



United States Department of Agriculture

Monitoring Implementation Guide

Land Management Plan for the Apache-Sitgreaves National Forests



Forest Service

Apache-Sitgreaves National Forests

Slightly Revised
June 2019

Monitoring Implementation Guide
Land Management Plan for the
Apache-Sitgreaves National Forests

Approved: M. Stephen Best Date: 5/24/17
M. Stephen Best, Forest Supervisor

Table of Contents

| | |
|-------------------------------------------------------|----|
| Introduction | 1 |
| Monitoring | 1 |
| Assumptions..... | 1 |
| Organization of the Guide..... | 2 |
| Maintenance and Improvement of Ecosystem Health | 3 |
| Question 1—Soil Health..... | 3 |
| Question 2—Watershed Health..... | 4 |
| Question 3—Riparian Health | 6 |
| Question 4—Air Quality | 7 |
| Question 5—TES Habitats | 8 |
| Question 6—Grassland Encroachment..... | 9 |
| Question 7—Ecological Indicators | 11 |
| Question 8—Old Growth | 14 |
| Question 9—Focal Species: Mexican Spotted Owl | 15 |
| Question 10—Focal Species: Northern Goshawk | 16 |
| Question 11—Focal Species: American Pronghorn | 17 |
| Question 12—Grassland Habitat | 18 |
| Question 13—Vegetation Communities | 19 |
| Question 14—Stream Temperature | 21 |
| Question 15—Insects, Diseases, Invasive Plants | 22 |
| Question 15a—Insects and Diseases | 23 |
| Question 15b—Invasive Plants | 25 |
| Question 15c--Climate | 25 |
| Question 16—Climate Change Vulnerability | 27 |
| Question 17—Timber Suitability..... | 27 |
| Question 18—Stand Restocking | 29 |
| Question 19—Harvest Unit Effects | 31 |
| Managed Recreation..... | 32 |
| Question 20—Recreational Opportunities | 32 |
| Question 21—Recreation Effects on Resources | 33 |
| Question 22—Scenic Integrity | 34 |
| Question 23—Infrastructure Sustainability | 35 |

| | |
|-------------------------------------------------------------------------------|----|
| Question 23a—Recreation Facilities | 35 |
| Question 23b--Roads | 36 |
| Question 24—Eligible and Suitable Wild and Scenic Rivers | 37 |
| Question 25—Wilderness Management | 37 |
| Question 26—Recommended Wilderness Management | 38 |
| Community-Forest Interaction | 39 |
| Question 27—Cooperation with Communities..... | 39 |
| Question 28—Interpretive Opportunities | 40 |
| Question 29—Output of Goods and Services | 41 |
| Question 29a--Timber | 41 |
| Question 29b--Forage | 43 |
| Planning and Other | 43 |
| Question 30—Plan Amendments | 43 |
| Question 31—Plan Objectives | 44 |
| Question 32—Adoption of Standards and Guidelines | 50 |
| Question 33—Cultural Resources | 51 |
| References | 53 |
| Appendix A. List of Abbreviations and Acronyms | 55 |
| Appendix B. Detailed Protocol, Methods, and Notes on Selected Questions | 58 |
| Question 14 Stream Temperature: Background | 58 |
| Considerations for Program Implementation | 58 |
| Program Implementation: Site Locations | 59 |
| Potential CCVA High Vulnerability Monitoring Sites:..... | 59 |
| Air/Water LMP Long-term Temperature Monitoring Sites on the ASNFs: | 60 |
| Program Implementation: Methods and Protocols | 60 |
| Question 18—Stand Restocking | 61 |
| Question 19—Harvest Unit Effects | 62 |
| Question 29—Output of Goods and Services | 63 |
| Question 29a—Timber - continued | 63 |
| Appendix C. Estimated costs of monitoring by fiscal year | 67 |

Introduction

This document provides guidance on how to implement the Monitoring Strategy (Chapter 5) of the Land Management Plan (LMP) for the Apache-Sitgreaves National Forests (USDA-Forest Service, 2015), as revised (2016)). It contains the methods and protocols to be used in implementing Chapter 5 of the Plan. Other techniques may also be used if they are approved in advance by the Forest Service. All data collected are subject to field checks and verification before they are accepted.

The guide is intended to be flexible and may be changed as new methods, techniques, and needs are identified. Monitoring of any given item may be conducted in whole or in part, and is dependent on funding, personnel, and other considerations. Monitoring may be performed by the Forest Service, its partners, or other interested parties.

The guide uses information in the Plan but it is not part of the Plan. Changes to this document are not considered to be an amendment or an administrative change to the Plan.

Monitoring

The monitoring described in this guide is primarily effectiveness monitoring, which seeks to answer the question “How effective are the projects and activities conducted under the Forest Plan in moving towards the appropriate Desired Conditions (DC)?” In most cases, data already collected by the Apache-Sitgreaves NFs and cooperators (e.g. Arizona Game and Fish Department) are reviewed to answer the monitoring questions. Only where necessary is new monitoring conducted (e.g. Question 7, which relates to the LMP's two Ecological Indicators).

It should be kept in mind that “no treatment” or “deferred treatment” are also management decisions. Therefore, a monitoring program can include areas where no project-level active management takes place, so that the consequences of these decisions can be evaluated. Monitoring outside of project areas can serve as reference sites and could also help isolate effects due to climate change by serving as a control for the effects of management actions. These considerations have been factored into data collection design for selected monitoring questions.

Assumptions

- Project-level monitoring is a requirement of the Plan (Plan, p. 31), and some LMP monitoring items in this Guide rely on project monitoring information provided by the districts.
- Because we intend to use as much field/resource data already collected and/or records of management activities annually reported in databases, it is assumed in this Guide that the reporting personnel (ASNFs employees in most cases) are keeping those databases current and populated with all related information fields pertinent to the monitoring information needs stated on the following pages.
- Cost estimates included in this document reflect additional resources needed to gather, analyze, interpret, and report data, but do not reflect the costs of data collection which is accomplished by projects, partners, or separately funded processes or entities.
- The plan used Potential Natural Vegetation Types (PNVT) to characterize vegetation on the forests. This classification system has been updated, and the units have been renamed [Ecological Response Units](#) (ERU). Future monitoring data and reports will reflect this change, although references to both names occur in this document.

- Data storage locations will be on the current USFS system. As of 2018, all monitoring data will be stored on Box/Pinyon or successor databases in folders designated by year and question.

Organization of the Guide

Question

This document contains a section for each of the monitoring questions found in table 12 (chapter 5) in the Forest Plan. Monitoring questions are presented within blue-shaded boxes and reflect the exact language in the Forest Plan. Some monitoring questions are divided into sub-questions. Sections have the following subheadings and content:

Reporting Interval

Taken from table 12 of the Forest Plan. Note that monitoring reports are produced biennially, so for questions with annual reporting intervals, results for two years are reported together in each report, while questions with 5-year reporting intervals will be reported in years 6, 10, 16, etc. For questions with 2-, 5-, or 10-year reporting intervals, data may be collected more frequently than they are reported.

Monitoring Method and Indicators

Taken from table 12 of the Plan

Indicator and Unit of Measure

One or more indicator is specified. Indicators are variables to be measured which can answer the monitoring question.

Method, Protocol, Sample Design

The approach used for answering the monitoring question is discussed. This includes the survey method, what equipment is used, and any analysis methods. If data are obtained from a database or other location, that location should be specified here. If needed, include the Sampling Design (number of samples, how they are located, and the frequency of sampling. When possible and relevant, the statistical basis of the sample design is discussed.) The sample design should include details of how data are obtained, including the frequency with which they are collected.

Data Location

Specialized data locations for obtaining or storing various data will be noted here as needed.

Responsible Staff Position

List the position that is responsible to ensure monitoring and evaluation of the question is completed.

Trigger

What would trigger the need to consider a change to the land management plan or take other action such as changing management protocols?

Estimated Annual Personnel Days and Other Costs

Estimate of costs of personnel days and other expenses are provided. However, this is not a budget document, and actual implementation costs may vary considerably from year to year. A table (Appendix C) and linked Excel spreadsheet shows cost estimates for fiscal years 2017-2020 (plan years 2-5).

Comments

Relevant information not covered in other sections.

Maintenance and Improvement of Ecosystem Health

Question 1—Soil Health

Are long-term soil health and productivity desired conditions being maintained or met?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review a sample of soil-disturbing activities for compliance with best management practices (BMPs) by project and allotment operating instruction implementation.

Indicator and Unit of Measure

- Soil Disturbance Class
- Soil Condition Class

Method, Protocol, Sample Design

- Annually, as program of work, complete soil disturbance monitoring and summarize results in a report.
- On a project by project basis, complete soil condition assessment monitoring.
- Every 5 years, consolidate, analyze, and summarize available project soil condition monitoring results and annual soil disturbance reports.

Best Management Practices are prescribed for ground-disturbing management activities to mitigate project effects to soil quality. Forests' application of the National Forest Soil Disturbance Monitoring Protocol (Page-Dumroese, et al., 2009) and the Technical Guidance of Soil Quality in the Southwestern Region document (USDA-Forest Service, 1999; USDA-Forest Service, 2013) will be used to measure the effectiveness of BMP application in maintaining soil health and productivity. The forests currently complete soil disturbance monitoring in activity areas using a stratified random sampling scheme. Soil condition data is collected on a project by project basis. Evaluation of both these indicators is dependent on project data being available.

Responsible Staff Position

Watershed Program Manager

Trigger

- Soil disturbance monitoring indicates a trend away from desired conditions or that forest standards and guidelines are not being met.
- Overall long-term soil condition monitoring data indicates that a management activity may be contributing to a downward trend in soil condition on one or more projects.

Estimated Annual Personnel Days and Other Costs

Soil disturbance and condition annual review – 2 person days per year, GS-12

Comments

Forest soil disturbance thresholds include a range of values, depending on management area or activity objectives.

Monitoring may result in a change in BMP design or application of annual operating instructions. Monitoring within project treatment areas will partially contribute toward Question 17. However, additional monitoring of soil health/productivity on ground outside of restoration treatment areas will be needed for timberland suitability re-analysis required in year 2025 (see Question 17).

Is this monitoring element still valid? Yes

Question 2—Watershed Health

How well are management activities contributing to desired conditions or maintaining watersheds in a healthy state and meeting Arizona water quality standards?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review a sample of soil-disturbing activities for compliance with BMPs by project, allotment operating instruction implementation, Section 18 reviews of allotment National Environmental Policy Act (NEPA), burn area emergency response (BAER) assessments, and Arizona Department of Environmental Quality water quality data.

Indicator and Unit of Measure

- National Best Management Practices (BMP) implementation and effectiveness ratings.
- Changes in Arizona Department of Environmental (ADEQ) water quality status and trends for waters within the Forest.
- The number of 6th Level HUC watersheds on the forest with an improved or deteriorated condition classification using the national Watershed Condition Framework.

Method, Protocol, Sample Design

Annually, as program of work complete National BMP implementation and effectiveness monitoring and produce report. Every five years produce summary of annual reports.

Every 2 to 3 years, review ADEQ's biennial report for trends and status of water quality within the forests. Every five years report on changes in trends and status of water quality in forest waters.

Summarize changes to Watershed Condition Class for 6th level HUCs every 5 years.

- Best Management Practices (BMPs) are prescribed for all management activities to mitigate project effects to soil and water quality and are key provisions of the MOU between the ADEQ and FS Region 3 for meeting water quality standards for the Nation's waters. Monitoring is completed to determine whether BMPs are implemented as designed and whether they are effective. The forests' application of National BMP Monitoring Protocol (<http://fsweb.wo.fs.fed.us/wfw/watershed/national-bmps.html>) will be used as a guide to how our activities are managed to protect water quality. The forests complete National BMP implementation and effectiveness evaluations on an annual basis. The forests determine the

number and resource categories of evaluations to be completed to reflect the program of work and meet national targets. Most sites to be evaluated are selected randomly. Monitoring results are entered into the National BMP database, and implementation and effectiveness ratings are generated.

- Water quality monitoring status and trends within the Forest will be evaluated by reviewing ADEQ's Clean Water Act Assessment - Arizona's Integrated 305(b) Assessment and 303(d) Listing Report Arizona 305(b) Reports. The 2016 report (Arizona Department of Environmental Quality, 2016) will be used as a baseline. These reports are generally released on a biennial basis and are available from the ADEQ website at <http://www.azdeq.gov/programs/water-quality-programs/surface-water-monitoring-and-assessments>.

Watershed Condition Framework – The Watershed Condition Classification update process is generally completed every 5 years. Watersheds are selected for updates based on planned or completed restoration work or to evaluate the effects of major disturbances such as wildfire. The results of the update process will be compared to baseline conditions (2016) to determine changes in watershed condition within the forests. Watershed Condition Classification data is available at <http://apps.fs.fed.us/nris/wcatt/>.

Data Location

The National BMP database is a Citrix application that houses all the assessment data information and is used to generate reports.

Responsible Staff Position

Watershed Program Manager

Trigger

- Over 30% of completed evaluations have composite National BMP Implementation and Effectiveness monitoring database ratings that are "Poor."
- Negative changes are noted in status or trends of multiple waterways and/or water bodies within the forests as compared to baseline conditions reported in ADEQ 2016 report.
- Multiple changes in watershed condition class show downward trend. Indicators evaluated will point to activities or resources that management practices must change, lessen or accelerate depending on causal agents.

Estimated Annual Personnel Days and Other Costs

- BMP annual review: 5 person days per year
- ADEQ water quality biennial review: 1 person day per 2 years
- WCF 6th Level HUC watershed condition assessment review of changes: 5 person days per year

Comments

BMP effectiveness monitoring may result in a change in BMP design or application. Annual monitoring report will be sent to ADEQ per MOU. Arizona Status of water quality (305b report) is published every 2 to 3 years.

Is this monitoring element still valid? Yes

Question 3—Riparian Health

How are management activities contributing to desired conditions or affecting riparian habitats, including wetlands, on the forests? Are riparian areas attaining and/or moving toward proper functioning condition? Are identified ecological indicators (e.g., aspen, riparian) present and fulfilling their ecological function?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review a sample of ground-disturbing activities for compliance with BMPs by project; allotment operating instruction implementation; prescribed fire burn plan implementation; mechanical or hand thinning implementation; proper functioning data or other approved Forest Service methodologies; and Section 18 reviews of allotment NEPA. Monitor riparian habitats for changes in ground cover, species composition, bank stability, and water quality.

Indicator and Unit of Measure

Long-term trend of the following components for Riparian PNVTs include:

- Understory vegetation composition
- Riparian woody species present in multiple size classes
- Stream bank and floodplain functioning

These indicators tier to the following Riparian Desired Conditions:

- Riparian-obligate species within wet meadows, around springs and seeps, along stream banks, and active floodplains provide sufficient vegetative ground cover (herbaceous vegetation, litter, and woody riparian species) to protect and enrich soils, trap sediment, mitigate flood energy, stabilize stream banks, and provide for wildlife and plant needs.
- Willows are reproducing with all age classes present, where the potential exists.

Method, Protocol, Sample Design

Photo Points will be used as the primary data protocol.

Project post-implementation site visit will be compared to existing PFC data to ascertain if conditions have improved, been maintained, or degraded due to management actions. Initial project documentation should provide the pre-treatment condition. Controls will also be assessed for riparian PNVTs if feasible locations can be found. Three project/control sites per year will be assessed opportunistically based on riparian PNVTs and project implementation. Data will be collected in Years 1-4 and aggregated/analyzed for the reporting during year 5.

At each site a photo point series where key management actions are occurring, this will focus on: grazing, vegetation management, prescribed burning, and/or recreation, depending on project actions. Sites will be selected where existing PFC data exists which may indicate factors of interest (both positively and negatively). At each site, a plot center will be monumented and located with GPS. From the plot center, photos will be taken downstream, upstream, and at 90° to the left and right. Each photo point will be documented on a data sheet along with ocular estimates of percent of woody riparian age

classes, percent of cover classes, and stream/floodplain stability. A line intercept for cover classes could also be done and documented for more quantitative data.

In addition, the Regional Office is completing an analysis for riparian PNVTs that will provide information such as cover classes and extent of PNVT types. This would augment the baseline information available for the entire Forest. If the Regional Office completes another analysis in the future, it would allow for looking at change over time in riparian PNVTs where project implementation occurred.

Some projects may have requirements for reassessment of PFC post-treatment. Where this occurs, that data will also be used to assess changes in the PFC factors as well as overall PFC rating.

Responsible Staff Position

Watershed, Range Program Managers

Trigger

If decreases in woody species age classes, loss of channel/floodplain stability, or undesirable changes in cover types are observed, they would trigger a closer look to determine if changes are caused by management actions or other factors. If management is determined to be the cause, then we may need to reassess management actions, project mitigations, or assumptions of the LMP.

Estimated Annual Personnel Days and Other Costs

Riparian - 5 days per year for 2 GS-11s for data collection and office; year five days would be for analysis and reporting.

Comments

Is this monitoring element still valid? Yes – it is important for determining riparian condition class and direction of trend. It would also address some of the riparian desired conditions in the Forest Plan and our ability to meet them.

Question 4—Air Quality

Are management activities contributing to desired conditions or improving air quality across the forests in Class 1 (Mount Baldy Wilderness) and Class II airsheds?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review interagency monitoring of protected visual environments' data.

Indicator and Unit of Measure

- Visual quality as measured with IMPROVE Air Quality Station protocol (Mount Baldy Wilderness)
- Lichen community composition and elemental concentration (all wilderness areas)

Method, Protocol, Sample Design

- Review lichen air quality bio-monitoring reports for Mount Baldy Wilderness and other wilderness areas as they come available throughout the life of the plan. No regular schedule has been established for these reports; they are assumed to be at 5-year intervals for cost estimates. Refer to (St. Clair & Leavitt, 2017) for baseline conditions.

- ADEQ air quality division track trends at IMPROVE monitoring sites every five years (Air Resource Specialists, 2013). These data will be acquired from ADEQ and reviewed.

Data Location

Lichen and IMPROVE reports: *IMPROVE site data is available at <http://views.cira.colostate.edu/fed/>.*

Lichen reports are produced by St. Clair and Leavitt or other contractors as determined by Watershed Program Manager.

Responsible Staff Position

Watershed Program Manager

Trigger

- Negative or too slow improving trend in monitored constituents to meet long term goals set by Regional Haze Rule as measured by IMPROVE protocol.
- Lichen monitoring showing decline in community composition, and/or drastic changes (20% or greater) in elemental concentrations.

Estimated Annual Personnel Days and Other Costs.

Air quality review - 1 person day, GS-12, per year

Comments

Lichens are useful air quality indicators and effectively complement other air quality monitoring technologies. They are especially sensitive to some important pollutants and concentrate many pollutants in proportion to environmental availability (McCune & Geiser, 2009).

Is this monitoring element still valid? Yes

Question 5—TES Habitats

Are habitats for threatened, endangered, sensitive, and other species for the forests being maintained or enhanced; meeting recovery objectives; moving toward desired conditions; and contributing to species viability?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review implementation of biological opinion terms and conditions and aquatic habitat and population surveys using current approved methodologies. Review implementation and evaluate effectiveness of project mitigation measures affecting habitat.

Indicator and Unit of Measure

The indicator is compliance with LMP biological opinion terms and conditions, recovery actions and project level implementation/effectiveness monitoring. The unit of measure will have two parts: 1) if we are complying with the LMP Biological Opinion (BO) and 2) whether or not project mitigations are effective.

Method, Protocol, Sample Design

There will be two parts to addressing the TES Habitat indicators. First, review the annual LMP BO reports to assess compliance with LMP BO terms and conditions and number of recovery objectives met. Second, review project-level implementation monitoring data to determine if habitats are being maintained or enhanced and to assess the effectiveness of project mitigation measures.

Conduct post-implementation field inspections or reviews of projects where TES habitats occur. Project level implementation monitoring should already be occurring and funded as part of the project. Review by SO personnel for effectiveness of project mitigations and effectiveness will occur annually.

A subset of projects will be reviewed with Districts to assess effectiveness of design features and conservation measures based on projects implemented. Specific project management actions that have the potential to impact large habitat areas will be the focus of monitoring. These may include vegetation management, grazing, prescribed burning, and/or recreation use. Two to three projects per year will be reviewed across the forests. Implementation assessment would include review of project mitigation measures and whether or not they were implemented on the ground in accordance with the environmental analysis. Secondly, the effectiveness would be assessed by determining if mitigations met their purpose of decreasing or removing effects to the associated TES habitat.

Responsible Staff Position

Aquatics Program Manager

Trigger

If LMP BO terms and conditions are not met, determine whether or not management actions contributed to result. If management actions are a potential cause, then any projects not maintaining or enhancing TES-PC species will be reviewed to assess mitigation and determine if mitigation measures need to be altered or added.

If any projects/activities are not complying with mitigation measures or BO terms and conditions, then review projects and devise more effective implementation strategies.

Estimated Personnel Days and Other Costs

3 days per year each for 2 SO personnel (GS-12) and 1 day each for District GS-11s to review projects with Districts

Additional 10 days (GS-12) for reporting and entering data.

Comments

Factors that should be considered are large events or non-Forest Service actions that affect or alter habitats (e.g. fires, drought).

Is this monitoring element still valid? Yes – provides information on management activities or short term effects that will be useful for understanding long term management of habitats.

Question 6—Grassland Encroachment

Are PNVTs and habitat needs being provided for and contributing to desired conditions? What percent of grasslands have more than 10 percent of encroachment of woody species?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review mid-scale vegetation assessment and percent change; stand exam data; post-prescribed fire monitoring plots; forest inventory analysis (FIA) plots; change in species composition and soil condition (range data); and acres of restored grassland.

Indicator and Unit of Measure

Percent of woody vegetation cover in grassland PNVTs at landscape (forest-wide) scale.

Method, Protocol, Sample Design

If R3 Mid-Scale Vegetation Mapping Assessment (MSVMA) is repeated in 5-year or 10-year increments, compare changes in tree or woody shrub cover in grasslands PNVTs. If new MSVMA products are not available, use remote imagery tools like NAIP air photos in GIS, LiDAR or satellite images from Geospatial Technology and Applications Center (GTAC). Compare changes in percent tree/shrub cover on grassland PNVT acres shown on LMP's PNVT map from about 2015 to 2020 to 2025 to 2030 vintage images or as close to these timeframes as available. Try to consistently use the same imagery type/source and scale each time to prevent visual bias. Image classification techniques in ArcGIS can be used to quickly and efficiently estimate crown cover of shrubs in grassland habitats.

Forest Silviculturist will work with GIS staff to select randomly stratified sample areas within all three ASNFs grassland PNVTs to consistently monitor the same acres over time. Sample proportionally to the forest-wide total acreage of each PNVT (from pages 56-57 in LMP): Great Basin grassland is roughly 185,500 acres; semi-desert grassland is roughly 107,000 acres; montane/subalpine grassland has roughly 51,600 acres. Overlay in GIS with proposed treatment project area boundaries, recent wildfire perimeters, or other strata of importance. Pick several contiguous grassland polygons which are cut-treated, uncut, burned, and unburned condition, and in a variety of soil TEU map units. Each time new remote imagery is reviewed for these sample areas, detect cover reductions due to treatments, wildfire, or other disturbances. Also detect cover changes where no treatment or disturbance has occurred in the previous 5 years. Use GIS image classification to estimate woody canopy cover percentages present at the time the imagery was captured. Categorize by acres having $\geq 10\%$ cover and acres with $< 10\%$ cover.

Data Location

PNVT maps from LMP Planning Record and wildfire perimeters are currently stored in the GIS T drive. Grassland PNVT boundary adjustments will be made in project-level NEPA filed in GIS T drive and incorporated into a database according to protocols set by GIS Coordinator. Treatment area polygons are currently stored in FACTS spatial database.

Responsible Staff Position

Forest Silviculturist

Trigger

If in a 5 year period, woody cover is shown across the total sampled acreage to be moving away from LMP desired conditions, then review how many acres have been treated annually in comparison to the LMP Objective (page 58) to "treat up to 25,000 acres" of grasslands annually, and field-verify that treatments are indeed reducing cover to $< 10\%$ (why or why not?). Consider increasing or modifying this

objective if needed. Consider ways to better link project actions to Plan direction, including follow-up treatments such as grazing deferment and prescribed fire in treated areas.

Estimated Annual Personnel Days and Other Costs

Year 1 only, to pick and list stratified sampling areas: (3 days GS-9 GIS time) + (1 day GS-12 Forest Silviculturist time) + (1 day GS-12 Forest Soils Scientist time)

Every 5th year: (2 days GS-9 GIS time) + (2 days GS-12 Silviculturist time) + (1 day GS-12 Soil Scientist time).

Comments

Is this monitoring element still valid? Yes. By now focusing on just grassland PNVTs, this question is feasible and will provide meaningful data that is actionable information about movement toward LMP DCs. The question uses woody encroachment as a surrogate for condition improvement. Full restoration of grassland ecosystems involves much more than removal of woody cover. Many grassland acres also need better (more continuous, more diverse) ground cover to reduce water and wind erosion and carry fire.

Question 7—Ecological Indicators

What is the effect of management upon habitat trends of ecological indicators (aspen, riparian) across the forests?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct aspen/riparian monitoring in accordance with species-specific protocols in both treated and untreated areas and in burned (within large wildfire burns) and unburned areas.

Interdisciplinary team review the annual aspen/riparian ecological indicator species monitoring reports to determine trend.

Indicator and Unit of Measure

Aspen

- Number, diameter class, and health of aspen stems on each permanent monitoring plot.
- Changes seen over time due to tree growth, mortality, and damage agents recorded at each exam plot revisit.

These indicators tier to the following Plan direction:

- Areas of aspen occur and shift across the forested landscape. They are successfully regenerating and being recruited into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smaller size classes. (DC, Plan p. 51)

Riparian

- Long-term trend of ecological indicators of the following components for cottonwood-willow and montane willow riparian forested PNVTs include:
 - Understory vegetation composition

- Riparian woody species present in multiple size classes
- Stream bank and floodplain functioning

These indicators tier to the following Riparian Desired Conditions:

- Riparian-obligate species provide sufficient vegetative ground cover (herbaceous vegetation, litter, and woody riparian species) to protect and enrich soils, trap sediment, mitigate flood energy, stabilize stream banks, and provide for wildlife and plant needs.
- Willows are reproducing with all age classes present, where the potential exists.

Method, Protocol, Sample Design--Aspen

Plot Establishment

A total of 132 plots were established on the Apache NF during 2015-2017, and 18 plots were established on the Sitgreaves NF (Black Mesa RD) in 2017. Baseline data have been collected from these plots. Future plot establishment will be tied to treatment areas (mechanical treatment, prescribed fire). New plots should be established before the treatment takes place in aspen-dominated and aspen-co-dominated stands. Existing plots should be used when present. At least 1 plot per 20 acres of aspen should be established, up to a maximum of 5 plots per treatment area. Plots should be permanently monumented and located by GPS.

Plot Design

Plots will be nested. A 0.01-acre, fixed radius plot ($r = 11.78$ ft.) will be used for tallying aspen regeneration. A concentric, variable-radius plot will be used to measure basal area of all trees taller than 6 ft., by species.

Timing of Data Collection

Data from plots within treatment areas should be collected before treatment is applied, if possible, after the first full growing season post-treatment, and 5 years after treatment. Previously established plots that fall within the boundaries of wildfires may be evaluated 1 and 5 years post-fire.

Data to Collect

Aspen regeneration will be tallied (number of stems shorter than 6 ft. tall) within the 0.01-acre fixed radius plot. Basal area, by species, will be measured with a prism in the variable-radius plot, for all live trees 6 ft. tall and taller. Disease and insect infestation of aspen should be noted, and approximate percentage of regeneration stems or basal area affected should be recorded. Management status of plot should be noted as one or more of the following categories: untreated (including pretreatment), mechanical treatment, prescribed burn, wildfire, and inside ungulate exclosure.

Method, Protocol, Sample Design--Riparian

Annual riparian monitoring in accordance with species-specific protocols is described under Question 3 in this Guide. Five-year reviews of data will be conducted to identify trends in riparian condition.

Responsible Staff Position

Forest Silviculturist (aspen), Aquatics Program Manager (riparian)

Trigger

Aspen

- Healthy aspen recruitment numbers drop below 50% across 20 percent of the aspen-occupied sites sampled, on either treated and/or non-treated sites, due to any cause.
- Management activity-induced or animal damage to more than 10 percent of aspen trees on aspen plots and/or within a project area that will likely prevent tree maturity attainment.
- Stand health in clear decline (reduced stocking numbers of healthy trees by age class as described above) after 5 years on 20+ percent of plots inside treatment areas, compared to plots in non-treatment areas.

If any trigger conditions are met, verify causes and investigate other factors, evaluate need to modify LMP Standards or Guidelines, or add new ones based on causes.

Riparian

Decreases in woody species age classes, channel/floodplain stability, or cover types are observed would trigger a closer look and determining if decreases are caused by management actions or other factors. If it is management, then we may need to reassess management actions, project mitigations, or assumptions of the LMP.

Estimated Annual Personnel Days and Other Costs

Aspen

All field plot monumenting supplies are already purchased and in storage for use by districts and/or SO.

Annually: (5 days GS-11 field data collection).

Every 5th year: (2 days GS-12 for summary and write-up).

Riparian

5 days per year for 2 GS-11s for data collection and office; year five days would be for analysis and reporting.

Comments

For the two ecological indicators (riparian and aspen), ongoing background management actions continue to occur, (e.g. livestock and wild ungulate grazing, fire suppression), even where no other project-level treatments have been implemented. These two indicators were chosen specifically to detect the effects of all management decisions/actions that may affect these ecological types, be they project-area-specific or ongoing across large portions of the landscape, including management by either the Forest Service or by other authorized agencies, and including the decision to withhold or defer active management.

Is this monitoring element still valid? Yes – it is important for determining riparian condition class and direction of trend. It would also address some of the riparian desired conditions in the Forest Plan and our ability to meet them.

Question 8—Old Growth

How are management activities affecting late successional forest structure in relation to desired conditions?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review amount and type of restoration treatments and the mid-scale vegetation assessment and percent change; FIA plots; post-prescribed fire monitoring plots; BAER assessments; and percent departure from desired condition by PNVT.

Indicator and Unit of Measure

Percent of total forested/woodland PNVT acres in the “medium” and “large to very large” overstory vegetation structural states (both open and closed canopy, single and multi-storied (defined in LMP Appendix B) as mapped by future R3 mid-scale vegetation mapping assessments forest-wide.

This indicator tiers to the following Plan direction for all PNVTs, as well as to other PNVT-specific DCs:

- Old growth is dynamic in nature, well distributed, and spatially shifts across forest and woodland landscapes over time.
- Old or large trees, multistoried canopies, large coarse woody debris, and snags provide the structure, function, and associated vegetation composition as appropriate for each forested and woodland PNVT.
- Diverse vegetation structure, species composition, densities, and seral states provide quality habitat for native and desirable nonnative plant and animal species throughout their life cycle and at multiple spatial scales. Landscapes provide for the full range of ecosystem diversity at multiple scales, including habitats for those species associated with late seral states and old growth.

Method, Protocol, Sample Design

Map and summarize percentages of vegetative structural states from R3’s Midscale Vegetation Mapping Assessment products for current (2012) conditions by each forest/woodland PNVT, and again in 5 year intervals as provided by the RO. Also document acres of late-successional structure lost or converted to Vegetation Structural State N (as defined in LMP Appendix B) by uncharacteristically hot wildfires, in years when these occur, by using RAVG burn severity maps from GTAC, if such structural state acreage locations were precisely known on the ground before the burn. If new MSVMA data are not provided by R3 every 5 to 10 years, then these method/protocol and sample design sections should be revised. If other methodology for obtaining monitoring data is used, consider reducing this question to just the most likely PNVTs to be treated in the next 10-15 year life of the LMP. These PNVTs include Ponderosa Pine and Dry Mixed Conifer Forest (because of the current emphasis to restore frequent-fire regimes), and PJ Woodland (because it is not represented by a focal species or ecological indicator).

MSVMA has its own sampling design, implemented at the regional/forest-wide scale.

Data Location

Original and new R3 MSVMA products and PNVT maps stored in GIS (currently T: drive).

Responsible Staff Position

Forest Silviculturist

Triggers

- After 5 years, more than 5% of very large diameter vegetation state acres lost as a direct result of wildfires and/or project treatments, especially if shifted into grass/forb/shrub/small-diameter vegetation state acres.
- More than 10% shift away from (instead of toward) desired total balance of these late-successional vegetation state percentages in LMP Appendix B overstory bar charts. Measure percent deviation from each state's desired percentage to derive the mean, which should show if we are making progress toward, or trending away from desired condition.

If triggered, conduct more intensive investigation at the project level to determine if LMP DCs, Standards and Guidelines for late-successional forest/woodland need improvement or replacement, or if lack of treatment in/around known old growth sites (LMP annual treatment acreage objective (Plan p. 37) not met or not well prioritized for strategic placement) may have contributed to losses.

Estimated Annual Personnel Days and Other Costs:

Time to summarize/evaluate MSVMA data just for the late-successional states in each forest/woodland PNVT only in years when new R3 MSVMA data are provided (ideally once every 5 years or so): (5 days GS-9 GIS time) + (4 days GS-12 Silviculturist time).

Comments

This question is intended to address old growth and large tree conditions, which continues to be a topic of great interest with many citizens/groups/agencies. Desired forest structure at the Landscape scale is displayed in overstory bar charts found in Forest LMP Appendix B for each PNVT appendix B of the Plan. Using Ponderosa Pine and Dry Mixed Conifer PNVTs as an example, the late-successional forest is represented by Vegetation Structural States D, E, H, I, J, K, L, and M (see each state defined in LMP Appendix B). These states are different for Wet MC, Spruce-Fir, Riparian Forests, and Woodlands. LMP DCs also include coarse woody debris, snags and logs as important late-successional (old growth) components, but amounts and sizes differ by PNVT, and cannot be determined using MSVMA data. So these vegetation states are used as an assumed proxy for complete old growth structure. Because these states provide important habitat for interior-dwelling wildlife/T&E species and sequester large amounts of carbon (to name a few benefits), monitoring this component for all forested and woodland PNVTs is equally important, wherever management actions (including treatment deferral decisions) are implemented. This monitoring question reduces the number of vegetation structural states that need to be addressed at the landscape scale for Question 13.

Is this monitoring element still valid? Yes. This question contributes late-successional information to Question 13. This monitoring could also help to verify the accuracy/precision of MSVMA and PNVT mapping at the project-level.

Question 9—Focal Species: Mexican Spotted Owl

What is the status of Mexican spotted owls as a focal species?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Information on breeding Mexican spotted owl occupancy in areas where they are known to occur and surveys or inventory efforts where their occupancy status is unknown (or areas presumed to be abandoned) will allow us to make inferences regarding the overall status of this species in mixed conifer PNVTs. Conduct project and non-project area monitoring of Mexican spotted owl protected activity centers in accordance with species-specific protocols.

Indicator and Unit of Measure

The indicator and unit of measure are occupancy of selected protected activity centers.

Method, Protocol, Sample Design

Gather survey data for protected activity centers and examine occupancy of protected activity centers that have a survey history in mixed conifer PNVTs.

No specific sample design is required.

Data Location

The Forest Wildlife Program Manager will annually update a summary table and place it in the appropriate data storage folder. .

Additionally, the Forest Wildlife Program Manager and wildlife biologists will enter spatial data into NRM Wildlife or successor database.

Responsible Staff Position

Forest Wildlife Program Manager

Trigger

If biologists detect declines in occupancy of protected activity centers, especially if clustered in one geographic area, examine management actions and recent events for possible causes.

Estimated Annual Personnel Days and Other Costs

Three days GS-12 Wildlife Program Manager to examine survey data and write summary of trends

Comments

Is this monitoring element still valid? Yes. Monitoring can help determine trends and success of this focal species and habitat.

Question 10—Focal Species: Northern Goshawk

What is the status of northern goshawks as a focal species?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Information on breeding northern goshawk occupancy in areas where they are known to occur and surveys or inventory efforts where their occupancy status is unknown (or areas presumed to be abandoned) will allow us to make inferences regarding the overall status of this species in the ponderosa pine PNVT. Conduct project and non-project area monitoring of northern goshawk post-fledging areas in accordance with species-specific protocols.

Indicator and Unit of Measure

The indicator is a decline in occupancy of post fledgling areas. Occupancy is the fraction of the total number of PFAs surveyed which have birds present.

Method, Protocol, Sample Design

Biologists will gather survey data for post fledgling areas. Protocols described in (Woodbridge & Hargis, 2006) will be used to determine occupancy of PFAs. Examine occupancy of post-fledging areas with a survey history in ponderosa pine PNVTs.

Data Location

The Forest Wildlife Program Manager and wildlife biologists will annually update a summary table.

Wildlife biologists will enter spatial data into NRM Wildlife or successor database.

Responsible Staff Position

Forest Wildlife Program Manager

Trigger

If biologists detect declines in post-fledgling areas, especially those clustered in one geographic area, examine management actions and recent events for possible causes.

Estimated Annual Personnel Days and Other Costs

Three days GS-12 Wildlife Program Manager to examine survey data and write summary of trends

Comments

Is this monitoring element still valid? Yes. Monitoring can help determine trends and success of this focal species and habitat.

Question 11—Focal Species: American Pronghorn

What is the status of American pronghorn as a focal species?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

To assess grassland PNVt habitat connectivity, obtain AZGFD population distribution data for American pronghorn populations.

Indicator and Unit of Measure

The indicator and unit of measure is the geographic distribution of pronghorn across game units surveyed by AZGFD.

Method, Protocol, Sample Design

During AZGFD annual aerial surveys of pronghorn in August, AZGFD will count pronghorn and note their geographic location. Then, forest biologists will work with AZGFD to examine temporal trends in geographic distribution of pronghorn.

The current AZGFD contact is Rick Langley, Region 1 Game Specialist, Arizona Game and Fish Department, 2878 E. White Mt. Blvd, Pinetop, AZ 85935; (928)367-4281; rlangley@azgfd.gov.

Annually, ASNFs will send Mr. Langley updated GIS (.shp) files of implemented project boundaries by July 15th so AZGFD can adjust the aerial extent of surveys, if necessary. AZGFD will send ASNFs an annual performance report for Federal Aid and data from August flights by October 1st.

Sample Design

No sample design required.

Data Location

Map products will be stored on the T drive or its successor:

T:\FS\NFS\ApacheSitgreaves\Program\1900Planning\GIS\FiscalYear\Q11-12.

Partnerships

Arizona Game and Fish Department—American pronghorn distribution data

Responsible Staff Position

Forest Wildlife Program Manager

Trigger

If contraction of geographic distribution occurs for several years, AZGFD and the Forest Service will collaborate to identify potential causes for the decrease that may be related to habitat connectivity issues.

Estimated Annual Personnel Days and Other Costs

Five days GS-12 Wildlife Program Manager to collaborate with AZGFD to examine data

Comments

Is this monitoring element still valid? Yes. Monitoring can help determine trends and success of this focal species and habitat.

Question 12—Grassland Habitat

Are management activities contributing to progress towards desired conditions for grassland habitat during the fawning period for American pronghorns?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review AZGFD data for American pronghorns, including fawn:doe ratios and population trends.

Indicator and Unit of Measure

The indicator and unit of measure is pronghorn fawn:doe ratio as measured in August.

This indicator tiers to the following Desired Condition for grassland (Plan p. 58):

During the critical pronghorn antelope fawning period (May through June22), cool season grasses and forbs provide nutritional forage; while shrubs and standing grass growth from the previous year provide adequate hiding cover (10 to 18 inches) to protect fawns from predation.

Method, Protocol, Sample Design

During annual AZGFD aerial surveys of pronghorn in August, AZGFD will count pronghorn does and fawns. Then, forest biologists will work with AZGFD to examine temporal trends in the pronghorn fawn:doe ratio.

The current AZGFD contact is Rick Langley, Region 1 Game Specialist, Arizona Game and Fish Department, 2878 E. White Mt. Blvd, Pinetop, AZ 85935; (928)367-4281; rlangley@azgfd.gov.

Annually, ASNFs will send Mr. Langley updated GIS (.shp) files of implemented project boundaries by July 15th so AZGFD can adjust the aerial extent of surveys, if necessary. AZGFD will send ASNFs an annual performance report for Federal Aid and data from August flights by October 1st.

No sample design required.

Responsible Staff Position

Forest Wildlife Program Manager

Partnerships

Arizona Game and Fish Department—American pronghorn reproductive data

Frequency of Evaluation

Annually

Trigger

According to AZGFD, the fawn:doe ratio that replaces the current population is 30 to 40 fawns for every 100 does. If during a five-year period the fawn:doe ratio falls below or does not improve to this level, then AZGFD and the Forest Service will collaborate to identify causes and potential habitat management solutions to move grassland habitat toward desired conditions.

Estimated Annual Personnel Days and Other Costs

Five days GS-12 Wildlife Program Manager to collaborate with AZGFD to examine data

Comments

Is this monitoring element still valid? Yes Monitoring can help determine trends and success of this focal species and habitat.

Question 13—Vegetation Communities

Are management activities moving vegetation communities and habitats closer to the desired condition identified at the appropriate scales as compared to baseline conditions?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review mid-scale vegetation assessment/percent change in developmental structural states, range analyses (transect data, photo plots, inspections), Forest Inventory and Analysis, Common Stand Exams, production and utilization surveys; Section 18 reviews of allotment NEPA; BAER assessments; fuels inventory; acres of aspen dominated and codominated forested PNVTs; and percent departure from desired condition by PNVT.

Review data sources listed above for departure or PNVT changes not explained by mechanical treatment, wildfire, natural succession or other ground disturbing event, as compared to baseline mid-scale (2012).

Review applicable indicators for all PNVTs: seral state diversity, ground cover, ecological status, patch size, disturbance regime (fire, insect, disease, flooding), coarse woody debris, snag density, fire regime condition class, riparian function assessment.

Indicator and Unit of Measure

Percent of total forested/woodland PNVT acres in the “early-successional development” and “mid-successional development” overstory vegetation structural states (both open and closed canopy, single and any multi-storied) as defined in LMP Appendix B and mapped by future R3 mid-scale vegetation mapping assessments forest-wide. (Essentially all states not already analyzed similarly for Questions 6 and 8.)

Method, Protocol, Sample Design

Map and summarize percentages of vegetative structural states from R3’s Midscale Vegetation Mapping Assessment products for current (2012) conditions by each forest/woodland PNVT, and again in 5 year intervals as provided by the RO. Focus on Ponderosa pine, Dry Mixed Conifer, and PJ Woodland PNVTs to reduce monitoring time/cost. Study wildfires occurring across project treatment areas since 2015 start of LMP implementation, looking for amounts/locations of serious ecosystem degradation, or not, as a sign of restored fire regime and fire regime condition class, or not.

MSVMA has its own sampling design.

Data Location

Original and new R3 MSVMA products and PNVT maps are stored in the Geospatial Reference Library (currently on the T drive).

Responsible Staff Position

Forest Silviculturist

Trigger

A 10% or greater change away from desired ratio of early to mid-successional vegetation states would trigger an examination of possible causes. Measure percent deviation from each state’s desired percentage to derive the mean, which should show if we are making progress toward, or trending away from desired conditions.

If triggered, conduct more intensive investigation at the project level to determine if LMP DCs, Standards and Guidelines for restoration of forest/woodland spatial patterns, structural arrangement, and age/size class distribution are being implemented in projects, or if LMP annual treatment acreage objective (Plan p. 37) is not being met in a timely manner.

Estimated Annual Personnel Days and Other Costs

Time to evaluate/summarize MSVMA data for the early- and mid-successional vegetation states for the Ponderosa pine and Dry Mixed Conifer forest PNVTs and PJ Woodland PNVT, only in years when new R3 MSVMA data are provided (ideally once every 5 years or so):

(3 days GS-9 GIS time) + (3 days GS-12 Silviculturist time)

Comments

PNVTs in the revised LMP are the “vegetation communities” referred to in this question. Regardless of what was published in LMP Table 12, this question is far too exhaustive and expensive to address all PNVTs at all plan scales. Grassland PNVTs are already addressed in Question 6, so are not repeated here. Late successional development forest and woodland conditions are already addressed by monitoring Question 8, so are not repeated here. Therefore, the remaining (early- and mid-successional development) vegetation structural states contained in the LMP Appendix B overstory bar charts should be covered here at the Landscape scale only. To reduce monitoring time/cost, greatest interest should be the most likely PNVTs to be treated in the next 10-15 year life of the LMP, such as low-severity frequent-fire regimes, and PJ Woodland should also be emphasized because we don’t have a focal species or indicator for it. Using Ponderosa Pine and Dry Mixed Conifer PNVTs as an example, the early- and mid-successional forest is represented by Vegetation Structural States A, B, C, F, G, N (see each state defined in LMP Appendix B). Question 18 (stand restocking of early-successional development acres) only addresses this particular question at the LMP Fine and Mid-scales (not Landscape scale).

Is this monitoring element still valid? Yes. This question depends on MSVMA data from R3. If 4FRI continues with future LiDAR imagery for their monitoring, that technology may help with this particular question on forest/woodland spatial patterns of cover versus openness.

Question 14—Stream Temperature

Is long term water quality (temperature) being maintained in aquatic systems to meet State of Arizona water quality standards for designated uses? What temperature change is attributed to climate vs. mechanical/wildfire treatments? Are water temperature changes correlated with climate vulnerability predictions for ASNFs watersheds?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Analyze forest stream temperature network data in comparison to available air temperature and streamflow data. Compare long-term trends in ADEQ monitoring data with forest monitoring data and CCVA predictions.

Indicator and Unit of Measure

Air and water temperatures will be collected at sites across the ASNFs; only perennial streams will be included to ensure water temperature data collected will be continuous for the entire year.

Method, Protocol, Sample Design

Approximately 15 sites will be located across the ASNFs, and both air and water temperatures will be collected at 15 minute intervals. Data from the temperature loggers are collected annually; some data

analyses and summaries will occur annually, while others will occur every five years when a detailed evaluation and report will be prepared to determine any trends and changes in both air and water temperatures. Metrics will include daily and monthly evaluations (e.g., minimum/maximum/means, etc.), those within the CCVA documentation, and impacts to aquatic/fish species where they or their habitat are present. Additionally, at sites where stream flow data are available, these data will be included and evaluated in the monitoring report prepared every five years.

Sampling sites were selected based on several criteria; some may have more than one of the selection criteria present within the site being evaluated. These included sites that were determined by the CCVA to be subwatersheds at moderate or high vulnerability, sites with low or minimal past and ongoing management activities (e.g., wilderness or primitive area), and sites associated with mechanical or wildfire treatments.

Responsible Staff Position

Aquatics Program Manager, Fisheries

Trigger

If an increasing trend in water temperature is detected in 50% or more of the sites being monitored, conditions at monitoring sites and treatments will be examined to determine possible causes. Other triggers may also be evaluated and could vary by stream and the species present (e.g., species threshold).

Estimated Personnel Days and Other Costs

Personnel days are 15 per year. Equipment, supplies, and miscellaneous costs are approximately \$1,000 per year.

Comments

Additional information regarding methods, protocols, and sampling design can be found in supporting documentation for the ASNfs temperature monitoring program (appendix B). ADEQ data will be covered under monitoring "Question 2".

Is this monitoring element still valid?

Yes, it will be determined after several years of data collection and analyses whether trends of increasing temperatures are occurring.

(See further content in appendix B.)

Question 15—Insects, Diseases, Invasive Plants

Are insect and disease populations within reference conditions? Are invasive plant species' populations changing substantially? Are their population levels compatible with achieving vegetation desired conditions and management approaches? Are changes and levels consistent with regional changes and levels? What is the relationship between these stressors and climate vulnerability predictions?

Monitoring Method and Indicators (from Table 12 in LMP)

Review forest health surveys and report, stand exams, project inspections and reviews, and noxious weeds and nonnative invasive species surveys and treatment reports.

Compare ASNFs to Southwest Region insect and disease population levels and trends to determine if change can be attributed to general decline in forest health in high vulnerability ERUs.

Question 15a—Insects and Diseases

Are insect and disease populations within reference conditions? [. . .] Are their population levels compatible with achieving vegetation desired conditions and management approaches?

Reporting Interval

1 year

Indicator and Unit of Measure

- Mapped acres of native bark beetle and defoliator activity and severity of attack/tree mortality.
- Percent of inventoried forest/woodland acres infected with moderate to severe dwarf mistletoe levels.
- Detection (presence or increase/absence) of new arrivals present (non-native species or natives never before documented on the ASNFs or in a particular PNVT).
- Increases in outbreak frequency or infection levels of native and non-native insects and disease.

Method, Protocol, Sample Design

Review annual forest health surveys, reports, and maps (file code 3400 & GIS T drive). Early detection and tracking species population dynamics/trends with ongoing trapping efforts for gypsy moth, Douglas-fir tussock moth, and misc. bark beetles. Revisit/maintain AZ Zone Forest Health Protection/ERI-NAU permanent monitoring plots already installed for root disease, dwarf mistletoe, white pine blister rust, bark beetle traps, and others as needed. Review all project-level FHP reports written by FS Entomologists/Pathologists. See tree insects/diseases and severity ratings recorded in pre-treatment and post-treatment CSE stand exams in FSVeg and FSVeg Spatial databases (+ permanent FIA plots revisited every 10 years if possible). Review project monitoring done to follow related LMP DCs, Standards and Guidelines. Conduct on-site field inspections/reviews of insect activity in project areas, and in project-created beetle brood host materials such as fire-scorched trees, and slash/decked logs left on-site longer than 30 days. Develop simple project inspection field checklist/reporting form.

Consider non-treatment factors still affecting insect-disease populations or behavior (such as severe drought, changes in precipitation patterns, wildfire, natural predator or biological controls, cyclical nature of some pest populations) when determining if treatments have had any direct positive or negative effect.

Use existing data collected by others according to their sampling designs (CSE plot data, FIA plot data, ADS mapping and data protocol, FHP specialist project visit field reports, bark beetle monitoring trap results). Forest Silviculturist/Contract COR/Sale Administrator should cooperate to develop simple project inspection field checklist/reporting form to quickly document visible information while doing routine contract inspections.

Data Location

Annual ADS maps and data are stored in T: Drive or may be obtained from regional Forest Service website.

Partnerships:

- Forest Health Protection (FHP), R3 Arizona Zone office - Annual aerial detection survey & mapping data, and project-specific forest health reports. GIS maps and data provided at no cost to ASNFs. Gypsy moth and Douglas-fir tussock moth (defoliators) traps provided by FHP and installed/monitored annually by district silviculture personnel. (Permanent dwarf mistletoe and root disease monitoring plots maintained by FHP across ASNFs from 1980s to mid-2000s may or may not be operational now = need to investigate if can be reinstated.)
- NAU, Dr. Kristen Waring – ASNFs permanent white pine blister rust monitoring plots already installed for several years and revisited regularly, in cooperation with AZ Zone FHP Pathologist. Done at no cost to ASNFs.

Responsible Staff Position

Staff officer in charge of Silviculture/Forest Health program, assisted by Forest Silviculturist and/or ASNFs Forest Health Coordinator, USFS AZ Zone Entomologists and Pathologists, project COR/Sale Admin/Inspectors, SO GIS Specialist.

Triggers

Bark beetle outbreaks persist on same acres 3 or more years in a row, and/or expand to adjacent or additional acres within 3 years. Defoliator outbreaks persist on same acres 2 or more years in a row, and/or expand to adjacent or additional acres within 2 years. Post-treatment (post-cut, post-RX burn) dwarf mistletoe levels are not consistent with Plan DCs, Standards and Guidelines. New non-native insect-disease species are detected. As warranted, contact AZ Zone FHP office ASAP, and consider changes needed in Plan Standards or Guidelines, or new ones to add.

Estimated Annual Personnel Days and Other Costs

Annually: (GS-12 Silviculturist x 6 days) + (GS-9 GIS x 3 days) + (GS-7 Harvest Inspector x 1 day)

Every 5th year: (GS-12 Silviculturist x 3 days)

Comments

Pertinent Plan Direction (more content in appendix B):

LMP DC for All PNVTs: “Insect and disease populations are at endemic levels with occasional outbreaks. A variety of seral states usually restricts the scale of localized insect and disease outbreaks.”

LMP Standards for All PNVTs: “Vegetation treatments shall include measures to reduce the potential for introduction of invasive plants and animals and damage from nonnative insects and diseases.”

LMP Guidelines for All PNVTs:

- “Insect and disease infected trees should be removed to prevent spread beyond endemic levels.
- Green slash and decked logs should be managed, in a timely manner, to make them unfavorable bark beetle habitat.
- Project implementation should include bark beetle monitoring within and adjacent to all active slash-creating projects to help prevent beetle outbreak.”

Numerous LMP Guidelines for All Forested PNVTs, the Community-Forest Intermix, and All Woodland PNVTs are further listed in appendix B.

Is this monitoring element still valid? Yes. Due to wide variety of forest/woodland insects and diseases, this approach narrows the focus to categories most-likely to be primary concerns during the life of this plan = native bark beetles and defoliators (native and nonnative) representing the insects, with dwarf mistletoe representing the persistent diseases. Any new or non-native pest species detected will also be considered as an indicator of departure from desired conditions. For more information, refer to (Conklin & Fairweather, 2010; Conklin, et al., 2009; Lynch, et al., 2010).

Question 15b—Invasive Plants

Are invasive plant species' populations changing substantially? Are their population levels compatible with achieving vegetation desired conditions and management approaches?

Reporting Interval

1 year

Indicator and Unit of Measure

Numbers of populations of noxious weeds identified per unit effort in field surveys.

Method, Protocol, Sample Design

Utilize temporary personnel as available to survey, identify, and map infestations of noxious weeds on the forests.

Data Location

Survey and treatment information is reported in the Threatened, Endangered and Sensitive Plants – Invasive Species (TESP/IS) application and housed in the Natural Resource Manager (NRM) Forest Service corporate data warehouse.

Responsible Staff Position

Range Program Manager

Trigger

A trend of increasing acres or numbers of newly identified populations over two reporting cycles (10 years) or a sudden uptick of a new invasive species on the Forests will trigger an examination of management actions or other causes which may be contributing to introduction and/or spread of invasive plants.

Estimated Annual Personnel Days and Other Costs

3 days for GS-12 Range Program Manager to summarize the findings

Comments

Is this monitoring element still valid? Yes; resources for identifying and mapping noxious weeds, however, are inadequate. If a data collection protocol and resources become available in the future which better address this question, the Forests will consider using them.

Question 15c--Climate

Are changes and levels consistent with regional changes and levels? What is the relationship between these stressors and climate vulnerability predictions?

Reporting Interval

5 years

Indicator and Unit of Measure

Indicator: frequency of occurrence of insect/disease outbreaks or invasive plant populations by Climate Change Vulnerability class (low, moderate, high, very high) at the HUC6 scale.

Method, Protocol, Sample Design

Calculate distribution of outbreaks, or new species arrivals, of insects and diseases by subwatershed. Compare outbreak acres by CCVA category. Will need to stratify by habitat and/or elevation because of nature of outbreaks (i.e. most insects and diseases are restricted to one or a few host species), or restrict analysis to common vegetation types like PPF and DMCF. Consult with AZ Zone Entomologists and Pathologists for their expert perspectives on endemic levels versus outbreaks, as some insect or disease population irruptions can be driven by stand stocking density or arrangement and canopy layers, while other outbreaks tend to be naturally cyclical in nature, or are explained by occasional weather events at the extreme ends of a normal climate range.

Select 2 or 3 invasive plant species which have the potential to be indicators of changing climatic conditions (e.g. look for species with known ranges of frost-sensitivity or drought-tolerance) and perform a similar analysis to that described above, using incidence of the selected species within watersheds of varying CCV classes.

After two CCVAs are available, geographic units which experienced a change in CCV could be analyzed separately to determine if changes in CCV over time result in changes in insect/disease/weed outbreaks.

Sample design for detection of beetles, defoliators, and diseases is determined by RO protocols.

Responsible Staff Position

Planning, Timber, Range

Trigger

Statistically significant deviation from expected distributions of one or more type of outbreak which can be attributed to climate change vulnerability will trigger a closer look at management actions which could be taken to mitigate effects and increase resilience.

Estimated Annual Personnel Days and Other Costs

1 person-day each for Forest Planner (GS-12) and Forest Silviculturist (GS-12) per year

Comments

Is this monitoring element still valid? This element was added when the Monitoring Strategy of the ASNFs LMP was changed to bring it into compliance with the 2012 Planning Rule (Administrative Change 1). This question is an attempt to detect ecological changes resulting from increased stress on forest trees caused by expected warming and drying of the climate. Insect and disease outbreaks can be correlated with climate-stressed trees, but multiple other factors (harvest activities, fire, new pest/pathogen introductions, etc.) can also be involved. Observations will be documented on a 5-year return interval. Reliable conclusions regarding climate change will not be possible on such a short interval.

Question 16—Climate Change Vulnerability

Has ASNFs' Climate Change Vulnerability Assessment (CCVA) by ERU changed over the life of the forest plan? How do current climate patterns, over the life of the forest plan, compare to vulnerability predictions for the ASNFs?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Compare CCVA assessments over time to determine change in vulnerability by ERU, local unit and sub-watershed.

Indicator and Unit of Measure

The final ASNFs CCVA was provided to the forests on January 17, 2017. Vulnerability is presented for ERUs, at the "local scale" (groups of 6th Level HUCs), and at the 6th Level HUC sub-watershed scale in tabular form. Vulnerability levels are: Low, Moderate, High, and Very High. The indicator will be changes to vegetation type as correlated with vulnerability level.

Method, Protocol, Sample Design

Changes to vegetation type as indicated in periodic Midscale Vegetation Modeling, correlated with predictions in the 2017 CCVA, will be used to infer climate-related vegetation changes.

Responsible Staff Position

Forest Planner

Trigger

Significant vegetation changes consistent with climate change in high vulnerability polygons should trigger an examination of restoration treatments to ensure that climate change adaptability is considered.

Estimated Annual Personnel Days and Other Costs

Calculation of summary statistics and preparation of report: 2 days for Forest Planner (GS-12), every 5 years

Comments

Is this monitoring element still valid? Yes; changes in vulnerability to climate change can be thought of as changes to the relative probability of type conversion (Triepke, 2017). Observation of type conversions in high risk CCVA polygons would indicate possible climate effects.

Question 17—Timber Suitability

Has timber suitability classification changed on any forests' lands?

Reporting Interval

10 years

Monitoring Method and Indicators (from Table 12 in LMP)

Reapply timber suitability criteria and process.

Indicator and Unit of Measure

Change in suitability, measured in acres. Suitable timberland acres in year 2025 compared to acres published in 2015 revised LMP.

Method, Protocol, Sample Design

Reapply timber suitability criteria and process in 10 years, as required by law. Only reanalyze areas where the following changes are known to have occurred after the LMP revision suitability analysis was completed:

- Site damage, pollution, or topsoil loss has reduced site productivity to less than a minimum of 20 cubic feet of industrial wood per acre per year, or reduced reforestation potential.
- Post-stand-replacement forested PNVT acres naturally convert to woodland, shrubland or grassland/savannah PNVT sites as an acceptable early successional ecosystem recovery phase such that artificial reforestation is not practical or economically feasible for more than 10 years.
- Haul road system is no longer functional to reach certain suitable timberland locations for some reason. (Lands must be within ¼ mile average, ½ mile maximum, from functional haul road to be classified as suitable.)
- Forested acres permanently removed from the “General Forest” LMP Management Area, e.g. for major above-ground new utility corridors or significant widening, new water reservoir construction & flooding, new surface mines/borrow pits, etc.
- Commercial harvesting on slopes >40 percent becomes economically feasible without doing long-term site productivity damage.
- Large or numerous land ownership exchanges occur.
- Lands classified as “administratively withdrawn” from timber production are officially reclassified.
- T&E species recovery plan habitat requirements no longer restrict harvest of trees as needed for regular rotations of commercial timber production, either for uneven-aged or even-aged silvicultural systems.

The answer to monitoring Question 1 should be sufficient to address soils stability/productivity on restoration treatment acres. So soil trends outside of treatment projects would still be needed. In the event that a new TEUI Survey of the ASNFs is not published by 2025, then the following work would have to be done by the ASNFs in years 2020-2024: Use post-wildfire BARC maps and BAER maps of mulched/seeded acres on highly disturbed sites to determine most-likely acres of reduced soil productivity (such as severely-burned wildfire acres receiving no BAER treatments to reduce topsoil loss). Check stand exam plot data collected on post-stand-replacement/highly disturbed forest acres, supplemented with field visits to determine if a new, significantly lower, site index has resulted. Develop a field checklist of apparent soil trends (i.e., visual presence of new rills, gullies, sheet erosion, lack of vegetation, loss of soil A-horizon) to be recorded during stand exams, inspection visits, range visits, soils/watershed visits, etc. Where these trends are evident, further soils surveys (soil pits, etc.) will be conducted on highly disturbed/eroded/polluted/rehabbed sites after sites have stabilized, to determine if soil productivity is permanently reduced, or can recover on its own or be restored within next 10 years. Areas of reduced soil productivity will be mapped. Also map acres permanently converted to non-forest by intentional management activities should be reported by districts as “permanent land clearing = code 4270” or “permanent flooding = code 4280” in FACTS-spatial databases. Map acres of other

changes listed above, reapply timber suitability criteria and process to determine total additions &/or subtractions to the 2015 Forest LMP's 596,744 acres of suitable timberlands.

Sample Design

Changes in ASNFs soil productivity may be available from R3's updated Terrestrial Ecosystem Unit Inventory TEUI surveys if they are published in time for use in this analysis. R3 has their own sample design for TEUI surveys.

Data Location

BARC wildfire soil burn severity maps and wildfire BAER treatment maps are filed in ASNFs GIS database (currently on the T drive).

Responsible Staff Position

Forest Silviculturist

Trigger

Reapply timber suitability criteria and process when enough acres exist in either case: If more than 10 percent of forestlands currently classified as suitable (Ponderosa Pine, Dry Mixed Conifer, Wet MC with Aspen, all on slopes under 40 percent) experience any of the applicable changes listed above, or if more than 10 percent of forestlands currently classified as non-suitable (Spruce-Fir, slopes 40+ percent, MSO Protected, administratively withdrawn, etc.) experience any of the applicable changes listed above. If the re-analysis reflects changes in suitable timberland acreage, then that will require new LTSYC and ASQ calculations which will prompt an LMP amendment.

Estimated Annual Personnel Days and Other Costs

Annual estimate: (GS-11 Soil Scientist x 2 days) + (GS-12 Silviculturist x 2 days) + (GS-9 GIS x 3 days)

Comments

Is this monitoring element still valid? Yes. Required by NFMA and USFS planning rule directives.

Question 18—Stand Restocking

Are forest and woodland stands adequately restocked within 5 years of final harvest treatment or after fire-created regeneration openings? Are these restocked areas retaining species composition and density compared to baseline PNVT? Are stocking patterns correlated with climate vulnerability predictions?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review annual reforestation needs report, stocking certifications, silvicultural prescriptions, timber/silviculture tracking database. Assess species composition and density in restocked areas relative to baseline PNVT range of variability.

Indicator and Unit of Measure

Planned natural regeneration areas are stocked, or not, by 5 years after intentional regeneration opening creation. Planted tree species and trees per acre which have survived, or not (percent survival).

Method, Protocol, Sample Design

- Query FACTS database for the following annual unit information:
 - Regeneration opening cuts or RX burn openings certified as naturally stocked, by years that opening was created and certified.
 - Regeneration opening cuts or RX burn openings planned for follow-up activities to facilitate natural regeneration, by years that follow-up activities are planned after opening creation date.
 - Regeneration opening cuts or RX burn openings surveyed 5 years after creation and scheduled for artificial planting, by year that planting is planned after opening creation date.
 - Plantations certified as stocked, by years of regeneration cut/RX burn and certification.
 - GI Report “FACTS Harvest Activities Needing Planting Certification”
 - Plantations scheduled for additional site preparation and/or fill-in planting, by years of regeneration cut/RX burn and scheduled follow-up work planned.
 - Failed plantation survival percentages reported, by year of survey.
 - Causal agents for reforestation need in each stand or opening.
 - Tree species, seed lot/s, and trees per acre planted, compared to survival percentage of the plantation.

Compare ASNFs forest-wide “reforestation needs” annually reported acres with reforestation acres completed/certified, by causal agent (part of normal Forest Silviculturist annual duties). Ensure that all reforestation records are properly entered into FACTS.

Annually review at least 5% of all silvicultural reforestation prescriptions written, for elevation/aspect/slope, desired tree species/species mix and stocking density, to compare with 1st/3rd year survival levels reported. Request district explanations for low survival percentages. Ask for project or stand documentation of any Silviculturist or Line Officer decision to postpone reforestation (on how many acres) to meet other LMP DCs/resource objectives, like to provide temporary early seral grass/forb/shrub vegetation states in certain locations. Include all such information in a summary report and share with Climate Change Coordinator. Create a spreadsheet to organize and document all pertinent information queried and collected annually.

Use GIS and FACTS spatial databases to see if any areas certified as stocked in past 15 years have subsequently received wildfire or RX fire during the life of this LMP. If district Silviculturist has not done so, spot field-check 2 such locations per year (if available) to determine resulting mortality/stocking reduction and possible new reforestation need again now. Are such new (repeat needs on the same acres) being reported in FACTS in a timely manner?

Various different sampling designs are used by district Silviculturists to determine natural regeneration and artificial reforestation adequacy for stocking certification. CSE sampling design is well documented.

Examine natural regeneration success as tallied in regeneration surveys after regeneration cuts in Dry Mixed Conifer Forest and Ponderosa Pine Forest. Compare success over time and note otherwise unexplained decreases in success rate in these two vegetation types.

Responsible Staff Position

Forest Silviculturist

Triggers

- If more than 10 percent of final harvest acres have not been certified as stocked by 5th-year post-harvest/post-prescribed-fire, then investigate/document, and support/schedule corrective action to get them stocked. This item cannot be adjusted in the LMP for suitable timberlands, as it is required by NFMA law.
- If any areas certified as stocked in past 15 years (regardless of how established) have subsequently burned by planned ignitions, or managed unplanned ignitions, and resulted in another new reforestation need again on the same acres, then LMP may need a new or modified Standard to protect established regeneration areas from fire use. Perhaps provide better LMP direction to reduce or remove fuels buildup prior to burning, or postpone burns in these areas for several years to prevent excessive young tree mortality levels.

Estimated Annual Personnel Days and Other Costs

In Year 1 or 2 only: Exam Contract cost

Annually: (GS-12 Silviculturist x 4 office days + 2 field days if needed) + (GS-9 GIS x 1 day) + (GS-12 Climate Change Coordinator x 2 days)

Comments

Is this monitoring element still valid? Yes. Required by NFMA and 1982 planning rule directives, as clarified in appendix B rationale. This question also is part of the forests' climate vulnerability monitoring.

Question 19—Harvest Unit Effects

How is harvest unit size affecting landscape patterns across the forests?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review mid-scale vegetation mapping assessment and percent change.

Indicator and Unit of Measure

Landscape scale (forest-wide): Acres of forest and woodland canopy cover classes compared to prior MSVMA acreages (11-29% cover = open canopy, and $\geq 30\%$ cover = closed canopy).

Mid-scale LMP DCs: Treatment cutting unit acres, locations, and prescriptions. Horizontal distribution of cutting units, strategic placement on the landscape.

Method, Protocol, Sample Design

Review final project-level NEPA documents and maps for strategic placement of cutting units with respect to locations of high-value resources/sites identified by the project ID Team. Review 20% of all detailed Silvicultural prescriptions written for project cutting units in forested and woodland PNVTs by various locations. (Example: 12 prescriptions written for Project ABC = review 2 prescriptions.) Compare prescribed target residual basal areas (BA), target tree group size/horizontal arrangement, interspaces

between tree groups, and spatial patterns to desired conditions stated in the LMP by PNVT and/or LMP Management Area. Ask to check district project-level monitoring records to see if cutting unit marking guides/layout/contract cutting requirements were implemented according to the prescription. If wildfires occur across treated projects, determine how well the high-risk resources/sites survived.

Data Location

Harvest/thinning unit sizes, shapes are in FACTS-spatial databases, by method of cut and completed date.

Responsible Staff Position

Forest Silviculturist

Trigger/s

If cutting-created opening size exceeds 40 acres on suitable timberlands (per NFMA), then reinforce this LMP Standard with District Line Officers, Silviculturists, and Timber layout personnel. If cutting unit locations, canopy cover/stand density reduction, spatial patterns are not consistent with LMP DCs, then do a review of Standards or Guidelines to possibly modify or add new ones in the Forest LMP.

Estimated Annual Personnel Days and Other Costs

Annual information collection in between 5th years: (GS-9 GIS Specialist x 1 day) + (GS-12 Silviculturist x 2 days = part of normal duties to review project NEPA and silviculture prescriptions)

Each 5th year to analyze/summarize data: (GS-9 GIS Specialist x 3 days) + (GS-12 Silviculturist x 3 days)

Comments

See appendix B for applicable LMP Direction.

See 4FRI monitoring publications available with respect to this subject included in the References/Literature Cited section in this document (Hamilton, et al., 2013; Zachmann & Dickinson, 2016). Contact 4FRI Monitoring Coordinator (928-226-4680) for more information as it becomes available from their monitoring effort.

Is this monitoring element still valid? Yes, but only partially. With respect to “landscape patterns across the ASNFs”, this question overlaps considerably with Question 13. As with other questions, question 19 depends on receipt of MSVMA products from USFS Region-3. At the project level “harvest unit size” ties in with NFMA 40 acre maximum even-aged final harvest unit size. But “treatment unit” location, shape and prescription may be of more interest for restoration and movement toward desired landscape patterns in each PNVT of interest.

Managed Recreation

Question 20—Recreational Opportunities

Do recreational opportunities respond to forest users’ desires, needs, and expectations?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review recreation use surveys and acres by recreation opportunity spectrum (ROS).

Indicator and Unit of Measure

Percent visitor satisfaction from Table 18 (Percent Satisfied Index Scores for Aggregate Categories) in the NVUM report. National Visitor Use Survey Monitoring Report will provide indicators and unit of measurement.

Method, Protocol, Sample Design

Protocol for the NVUM is provided by the Washington Office. The survey design is developed by the Forest Recreation Program Group working with the WO National Visitor Use Program Manager. Forest Service National Visitor Use Monitoring Program is the method utilized, and is completed every 5 years. Review the detailed visitor satisfaction results from the NVUM report for the forests. Take into consideration that developed facilities and interpretive displays are not appropriate in wilderness, but may be found at trailheads. Also consider that trail signage in wilderness is not at the same level as outside wilderness.

Data Location

NVUM reports available at <http://www.fs.fed.us/recreation/programs/nvum/>

Responsible Staff Position

Recreation Program Manager

Trigger

1. Decrease in visitor satisfaction from previous NVUM results of 5 percentage points or more.
2. Any visitor satisfaction result that is below FS national target of 85%.

Consider elements in the Forest Plan or management techniques that may need to be changed to improve recreation experiences.

Estimated Annual Personnel Days and Other Costs

1 day, Recreation Program Mgr. (GS-12), in 5th year

Comments

FS national target is 85 percent for visitor satisfaction

Is this monitoring element still valid? Yes, NVUM is a national program that is used to indicate recreation trends and satisfaction on National Forest System lands.

Question 21—Recreation Effects on Resources

How are recreational activities (including off-highway vehicle use) affecting the physical and biological resources of the forests?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review law enforcement warnings and citations regarding resource damage; amount of soil surface cover on routes or areas closed to motor vehicle travel; acres of noxious weeds and invasive nonnative species treated in developed campgrounds and dispersed camping areas; and trail condition surveys.

Indicator and Unit of Measure

Law enforcement data have not been made available to the ASNFs for this purpose.

Method, Protocol, Sample Design

An alternate source of data for this question needs to be identified. One possibility would be to identify a subset of dispersed camping sites located in corridors designated by the upcoming Travel Management decision and document impacts through photo points or other simple, repeatable techniques.

Responsible Staff Position

Recreation Program Manager, Range Program Manager

Trigger

Estimated Personnel Days and Other Costs

1 day, Recreation Program Mgr. (GS-12), 1 day, Range Program Mgr. (GS-12)

Comments

Need to determine how to factor in effects from TMR implementation

Is this monitoring element still valid? Yes, especially as it relates to travel management.

Question 22—Scenic Integrity

How are projects and programs affecting scenic integrity?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct management reviews.

Indicator and Unit of Measure

1. Percent and acres that meet Scenic Integrity Objectives (SIOs)
2. Percent change in Scenic Integrity Level (SIL)
3. Scenic Integrity Objective Map can be found in Forest Plan documents

Method, Protocol, Sample Design

1. The Scenery Management System (SMS) is the tool for managing and inventorying scenic resources.
2. Conduct implementation project monitoring reviews for Scenic Integrity Objectives (SIO)
3. Forest Plan Scenic Integrity Objective Map with forest-wide objectives and acres to be maintained.
4. Annually, review the design of five completed projects with constructed features and landscape alterations for Scenic Integrity Objectives.

Responsible Staff Position

Recreation Program Manager

Trigger

If more than 1 project does not meet SIOs, change of > 10 percent for any SIL triggers examination of project design criteria related to scenic management.

Estimated Personnel Days and Other Costs

5 days, Recreation Program Manager

Comments

Is this monitoring element still valid? Yes. Monitoring can ensure that scenic values are considered in project planning and implementation.

Question 23—Infrastructure Sustainability

Are the forests’ infrastructure (e.g., recreation facilities, roads, trails) and their ability to facilitate administrative needs and attainment of desired conditions for administrative uses and recreational opportunities, including access, sustainable?

Monitoring Method and Indicators (from Table 12 in LMP)

Query NRM database for amount of deferred maintenance (recreation and transportation).

Question 23a—Recreation Facilities

Are the forests’ infrastructure (recreation facilities, trails) and their ability to facilitate administrative needs and attainment of desired conditions for administrative uses and recreational opportunities, including access, sustainable?

Reporting Interval

5 years

Indicator and Unit of Measure

1. Number of recreation sites maintained to standard
2. Dollars of recreation sites needed by Deferred Maintenance

Method, Protocol, Sample Design

NRM I-web report NRM condition surveys/Real Property Condition Surveys
INFRA for estimates of Deferred Maintenance

Data Location

Forest-wide on NRM/INFRA Database and WorkPlan.

Responsible Staff Position

Recreation Program Manager and Engineering

Trigger

1. If the 5 year average of recreation sites maintained to standard is less than 50 percent, or
2. If in 5 years the deferred maintenance dollars of recreation facilities increase by 50 percent from year one of the signed Forest Land Management Plan,

Then examine recreation sites for closure and/or investment based on public health and safety.

Estimated Personnel Days and Other Costs

2 days Recreation Program Manager (GS-12)

Comments

Is this monitoring element still valid? Yes; long-term sustainability of the recreation program is necessary to comply with law and policy.

Question 23b--Roads

Are the forests' infrastructure (roads) and their ability to facilitate administrative needs and attainment of desired conditions for administrative uses and recreational opportunities, including access, sustainable?

Reporting Interval

5 years

Indicator and Unit of Measure

1. Miles of Roads Maintained Annually
2. Dollars of Roads Deferred Maintenance

Method, Protocol, Sample Design

Populate accomplishments in Road Maintenance Plan; Generate Accomplishments Report from Natural Resource Manager (NRM) (Record for reporting miles of roads maintained and reconstructed) database or its successors.

Responsible Staff Position

Engineering, Roads Manager

Trigger

1. If miles of passenger vehicle roads (ML 3-5) maintained is less than 80 percent; or
2. If the 5 year average of miles of high clearance vehicle roads (ML 1-2) maintained is less than 20 percent; or
3. If in 5 years the road deferred maintenance dollars increases by 50 percent from year one of the signed Forest Land Management Plan;

Then re-evaluate the extent of the transportation system.

Estimated Annual Personnel Days and Other Costs

10 days of roads manager to run reports and summarize results

Comments

Currently annual target is for miles maintained, this includes any maintenance activity and does not key in on the entire route being maintained to standard.

Is this monitoring element still valid? Yes, ties to implementation of Travel Management Rule.

Question 24—Eligible and Suitable Wild and Scenic Rivers

Are eligible and suitable wild and scenic rivers being managed to protect and enhance the identified outstandingly remarkable values?

Reporting Interval

2 years

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct management reviews of projects and ongoing activities within river corridors.

Indicator and Unit of Measure

The indicators are the ORVs and the free-flowing condition of the river.

Method, Protocol, Sample Design

Conduct reviews of projects and ongoing activities within the Wild and Scenic river corridor.

Monitoring will have to be incorporated into projects for proper implementation of plan.

Section 7 Reports of the Wild and Scenic Rivers Act would evaluate the effects of the project proposed action on the ORVs and free flowing condition.

Responsible Staff Position

Recreation Program Manager, Watershed Program Manager

Trigger

Negative effects to free-flowing condition, water quality, or identified Outstandingly Remarkable Values for each eligible or suitable river will trigger an evaluation of potential mitigation strategies.

Estimated Personnel Days and Other Costs:

3 days, Recreation Program Mgr. (GS-12) + 3 days, Watershed Program Mgr. (GS-12)

Comments

Is this monitoring element still valid? Yes as it is needed to ensure values are being met for wild and scenic rivers.

Question 25—Wilderness Management

Are designated wilderness and the primitive area being managed to maintain the wilderness values and character?

Reporting Interval

2 years

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct management reviews of projects and ongoing activities within designated wilderness and the primitive area.

Indicator and Unit of Measure

1. number of Minimum Requirements Analysis (MRA) documents that allow for trammeling
2. number of acres of each wilderness or primitive area affected

3. Number of project actions that impact wilderness values and character.

Method, Protocol, Sample Design

Gather completed MRA documents and review. Conduct management reviews of 2 projects implemented during the biennium that have the potential to impact wilderness values and character. Projects should be selected based on geographic overlap with designated wilderness or the primitive area and the presence of management actions that may impact wilderness values and character. Consider whether project design features have been properly implemented and have been effective in mitigating potential impacts on values and character.

Responsible Staff Position

Recreation Program Manager

Trigger

- If more than 1 percent of a wilderness or primitive area is cumulatively affected by trammeling (1% of each area follows: Mount Baldy Wilderness - 70 acres, Bear Wallow Wilderness - 111 acres, Escudilla Wilderness - 52 acres, Blue Range Primitive Area - 1,666 acres), then the Forests would reassess the need to develop a wilderness management plan.
- If project actions are found to impact wilderness values or character, determine possible causes (incompatible project action, inadequate design features, failure to implement planned design features, etc.).

Estimated Personnel Days and Other Costs

2 days Recreation Program Manager (GS-12)

Comments

Trammeling is defined as “modern human activities or actions that control or manipulate the components or processes of ecological systems inside the wilderness.”

The indicators and triggers for this monitoring question will need to be revisited when the National Wilderness Character Monitoring protocol is fully implemented on the forests.

Is this monitoring element still valid? Yes; compliance with the wilderness act requires the forests to ensure wilderness and primitive area character and values are being maintained.

Question 26—Recommended Wilderness Management

| |
|------------------------------------------------------------------------------------------|
| Are recommended wilderness being managed to protect the wilderness values and character? |
|------------------------------------------------------------------------------------------|

Reporting Interval

2 years

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct management reviews of projects and ongoing activities within recommended wilderness.

Indicator and Unit of Measure

Indicator is human-caused disturbance that does not complement wilderness characteristics. Unit of measure is authorized activity that causes irreparable damage to wilderness characteristics.

Method, Protocol, Sample Design

Review 2 projects per biennium for human-caused disturbance that do not complement wilderness characteristics. Projects should be selected based on geographic overlap with recommended wilderness and the presence of management actions that may impact wilderness characteristics.

Responsible Staff Position

Recreation Program Manager

Trigger

More than 1 percent of recommended wilderness cumulatively affected. One percent of each recommended wilderness follows: Bear Wallow NW - 2 acres, Bear Wallow SE - 1 acre, Escudilla - 70 acres.

Estimated Personnel Days and Other Costs

1 day, Recreation Program Mgr. (GS-12)

Comments

Is this monitoring element still valid? Yes, to ensure wilderness characteristics are being maintained.

Community-Forest Interaction

Question 27—Cooperation with Communities

How well are the forests interacting and planning in cooperation with communities?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Conduct management reviews and review number of tribal agreements and acres of community wildfire protection plan treated. Review number of grants, agreements, and volunteers and type of resource benefit.

Indicator and Unit of Measure

Quantitative feedback through numbers of correspondences and communications with Tribes, agreements, news releases, public outreach events, community engagements, customer feedback through person-to-person contact, social media.

Method, Protocol, Sample Design

Qualitative and Quantitative assessment of how well the forests are interacting and planning in cooperation with communities. Review NEPA and NHPA documentation to assure that tribes are consulted with early and often and to assure that they have an opportunity to provide input to planned projects. Review existing tribal agreements including MOUs, MOAs, cooperative agreements, etc., to assure that they are up-to-date and are meeting Forest objectives. Review website and social media engagement. Monitor visitation numbers at district offices, and visitor centers. Monitor attendance at public meetings and the publics' responses.

- Qualitative Assessment: Assess program performance by interviewing a cross section of Apache-Sitgreaves National Forests management staff, including Forest Supervisor, Tribal Liaison, Public Affairs Officer, and Grants and Agreements Specialist, and a sampling of external community

contacts (county supervisors, members of the Natural Resource Working Group, state agency personnel). Ask for feedback re:

- How they would characterize the relationship of the forests and communities
 - Examples of increased or decreased interaction between forests and communities
 - Has there been a change in the number of agreements, partnerships, or other cooperative efforts?
 - Has there been a change in the number of interpretive opportunities?
 - Any other examples of forests-community interaction?
 - Is current forest management (processes such as field reviews, information sharing) meeting coordination needs?
- Quantitative Assessment via Social Media Insights, Google analytics, etc.

Responsible Staff Position

Public Affairs Office, Forest Archeologist and/or Tribal Liaison

Trigger

Monitoring highlights significant issues that could be addressed by modifying how the forests engage with communities, e.g. unexpected significant uptick in negative person-to-person feedback and/or social media engagements, tribal consultation, public comments, unusual drop in numbers of agreements, etc.

Estimated Annual Personnel Days and Other Costs

7 days (2-3 days to gather input and 3-4 days to evaluate, assimilate and report information) (GS-12)

Comments

Qualitative assessment tends to be subjective in nature; quantitative assessment provides more meaningful data.

Is this monitoring element still valid? Yes. The forest is required to meet legal and regulatory requirements for public engagement and government to government relations with Federally recognized Tribes, as described in 36 CFR 219.4. Relates to Strategic Objective F: Connect people to the outdoors (USDA-Forest Service, 2015).

Question 28—Interpretive Opportunities

Do the forests provide interpretive opportunities that describe natural resources and the Forest Service mission?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review number and type of interpretive programs conducted.

Indicator and Unit of Measure

Number of interpretive plans, presentations, people attending presentations

Method, Protocol, Sample Design

Review data entered into INFRA, the National Information Conservation Education (NICE) database, and annual NatureWatch report, then create internal reporting system.

Responsible Staff Position

PAO/Recreation Program Manager

Trigger

Consistent trend of decreasing number of presentations per year over 5 year period.

Estimated Annual Personnel Days and Other Costs

2 days, PAO, Recreation Program Manager

Comments

Currently only number of plans recorded in INFRA. Some information recorded in NICE, but not recently. Need to track 1) the number of interpretive plans, 2) the number of presentations, and 3) the number of people attending presentations.

Is this monitoring element still valid? Yes. Relates to Strategic Objective F: Connect people to the outdoors (USDA-Forest Service, 2015).

Question 29—Output of Goods and Services

Are outputs of goods and services being produced at a rate consistent with projections?

Monitoring Method and Indicators (from Table 12 in LMP)

Review allowable sale quantity (ASQ) compared to actual sale quantity; number of firewood permits issued; number of cords of firewood sold; tons of biomass sold; number of Christmas tree permits sold; number of livestock permitted and actual use records; and number of forest products permits issued.

Question 29a--Timber

Are outputs of [tree & wood-related] goods and services being produced at a rate consistent with projections?

Reporting Interval

5 years

Indicator and Unit of Measure

Wood volumes offered/sold/cut, as measured in CCF, cords, and tons; and wood product/tree permits issued, as total numbers sold.

Method, Protocol, Sample Design

Summarized here. See appendix B for a complete description of monitoring rationale, and detailed protocol methodology for personnel to follow. As directed in LMP Objectives (and documented in 2015 Plan Revision EIS analysis): Annual cutting average of 83,970 CCF, not to exceed 139,395 CCF any year in the first LMP decade, of industrial species/sizes (sawtimber, pulp, poles) sold and/or removed from both suitable (ASQ) and non-suitable timberlands to businesses and individuals. Up to 94,000 CCF (119,380 cords) of firewood provided annually for personal and commercial use permits. Annually offer up to 585,799 tons of biomass to markets. Annually provide an average of 5,000 Christmas tree permits.

Permits for other forest products (wildlings, cones, boughs, mushrooms, etc.) sold upon demand, with stipulations for resource protections included. See product definitions in Comments section below, and cutting volume projections in EIS Forest Products Specialist Report.

- For Fuelwood and Christmas Tree Permit Sales: These two items should be very simple to track and summarize at the SO level, using standard reports that can be generated in TIM and TSA program databases. (See appendix B)
- For Timber/Pulpwood/Biomass wood volumes: Per ASNFs 8-25-2016 Timber Volume Tracking Meeting, Forest Leadership does expect project cutting volumes to be tracked annually and monitored differently for both ASQ and Non-ASQ volumes offered and sold/cut, on both suitable timberlands and on non-suitable lands. Starting in FY2017, doing so annually will require a detailed set of steps as listed and explained clearly in appendix B.

Responsible Staff Position

Forest Silviculturist

Trigger

- If 5-year cutting volume CCF average is more than 20 percent over the ASQ/EIS projected industrial harvest average, make cutting adjustments before the end of the decade to reduce sales volumes on suitable timberlands in the last 5 years, or amend volume in the LMP before the end of the decade. (See Comments section below for rationale).
- If markets demand more industrial volume, then the Forests would have the option to consider a plan amendment to change the ASQ.
- If product demand or removal volumes are beyond capability of the land (as documented in ASNFs Plan Revision EIS planning record – see EIS Appendix A, Responses to Public Comments on the ASQ topic), or if species persistence on-site or key wildlife habitat is being impacted, or irreversible resource damages are occurring directly from product offerings in spite of mitigations implemented, then assign interdisciplinary team to reconsider product supply versus demand levels. Coordinate in year 2025 (or sooner if needed) with re-analysis of suitable timberlands to be done in Question 17.
- If numbers of fuelwood and Christmas tree permits do not meet their LMP Objectives, or if demand exceeds those numbers, then the Forests could consider changing those objectives through a plan amendment.
- If permits sold to the public lack appropriate resource protection stipulations, then notify the corresponding District Ranger about this LMP Guideline (Plan page 95).

Estimated Annual Personnel Days and Other Costs

(GS-9 Timber Resource Specialist x 2 days) + (GS-12 Silviculturist or Timber CO x 2 days)

Comments

Per the 1982 Planning Rule and FS 2400 Timber Directives used for Plan Revision ASQ modeling and calculations, commercial timber species and sizes that count as ASQ volume include: Ponderosa pine, southwestern white pine, Douglas-fir, white fir, corkbark fir, blue spruce, and Engelmann spruce, as traditional sawtimber and pulp sizes respectively: 9.0+”DBH to 6” top, and 5.0” – 8.9”DBH to 4” top. These species and sizes only count toward ASQ when they are cut from Suitable timberlands, unless they are harvested as wildfire, windthrow, or insect-disease in distinct salvage sales. All other species

and sizes not specified here may count as “biomass” when cut from suitable timberlands. All species and all sizes cut on Non-suitable lands always count as Non-ASQ volume. Tons of biomass can be converted from CCF provided on TIM reports (using the conversion factor of 1 CCF = 3.5 tons, source: R3 Measurements Specialist, based on R3 weight scale study conducted locally.) Because biomass often contains tops, limbs, and non-commercial sized trees, it was not included in this LMP’s calculation for the ASQ. (See more in appendix B.)

Is this monitoring element still valid? Yes.

Question 29b--Forage

Are outputs of [forage/range-related] goods and services being produced at a rate consistent with projections?

Reporting Interval

5 years

Indicator and Unit of Measure

Animal Unit Months (AUMs) or Head Months

Method, Protocol, Sample Design

Number of livestock permitted and/or actual use reports will be obtained from reporting database. Number of horses will be determined from aerial surveys conducted for other purposes and reported by the Forests as they are available. Rocky Mountain Elk population estimates for the Forests will be obtained by the Wildlife Program Manager as available from AZGFD. Trends in forage demand (animal unit equivalents of permitted livestock, horses, and elk) will be calculated and reported at 5-year intervals.

Responsible Staff Position

Range Program Manager; Wildlife Program Manager

Trigger

Decline in permitted AUMs or Head Months will trigger a review of ongoing range NEPA projects to identify potential causes of decline.

Estimated Annual Personnel Days and Other Costs

Every 5th year, 3 person-days for Range Program Manager, GS-12; 3 person-days for Wildlife Program Manager, 3 person-days for Forest Planner

Comments

Is this monitoring element still valid? Yes for the Multiple Use Sustained Yield Act and if we’re using as a surrogate for rangeland improvement through cultural or mechanical treatments over the planning period.

Planning and Other

Question 30—Plan Amendments

Are there changes that have resulted in unforeseen issues requiring plan amendments?

Reporting Interval

5 years

Monitoring Method and Indicators (from Table 12 in LMP)

Review the number of forest plan amendments, and conduct a content analysis on those amendments.

Indicator and Unit of Measure

Number of plan amendments, including site-specific amendments, completed because the project or activity was not consistent with a plan decision.

Method, Protocol, Sample Design

On an annual basis, request from each district and SO staff area all site-specific amendments for signed decisions within the past year.

Responsible Staff Position

Forest Planner

Trigger

If two or more projects/activities deviated from the same plan decision and required site-specific amendments, consider a forest-wide plan amendment if appropriate.

Estimated Annual Personnel Days and Other Costs

Forest Planner – GS-12 1 day to gather, evaluate, and assimilate. District and SO personnel – ½ day to locate amendments and forward (5 person-days)

Comments

As management reviews are conducted on projects/activities, forest planner should participate and review how applicable standards and guidelines have/have not been applied.

Is this monitoring element still valid? Yes. This will help ensure the Forest Plan is up to date.

Question 31—Plan Objectives

Are plan objectives being achieved?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Report completed accomplishments toward meeting plan objectives.

Indicator and Unit of Measure

Report of annual accomplishments towards meeting plan objectives. (See below)

Method, Protocol, Sample Design

On an annual basis, report how the forest has accomplished each objective using the attached form (table 1). Methodology (data source) will vary depending on topic (table 2). Forest planner will run reports and query applicable program managers for information.

Responsible Staff Position

Forest Planner

Trigger

1. For annual objectives, if there is no progress towards achieving the objective within the past year,
2. For planning period objectives, if there is no progress within 5 years of implementation of the plan,

Then, review plan objectives for relevance; review processes for tying projects to plan direction.

Estimated Annual Personnel Days and Other Costs

Forest Planner (GS-12) 3 days

Comments

Is this monitoring element still valid? Yes. This will help ensure the Forest Plan is up to date.

| PLAN SECTION | OBJ # | PAGE | OBJECTIVE TEXT | TIME TO COMPLETE | UNIT(S) | CONTACT | DATA SOURCE AND PROTOCOL | FISCAL YEAR _____ ACCOMPLISHMENTS |
|-----------------------------|-------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Overall Ecosystem Health | 1 | 17 | During the planning period, improve the condition class on at least 10 priority 6th level HUC watersheds by removing or mitigating degrading factors [2]. | Planning period | watershed | Watershed Program Manager | Gather data from annual target reporting: WTRSHD-CLS-IMP-NUM (number of watersheds moved to an improved conditions class. See the Watershed Condition Framework step F on page 21 for more information (USDA-Forest Service, 2011). | |
| Soil | 2 | 21 | Annually, enhance or restore an average of 350 acres within priority 6th level HUC watersheds, including treating the causes of State and federally designated impaired or threatened waters to improve watershed condition and water quality. | Annual | acres | Watershed Program Manager | Gather accomplishments from the Watershed Program Manager. | |
| Aquatic Habitat and Species | 3 | 26 | Annually, enhance or restore 5 to 15 miles of stream and riparian habitat to restore structure, composition, and function of physical habitat for native fisheries and riparian-dependent species. | Annual | miles | Aquatics Program Manager | Gather data from annual target reporting: HBT-ENH-STRM (miles of stream habitat restored or enhanced) | |
| Aquatic Habitat and Species | 4 | 26 | During the planning period, complete at least five projects (e.g., remove barriers, restore dewatered stream segments, or connect fragmented habitat) to provide for aquatic and riparian associated species and migratory species. | Planning period | project | Aquatics Program Manager | Gather accomplishments from Fisheries Program Manager and Forest Wildlife Biologist. | |
| Riparian Areas | 5 | 35 | Annually, move 200 to 500 acres toward desired composition, structure, and function of streams, floodplains, and riparian vegetation. | Annual | acres | Watershed Program Manager | Gather accomplishments from the Watershed Program Manager. | |
| Riparian Areas | 6 | 35 | Within the planning period, relocate, repair, improve, or decommission a minimum of 4 miles of National Forest System roads or trails that add sediment to streams, damage riparian vegetation, erode stream banks, cause gullies, and/or compact floodplain soils. | Planning period | miles | Forest Engineer | Gather accomplishments from the Forest Engineer RAR (Roads Accomplishment Report) | |
| Riparian Areas | 7 | 35 | Annually, remove an average of 2 miles of unauthorized roads or trails that add sediment to streams, damage riparian vegetation, erode stream banks, cause gullies, and/or compact floodplain soils. | Annual | miles | Forest Engineer | Gather accomplishments from the Forest Engineer NFRR – Target Accomplishment | |
| Riparian Areas | 8 | 35 | Within the planning period, enhance or restore 5 to 25 wet meadows, springs, seeps, or cienegas to proper hydrologic function and native plant and animal species composition. | Planning period | meadow/ spring/ cienega | Watershed Program Manager | Gather accomplishments from the Watershed Program Manager. | |
| Riparian Areas | 9 | 35 | Annually, work with partners to reduce animal damage to native willows and other riparian species on an average of 5 miles of riparian habitat. | Annual | miles | Wildlife Program Manager | Gather accomplishments from the Wildlife Program Manager | |
| All Forested PNVTs | 10 | 37 | Annually, treat 5,000 to 35,000 acres to reduce tree densities, restore natural fire regimes, promote species habitat and ecosystem health, reduce fire hazard, maintain desired conditions, initiate recovery from uncharacteristic disturbance, and provide forest products, leaving a desired mix of species with the range of desired densities that are resilient to changing climatic conditions. | Annual | acres | Timber, Fuels Program Managers | Gather accomplishments from the Timber Program Manager and Fuels Program Manager. | |

| PLAN SECTION | OBJ # | PAGE | OBJECTIVE TEXT | TIME TO COMPLETE | UNIT(S) | CONTACT | DATA SOURCE AND PROTOCOL | FISCAL YEAR _____ ACCOMPLISHMENTS |
|--------------------------|-------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Aspen | 11 | 51 | Aspen dominated and codominated acres within forested PNVTs, representing a range of age classes, are maintained on at least 50,000 acres during the planning period. | Planning period | acres | Timber Program Manager | Gather accomplishments from the Timber Program Manager | |
| All Woodland PNVTs | 12 | 52 | Annually, treat or maintain 5,000 to 15,000 acres to promote a highly diverse structure. | Annual | acres | Timber Program Manager | Gather accomplishments from the Timber Program Manager | |
| Grasslands | 13 | 58 | Decrease or maintain the woody canopy cover at less than 10 percent by treating up to 25,000 acres annually. | Annual | acres | Fuels Program Manager | Gather accomplishments from the Fuels Program Manager | |
| Wildlife and Rare Plants | 14 | 62 | Annually, improve wildlife connectivity by removing at least five unneeded structures (e.g., fence). | Annual | structures (2 miles of fence = 1 structure) | Fisheries, Wildlife Program Managers | Gather accomplishments from Fisheries Program Manager and Forest Wildlife Biologist. | |
| Invasive Species | 15 | 66 | Annually, contain, control, or eradicate invasive species (e.g., musk thistle, Dalmatian toadflax) on 500 to 3,500 acres. | Annual | acres | Range Program Manager | Gather data from annual target reporting: INVPLT-NXWD-FED-AC (highest priority acres treated annually for noxious weeds and invasive plants on NFS). | |
| Invasive Species | 16 | 66 | Annually, control or eradicate invasive species (e.g., tamarisk, bullfrogs) on at least 2 stream miles. | Annual | miles | Fisheries Program Manager | Gather accomplishments from Fisheries Program Manager | |
| Dispersed Recreation | 17 | 72 | Annually, rehabilitate, stabilize, revegetate, or relocate an average of five dispersed campsites to improve recreation opportunities and/or protect the environment. | Annual | campsite | Recreation Program Manager | Gather accomplishments from Recreation Program Manager | |
| Dispersed Recreation | 18 | 72 | Within the planning period, work with the AZGFD, ADOT, and other partners to provide at least 10 new wildlife viewing opportunities. | Planning period | opportunities | Wildlife Program Manager | Gather accomplishments from Wildlife Program Manager. Examples include constructed features like turnouts, platforms, bird blinds, or programs like guided hikes for school children or the public. | |
| Developed Recreation | 19 | 74 | Within the planning period, reduce the developed recreation deferred maintenance backlog at plan approval by 10 percent. | Planning period | % change in DM \$ | Recreation Program Manager | Gather accomplishments from Recreation Program Manager I-Web Recreation Site Needed Annual OM Costs (sum the deferred maintenance costs) / snap shot at beginning of plan period of deferred maintenance to compare at end of planning period | |
| Developed Recreation | 20 | 74 | Within the planning period, accessible and wildlife-resistant trash facilities should be provided in all developed sites where trash is collected. | Planning period | % of sites equipped | Recreation Program Manager | Gather accomplishments from Recreation Program Manager | |
| Motorized Opportunities | 21 | 75 | Annually, maintain at least 20 percent of the passenger vehicle and 10 percent of the high-clearance vehicle NFS roads. | Annual | % of each ML of road maintained | Forest Engineer | Gather accomplishments from annual target reporting: RD-PC-MAINT-MI (miles of passenger car system roads receiving maintenance) and MC-HC-MAINT-MI (miles of existing high clearance system roads reconstructed) Gather total number of road miles from NRM: I-Web Dashboard Report under Business Areas/Engineering/Roads – DS Mileage Summary by Maint. Level. Levels 3-5 = passenger car system, Level 2 = high clearance system Calculate % based on above. | |
| Motorized Opportunities | 22 | 75 | Annually, maintain at least 20 percent of NFS motorized trails. | Annual | % | Recreation Program Manager | Gather total number of motorized trail miles from NRM: I-Web Dashboard Report under Business Areas/Recreation/Trails – NFS Trail Miles: Motorized, Non-Motorized, Wilderness | |

| PLAN SECTION | OBJ # | PAGE | OBJECTIVE TEXT | TIME TO COMPLETE | UNIT(S) | CONTACT | DATA SOURCE AND PROTOCOL | FISCAL YEAR _____ ACCOMPLISHMENTS |
|--------------------------------------|-------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Nonmotorized Opportunities | 23 | 78 | Annually, maintain at least 20 percent of nonmotorized trails. | Annual | % | Recreation Program Manager | Gather total number of motorized trail miles from NRM: I-Web Dashboard Report under Business Areas/Recreation/Trails – NFS Trail Miles: Motorized, Non-Motorized, Wilderness | |
| National Recreation Trails | 24 | 81 | Within 5 years of plan approval, initiate the process for the regional forester to remove the NRT designation from the Escudilla trail in conformance with Forest Service Manual 2353.57 – Management of National Recreation Trails. | 5 years | qualitative update on status | Recreation Program Manager | Contact Forest Recreation Program Manager or Alpine District Ranger for status. | |
| Scenic Resources | 25 | 85 | Annually, accomplish an average of five projects to enhance scenic resources (e.g., restore grasslands and aspen, remove unnecessary fences, close and rehabilitate unneeded gravel/cinder pits). | Annual | project | Recreation Program Manager | Gather accomplishments from Recreation Program Manager | |
| Lands | 26 | 88 | Annually, survey and post on average 2 to 5 miles of unposted NFS boundary. | Annual | miles | Lands Program Manager | Gather data from annual target reporting: LND-BL-MRK-STD (miles of property line maintained to standard) | |
| Lands | 27 | 88 | Annually, maintain on average 2 to 5 miles of property boundary posting and corner monuments. | Annual | miles | Lands Program Manager | Gather data from annual target reporting: LND-BL-MRK-MAINT | |
| Lands | 28 | 88 | Annually, resolve an average of three existing trespass cases. | Annual | case | Lands Program Manager | Gather data from annual target reporting: LND-TTL-MGMT-CASES-RSLVD | |
| Cultural Resources | 29 | 90 | Every 2 years or according to Southwestern Region Heritage Program standards, National Register sites and priority cultural resources are inspected. | Biennial | inspections | Heritage Program Manager | Gather accomplishments from Heritage Program Manager | |
| Cultural Resources | 30 | 90 | During the planning period, nominate at least five eligible cultural resources for inclusion in the NRHP. | Planning period | nominations | Heritage Program Manager | Gather accomplishments from Heritage Program Manager | |
| Cultural Resources | 31 | 90 | Annually, provide a Passport in Time (PIT) or other education project to provide opportunities for the public to learn about the Apache-Sitgreaves NFs' past and cultural resources. | Annual | education projects | Heritage Program Manager | Gather data from annual target reporting: HRTG-PROG-MGD-STD (number of heritage programs managed to standard) | |
| Cultural Resources | 32 | 91 | Annually, complete a minimum of 100 acres of non-project cultural inventory to expand existing knowledge about the nature, location, and management needs of the forests' cultural resources. | Annual | acres | Heritage Program Manager | Gather accomplishments from Heritage Program Manager | |
| American Indian Rights and Interests | 33 | 93 | Over the planning period, a minimum of five MOUs are renewed or established with tribes associated with the Apache-Sitgreaves NFs. | Planning period | MOUs | Heritage Program Manager | Gather accomplishments from Heritage Program Manager | |
| Forest Products | 34 | 95 | Annually, prepare and offer up to an average of 122,000 CCF [29] from suitable timberlands resulting from sustainable harvest to provide wood products to businesses and individuals. | Annual | CCF | Timber Program Manager | Gather accomplishments from the Timber Program Manager | |
| Forest Products | 35 | 95 | Annually, provide up to 94,000 CCF (119,380 cords) of firewood for personal and commercial use. | Annual | CCF | Timber Program Manager | Gather accomplishments from the Timber Program Manager | |
| Forest Products | 36 | 95 | Annually, provide an average of 5,000 permits for Christmas trees. | Annual | permits | Timber Program Manager | Gather accomplishments from the Timber Program Manager | |

| PLAN SECTION | OBJ # | PAGE | OBJECTIVE TEXT | TIME TO COMPLETE | UNIT(S) | CONTACT | DATA SOURCE AND PROTOCOL | FISCAL YEAR _____ ACCOMPLISHMENTS |
|--------------|-------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------|---------------------------|------------------------------------------------------------|-----------------------------------|
| Water Uses | 37 | 104 | Annually, prepare at least one instream flow water rights application until water acquisition needs are complete to sustain riparian areas, fish, wildlife, and water-based recreation. | Annual | applications | Watershed Program Manager | Gather accomplishments from the Watershed Program Manager. | |

Question 32—Adoption of Standards and Guidelines

Are the standards and guidelines prescribed being incorporated in NEPA documents and implemented in projects and activities?

Reporting Interval

1 year

Monitoring Method and Indicators (from Table 12 in LMP)

Review the number of forest plan amendments and NEPA decision documents that deviate from forest plan standards and guidelines. Conduct management reviews of selected projects and activities.

Indicator and Unit of Measure

Compliance with standards and guidelines.

Method, Protocol, Sample Design

On an annual basis, review NEPA decision documents for incorporation of standards and guidelines. This review should be conducted throughout the year as the documents are prepared. Reviews of documents should be documented as they occur.

Every two years, review projects (management review) currently under implementation with the appropriate line officer to assess adherence to standards and guides (project design measures).

Responsible Staff Position

Forest NEPA Coordinator

Trigger

If initial monitoring is inconclusive or indicates a pattern of minor discrepancies between standards and guidelines and their implementation or between expected and actual results – consider additional monitoring.

If monitoring shows major discrepancies between standards and guidelines and their implementation, and/or lack of plan compliance leads to sustained objections and/or adverse judgements in lawsuits, either:

- refer to the appropriate line officer for action to ensure proper application of standards and guidelines; or
- if a particular standard or guideline is not achievable (repeated issues), consider modifying or deleting (amend the plan).

Estimated Annual Personnel Days and Other Costs

Annually: Forest Environmental Coordinator 2 days to review projects. Biennially: Additional day each for Forest Environmental Coordinator and Forest Planner

Comments

Annual review of S&Gs can be conducted during on-going SO review of NEPA projects.

Is this monitoring element still valid? Yes; plan compliance is required by law.

Question 33—Cultural Resources

What is the condition of archaeological sites and traditional cultural properties on ASNFs?

Reporting Interval

2 years

Monitoring Method and Indicators (from Table 12 in LMP)

Inventory and assessment of cultural resources from surveys conducted pre- and post- project and program monitoring; and stewardship actions taken, including preservation, stabilization, research, interpretation, partnerships, volunteer opportunities, and other forms of public outreach.

Indicator and Unit of Measure

- Total number of historic properties inspected per year
- Total number of PHAs inspected per year
- Total number of historic properties effectively managed during project implementation per year
- Total number of historic properties not effectively managed during project implementation per year
- Total number of damage assessments per year
- Total number of historic properties restored, rehabilitated, or repaired per year

Method, Protocol, Sample Design

The conditions of archaeological sites and traditional cultural properties (inclusively called “historic properties”) are obtained during monitoring. If associated with projects, historic property monitoring is conducted prior to, during, and/or after project implementation. If priority cultural assets (Priority Heritage Assets or PHAs), the conditions of these historic properties are monitored every 2-5 years. Historic property conditions associated with projects are obtained by inventory and assessment of cultural resources from associated surveys. PHAs are monitored for nationally-required heritage program targets. These targets also include stewardship actions taken, such as preservation, stabilization, research, interpretation, partnerships, volunteer opportunities, and other forms of public outreach. Historic property condition related to project implementation is first obtained by documenting base condition during initial inventory and then documenting condition during and/or after implementation. For monitoring purposes, PHA condition assessments are based off of changes over time, starting with the base condition assessment. Changes to historic property condition that negatively affect the property are addressed through stabilization/restoration programs and continued monitoring.

Historic property condition is documented by the initial site record, and then monitoring forms or site record updates. Some types of disturbances to sites documented include but are not limited to: the extent of bioturbation, cryoturbation, and erosion observed; evidence of looting and/or vandalism, mechanical disturbance, disturbances from livestock, livestock and wildlife improvements, presence of roads and trails within the site boundaries, evidence of personal or commercial fuelwood cutting within site boundaries, and evidence of fire burning through sites (all past and current).

- PHAs are monitored for condition (non-project inspections). Monitoring forms are generated to document conditions.

- Per the Region 3 Programmatic Agreement, a professional archaeologist monitors all historic properties where there is project implementation within site boundaries in order to monitor effectiveness of the site protection measures - and to be available to modify protection measures if they are not being effective. Monitoring forms are generated to document conditions.
- The project manager is responsible for monitoring the effectiveness of treatments of sites that are avoided during implementation. Forest Service Archaeologists will monitor all or a sampling of sites for effectiveness. Monitoring forms that identify any disturbances are generated to document conditions.
- Damage assessments are written and restoration measures are developed and implemented for sites that are impacted by projects or vandalism/looting. These reports are sent to the State Historic Preservation Officer and affiliated Tribes.

Data Location

National database (Currently NRM Heritage 2.0, the T drive under the Heritage 2360 Restricted folder: T:\FS\NFS\ApacheSitegreaves\Program\2300Recreation\2360HeritageRestricted), and hard copy cultural resources project and site files at the Supervisor's Office and the District offices.

Responsible Staff Position

Heritage Program Manager and Tribal Relations Program Manager

Trigger

Historic properties and PHAs are not being effectively managed to eliminate or minimize adverse effects related to project activities, vandalism, or benign neglect.

Estimated Annual Personnel Days and Other Costs

Costs incurred to comply with law, regulation and policy (not attributable to plan monitoring): dependent on the number of historic properties that need to be monitored any given year. It is also dependent on the number PHAs that require monitoring, stabilization, or rehabilitation over a given year. Extra costs related to monitoring: 5 days Forest Archeologist (GS-12) to gather and organize data and write report.

Comments

Is this monitoring element still valid? Yes. The number of historic properties that require monitoring changes every year. The number of historic properties monitored is dependent upon the type of project, the density of sites within or adjacent to the project area, and the type of implementation. For PHAs, the number of historic properties that require monitoring is based on the number of PHA monitoring reports that are going to expire any given year. Because of this, personnel days and other costs cannot be quantified with any accuracy.

References

- Air Resource Specialists, 2013. *Air quality values monitoring plan for the Apache-Sitgreaves and Gila National Forests*, s.l.: Air Resource Specialists, Inc..
- Arizona Department of Environmental Quality, 2016. *2016 Clean Water Act Assessment--Arizona's Integrated 305(b) Assessment and 303(d) Report*, Phoenix, AZ: ADEQ.
- Conklin, D. & Fairweather, M., 2010. *Dwarf mistletoes and their management in the Southwest*, Albuquerque, NM: USDA Forest Service Southwestern Region R3-FH-10-01.
- Conklin, D. et al., 2009. *White pines, blister rust, and management in the Southwest*, Albuquerque, NM: USDA-Forest Service, Southwestern Region, R3-FH-09-01.
- Hamilton, R. et al., 2013. *Multiscale landscape pattern monitoring using remote sensing: the four forest restoration initiative*, Salt Lake City, UT: USDA-Forest Service Remote Sensing Application Center RSAC-10022-RPT1.
- Lynch, A. et al., 2010. *Forest insect and disease activity on the Apache-Sitgreaves N.F. and Fort Apache Indian Reservation, 1918-2009: report for the Apache-Sitgreaves N.F./Regional Analysis Team*, Tucson, AZ and Flagstaff, AZ: USDA-Forest Service Rocky Mountain Research Station and Arizona Zone Office Forest Health Protection.
- McCune, B. & Geiser, L., 2009. *Macrolichens of the Pacific Northwest*. Corvallis, OR: Oregon State University Press.
- Page-Dumroese, D., Abbot, A. & Forest, T., 2009. *Forest Soil Disturbance Monitoring Protocol Volume I: Rapid Assessment*, s.l.: USDA-Forest Service Gen. Tec. Rep. WO-82a.
- St. Clair, L. & Leavitt, S., 2017. *Review of the original lichen air quality bio-monitoring programs and baselines in the Mount Baldy Wilderness Area (Apache National Forest, Chiricahua Wilderness Area and Galiuro Wilderness Area (Coronado National Forest), [. . .] Arizona*, Provo, UT: Unpublished report; copy on file at Apache-Sitgreaves NF Supervisor's Office.
- Triepke, F., Wahlberg, M., Muldavin, E. & Finch, D., 2014. *Assessing climate change vulnerability for ecosystems of the southwestern U.S.*, Albuquerque, NM: USDA Forest Service unpublished technical report on file..
- Triepke, J., 2016. *Climate Change Vulnerability Assessment Apache-Sitgreaves National Forests*, Albuquerque, NM: USDA-Forest Service Southwestern Region Unpublished technical report on file,.
- USDA-Forest Service, 1999. *Region 3 Supplement No. 2509.18-99-1*, s.l.: USDA-Forest Service Handbook 2509.18 Soil Management Handbook.
- USDA-Forest Service, 2011. *Watershed condition framework: a framework for assessing and tracking changes to watershed condition*, Washington, DC: USDA-Forest Service.
- USDA-Forest Service, 2013. *Technical Guidance of Soil Quality in the Southwestern Region*, s.l.: USDA-Forest Service Letter dated Jan. 16, 2013.

USDA-Forest Service, 2015. *Land Management Plan for the Apache-Sitgreaves National Forests*, Albuquerque, NM: USDA-Forest Service Region 3.

USDA-Forest Service, 2015. *Strategic Plan: FY 2015-2020*, Washington, DC: USDA-Forest Service FS-1045.

WhiteTrifaro, L., 2013. *Report on the selection of management indicator species and ecological indicators*, s.l.: USDA-Forest Service Apache-Sitgreaves National Forests.

Woodbridge, B. & Hargis, C., 2006. *Northern goshawk inventory and monitoring technical guide*, Washington, DC: USDA-Forest Service GTR WO-71.

Zachmann, L. & Dickinson, B., 2016. *Four forest restoration initiative--landscape pattern analysis*, Albuquerque, NM: USDA-Forest Service.

Appendix A. List of Abbreviations and Acronyms

| Abbreviation | Explanation |
|--------------|--------------------------------------------------------------------------------------------------------------------------|
| 4FRI | Four-Forest Restoration Initiative |
| ADEQ | Arizona Department of Environmental Quality |
| ADOT | Arizona Department of Transportation |
| ADS | Air Detection Survey (flight map of insect attacks & aspen mortality by location and severity) |
| ASNFs | Apache-Sitgreaves National Forests |
| ASQ | Allowable Sale Quantity (maximum average annual volume of commercial wood cut from suitable timberlands) |
| ATSA | Automated Timber Sale Accounting program (also called TSA) |
| AUM | Animal Unit Month |
| AZGFD | Arizona Game and Fish Department |
| BA | Basal Area (stand density in square feet per acre of tree boles) |
| BARC | Burned Area Reflectance Classification (post-fire satellite data layer of soil burn severity) |
| BMP | Best Management Practice |
| CCF | Hundred Cubic Feet (wood volume) |
| CCVA | Climate Change Vulnerability Assessment |
| COR | Contracting Officer's Representative |
| CSE | Common Stand Exam program |
| DBH | Diameter at Breast Height (4.5 ft.) |
| DC | Desired Condition |
| DMCF | Dry Mixed Conifer Forest |
| EIS | Environmental Impact Statement |
| ERU | Ecological Response Unit (equivalent to PNVT) |
| FACTS | Forest Service Activity Tracking System (part of NRM) |
| FHP | Forest Heath Protection (USFS AZ Zone entomologists, pathologists) |
| FIA | Forest Inventory and Analysis |
| FSVeg | Field Sampled Vegetation (database where CSE data is stored; part of NRM) |
| GI | Geospatial Interface (spatial features linked to FACTS and other NRM databases) |
| GIS | Geographic Information System |
| GTAC | Geospatial Technology and Applications Center (USFS) |
| HUC | Hydrologic Unit Code |
| HUDRA | High-Use Developed Recreation Area |
| INFRA | Infrastructure (database now part of NRM) |
| LEIMARS | Law Enforcement and Investigations Management Attainment Reporting System |
| LIDAR | Light Detection and Ranging (3-dimensional remote sensing) |
| LMP | Land Management Plan (the 2015 revised Forest Plan) |
| LSC | Land Suitability Class (code for timber suitability) |
| LTSYC | Long Term Sustained Yield Capacity (of suitable timberlands) |
| MIM | Multiple Indicator Monitoring (for streams) |
| MRA | Minimum Requirements Analysis |

| Abbreviation | Explanation |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 4FRI | Four-Forest Restoration Initiative |
| MSVMA | Mid-Scale Vegetation Mapping Assessment |
| NAIP | National Agriculture Imagery Program |
| NAU/ERI | Northern Arizona University Ecological Restoration Institute |
| NEPA | National Environmental Policy Act |
| NFMA | National Forest Management Act |
| NRHP | National Register of Historic Places |
| NRIS | Natural Resource Information System (database, part of NRM) |
| NRM | Natural Resource Manager (Forest Service database) |
| NRM-AqS | Natural Resource Manager Aquatic Surveys |
| NRT | National Recreation Trail |
| NVUM | National Visitor Use Monitoring |
| ORV | Off-road Vehicle |
| PAO | Public Affairs Office |
| PHA | Priority Heritage Asset |
| PJ | Piñon-Juniper |
| PNVT | Potential Natural Vegetation Type (equivalent to ERU) |
| PPF | Ponderosa Pine Forest |
| PUP | Pesticide Use Permit |
| R3 | USFS Region-3 |
| RAR | Roads Accomplishment Report |
| RAVG | Rapid Assessment of Vegetation (mapped wildfire burn severity reductions in tree stocking) |
| RMRS | Rocky Mountain Research Station (USFS) |
| RNA | Research Natural Area |
| RO | Regional Office (USFS R3) |
| RSAC | Remote Sensing Applications Center (integrated as part of GTAC) |
| RX | Prescription (prescribed cuts and/or prescribed fire) |
| SA | (Timber) Sale Administrator |
| SIL | Scenic Integrity Level |
| SIO | Scenic Integrity Objective(s) |
| SO | Supervisor's Office |
| T&E | Threatened and Endangered |
| TESPC | Threatened, Endangered, Sensitive, Proposed, Candidate (species) |
| TEUI | Terrestrial Ecological Unit Inventory |
| TIM | Timber Information Manager (FS program used to plan/assemble timber sale & stewardship contracts, and permit product plans) |
| TMR | Travel Management Rule |
| TNC | The Nature Conservancy |
| TSI | Timber Stand Improvement (pre- or non-commercial thinning) |
| VDDT | Vegetation Dynamic Development Tool (Forest Plan analysis model) |
| WFDSS | Wildfire Decision Support System |

| Abbreviation | Explanation |
|---------------------|------------------------------------|
| 4FRI | Four-Forest Restoration Initiative |
| WorkPlan | [Forest Service Budget Database] |

Appendix B. Detailed Protocol, Methods, and Notes on Selected Questions

Question 14 Stream Temperature: Background

Under the 1987 LMP continuous water/air temperature collection did not begin until the late 1990s, and was accomplished in cooperation with Trout Unlimited. This monitoring occurred in Apache and Gila Trout recovery streams, and continued until 2006. In 2011 the Wallow Fire occurred, significantly impacting large portions of the Alpine and Springerville Ranger Districts. In order to determine impacts (and recovery) as a result of the Wallow Fire, temperature loggers were purchased and monitoring began in the fall of 2012. These efforts are continuing, and have expanded to areas not impacted by the Wallow Fire; but are still limited to locations on the Alpine and Springerville Ranger Districts. While some of the current monitoring sites can provide data for monitoring of the ASNFs LMP, additional sites across the entire ASNFs will need to be added to address the intent and requirements of the LMP Monitoring Strategy (LMP Chapter 5). “Question 14” within the Monitoring Strategy (page 144 of the LMP) specifically addresses this issue, and the purpose of this document is to present the details and rationale to meet the intent and requirements of the Monitoring Strategy. “Question 14”, its monitoring methods and indicators, and the monitoring interval are presented below, and the documentation following will address these components and how they will be implemented along with the LMP for the next 10-15 years.

Considerations for Program Implementation

Appendix A (Climate Change Trends and Apache-Sitgreaves NFs Land Management Planning) of the 2015 ASNFs LMP, the Climate Change Vulnerability Assessment (Triepeke, 2017), and the ongoing temperature monitoring program were the primary considerations in the development of these guidelines to address question 14 of the LMP Monitoring Strategy. Climate change and potential ecosystem impacts on the ASNFs are considerable and discussed in detail within Appendix A of the LMP (see pages 179-214). Extended drought, extreme precipitation events, reduced snowpack and earlier snowmelt, warmer winter temperatures, and summer heat waves lasting two weeks longer than current conditions; are all projected impacts that will occur with changing climate conditions into the 21st century. If these changes occur, the potential impacts to riparian and aquatic habitats are concerns; along with additional impacts to ecological conditions and increases in invasive and non-native species. The Climate Change Vulnerability Assessment (CCVA) completed for the ASNFs determined vulnerability ratings for the ASNFs by ERUs (Ecological Response Units). Additionally, composite vulnerability categories were determined for each 6th-level watershed that occurs on the ASNFs. Considering this information along with the LMP monitoring strategy and the ongoing temperature monitoring program; monitoring sites will be necessary across the ASNFs in various locations to: address increasing air/water temperatures throughout the year and changing stream flows, compare temperature changes between subwatersheds with different vulnerability ratings, and determine if temperature changes occur in areas where mechanical treatments are implemented or wildfires occur.

It is recognized that budgets, funding, and other issues can impact the ability to accomplish the monitoring strategy and specific monitoring questions. Therefore, if necessary, methods and protocols can be modified and sampling intensity can be reduced (or increased) to address changes in funding or priorities. Additionally, sampling could be increased or focus on other issues (*e.g.*, species impacts/thresholds) if additional funding becomes available or partners/cooperators are available to

assist with monitoring and evaluation. It is also recognized that multiple-use management/activities has occurred across most of the ASNFs in the past and will continue into the future. The ability to determine changes associated with certain management activities or climate will be complicated by other factors that can occur and contribute to changes in riparian and aquatic habitats, and stream and air temperatures. Therefore, it could be necessary to adjust and modify air/water temperature data collection sites and methods/protocols as data are collected and analyzed.

Program Implementation: Site Locations

As mentioned above many (~65 water temp. sites and ~10 with air temp. sites) temperature loggers are currently in place on the Alpine and Springerville Ranger Districts, and although many of these sites were placed to monitor fire impacts and fish species impacts, some can also be used to address LMP monitoring. Of the current locations where data are being collected, sites best suited for LMP monitoring are the East, South, and West Forks of the Little Colorado River, East and West Forks of the Black River, Black River, and Bear Wallow Creek. Stream flow data are currently being collected at four locations on the ASNFs; Beaver Creek, East Fork Black River, North Fork East Fork Black River, and West Fork Black River. All four of these subwatersheds currently have water data loggers in place, but only one location (North Fork East Fork Black River) has both air and water data loggers in place. Continued monitoring at sites where stream flow data are collected will be important to determine if stream flows are declining, and how declines may impact water temperatures in conjunction with increasing air temperatures.

As stated above the composite vulnerability category for each subwatershed (194 total) on the ASNFs was determined; and the result by category was 1-low, 116-moderate, 71-high, and 6-very high. No sampling sites will be located within the low or very high subwatersheds; as they are mostly without perennial streams, consist of substantial amounts of private lands, or substantially influenced by other lands that are both Forest Service and non-Forest Service ownership. Numerous opportunities exist to evaluate changes within the moderate and high vulnerability subwatersheds; and while many existing monitoring sites occur within moderate subwatersheds, some sites will need to be added to increase the number within high vulnerability subwatersheds. Potential high vulnerability sites are listed below, and monitoring is currently occurring within the Fish Creek (Black River watershed) and West Fork Little Colorado River subwatersheds. Adding sites within Chevelon, Grant, KP, and Willow Creek subwatersheds will adequately address additional monitoring needs across the ASNFs.

Potential CCVA High Vulnerability Monitoring Sites:

1. Gentry
2. Leonard Canyon
3. Lower Willow and Upper Willow
4. Upper Chevelon Canyon
5. Alder and Upper West Chevelon Creeks
6. West Fork Little Colorado River
7. Grant and KP Creeks
8. Fish Creek (Black River watershed)

Monitoring sites will also be necessary to determine any potential impacts associated with “mechanical/wildfire treatments”. Two projects, the West Escudilla Restoration Project and the Wallow

West Landscape Prescribed Fire Project are the projects that could best fill this monitoring requirement. Many perennial streams occur in both of these project areas, and many are currently being monitored for water temperature. When specific areas are identified for treatments, if those areas are currently not being monitored; additional sites will be located where necessary. It is anticipated that 3 additional sites will be necessary for these two projects.

Lastly, some monitoring will be necessary in locations where ongoing and future management activities and impacts will be minimal or reduced compared to other areas of the ASNFs (*e.g.*, General Forest Management Area). Areas best suited for this monitoring include the Bear Wallow Wilderness, Blue Range Primitive Area, Clifton Ranger District (*i.e.*, Natural Landscape Management Areas), Escudilla Wilderness, and Mount Baldy. Adding sites within Grant and KP creeks, as discussed above, will also meet objectives for this monitoring (*i.e.*, both high vulnerability and low management impact areas). Other sites are already in place for some of these areas; Bear Wallow Creek (Bear Wallow Wilderness) and East and West Forks Little Colorado River (Mount Baldy Wilderness).

Given the discussion above, approximately 15 monitoring sites will be necessary across the ASNFs to address potential air/water temperature changes under the 2015 LMP. Specific locations for 12 sites are listed below, and the three sites yet to be identified will likely occur within the West Escudilla Restoration and/or Wallow West Landscape Prescribed Fire projects.

Air/Water LMP Long-term Temperature Monitoring Sites on the ASNFs:

1. Bear Wallow Creek
2. Beaver Creek
3. Chevelon Creek
4. East Fork Black River
5. East Fork Little Colorado River
6. Fish Creek
7. Grant Creek
8. KP Creek
9. Leonard Canyon
10. West Fork Black River
11. West Fork Little Colorado River
12. Willow Creek
13. +3 Sites to be determined

Program Implementation: Methods and Protocols

Both the methods and protocols will be the same as current monitoring efforts. Specific site locations and installation methods are dependent on site conditions. Generally, water temperature loggers are secured with aircraft cable to boulders or with duckbill anchors driven into the substrate; and the loggers are placed in a PVC housing to protect them from disturbance, and receiving any direct insolation (sunlight) that could bias temperature readings. Instream locations should be as close to the thalweg as possible, and avoid locations where the logger could be buried by substrate. Stream sites are documented with one-inch circular tags epoxied to boulders, stakes with flagging on the upper stream banks, photographs, and GPS locations. All of these are not present at all sites, but all sites at the minimum have photographs and GPS location information collected. Air temperature loggers are placed in trees in PVC cases near the site where the water temperature logger is located, and a wooden stake is placed near the tree and several photographs are taken. Temperature data loggers are programmed to collect temperature readings

every fifteen minutes, and the data are downloaded/collected once a year. The data are reviewed for any problems or errors, and stored in the NRM-AqS database. Annual reports will be prepared to document what specific monitoring has occurred for the past year; and some basic metrics can be determined at this time, but any metrics relating to trends that may occur in the data will be determined every five years in that monitoring report. Metrics will include daily and monthly summaries (e.g., minimum/maximum/mean), increases in the highest/lowest 5% of days for both summer and winter, any thresholds (e.g., days above 80 degrees for Apache Trout) established for species (will not be at all sites, and species will vary by site). Additional metrics could also be calculated as discussed in the report “Assessing Climate Change Vulnerability for Ecosystems of the Southwestern U.S. (Triepeke, et al., 2014); see page 10, table 1).

Question 18—Stand Restocking

Comments

Background/Rationale: This question can only be easily addressed at the LMP Fine and Mid-scales, due to the nature of data already being collected, and it takes over 5-10 years for established seedling growth to show any measurable tree cover visible on remote sensing imagery.

This question ties back to the LMP Standard for All Forested PNVTs on page 37: “On lands suitable for timber production, timber harvest and wildland fire intended to create openings for tree regeneration shall only be used when there is reasonable assurance of restocking within 5 years after final regeneration harvest. Restocking level is prescribed in a site specific silvicultural prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the plan area. In some instances, such as when lands are harvested or prescribed burned to create openings for firebreaks and vistas, it is appropriate not to restock.”

This LMP standard and related monitoring question came from the USFS forest planning direction to include this NFMA legal requirement for ensuring adequate and timely reforestation of final harvest treatments, such as even-aged system clearcuts and seed cuts, as well as uneven-aged system individual tree selection cuts and scattered openings created for regeneration in the group selection cutting method. Thus, restocking on acres deforested by wildfire, wind-throw, insect outbreak, etc. do not apply. But it does apply where stand openings are intentionally created by using prescribed fire for the purpose of clearing such acres to initiate a new tree age class. Technically, the 5 year restocking legal timeframe only applies to locations where the use of cuts and/or RX fire for this purpose occur just on suitable timberlands as a regulated timber production emphasis. Regeneration “failure” is rarely reported, because follow-up actions are usually scheduled to ensure eventual success.

The majority of reforestation stocking data available to monitor for this question is only collected as survival surveys in plantations. But the majority of plantations installed each year on the ASNFs since 2003 have all been done entirely on acres burned by wildfires (i.e. not from cuts or RX burns used to intentionally create conditions for a new age class). Given the overwhelming sizes of our recent mega-wildfires, the majority of seedling plantations installed and monitored for stocking success during the life of this LMP (and well-beyond) will continue to be placed on wildfire-caused acres. So data collected there does not specifically address this question as it is worded. However, to help address the climate change portion of this monitoring question, this data may need to be used anyway, as it is all we have. But that inherent bias in the data needs to be disclosed here.

Where natural regeneration occurs after wildfires (be it aspen/oak/juniper/willow sprouts, or natural conifer seedlings) the districts have only been locating enough areas to visually certify about 500 to

5,000 acres annually as “stocked” in the FACTS database, by using professional ocular judgement or very quick-measure temporary random plots not recorded. In most cases “species composition and density compared to baseline PNV” as this question states, is not being field surveyed or recorded. This work is done with very little time permitted due to much higher workload priorities, such that District Silviculturists do not have a good idea of how many more naturally-regenerated acres might exist until they have time or help to go out and look for some more sites to certify each year. Time permitting, post-burn CSE exam plot data already collected within wildfire areas should be searched in the FSveg database by District Silviculturists for evidence of natural regeneration becoming established, by species and density (trees per acre), but this work would be time-consuming.

There are several group selection cuts and some seed cuts now planned in new NEPA projects across the ASNFs. Most are designed for natural regeneration to come in from seed trees in the surrounding stand, rather than intended as plantations. We do have local evidence in most cases, that enough natural conifer (ponderosa pine) regeneration typically is established within about 15 years after final harvest to certify the new stand as stocked. Thus we often choose not to undertake very costly artificial planting prematurely. After 5 years have passed since final harvest removal, the district Silviculturist should be visiting those sites with a quick walkthrough evaluation to determine if each created opening shows some promise that natural regeneration is starting to come in. They then use professional judgement in deciding whether to certify the stand in FACTS as “stocked”, or to instead plan an RX burn for site preparation, to implement animal damage control, and/or to schedule certain scattered openings for future artificial planting. Only on planted acres would precise survival and stocking surveys be conducted. Details of these surveys are not always documented in FACTS due to workload time constraints. But they are summarized on spreadsheets submitted annually to the Regional Reforestation Coordinator.

Method, Protocol, Sample Design (continued)

FACTS “completed” dates (not “accomplished” dates) are required to know the actual year an opening cut was created on the ground. For all plantations, note if planting is planned in response to wildfire versus final harvest causal agents, by activity method of cut reported. Intentional regeneration opening creation methods include: Stand/patch/strip clearcuts; shelterwood seed cuts; stand-level individual tree selection cuts; group selection cuts; and RX fire specifically used to create regeneration openings for establishment of a new age class. Note for each stand if certified acres match created opening acreage, or are less.

Harvest cut activity “completion” date needs to be recorded by the districts in a timely manner after the activity has been done on the ground, because the FACTS “accomplished” date simply marks when a treatment contract or sale was awarded. All completed seedling plantations should also have the causal agent, tree species, trees per acre and seed lot/s planted, and survival percentages reported in those FACTS fields, especially to justify site fill-in planting scheduled for a later date, or when certified as “stocked.”

Question 19—Harvest Unit Effects

Comments

Background/Rationale:

For the LMP Mid-scale (project level): The key to focus on with this question is treatment prescriptions and strategic placement of cutting units within the Community Forest Intermix Management Area, as

well as other high-value resources/sites. (For example: Open forest/woodland canopy created next to private lands and on the south and west sides of repeater/communications sites and possibly MSO PACs/Goshawk PFAs, to help slow running crown fires from threatening such sites). This monitoring would give us mapped patterns that show meaningful trends of improvement with respect to the LMP DCs stated below, by verifying that treated cutting units will have improved the density, horizontal structure, and mosaic of woody vegetative conditions within them, and especially keyed on their location near high-value resource sites.

Results of this monitoring question could also potentially contribute to help answer Questions 5, 8, 9, 10, 22, 26, and 27. Amount of grassland acres opened up below 10% woody canopy cover (Q6) would also contribute to horizontal spatial patterns across the ASNFs.

Applicable LMP Direction:

LMP Standard (page 37) for all Forested PNVTs:

- “If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then National Forest Management Act (NFMA) requirements regarding public notification and regional forester approval shall be followed. These requirements do not apply to the size of areas harvested because of natural catastrophic conditions such as, but not limited to, fire, insect and disease attacks, or windstorms.” (Note: There is no legal limit or LMP limit on thinning harvest unit size.)

LMP DC (page 28) for ALL PNVTs at the Landscape Scale:

- “Vegetative connectivity provides for species dispersal, genetic exchange, and daily and seasonal movements across multiple spatial scales.”

LMP DCs (pages 29-30) for All PNVTs at the Mid-Scale:

- “The composition, density, structure, and mosaic of vegetative conditions reduce uncharacteristic wildfire hazard to local communities and forest ecosystems.”
- “Vegetation conditions provide hiding and thermal cover in contiguous blocks for wildlife. ...”

LMP DCs (page 113) for Community-Forest Intermix Management Area:

- “The Community-Forest Intermix Management Area is composed of smaller groups of trees that are spaced more widely than other forested areas. ...”
- “Ponderosa pine and dry mixed conifer forest structure is similar to forest-wide conditions or is composed of smaller and more widely spaced tree groups than in the general forest.”
- “Wet mixed conifer and spruce-fir forests are growing in an overall more open condition than the wet mixed conifer forest outside of the Community-Forest Intermix Management Area. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire.”

Question 29—Output of Goods and Services

Question 29a—Timber - continued

Method, Protocol, Sample Design

- For Fuelwood and Christmas Tree Permit Sales: These two items should be very simple to track and summarize at the SO level. Use the FY Quarterly report in TIM program/database filtered for “All Sales” in R3, on the ASNFs, which captures the total CCF of all types of Fuelwood permits sold (convertible Product code 07) = the “**CUTS203F**” report. Another similar quarterly report exists for the total number of all Christmas tree permits sold = the “**CUTS204R**” filtered for “All Sales” in R3 sorted by State and ASNFs as non-convertible products. If these are not available, then number of CCF (cords) of firewood sold, number of Christmas tree permits sold, and number of other forest product permits sold/issued = all are found on TSA Report #478-02 generated monthly with annual summary, and TSA Report #475-02 generated monthly/quarterly. Randomly check for appropriate resource protection stipulations being included in various permits issued to the public.
- For Timber/Pulpwood/Biomass wood volumes: Per ASNFs 8-25-2016 Timber Volume Tracking Meeting, Forest Leadership does expect project cutting volumes to be tracked annually and monitored differently for both ASQ and Non-ASQ volumes offered and sold/cut, on both suitable timberlands and on non-suitable lands. Starting in FY2017, doing so annually will require:
 - Project Silviculturists to start using the 2015 LMP Suitable Timberlands map (Plan Alternative B in GIS T:drive) during the NEPA and Silviculture prescription steps for considering stands that may need to be re-delineated for correct PNVNT and Suitability status. Transition zones (ecotones) between suitable and non-suitable lands should be looked at on-the-ground as time permits. The project Silviculturist will make a professional judgement call regarding any stand or sale cutting unit which has boundaries that include both suitable & nonsuitable lands, in order to call it all either one or the other, and will document these determinations for the district Presale (sale prep) Forester.
 - Most useful TIM reports will be used, like the “Completion of Gate 4” Timber Sale Report. A 2400-6T contract report will show all CCF of mandatory commercial sawtimber and pulpwood products & species; while a 2400-13T contract report will also show any CCF of non-commercial products and species (aspen, juniper, biomass, etc.) listed as additional but separate products offered in certain cutting units, which may or may not be mandatory for the purchaser to cut. This information is input by the Presale Forester or TMA at time of sale layout, using cruise design info and cutting unit info. Presale personnel need to become mindful of the ASQ tracking need while inputting all different product classes, species, and Land Suitability Class of the cutting unit, as these reports will be key for the SO person doing the ASQ -vs- Non-ASQ volume tracking. If sales are set up correctly in TIM gates at the start, this tracking effort will be much more simple, accurate and reliable.
 - Every Cutting unit that is input into TIM must be assigned a Timber Land Suitability Class (LSC) code as either “Suitable-Timber” = code 500, or a code for Non-Suitable. We intend to use just one standard LSC code for the “Non-Suitable-Timber” cutting units, which is code 800.

- The district Presale Foresters will also look at the Suitable Timberlands map while doing cutting unit layout. They will look for opportunities to set cutting unit boundaries totally within either the Suitable area or the Non-Suitable area. Where not practical to adjust cutting unit boundaries for this purpose, then all cutting units that have a noticeable split of acres including both categories will need a judgement call as to which single category to label it in TIM. The project Silviculturist will be consulted for this decision if it is not already noted in their prescriptions for the stands in that cutting unit.
- To keep this process as simple and quick as possible for everyone involved, ASNFs Leadership are willing to accept a somewhat inaccurate tracking system under the assumption that the discrepancies will balance out in the big picture. If we see that in a certain year our volume tracked as ASQ is approaching the LMP upper limit of 122,000 CCF, then we can go back to the maps and manually do a pro-rated split of the volume in each cutting unit, using the TIM per-acre volume for each cutting unit times the number acres determined to actually be only Suitable, thus moving the remainder into the Non-ASQ category. (If at some point the TIM database programmers should revise the database to add a percentage split option for a single cutting unit to display say 60% of the acres as Suitable and the other 40% as Non-Suit., then that option would be used.)
- In order to prevent tabulating separate volume reports from each sale individually, RO/SO TIM specialists can search existing TIM reports for any that may summarize all volume marked as "Suitable" for the entire ASNFs (Apache NF = Proclaimed Forest 021, Sitgreaves NF = Proclaimed Forest 028) for an entire fiscal year, if possible. Preferably such a report should also include all volume added by Sale Administrators during sale operations (see form FS-2400-66a TM), and also accounts for any dropped or defaulted volume if possible. If total reports for an entire forest by fiscal year are not possible, CCF industrial species/sizes harvest volumes by sale are found on TSA Report #478-02 generated monthly with annual summary, and TSA Report #475-02 generated monthly/quarterly, among other reports available.
- All wildfire-caused and insect-disease live trees or dead tree salvage volume offered/sold in separate salvage sales must have a sale name which includes the word "Salvage" in the title when input in TIM. This is needed because such volume does not count toward ASQ, per NFMA law. However, random scattered infested-infected individual trees or small groups within cutting units that are salvaged or sanitized as part of a normal restoration thinning prescription will still count toward the ASQ when they are not in a true salvage sale.
- For CCF of other products sold to citizens on wood permits from TIM product plans, the following will be assumed: sawlogs, poles, and pulp are usually "industrial species" cut from near roads and thus are most likely on suitable timberlands = contribute to ASQ. Posts and novelty wood (usually juniper, aspen, oak, locust, other) may not be industrial species, and thus do not contribute to ASQ.
- In Year 1, Forest Silviculturist and Timber Contracting Officer (CO) will develop a spreadsheet for tracking different categories of volumes derived from the procedures outlined above. Forest Timber CO and/or Timber Resource Specialist is then responsible to keep that spreadsheet current annually.

- All new ASNFS Timber/Silviculture employees, and any 4FRI personnel not very familiar with the ASNFSs, who are creating or administering cutting contracts on the ASNFSs will be informed of this mandatory process.

Comments (continued)

ATSA and TIM produce monthly volumes and permit sales reports, which can be summarized by fiscal year after the Sept. 30 reporting period closing (automated reports ready about early November).

M. Boehning and J. Drury's rationale for "Trigger" section cutting volume adjustment on suitable timberlands is an assumption that the majority of forest restoration treatments in next 10 years will be done by 4FRI, only on suitable lands (i.e., only Ponderosa pine and Mixed Conifer forest acres on slopes <40 percent), so that is where the greatest chance of over-cutting beyond decade projections is most likely to occur and could be adjusted in the second 5 years.

Appendix C. Estimated costs of monitoring by fiscal year

MONITORING COST SUMMARY, FISCAL YEARS 4-6

| QUESTION | FY2019 | FY2020 | FY2021 |
|---------------|-----------------|-----------------|-----------------|
| 1 | \$829 | \$829 | \$829 |
| 2 | \$4,559 | \$4,144 | \$4,559 |
| 3 | \$3,457 | \$3,457 | \$3,457 |
| 4 | \$414 | \$414 | \$414 |
| 5 | \$8,360 | \$8,360 | \$8,360 |
| 6 | \$0 | \$1,815 | \$0 |
| 7 | \$1,729 | \$2,557 | \$1,729 |
| 8 | \$0 | \$3,087 | \$0 |
| 9 | \$1,243 | \$1,243 | \$1,243 |
| 10 | \$1,243 | \$1,243 | \$1,243 |
| 11 | \$2,072 | \$2,072 | \$2,072 |
| 12 | \$2,072 | \$2,072 | \$2,072 |
| 13 | \$0 | \$2,101 | \$0 |
| 14 | \$6,186 | \$6,186 | \$6,186 |
| 15 | \$5,650 | \$6,893 | \$5,650 |
| 16 | \$0 | \$829 | \$0 |
| 17 | \$2,378 | \$2,378 | \$2,378 |
| 18 | \$3,601 | \$3,601 | \$3,601 |
| 19 | \$1,115 | \$3,215 | \$1,115 |
| 20 | \$0 | \$414 | \$0 |
| 21 | \$829 | \$829 | \$829 |
| 22 | \$2,072 | \$2,072 | \$2,072 |
| 23a | \$0 | \$829 | \$0 |
| 23b | \$0 | \$3,457 | \$0 |
| 24 | \$2,487 | \$0 | \$2,487 |
| 25 | \$829 | \$0 | \$829 |
| 26 | \$414 | \$0 | \$414 |
| 27 | \$0 | \$2,901 | \$0 |
| 28 | \$0 | \$829 | \$0 |
| 29a | \$1,400 | \$1,400 | \$1,400 |
| 29b | \$0 | \$3,730 | \$0 |
| 30 | \$0 | \$2,143 | \$0 |
| 31 | \$1,243 | \$1,243 | \$1,243 |
| 32 | \$1,658 | \$829 | \$1,658 |
| 33 | \$2,072 | \$2,072 | \$2,072 |
| TOTALS | \$58,049 | \$79,383 | \$58,049 |