service activities and those activities permitted by the Forest Service, such that the physical, chemical and biological processes and functions of the soil in an ecosystem are maintained or enhanced.</p> <p style="text-align: center;">Standard:</p> <p>19. (ST) Manage land treatments to limit the sum of severely burned and detrimentally compacted, puddled, and displaced land to no more than 15 percent of any land unit</p>	<ul style="list-style-type: none"> • Type, degree and extent of soil disturbance and risk rating to determine the effect of soil disturbance on soil productivity and hydrologic function • Acres of soils restored or protected 	<p>Status: 2 years</p> <p>Trends: 6 years</p>