



United States Department of Agriculture

# Monitoring Implementation Guide

## Land Management Plan for the Apache-Sitgreaves National Forests



Forest Service

Apache-Sitgreaves National Forests

May 2017



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

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## 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. Questions 3 and 7, which relate 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 should 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 reflect the current USFS system. As updates occur and data are moved, this Guide will be updated to reflect new location references.

## Organization of the Guide

This document contains a section for each of the monitoring questions found in table 12 (chapter 5) in the Forest Plan (Questions 3 and 7 have been treated together). Monitoring questions are presented within 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:

### *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*

This is the location where the data should be placed once collected. Data for certain questions are stored in program-specific locations. All monitoring data will be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData> by fiscal year and question #.

### *Responsible Staff Position*

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

### *Frequency of Evaluation*

The evaluation frequency is indicated in the Forest Plan for each monitoring question and is repeated here because sub-items may vary. The evaluation frequency (in years) should not be confused with the monitoring frequency described in the sample design. When scheduled for reporting, all Forest Plan monitoring and evaluation will be reported in the biennial monitoring and evaluation report.

### *Trigger*

What would trigger the need to consider a change to the land management plan?

### *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?

### *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*

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.

### *Data Location*

Soil disturbance and condition data will be housed in

<O:\NFS\ApacheSitgreaves\Program\2500WatershedAirMgmt\2550SoilMgmt\SO>. Annual soil disturbance monitoring reports will be located in

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q01>.

### *Responsible Staff Position*

Watershed Program Manager

### *Frequency of Evaluation*

- 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.

### *Trigger*

- Soil disturbance monitoring suggests that forest guidelines are not being met. Forest soil disturbance thresholds include a range of values, depending on management area or activity objective.
- 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

Total Cost/year: \$815.

*Comments*

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?

*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*

- 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.

ADEQ's Clean Water Act Assessment - Arizona's Integrated 305(b) Assessment and 303(d) Listing Reports will be copied to:  
<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\FiscalYear\Q02>.

#### *Responsible Staff Position*

Watershed Program Manager

#### *Frequency of Evaluation*

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 6<sup>th</sup> level HUCs every 5 years.

#### *Trigger*

- Over 30% of completed evaluations have composite National BMP Implementation and Effectiveness monitoring database ratings that are "Poor."
- Negative changes 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, - \$2,040
- ADEQ water quality biennial review - 1 person day per 2 years, - \$408
- WCF 6th Level HUC watershed condition assessment review of changes -5 person days per year, - \$2,040

Total Cost/year: \$4,488.

*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 and Ecological Indicators**

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?

*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.

**Question 3a--Riparian**

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?

*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.

***Data Location***

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q03\_07\.

***Responsible Staff Position***

Watershed, aquatics, range

***Frequency of Evaluation***

Every 5 years

***Trigger***

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***

Riparian - 5 days per year for 2 GS-11s for data collection and office; year five days would be for analysis and reporting. 10 days x \$350 is estimated to be \$3,500 per year.

Total Cost/year: \$3,500.

***Comments***

Cottonwood-willow and montane-willow PNVTs are covered under 3b, and data for that will be utilized here. A detailed user guide will be created and put in the LMP monitoring folder for this question.

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.

### **Questions 3b and 7a--Riparian**

3b. Are identified riparian ecological indicators present and fulfilling their ecological function? What is the effect of management upon habitat trends of ecological indicators (riparian) across the forests?

7a. What is the effect of management upon habitat trends of ecological indicators (riparian) across the forests?

#### ***Indicator and Unit of Measure***

- 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***

Photo Points will be used as the primary data protocol.

Three to six sites per the Riparian Ecological Indicator PNVT types will be established across the forests. Sites will be incorporated with Question 15 Temperature sites to extent feasible. At each site, a plot center will be monumented. 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. A percentage of the sites will be revisited every two years, so all sites are visited twice in a five year timeframe.

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.

#### ***Data Location***

[O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ \(FiscalYear\)\Q03\\_07\](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ (FiscalYear)\Q03_07\)

#### ***Responsible Staff Position***

Aquatics, Watershed, Timber

#### ***Frequency of Evaluation***

Annual monitoring, Summary at 5 year intervals

### *Trigger*

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*

5 days per year for 2 GS-11s for data collection and office; year five days would be for analysis and reporting. 10 days x \$350 is estimated to be \$3,500 per year.

Total Cost/year: \$3,500.

### *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. See Monitoring Method and Indicators for Question 7 below. 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. A detailed user’s guide will be created and put in the LMP monitoring folder for this question.

### **Questions 3c and 7b--Aspen**

3c. How are management activities contributing to desired conditions or affecting aspen on the forests? Is aspen (ecological indicator) present and fulfilling its ecological role? What is the effect of management upon habitat trends of ecological indicators (aspen) across the forests?

7b. What is the effect of management upon habitat trends of ecological indicators (aspen) across the forests?

### *Indicator and Unit of Measure*

- 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.
- Total acres of aerially mapped new aspen mortality.

These indicators tier to the following Plan direction:

- DC = “Aspen areas are successfully regenerating and being recruited into older and larger size classes.”
- Objective = “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.”

### *Method, Protocol, Sample Design*

Summarized here. See appendix B for a complete description of monitoring rationale, and detailed protocol methodology for field personnel to follow.

For DC monitoring purposes, a minimum of 3 age classes (from CSE plot data as described in appendix B of this document) should be present as a measurable parameter for the LMP DC:

- Trees under 6 feet tall are “regeneration”, which may or may not become persistent recruitment that will reach maturity. LMP emphasizes recruitment, not just regeneration.
- Youngest age class (6+ ft. tall to 0.9”DBH): Five years after initial regeneration, existing young aspen trees present on plots remain healthy, and numbers have increased or have not decreased by 5% from prior plot samples.
- Middle age class (1-8.9”DBH): Minimum 70 percent of aspen trees 1 to 9 inches DBH sampled have at least 40 percent live crown with minor physical damage severity rating by any damaging agent (CSE minor severity generally is <20 percent crown affected, or <50% bole circumference affected). Aspen comprises at least 50 percent of the total stand live sq. ft./acre basal area.
- Older age class (9+”DBH): At least 70 percent of acres occupied by aspen trees 9+ inches DBH or larger comprise 30 percent or more of the total stand live sq. ft./acre basal area. 40 percent or more trees sampled have at least 30 percent live crown and minor damage severity.

For LMP DC Long-term aspen retention: Mature aspen clones need a healthy future aspen recruitment range of 50 to 100 percent of the live aspen overstory present (1:2 up to 1:1 replacement ratio) on the same occupied acres.

For LMP Objective: Five-year R3 midscale vegetation mapping assessment (MSVMA) of forest-wide aspen dominance-codominance acreages will be used if available. If subsequent MSVMAs are not available, then use the other data sources and methods described in appendix B.

### *Data Location*

CSE plot data in FS Veg Spatial database, and aspen plot list and location maps in

O:\NFS\ApacheSitgreaves\Program\2400TimberMgmt\SO\2470SilvPractices\2470\_silviculture\Aspen\CSE Aspen Monitor Plots; FHP aspen mortality maps in GIS T:drive; FACTS/spatial database for treatment units and burn boundaries; project NEPA design and Silviculture prescriptions, burn plans from NEPA Coordinator or O:drive 1900 files. Request copies of AZGFD photos and store in same FS monitoring folder named below. LMP Monitoring Results to be written and summarized as they are interpreted, and kept filed in

[\(FiscalYear\)\Q03\\_07\.](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)

### *Partnerships*

- USFS AZ Zone Forest Health Protection Specialists – Annual aerial detection survey (ADS) mapping of visible aspen insect-disease agents/locations and aspen mortality acres.
- Western Aspen Alliance/Utah State University (Dr. Paul Rogers) – Advice for data interpretation and possible grant funding opportunities to help pay for plot revisit costs, volunteers, etc.
- Arizona Game and Fish Department—Aspen photo points.
- 4FRI Monitoring Coordinator – see appendix B.
- USFS Rocky Mtn. Research Station (Warren K. Moser, Research Forester) – Coordination for Corduroy Research Natural Area proposed in LMP.



### *Responsible Staff Position*

Staff officer in charge of Silviculture/Timber/Fuels program, assisted primarily by Forest Silviculturist and GIS. Possibly some assistance from Forest Wildlife Biologist, and/or Fuels Specialist.

### *Frequency of Evaluation*

See appendix B for more detailed explanation.

Year 1 (one time only): This work is already funded/approved in WorkPlan for FY17. District Silviculture personnel to finalize plot monumentation, records and maps. Forest Silviculturist to reduce plots down to a range of 75 to 100 permanent plots and stratify with GIS assistance. Forest Silviculturist will also coordinate with R3 FSVeg specialist to extract stand-level plots into individual stand-alone plot data (assumed to be funded as part of that RO specialist's normal work responsibilities).

Annually starting in 2018: As described above and more fully in appendix B, Forest Silviculturist to: Oversee CSE task order to revisit 15-20 plots each year; review FHP (ADS) mapped acres of aspen mortality across ASNFs; review samples of NEPA project-level design, prescriptions and implementation, as part of normal job duties; collect field photo point data from AZGFD, if available.

Every 5 years: Forest Silviculturist to review, analyze and summarize trends of annual data collected. Review MSVMA for changes in the aspen dominance/codominance acreage, if/when provided by R3.

### *Trigger*

- Loss of more than 5,000 acres (10 percent) of aspen dominated/codominated forest in 5 years across the ASNFs, due to any cause except wildfire (from MSVMA or FHP ADS mapped acres).
- Healthy aspen recruitment numbers drop below the measurable indicators stated above 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. Possibly also modify or add to Management Approach sections in LMP for aspen, forested PNVTs, fire management, range management, terrestrial wildlife, recreation, or others as appropriate.

### *Estimated Annual Personnel Days and Other Costs*

All field plot monumentation supplies are already purchased and in storage for use by districts and/or SO. See appendix B for details of costs displayed here.

Year 1 Only: (2 days GS-9 GIS support) + (3 days GS-11 Forest Silviculturist time) = in addition to days already funded for LMP aspen monitoring in WorkPlan for FY17 (\$1,582)

Annually thereafter: (1 day GS-9 GIS support) (\$281) + (Exam Contract cost range for 15-20 plots = \$1,125 – \$1,500) + (5 days GS-12 Silviculturist contract task order prep/inspect/admin.) (\$2,038) + (3 days GS-12 Silviculturist time other tasks) (\$1,223).

If desire cross-functional training, meet with cooperators/volunteers = 3 extra GS-12 Silviculturist days. (Grant application writing = extra time/cost not included here.)

Every 5<sup>th</sup> year: (Total Annual cost) + (5 additional days GS-12 Silviculturist time for data interpretation of 75-100 plots, maps, MSVMA aspen acres, & writing summary report) (\$2,038).

Total Cost/year (excluding first-year costs): \$5,450.

#### *Comments*

(See also comment under Questions 3b and 7a above; further content in appendix B.)

Is this monitoring element still valid? Yes. (See further content in appendix B)

### 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?

#### *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 and Leavitt 2015 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 also available at <http://views.cira.colostate.edu/fed/>.*

Monitoring data will be stored at:

[\(FiscalYear\)\Q04\).](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)

#### *Responsible Staff Position*

Watershed Air Program

#### *Frequency of Evaluation*

- Review ADEQ IMPROVE reports or analyze data internally every 5 years.
- Review available Lichen monitoring reports every 5 years.

#### *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 per year, - \$408.

Total Cost/year: \$408.

***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?

***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 would 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.

**Data Location**

[\(FiscalYear\)\Q05\).](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData)

**Responsible Staff Position**

Wildlife, Fisheries

**Frequency of Evaluation**

Annually on selected newly implemented and ongoing activities

**Trigger**

If LMP BO terms and conditions are not met, determine whether or not it is due to management actions. 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. \$2,515)

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

Total Cost/year = \$8,221.

**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?

**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), or Google Earth. 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 increases 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.

If needed as a result of project-level field analysis used to determine true grasslands (rather than woodland or PJ savanna), adjust LMP's PNVT map of grassland boundaries as verified by each project's Soils Scientist, Range Specialist, or project Silviculturist. Add such areas to the sampling set as appropriate. If ASNFs updated TEUI survey is published during the life of this LMP, use that information to help adjust grassland boundaries.

### *Data Location*

PNVT maps from LMP Planning Record and wildfire perimeters in GIS T:drive. Grassland PNVT boundary adjustments (if any) made in project-level NEPA filed in GIS T:drive. Treatment area polygons in FACTS spatial database. Store list of chosen polygons, copies of maps, copies of imagery and other analysis tools used, analysis notes, and summary conclusions in <O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q06\.

### *Responsible Staff Position*

Staff officer in charge of Silviculture/Timber/Fuels program assisted primarily by Forest GIS Specialist, with some input from Forest Silviculturist, and possibly Soils, Range, or Fuels Specialists on occasion.

### *Frequency of Evaluation*

Every 5 years

### *Trigger*

If in each 5 year period, no net gain of woody encroachment reduction/maintenance is shown across the total sampled acreage (i.e., if activities on treated acres are not keeping up with new encroachment that

is growing into recently treated areas and/or canopy cover increasing on untreated areas), 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.

#### *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 5<sup>th</sup> year: (2 days GS-9 GIS time) + (2 days GS-12 Silviculturist time) + (1 day GS-12 Soil Scientist time).

Total Cost/year (excluding first-year costs): \$1,785.

#### *Comments*

The first sentence in this question can be addressed by monitoring data collected for forest and woodland PNVTs in Questions 3, 5, 7, 8, 13, 18, 31, and 32. Woody encroachment into true grasslands is the key issue for the second sentence to be addressed here in Question 6. This approach is essentially a GIS/remote sensing exercise to keep it economical. It would not necessarily require new MSVMA canopy cover data from R3 as there is no need in this case for tree size classes or vertical canopy layers.

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. Questions 8 and 13 can cover changes in successional/structural states in the forest and woodland PNVTs. This monitoring question is essentially asking “How much of our grasslands are still departed from their Plan DCs?” And it uses woody encroachment as the surrogate measure 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. Grassland restoration may also be inferred from results of pronghorn/habitat monitoring Questions 11 and 12.

(See further content in appendix B.)

### Question 7—Ecological Indicators

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

#### *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.

#### *Comments*

This question has been combined in this Guide with Question 3, although it remains a separate question in the Plan Monitoring Strategy.

## Question 8—Old Growth

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

### *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:

- “Old growth is dynamic in nature and occurs in well-distributed patches that spatially shift 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.”
- “...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 forests.”
- “Where current forests are lacking proportional representation of late seral states and species composition on a landscape scale, old growth characteristics should be retained or encouraged to the greatest extent possible within the scope of meeting other desired conditions (e.g., reduce impacts from insects and disease, reduce the threat of uncharacteristic wildfire).”
- Ponderosa Pine & Dry Mixed Conifer “Old growth occurs throughout the landscape, in small, discontinuous areas consisting of clumps of old trees, or occasionally individual old trees. Other old growth components are also present including dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).”
- Piñon-Juniper - Savanna Woodland “Old growth occurs in isolated locations scattered throughout the landscape, as individual old trees or as clumps of old trees. Other old growth components may also be present including dead trees (snags), downed wood (coarse woody debris), and/or structural diversity.”
- Piñon-Juniper - Persistent Woodland “Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).”

### *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 must 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). Review the Old/Large Tree implementation plans being incorporated into project NEPA designs for adequacy at the LMP's Fine and Mid-scale DCs.

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.

LMP Monitoring Results should be written and summarized as they are interpreted, and kept filed in <O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q08>.

#### *Responsible Staff Position*

Staff officer in charge of Silviculture/Timber/Fuels program, assisted by R3 Geometronics, SO GIS Specialist, Forest Silviculturist, maybe Forest Fuels Specialist.

#### *Frequency of Evaluation*

Summarized and evaluated every 5 years to detect late-successional state acreage losses, and/or shifts into other vegetation structural states (defined in LMP Appendix B). After 10-15 years look for acres of medium-diameter states grown into the large-very large diameter states.

#### *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 (LMP Mid- and Fine scales) 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 not met or not well prioritized for strategic placement) may have contributed to losses (could tie in with Question 19 results).

#### *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).

Total Cost: \$0 in most years: \$3,035 only in years when new MSVMA data are provided by R3.

#### *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/sister 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 Questions 6 and 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.

(See further content in appendix B.)

## Question 9—Focal Species: Mexican Spotted Owl

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

### *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 located here:

O:\NFS\ApacheSitgreaves\Program\2600WildlifeMgmt\SO\2670WildlifeTES\2670\_tes\_plants\_and\_animals\2670-6\_species\birds2\MSO\Master\_MSO.

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

For monitoring purposes, data will be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q09>.

*Responsible Staff Position*

Forest Wildlife Program Manager

*Frequency of Evaluation*

Annually

*Trigger*

If biologists detect declines in occupancy of protected activity centers, 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.

Total Cost/year: \$1,223.

*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?

*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. Examine occupancy of post-fledging areas with a survey history in ponderosa pine PNVTs.

No specific sample design is required.

*Data Location*

The Forest Wildlife Program Manager and wildlife biologists will annually update a summary table located here:

O:\NFS\ApacheSitgreaves\Program\2600WildlifeMgmt\SO\2600\_general\birds\northern\_goshawk\District\_goshawk\_spreadsheets

Additionally, wildlife biologists will enter spatial data into NRM Wildlife.

For monitoring purposes, data will be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q10>.

*Responsible Staff Position*

Forest Wildlife Program Manager

*Frequency of Evaluation*

Annually

*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.

Total Cost/year: \$1,223.

*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?

*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](mailto:rlangley@azgfd.gov).

Annually, ASNFs will send Mr. Langley updated GIS (.shp) files of implemented project boundaries by July 15<sup>th</sup> 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 1<sup>st</sup>.

*Sample Design*

No sample design required.

**Data Location**

[O:\NFS\ApacheSitgreaves\Program\2600WildlifeMgmt\SO\2600\\_general\mammals\pronghorn\FocalSpecies](O:\NFS\ApacheSitgreaves\Program\2600WildlifeMgmt\SO\2600_general\mammals\pronghorn\FocalSpecies). Here, biologists will store raw data spreadsheets, annual performance reports for Federal Aid, final map products, and summaries interpreting the data.

For monitoring purposes, data will be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q11>. Information at this location are final map products and summaries interpreting the data.

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

**Frequency of Evaluation**

Annually

**Trigger**

If contraction of geographic distribution occurs for several years, AZGFD and the Forest Service will collaborate to identify potential causative factor 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.

Total Cost/year: \$2,038.

**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?

**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. The desired conditions of interest for this indicator are those at the fine scale level as stated on page 58 of the Plan that focus on grassland health. These desired conditions describe ungrazed vegetation height and the ability of cool season grasses and forbs to provide forage while shrubs provide cover during the pronghorn fawning period.

***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](mailto:rlangley@azgfd.gov).

Annually, ASNFs will send Mr. Langley updated GIS (.shp) files of implemented project boundaries by July 15<sup>th</sup> 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 1<sup>st</sup>.

No sample design required.

***Data Location***

O:\NFS\ApacheSitgreaves\Program\2600WildlifeMgmt\SO\2600\_general\mammals\pronghorn\FocalSpecies

For monitoring purposes, data will be stored at:

[\(O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\)](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)(FiscalYear)\Q12).

Map data and products will be stored here:

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

***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 how Forest Service management could help improve grassland habitat. AZGFD and the ASNFs will work together to determine whether to exclude other potential causes for decline such as inadequate rain in the spring that results in growth of vegetation used as forage and hiding cover in summer.

***Estimated Annual Personnel Days and Other Costs***

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

Total Cost/year: \$2,038.

***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?

### *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 stored in the Geospatial Reference Library (currently on the “T” drive). LMP Monitoring Results should be written and summarized as they are interpreted, and kept filed in:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q13\.

### *Responsible Staff Position*

Staff officer in charge of Silviculture/Timber/Fuels program, assisted by R3 Geometronics, SO GIS Specialist, Forest Silviculturist, maybe Forest Fuels Specialist.

### *Frequency of Evaluation*

Summarized and evaluated every 5 years to detect acreage losses, ingrowth, and/or shifts into, or out of, other vegetation structural states (as defined in LMP Appendix B).

### *Trigger*

After 5 years, more than 10% shift away from (instead of toward) desired total balance of the early- and mid-successional vegetation state percentages in LMP Appendix B overstory bar charts (i.e. uneven-aged structure and size-class distribution). 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.

If triggered, conduct more intensive investigation at the project-level (LMP Mid- and Fine scales) to determine if LMP DCs, Standards and Guidelines for restoration of forest/woodland spatial patterns, structural arrangement, and age/size class distribution need better clarification for district interdisciplinary team specialists; or if LMP annual treatment acreage objective is not being met in a timely manner (ties in with Question 31.)

### *Estimated Annual Personnel Days and Other Costs*

Time to evaluate/summarize MSVMA data just for the early- and mid-successional vegetation states for just 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)

Total Cost: \$0 in most years; \$2,066 only in years when new MSVMA data are provided by R3.

### *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. Like questions 3, 6, 8, and 19, 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.

(See further content in appendix B.)

## 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?

### *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. 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/wildfire treatments”. Approximately 15 sites will occur across the ASNFs, and some could have more than one of the selection criteria present within the site being evaluated.

### *Data Location*

USDA Forest Service NRM-AqS database, O/T drives (2630 Fish Habitat)

For monitoring purposes, data will be stored at:

[\(O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\)](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)(FiscalYear)\Q14).

### *Responsible Staff Position*

Aquatics Program Manager, Fisheries

### *Frequency of Evaluation*

Every 5 years

### *Trigger*

If trend is increasing in 50% or more of the sites being monitored. 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 at a total cost of approximately \$5,250 (15x350). Equipment, supplies, and miscellaneous costs are approximately \$1,000 per year.

Total Cost/year: \$6,250.

### *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 (~5 years) 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?

#### *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 in T: Drive or from regional Forest Service website. Annual FHP summary reports and project-specific FHP reports obtained as received and filed in

O:\NFS\ApacheSitgreaves\Program\3400ForestHealthProtection\3410DetectionMonitoringEvaluation\(\fiscal year).

Plan Monitoring Results should be written and summarized as they are interpreted, and kept filed in [O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\\(\FiscalYear\)\Q15](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\(\FiscalYear)\Q15).

#### *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.

### *Frequency of Evaluation*

FHP aerial detection survey and other data collected and mapped annually, forest-wide. Annually check for FHP monitoring plot info, project-level FHP field visit data documented in reports, CSE stand exam data, as available. Study data and summarize trends every 3-5 years. Reporting frequency is every 5 years.

### *Trigger/s*

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*

FHP aerial detection surveys/maps, ground visits, insect trapping/monitoring programs, and project evaluation reports are done annually at no cost to ASNFs. Use FIA plot data and stand exams collected for projects and 4FRI monitoring if available, at minimal cost to us. Some FHP monitoring dollars are available annually with proposals submitted by Forest Silviculturist (currently tied to Western Bark Beetle Initiative and other regional/national forest health priorities). Forest Silviculturist days are minimal because some of this work is part of normal annual job responsibility as ASNFs Forest Health Coordinator.

Annually: (GS-12 Silviculturist x 6 days) + (GS-9 GIS x 3 days) + (GS-7 Harvest Inspector x 1 day) = \$3,518

Every 5<sup>th</sup> year: (GS-12 Silviculturist x 3 days) = \$1,223

Total Cost/year: \$3,763.

### *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?

*Indicator and Unit of Measure*

Noxious or invasive species Pesticide Use Permits (PUPS) indicating specific target pest, pesticide name, and number of acres to be treated. Method, Protocol, Sample Design

Summarize annual PUPS comparing the number of PUPS, target pest, and number of acres to be treated.

*Data Location*

PUPS will be stored on the O drive at the following file paths:

<O:\NFS\ApacheSitgreaves\Program\2900InvasiveSpecies\SO\Forest PUPS>

<O:\NFS\ApacheSitgreaves\Program\2900InvasiveSpecies\SO\ADOT>

Invasive plant reports will be stored in the [TESP/IS application](#), part of the NRM database.

For the purpose of monitoring, data will be stored in:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q15>.

*Responsible Staff Position*

Range, Ecology, Noxious/Invasive Plant Species Coordinator

*Frequency of Evaluation*

Every 5 years

*Trigger*

A trend of increasing acres 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.

Total Cost/year: \$1,223.

*Comments*

Is this monitoring element still valid? Comparison of PUPS over time should provide an indication of whether the invasive species populations are changing substantially. Spatial data for new infestations

are not currently available. 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?

#### *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.

#### *Data Location*

Data and maps will be gathered by Forest Silviculturist, GIS Specialist, and the Range Program Manager for Questions 15a and 15b, will be provided to Forest Planner for Climate Change portion of analysis. Monitoring data will be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q15\.

#### *Responsible Staff Position*

Planning, Timber, Range

#### *Frequency of Evaluation*

Observations will be documented on a 5-year return interval. Reliable conclusions regarding climate changes will not be possible on such a short interval.

#### *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.

Total Cost/year: \$816

### *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.

### **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?

### *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*

Climate Change Vulnerability Assessments are currently scheduled to be updated on a 5-year cycle. The draft ASNFs CCVA was provided to the forests in January, 2016. Vulnerability is presented for ERUs, at the "local scale" (groups of 6<sup>th</sup> Level HUCs), and at the 6<sup>th</sup> Level HUC sub-watershed scale in tabular form. Vulnerability levels are: Low, Moderate, High, and Very High. Changes to these levels in subsequent iterations of the CCVA are the indicator.

### *Method, Protocol, Sample Design*

Weighted indices which reflect acreage of sub-watersheds and local scale units will be used to calculate overall change in climate change vulnerability at 5-year intervals. Additionally, per-ERU changes will be noted.

### *Data Location*

CCVA reports will be produced by the R3 Office and stored on the O drive or its successor. Summary statistics will also be stored here.

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q16>.

### *Responsible Staff Position*

Forest Planner will be responsible for generating summary statistics and reports.

### *Frequency of Evaluation*

Every 5 years

### *Trigger*

A 5% change in the total area increasing 1 or more vulnerability categories (i.e. Low to Moderate, Moderate to High, etc.) should trigger an examination of planned harvests and other vegetation treatments in areas where the increases occur.

### *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.

Total Cost/year: \$163.

### *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, 2016). Increases in the areal extent of high and very high vulnerability may indicate areas on the forests where vegetation manipulation or fire may result in type conversion.

## Question 17—Timber Suitability

Has timber suitability classification changed on any forests' lands?

### *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 filed on ASNFs T:drive.

Stand exam data in FSVeg-spatial database. Soils field checklist reported to soils scientist, and soils data stored in O:drive\NFS\ApacheSitgreaves\Program\2550\LMPmonitoring\SuitableTimberlandReanalysis.

Plan monitoring results, copies of all relevant 2015 LMP planning record documents, and maps of the timber suitability analysis criteria and procedures used should be filed in:

[O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ \(FiscalYear\)\Q17](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ (FiscalYear)\Q17).

#### *Responsible Staff Position*

Staff officer in charge of Timber/Silviculture program, assisted by Forest Silviculturist, Soils Scientist, and SO GIS Specialist.



### *Frequency of Evaluation*

Annually review areas where known changes have occurred. By law, reanalyze timber suitability every 10 years. Do sooner if major site disturbances occur that clearly affect soil productivity and/or reforestation potential on more acres than the trigger point.

### *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-12 Soils Scientist x 2 days) + (GS-12 Silviculturist x 2 days) + (GS-9 GIS x 3 days) = \$2,473 annual subtotal

[Without updated TEUI surveys, costs to Forests for this item would be substantially higher.]

Total Cost/year: \$2,473.

### *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?

### *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.

More content is in appendix B.

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 district personnel inputting reforestation records in FACTS correctly understand how this forest-wide report tracks the needs, based on proper use of FACTS-IDs and Subunit IDs, and site productivity classes.

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 1<sup>st</sup>/3<sup>rd</sup> 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 info in a summary report and share with Climate Change Coordinator. Create a spreadsheet to organize and document all pertinent info 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.

#### *Data Location*

FACTS tabular and FACTS spatial databases. Copies of plantation prescriptions and survival surveys from the Silviculturists’ district files. Forest Silviculturist’s annual forest-wide Reforestation Needs reports filed in

O:\NFS\ApacheSitgreaves\Program\2400TimberMgmt\SO\2470SilvPractices\2470\_silviculture\Reforest-TSI\_NeedsTracking.

Plan Monitoring Results should be written and summarized as they are interpreted, and kept filed in [O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ \(FiscalYear\)\Q18](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\ (FiscalYear)\Q18).

**Responsible Staff Position**

Staff officer in charge of Silviculture/Timber/Fuels program, assisted primarily by Forest Silviculturist, SO GIS Specialist, Climate Change Coordinator, and occasionally the Forest Fuels Specialist.

**Frequency of Evaluation**

Annually, for all natural regeneration sites at the 5-year post-final-harvest or post-fire-created opening timeframe. Annually for all plantations completed and/or surveyed for survival/stocking. Interpret findings, summarize and write report every 5 years.

**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)

Total Cost/year: 3,542.

**Comments**

Is this monitoring element still valid? Yes. Required by NFMA and 1982 planning rule directives, as clarified in appendix B rationale. This element was also chosen by ASNFs Planner to contribute toward compliance with 2012 planning rule for climate vulnerability monitoring.

**Question 19—Harvest Unit Effects**

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

**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 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***

- Data and SO summaries of Monitoring Question 13 from new MSVMA stored in SO's GIS and Forest LMP Monitoring Folder.
- Harvest/thinning unit sizes, shapes in FACTS-spatial databases, by method of cut and completed date.
- NEPA project final documents and maps stored in 1900 file designation by project name, or request from district NEPA coordinator or project specialists.
- Silviculture prescriptions on file in Pre-Sale Forester's package or obtain file location directly from project Silviculturist.
- Project-level implementation monitoring records (Silviculturist's field notes of field checks done on marking crew quality of prescription application, sale administration/harvest inspection records of contractor DxP or DxD compliance with contract requirements, etc.) should be available on request from district personnel.

LMP Monitoring Results should be written and summarized as they are interpreted, and kept filed in:

[O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\\(\FiscalYear\)\Q19\](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\(\FiscalYear)\Q19\)

***Responsible Staff Position***

Staff officer in charge of Silviculture/Timber program, assisted primarily by Forest Silviculturist, SO GIS specialist, and RO Geometronics personnel (for MSVMA).

***Frequency of Evaluation***

Annually: Query method of cut reported by cutting unit and unit location/shape from FACTS spatial database; do sample reviews of project final NEPA documents, maps, and detailed Silviculture prescriptions; request project implementation monitoring records as available; ask 4FRI Monitoring Coordinator if any spatial analysis has been done for our project areas or larger scales which could possibly be obtained at no cost to the ASNFs. Every 5 years summarize the information collected annually, and summarize any new R3 MSVMA canopy cover class data.

### *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 5<sup>th</sup> 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) Subtotal=\$1,096.

Each 5<sup>th</sup> year to analyze/summarize data: (GS-9 GIS Specialist x 3 days) + (GS-12 Silviculturist x 3 days). If 5-yr. MSVMA data is not available, then GIS time would only be 2 days in 5<sup>th</sup> years. Subtotal 5<sup>th</sup> yr. cost=\$2,066.

Total Cost/year: \$1,509.

### *Comments*

See appendix B for applicable LMP Direction.

See 4FRI monitoring publications available with respect to this subject (filed with this Monitoring Guide in same O:drive folder) and 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 (LMP Mid-scale DCs) “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.

(See further content in appendix B.)

## **Managed Recreation**

### **Question 20—Recreational Opportunities**

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

#### *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/>

Monitoring data to be stored at:

[\(FiscalYear\)\Q20\).](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData)

**Responsible Staff Position**

Recreation Program Manager

**Frequency of Evaluation**

Every 5 years - tied to NVUM survey

**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 5<sup>th</sup> year

Total Cost/year: \$82.

**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?

**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**

This question will focus on law-enforcement activity and incident reports: number/type/location of violation notices/citations/warnings/incident reports for resource damage, campfires, dumping, littering, unauthorized construction. Some noxious weed information can be obtained from Pesticide

Use Proposals. Available information, such as total acres treated, will be extracted from target reporting in the database of record.

***Method, Protocol, Sample Design***

Review of LEIMARS data; Review PUPs which include HUDRA Management Area; Review selected trail condition surveys. PUPs do not contain acreage but will be modified to include whether HUDRAs were included in the treatments.

***Data Location***

LEIMARS, herbicide treatment database of record.

Monitoring data to be stored at:

[\(FiscalYear\)\Q21\).](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)

***Responsible Staff Position***

Recreation Program Manager, Range Program Manager

***Frequency of Evaluation***

Annually

***Trigger***

New trends (technology or impacts to resources) or otherwise unexplained 10 percent increase in violations triggers an examination of plan direction which relates to recreational use.

***Estimated Personnel Days and Other Costs***

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

Total Cost/year: \$815.

***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?

***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.

**Data Location**

Data will be generated and stored in O:\NFS. . .\2300recreation\SO\

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q22\.

**Responsible Staff Position**

Recreation Program Manager

**Frequency of Evaluation**

Every 2 years

**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 Mgr.

Total Cost/year = \$1,019.

**Comments**

Is this monitoring element still valid? Yes. Monitoring can ensure consideration of scenic values are met.

**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?

**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.

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\>(FiscalYear)\Q23\.

**Responsible Staff Position**

Recreation Program Manager and Engineering

**Frequency of Evaluation**

Every 5 years

**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)

Total Cost/year: \$163.

**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?

**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.

**Data Location**

O:\NFS\ApacheSitgreaves\Program\7700TravelMgmt\7730OperationMaintenance\SO\Road Maintenance Planning/ (appropriate FY folder)

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\>(FiscalYear)\Q23\.

**Responsible Staff Position**

Engineering, Roads Manager

**Frequency of Evaluation**

Every 5 years

**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.

Total Cost/year: \$815.

**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?

**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.

**Data Location**

Data will be generated and stored in O:\NFS\ . . \2300recreation\SO\

Monitoring data to be stored at:

[\(FiscalYear\)\Q24.](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData)

**Responsible Staff Position**

Recreation Program Manager, Watershed Program Manager

**Frequency of Evaluation**

Every 2 years, subject to availability of relevant projects.

**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) + Watershed Program Mgr. (GS-12)

Total Cost/year: \$1,223.

**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?

**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

**Method, Protocol, Sample Design**

Gather completed MRA documents and review.

**Data Location**

Monitoring data to be stored at:

[O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\ \(FiscalYear\)\Q25\](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\ (FiscalYear)\Q25\)

**Responsible Staff Position**

Recreation Program Manager

**Frequency of Evaluation**

Every 2 years

**Trigger**

If more that 1 percent of each of wilderness or primitive area 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.

*Estimated Personnel Days and Other Costs*

2 days Recreation Program Manager (GS-12)

Total Cost/year = \$408.

*Comments*

Trammeling is defined as “modern human activities or actions that control or manipulate the components or processes of ecological systems inside the wilderness.” Monitoring of ongoing activities and projects to protect defined values and characteristics. Forest will be defining wilderness values and character for three designated wilderness and one primitive area in 2017.

The indicator and trigger 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, to ensure wilderness and primitive area characteristics and values are being maintained.

**Question 26—Recommended Wilderness Management**

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

*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 projects for human-caused disturbance that do not complement wilderness characteristics.

*Data Location*

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q26\.

*Responsible Staff Position*

Recreation Program Manager

*Frequency of Evaluation*

Every 2 years

*Trigger*

More that 1 percent of each 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).

Total Cost/year: \$204.

### 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?

#### *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 via 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.

#### *Data Location*

Monitoring data to be stored at:

[O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\\(\FiscalYear\)\Q27\](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\(\FiscalYear)\Q27\)

***Responsible Staff Position***

Public Affairs Office, Forest Archeologist and/or Tribal Liaison

***Frequency of Evaluation***

Annual data collection; (reported every 5 years per plan p. 146)

***Trigger***

Does the monitoring highlight significant issues that could be addressed by amending the plan 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)

Total Cost/year: \$2,853

***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?

***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.

***Data Location***

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q28\.

***Responsible Staff Position***

PAO/Recreation Program Manager

***Frequency of Evaluation***

Every 2 years

**Trigger**

Consistent trend of decreasing number of presentations per year over 8 year period.

**Estimated Annual Personnel Days and Other Costs**

2 days, PAO, Recreation Program Manager

Total Cost/year: \$408.

**Comments**

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

**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.

#### *Data Location*

Annual ASNFs and 4FRI harvest status spreadsheets/reports to be stored on O:drive (backup copies to be kept on file in Supervisor's Office Timber Resources office folders). ATSA/TIM reports kept on paper in Sale folders and electronically in ASNFs

O:drive\NFS\ApacheSitgreaves\Program\2400TimberMgmt\SO\TSA Reports.

Monitoring data to be stored at:

[\(FiscalYear\)\Q29\">O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData)

#### *Responsible Staff Position*

Staff officer in charge of Timber program, with assistance from Forest Timber CO, Forest Silviculturist, and Timber Resource Specialist (ATSA-TIM accounting skills).

#### *Frequency of Evaluation*

Annually query and record in spreadsheet format all ASQ volumes offered/sold and cut, as well as Non-ASQ volumes and permits offered and sold. Compare totals and averages with LMP Objectives and EIS projected volumes every 5 years, and summarize in a written report.

#### *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).

Total Cost/year: \$1,377.

**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. Also see the July 2016 power-point presentation on Timber Suitability and LMP wood volume projections filed in O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonImpPlan\WorkingDocument s\Silv-Timber\.

**Question 29b--Forage**

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

**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.

**Data Location**

INFRA database

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\FiscalYear\Q29>.

**Responsible Staff Position**

Range Program Manager; Wildlife Program Manager

***Frequency of Evaluation***

Every 5 years

***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 5<sup>th</sup> year, 3 person-days for Range Program Manager, GS-12; 3 person-days for Wildlife Program Manager, 3 person-days for Forest Planner. Total cost each 5<sup>th</sup> year: \$3,668.

Total Cost/year: \$734.

***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?

***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.

***Data Location***

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\>(FiscalYear)\Q30\.

***Responsible Staff Position***

Forest Planner

***Frequency of Evaluation***

Every 5 years

***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 – 1 day to gather, evaluate, and assimilate (\$408). District and SO personnel – ½ day to locate amendments and forward (5 person-days @ \$340)

Total Cost/year: \$2,108.

**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?

**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.

**Data Location**

Monitoring data to be stored at:

[\(FiscalYear\)\Q31\).](O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData)

**Responsible Staff Position**

Forest Planner

**Frequency of Evaluation**

Annually. Note: not all objective accomplishment can be reported each year due to the availability of source data

**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.

Total Cost/year: \$1,223.

*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	
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 [30] ) 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?

### *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).

### *Data Location*

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPlng\MonData\>(FiscalYear)\Q32\.

### *Responsible Staff Position*

Forest NEPA Coordinator

### *Frequency of Evaluation*

Annually

### *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.

Total Cost/year: \$1,223.

*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?

*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 O and T drives under the Heritage 2360Restricted folders: O:\NFS\ApacheSitgreaves\Program\2360Heritage\2360Heritage Restricted and T:\FS\NFS\ApacheSitgreaves\Program\2300Recreation\2360HeritageRestricted), hard copy cultural resources project and site files at the Supervisor's Office and the District offices.

Monitoring data to be stored at:

<O:\NFS\ApacheSitgreaves\Program\1900Planning\1920LandMgmtPIng\MonData\>(FiscalYear)\Q33\.

#### *Responsible Staff Position*

Heritage Program Manager and Tribal Relations Program Manager

#### *Frequency of Evaluation*

- As needed during or after project implementation
- PHAs are inspected every 2 years or according to Southwestern Region Heritage Program standards

#### *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. \$2,038.

Total Cost/year: \$2,038.

*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.

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## Appendix A. List of Abbreviations and Acronyms

Abbreviation	Explanation
4FRI	Four-Forest Restoration Initiative
ADEQ	<a href="#">Arizona Department of Environmental Quality</a>
ADOT	<a href="#">Arizona Department of Transportation</a>
ADS	Air Detection Survey (flight map of insect attacks & aspen mortality by location and severity)
ASNFs	<a href="#">Apache-Sitgreaves National Forests</a>
ASQ	<a href="#">Allowable Sale Quantity</a> (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	<a href="#">Arizona Game and Fish Department</a>
BA	Basal Area (stand density in square feet per acre of tree boles)
BARC	<a href="#">Burned Area Reflectance Classification</a> (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 <a href="#">NRM</a> )
FHP	Forest Heath Protection (USFS AZ Zone entomologists, pathologists)
FIA	<a href="#">Forest Inventory and Analysis</a>
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 <a href="#">NRM</a> )
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 <a href="#">Forest Plan</a> )
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

<b>Abbreviation</b>	<b>Explanation</b>
4FRI	Four-Forest Restoration Initiative
MSVMA	Mid-Scale Vegetation Mapping Assessment
NAIP	<a href="#">National Agriculture Imagery Program</a>
NAU/ERI	<a href="#">Northern Arizona University Ecological Restoration Institute</a>
NEPA	<a href="#">National Environmental Policy Act</a>
NFMA	<a href="#">National Forest Management Act</a>
NRHP	<a href="#">National Register of Historic Places</a>
NRIS	Natural Resource Information System (database, part of <a href="#">NRM</a> )
NRM	<a href="#">Natural Resource Manager</a> (Forest Service database)
NRM-AqS	<a href="#">Natural Resource Manager</a> 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	<a href="#">USFS Region-3</a>
RAR	Roads Accomplishment Report
RAVG	Rapid Assessment of Vegetation (mapped wildfire burn severity reductions in tree stocking)
RMRS	<a href="#">Rocky Mountain Research Station</a> (USFS)
RNA	Research Natural Area
RO	Regional Office ( <a href="#">USFS R3</a> )
RSAC	<a href="#">Remote Sensing Applications Center</a> (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	<a href="#">Terrestrial Ecological Unit Inventory</a>
TIM	Timber Information Manager (FS program used to plan/assemble timber sale & stewardship contracts, and permit product plans)
TMR	<a href="#">Travel Management Rule</a>
TNC	<a href="#">The Nature Conservancy</a>
TSI	Timber Stand Improvement (pre- or non-commercial thinning)
VDDT	Vegetation Dynamic Development Tool (Forest Plan analysis model)
WFDSS	Wildfire Decision Support System



<b>Abbreviation</b>	<b>Explanation</b>
4FRI	Four-Forest Restoration Initiative
WorkPlan	[Forest Service Budget Database]

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

### Question 3—Riparian Health and Ecological Indicators

#### Questions 3c&7b—Aspen - continued

##### *Method, Protocol, Sample Design (continued)*

As an indicator of ecosystem condition, aspen should be monitored in both treated and untreated areas to determine its overall status, given that other management and natural events continue to occur on non-treated acres. Per Monitoring Strategy in Forest LMP Table 12, “Conduct...species’ specific protocols in both treated and untreated areas and in burned (within large wildfire burns) and unburned areas.”

District Silviculturists to provide new 2017 exam plot locations and numbers monumented for aspen during routine exam contract inspections as normal ongoing duties. Black Mesa RD has collected tree exam data on 3 plots within aspen fenced exclosures, and they plan to install 17 more permanent CSE Intensive-level aspen monitoring plots across various strata in 2017 (to 2018?). Lakeside RD has a negligible amount of aspen. The Apache NF (Alpine and Springerville RDs) will complete permanent monumentation of approximately 125 Common Stand Exam (CSE) Intensive-sample plots randomly installed from 2013 to 2017 across a wide range of aspen conditions, as an opportunistic set of baseline tree exam data collected, following our CSE contract Intensive-level protocol. (Approx. 24 plots in calendar 2013, 64 plots in calendar 2014, 27 plots in calendar 2015, <5? plots in 2016, 5+ plots possible in 2017.) These plot locations have been/are being recorded and mapped. Baseline data for these plots still need to be grouped by the management strata listed below, according to plot locations and known site history at time of data collection.

All collected aspen monitoring plot data will be sorted into whichever of the following strata that apply: Untreated, Cut-Treated, RX Burn Treated, Wildfire-burned, Unburned areas, Treatment Mix of Cutting plus RX Burn, and Exclosure-Fenced. As opportunities arise, substrata may include: healthy aspen/aspen decline sites, within active/inactive grazing allotments, within ¼ mile/over ¼ mile from permanent surface waters, gentle/steep slopes, very rocky/not rocky sites. Use GIS to determine which plots fall within recently treated &/or burned areas, and record by project name, type of disturbance, year of disturbance, and conifer PNVt the plot resides in. Query existing CSE Stand-level plot data from FSveg Spatial database and extract as stand-alone plots. In 2017 Forest Silviculturist to reduce final total number of plots down to 75-100.

Revisit 15-20 CSE individual plots annually as described below (*Frequency* section) and also load the new data into FSveg Spatial. When revisiting aspen plots also look for and record evidence that LMP Standards and Guidelines have been followed in treatment areas, to help answer Question 32, especially all LMP aspen-related Guidelines.

Supplemental Data Opportunities: Arizona Game and Fish Department (AZGFD) has installed nearly 100 permanent photo points within the 2011 Wallow wildfire perimeter, with initial photos taken in 2012-2013. Use AZGFD photo points for extra info when/where available = seek to coordinate some AZGFD photo points at same locations as our CSE exam plot centers. If needed, use FIA plot data when/if available to fit this protocol = FIA revisits a subset of their plots about once every 10 years.

Where aspen occurs, if available annually, review 1 NEPA project-level set of Rx cutting prescriptions + 2 wildland fires (planned ignition = RX burn prescription, and unplanned ignition = WFDSS written resource management objectives for the fire) as written and implemented, for project design to meet aspen-appropriate silvics commensurate with forest plan DC. Note post-treatment direct effects by management tools and natural agents, such as new regeneration response, or bole/crown/root damage to more than 20% of aspen trees that will likely prevent tree maturity attainment.

While interpreting data and project reviews to summarize in monitoring reports, consider non-treatment factors still affecting aspen health (such as severe late frost events, extreme drought, wild/domestic ungulate use, gopher damage to roots, soil TES unit productivity, etc.) when determining if treatments have had any direct positive or negative effect. The 3 most prevalent damaging agents should be recorded in CSE plot data. Also consult the October 2013 ASNFs Plan Revision document "Report on the Selection of Management Indicator Species and Ecological Indicators" (WhiteTrifaro, 2013)" for additional evaluation factors to consider/address in aspen monitoring analysis summary documents to be written.

CSE and our ASNFs exam contract have well-documented sampling designs for the Intensive exam level, which should continue to be used for all plot revisits to provide consistent data for clean comparison to baseline data already collected. It will be critical to stress to CSE contractors and/or FS personnel the importance of correctly identifying/recording the aspen damaging agents found on plots (ungulate versus rodent damage as one example).

Five-year R3 midscale vegetation mapping assessment (MSVMA) will be used, if available, for tracking forest-wide aspen dominated-codominated acreage. If subsequent MSVMAs are not available, then use annual FHP air detection survey (ADS) mapping of aspen mortality acres to determine total aspen acreage lost every 5-year period. Subtract that acreage from the total aspen acres stated in LMP (roughly 24,000 acres mostly aspen dominated and roughly 52,000 conifer acres codominated with aspen). Crudely map new acres of aspen resulting from wildfires or other disturbances as they occur, based on district observations or new NAIP photography or Google-Earth images when available for late-Sept. through October (fall months needed to distinguish aspen crowns from conifers).

### *Frequency of Evaluation*

Year 1 (one time only): District Silviculture personnel to monument final plots (2017) in strata least represented; and update master table of monumented plots, missing dates, and plot location maps. Forest Silviculturist to reduce 125 Apache side CSE aspen plots down to a range of 75 to 100 permanent plots, by picking 1-2 representative plots out of tight plot clusters, and keeping all plots located farther from roads to balance the many plots close to roads. Stratify which plots fall within treated &/or burned areas, etc., using GIS/FACTS spatial info. This work is already funded in WorkPlan for district and SO Silviculturists for FY17. In addition, the ASNFs will initially need approx. 2 days (?) of R3 FS Veg specialist or programmer assistance to extract individual aspen plot data from existing stand-level exams and copy all aspen plot/tree data into a separate aspen plot data set of stand-alone individual plots (assumed to be funded as part of that RO specialist's normal work responsibilities).

Annually starting in 2018: SO to issue exam CSE contract task order (administered by Forest Silviculturist/COR) to annually revisit 15-20 different aspen plots (about 5 years after initial base data was collected), and re-measure same plot data, so that after 5 years all plots have been revisited. (Contract cost approx. \$75/plot. If plot data is collected by NAU-ERI, but they would have to agree to use

our IDIQ exam contract specifications with CSE protocol and software. Or it could be collected by dependable conservation groups/volunteers under close Forest Silviculturist direction, using a FS-provided portable data recorder pre-loaded with ExamsPC software = borrow from Apache Zone Silviculturist for 3 weeks/year.) As described above, Forest Silviculturist to annually: review FHP (ADS) mapped acres of aspen mortality across ASNFs; review samples of NEPA project-level design, prescriptions and implementation, as part of normal job duties; collect field photo point data from AZGFD, if available.

Every 5 years: Forest Silviculturist to review, analyze and summarize data trends. Also review MSVMA for changes in the aspen dominance/codominance acreage, if/when provided by R3.

### *Comments*

#### **Background**

For the past 3 decades aspen health and decline across the ASNFs have been rigorously debated. A combination of various factors such as logging damage, drought, wild and domestic ungulate browsing pressure, lack of coniferous stand thinning, lack of fire to regenerate aspen recruitment, undesired RX fire damage to developing and mature aspen clones, insect-disease attacks, severe frost events, all have played a role. A number of research publications and field observations document severe and widespread impacts of browsing and barking by large local elk herds on lack of aspen regeneration and/or inability to reach clone maturity. Only long-term monitoring data will enable the ASNFs to determine better what is happening with our aspen condition under various management actions and non-actions. This issue is of special interest to AZGFD and the Western Aspen Alliance, as well as our own Biologists, Silviculturists, and public recreationists. Ongoing and new understanding of aspen silvics/ecology, and its important role in biodiversity, prompted this tree species to receive much more attention in the Revised ASNFs LMP, especially as an ecological indicator.

This process is designed to produce quantitative monitoring of trends in aspen health and numbers present, but is too limited in plot data collection to provide statistically qualitative results by stratum. Monumented CSE plot locations are biased toward sites supporting aspen, many are near roadsides, and all are not ideally well-distributed across all aspen populations or conditions. Thus, a subset of the 125 plots on the Apache side will be used, along with all 20 plots planned on the Sitgreaves side (Black Mesa RD).

NAIP photography is not usually flown in the autumn, so it cannot always be relied upon to see aspen and riparian hardwood species by remote imagery.

ASNFs hope to collaborate with several partners to get field work done (AZGFD, RMRS, Western Aspen Alliance = Dr. Paul Rogers of Utah State Univ., NAU-ERI, The Nature Conservancy, exam contractors, volunteers, and possibly 4FRI monitoring board, as well as AZ Zone Forest Health Pathologist). Grant dollar proposals could be developed to help defray USFS costs. This process will likely evolve as other interested cooperators get more involved. If the ASNFs proposed Corduroy RNA on the Alpine RD is approved and active research undertaken with RMRS, then that information may also be utilized.

Most may not, but some of our 125+ monumented CSE aspen plots may potentially become 4FRI pre-treatment and post-treat monitoring plots, because live conifers of all sizes as well as snags, logs, stumps, and Brown's fuel-loading data was also collected at every plot in addition to aspen. If these are used by 4FRI, hopefully they would pick up the cost of revisiting to re-measure all plots, for post-

treatment data. And then we could just glean the aspen data for our use. By revisiting those same permanent plots to recollect the same sorts of information over time, that data could also be used to help answer several other LMP monitoring questions (5, 6, 8, 13, 15, 18, 32) as well. Thus the costs displayed here would actually benefit the entire monitoring strategy and should not be counted against just aspen monitoring. And if the 4FRI Monitoring Board chooses to adopt any or all of these permanent plot locations as part of their program, ASNFs may wish to partner with 4FRI to accomplish plot re-visitation/re-sampling. If 4FRI declines to use our plots, then only aspen trees on each plot would need to be re-inventoried with new data every 5 years, which could be easily done by FS personnel rather than a contractor.

## Questions 6, 8, and 13

### *Comments*

The Mid-Scale Vegetation Mapping Assessment (MSVMA) effort and products provided by USFS Region-3 Ecology and Geometronics specialists, are not to be confused with the Mid-scale level of Desired Conditions (DCs) stated in the Forest Land Management Plan (LMP). Mid-Scale Vegetation Mapping Assessment is done at the forest-wide Landscape scale (well over 10,000 acres). It provides roughly-estimated acres of forest and woodland conditions across the entire ASNFs at time of mapping, by dominant-codominant vegetation type, tree bole diameter size classes, canopy closure classes, and vertical canopy layers. This combination of data was used to determine the VDDT model's overstory vegetative structural states displayed in LMP Appendix B bar charts for each PNVT, and for comparison between Plan Revision alternatives. R3 made it clear that MSVMA is too coarse (imprecise) for accurately detecting woody vegetation structure at the project level for Mid-scale and Fine scale DCs. In comparison, the ASNFs LMP's Mid-scale DCs are defined as 100 to 1,000 acres. The ASNFs original MSVMA was completed in 2009, and was revised in 2012 to reflect new information about aspen sites within the 2011 Wallow wildfire area. The MSVMA dominant-codominant vegetation types were not used as the source for mapping of the LMP's PNVT boundaries. PNVT mapping was done using the ASNFs Terrestrial Ecosystem Survey soils and climatic gradient classifications. (However, individual dominant-codominant species presence, like aspen, are mapped by the MSVMA.)

At time of ASNFs LMP Monitoring Strategy development, Region-3 (R3) told the ASNFs Plan Revision Team that they expected to conduct new MSVMA efforts about every 5 years for long-term monitoring of landscape-level forest-wide improvements toward DCs, to provide consistency with the same data source/method used at time of LMP Revision. Several of the ASNFs Plan monitoring questions were approved for inclusion in the Monitoring Strategy (LMP Chapter 5, Table 12) based on our expectation that additional subsequent MSVMA data would be provided by R3. There would be no need to re-run the VDDT model, as only simple comparison of acreage changes is needed in each vegetative structural state from those percentages shown in LMP Appendix B with new percentages provided by subsequent MSVMA data provided in future years.

Note: If FIA data are available and used, beware that FIA plot data for large/very large tree data in R3 may be potentially skewed against accurately representing the large trees actually present.

## Question 14 Stream Temperature: Background

### *Monitoring Method and Indicators*

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.

### *Monitoring Interval*

Every 5 years

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 (Triepke, 2016), 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 21<sup>st</sup> 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 6<sup>th</sup>-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/wildfire treatments are implemented.

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. (Triepke, et al., 2014); see page 10, table 1).

### Question 15a—Insects and Diseases

Pertinent Plan Direction:

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.

LMP Guidelines for All Forested PNVTs:

- “On single species dominated sites, uneven-aged management may be used where less than 20 percent of the host tree species—or less than 25 percent of the area—is infected by dwarf mistletoe. Thinning and under-burning may be used to keep dwarf mistletoe levels from increasing. Even-aged management or deferral should be considered when greater than 20 percent of the host species, or 25 percent of the area, is infected with dwarf mistletoe.
- On single species dominated sites, thinning should not be attempted where more than 80 percent of the host species—or 90 percent of the area—is infected with dwarf mistletoe. Regeneration and/or deferral may be used in these cases. However, in the Community-Forest Intermix Management Area additional treatment options may be used.
- On mixed species dominated sites, even-aged management or deferral should be used instead of uneven-aged management where more than 50 percent of conifer trees (excluding white fir) are infected by dwarf mistletoe.
- When thinning dwarf mistletoe infected sites, as much mistletoe should be removed as possible without sacrificing the healthiest, most desirable trees for the particular site (in some situations, this

may involve retaining some trees in the upper canopy that are lightly infected to meet multiple resource objectives).

- Where a seed cut treatment (even-aged method to promote natural seedling establishment) is applied for dwarf mistletoe control, it should be followed within 10 years of seedling establishment by a final removal treatment or other effective means to prevent further infection.”
- Healthy southwestern white pine should be retained to maintain the wide range of genetic variability that contributes to resistance against the nonnative white pine blister rust disease.
- Tree species that are less susceptible to root disease should be retained within areas of root disease infection to reduce spread of disease.

LMP Guideline for All Woodland PNVTs: “Tree species that are less susceptible to root disease should be retained within areas of root disease infection to reduce spread of disease.”

LMP Guidelines for the Community-Forest Intermix Management Area:

- “To reduce fire hazard and spread of insects and disease onto adjacent lands, slash should be treated (e.g., removal, pull back, relocation, burned) as soon as possible.
- Where more than 80 percent of the host species or 90 percent of the area is infected with dwarf mistletoe (if regeneration or deferred treatment is not feasible), then thinning from below and/or prescribed fire should be used as needed for fire hazard reduction.”

## 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 above, 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. Once enough projects are summarized, then some collective pattern or trend might be inferred at the landscape scale?

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 PNVT 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 ASNFS, who are creating or administering cutting contracts on the ASNFS 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

QUESTION	FY2017	FY2018	FY2019	FY2020
1	\$815	\$815	\$815	\$815
2	\$4,483	\$4,076	\$4,483	\$4,076
3a	\$3,401	\$3,401	\$3,401	\$3,401
3b7a	\$3,401	\$3,401	\$3,401	\$3,401
3c7b	\$5,042	\$5,042	\$5,042	\$7,080
4	\$408	\$408	\$408	\$408
5	\$8,222	\$8,222	\$8,222	\$8,222
6	\$0	\$1,785	\$0	\$0
8	\$0	\$3,035	\$0	\$0
9	\$1,223	\$1,223	\$1,223	\$1,223
10	\$1,223	\$1,223	\$1,223	\$1,223
11	\$2,038	\$2,038	\$2,038	\$2,038
12	\$2,038	\$2,038	\$2,038	\$2,038
13	\$0	\$2,066	\$0	\$0
14	\$6,101	\$6,101	\$6,101	\$6,101
15a	\$3,518	\$3,518	\$3,518	\$4,741
15b	\$1,223	\$1,223	\$1,223	\$1,223
15c	\$815	\$815	\$815	\$815
16	\$815	\$0	\$0	\$0
17	\$2,473	\$2,473	\$2,473	\$2,473
18	\$3,542	\$3,542	\$3,542	\$3,542
19	\$1,096	\$3,162	\$1,096	\$1,096
20	\$0	\$0	\$0	\$408
21	\$815	\$815	\$815	\$815
22	\$2,038	\$0	\$2,038	\$0
23a	\$0	\$0	\$0	\$815
23b	\$0	\$0	\$0	\$3,401
24	\$2,445	\$0	\$2,445	\$0
25	\$815	\$0	\$815	\$0
26	\$408	\$0	\$408	\$0
27	\$2,853	\$2,853	\$2,853	\$2,853
28	\$815	\$0	\$815	\$0
29a	\$1,377	\$1,377	\$1,377	\$1,377
29b	\$0	\$0	\$0	\$3,668
30	\$0	\$0	\$0	\$2,108
31	\$1,223	\$1,223	\$1,223	\$1,223
32	\$1,630	\$815	\$1,630	\$815
33	\$2,038	\$2,038	\$2,038	\$2,038
<b>TOTALS</b>	<b>\$68,334</b>	<b>\$68,726</b>	<b>\$67,518</b>	<b>\$73,435</b>