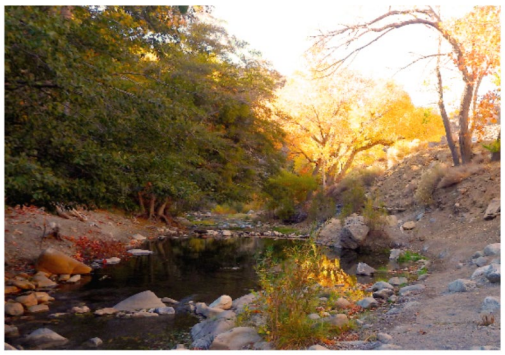
United States Department of Agriculture

2018 Biannual Monitoring and Evaluation Report for the Angeles National Forest



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Executive Summary

The following table serve as a summary of the evaluation status for each monitoring question and the recommendations from the plan monitoring program based on the evaluations contained in this report. Not every monitoring question is updated every two years, this is noted below.

Table 1. Listing of PMP Monitoring Questions and their evaluation status and change recommendations

item #	Monitoring Question	Date of Most Current Evaluation	Currently, are any changes being recommended as a result of the evaluation for this item? (Yes/No)	Date of Previous Evaluation	Previously, were changes recommended? (Yes/No)
1	Has the ANF made progress in reducing the number of acres that are adjacent to development within wildland/urban interface defense zones that are classified as high risk? Are wildfires becoming larger, more frequent, or more severe, and is there a seasonal shift in fire activity?	**August 2018**	**no**	**none**	**no**
2	Is the ANF making progress toward increasing the percentage of montane conifer forests in Condition Class 1?	**August 2018**	**no**	**none**	**no**
3	Is the ANF making progress toward maintaining or increasing the percentage of vegetation types that naturally occur in Fire Regime IV in Condition Class 1?	**August 2018**	**no**	**none**	**no**
4	Has the forest been successful at reducing mortality risk? Is tree mortality increasing across the landscape, and is it distributed evenly across elevations? Are fire frequencies becoming more departed from the natural range of variation?	**August 2018**	**no**	**none**	**no**
5	Are the ANF's reported occurrences of invasive plants/animals showing a stable or decreasing trend?	**August 2018**	**no**	**none**	**no**

item #	Monitoring Question	Date of Most Current Evaluation	Currently, are any changes being recommended as a result of the evaluation for this item? (Yes/No)	Date of Previous Evaluation	Previously, were changes recommended? (Yes/No)
6	(3.1) Are trends in indicators and visitor satisfaction surveys indicating that the ANF has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction? (3.2) Are trends in indicators and visitor satisfaction surveys depicting the ANF has provided solitude and challenge in an environment where human influences do not impede the free play of natural forces?	**August 2018**	**no**	**none**	**no**
7	(4.1a) Has the ANF been successful at protecting ecosystem health while providing mineral and energy resources for development? (4.1b) Has the ANF been successful at protecting ecosystem health while providing renewable resources for development?	**August 2018**	**no**	**none**	**no**
8	(5.1) Is the ANF making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds? (5.2) Is the ANF increasing the proper functioning condition of riparian areas? (5.1 and 5.2) How do streamflows compare with historical records?	**October 2016**	**no**	**2010**	**no**
9	Are trends in resource conditions indicating that habitat conditions for fish, wildlife, and rare plants are in a stable or upward trend? Are chaparral and coastal sage scrub vegetation communities type converting to non-native annual grasslands? Is	**August 2018**	**no**	**none**	**no**

item #	Monitoring Question	Date of Most Current Evaluation	Currently, are any changes being recommended as a result of the evaluation for this item? (Yes/No)	Date of Previous Evaluation	Previously, were changes recommended? (Yes/No)
	coast live oak mortality increasing across the landscape?				
10	Is the ANF balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions? How many of each type of special use authorization, mining permit, and forest product permit are active on the forest?	**August 2018**	**no**	**none**	**no**

Introduction

Purpose

The purpose of this biennial monitoring evaluation report is to facilitate the determination by the Responsible Official of whether a change in plan components or other plan content that guide management of resources on the Plan area may be needed (36 CFR 219.12(a)(1)). This report represents one part of the Forest Service's overall monitoring program for the Angeles National Forest (ANF). This Biannual Monitoring and Evaluation Report (Report) is not a decision document (FSH 1909.12 Ch. 34). Rather, this report evaluates the monitoring questions and indicators presented in the Plan Monitoring Program (PMP) chapter of the Land Managment Plan (LMP or Forest Plan) in relation to management actions carried out in the Forest Plan area, and in conjunction with the Region's Broader-Scale Monitoring Strategy.

Monitoring and evaluation are continuous learning tools that form the backbone of adaptive management (36 CFR 219.12(d)(2)). For this reason, an evaluation will be produced every two years. This is a written report of this evaluation since the LMP Monitoring requirement administrative change was finalized in 2016. This report indicates whether or not a change to the Forest Plan, management activities, or to the monitoring program may be needed, or whether a new assessment may be warranted based on the new information. This Report will be used to inform adaptive management of the ANF.

Objectives

There are several objectives for this report, including:

- Assess the current condition (i.e., status) and trend of forest resources;
- Document implementation of the Plan Monitoring Program (PMP), including changes;
- Evaluate relevant assumptions, changed conditions, management effectiveness, and progress towards achieving the desired conditions, objectives, and goals described in the Forest Plan;
- Share the evaluation with stakeholders; and
- Present change recommendation options to the Responsible Official.

Roles and Responsibilities in Implementing the Plan Monitoring Program

Implementing the PMP requires a coordinated effort of many people, from the people who collected the data (see Monitoring Evaluation below) to the Responsible Official. The Responsible Official for this report of the Forest Supervisor of the Angeles National Forest. The Forest NEPA Planner coordinated with the Interdisciplinary Team who provides input to this Report. Staff from the Angeles National Forest Supervisor's office, San Gabriel Mountains National Monument District Office, Los Angeles Gateway Ranger District and various seasonal staff provided valuable input to form the basis of this Report.

The team contributed to this report is identified as the following:

Table 2. Monitoring Team

Last Name	First Name	Emails	Job Title
Anderson	Kelsha	kelshaanderson@fs.fed.us	Forest Hydrologist
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Mitchell	Seth	srmitchell@fs.fed.us	Fuels Battalion
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Welch	Leslie R	lrwelch@fs.fed.us	District Wildlife Biologist

Summary of the Plan Monitoring Program Requirements

Monitoring and evaluation requirements have been established through the National Forest Management Act (NFMA) at 36 CFR 219. Additional direction is provided by the Forest Service in Chapter 30 – Monitoring – of the Land Management Handbook (FSH 1909.12). The PMP requirements have been met in appendix C of the Angeles National Forest Land Management Plan (LMP or Forest Plan).

The 2005 Forest Plan Part 3 Appendix C sets the foundation of the monitoring program. In 2014, the court settlement resulted an amendment to the Forest Plan with additional monitoring criteria. This action was completed in compliance with the 1982 Planning Rule. In 2016, an administrative change to the monitoring program was prompted due to the transition to the 2012 Planning Rule. This administrative change require public notice and opportunity for comment. In 2016, the effort to involve the public resulted no public comment. This Report follows a National Template from the Washington Office to test out a pilot monitoring program in an effort to streamline reporting requirement and standardize reporting format across the National Forest System (NFS).

Monitoring and evaluation are separate, sequential activities required by NFMA regulations. Monitoring involves answering a series of specific question through the repeated collection of data by observation or measurement. General types of monitoring include: effectiveness, validation, and surveillance. Evaluation involves analyzing and interpreting monitoring data, usually in relation to an established goal or target. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives, and outcomes

of the Forest Plan are being met. Monitoring and evaluation are critical steps in the process of keeping the Forest Plan responsive to changing conditions, thereby providing the feedback mechanism for an adaptive management framework.

This Report is intended to be a current evaluation of all the monitoring questions and associated indicators described in the Plan Monitoring Program (PMP). This Report may not be comprehensive because monitoring data for some indicators are not collected every year, or every two years. Therefore, it may be necessary to reference a previous evaluation for a specific monitoring question.

How to Use this Report

This Report is a tool and a resource for the Forest Service to assess the condition of forest resources in relation to Forest Plan direction and management actions. It is also a tool and a resource for the public to learn more about how the Forest Service is managing forest resources.

For the Forest Service

The roles and responsibilities of key staff in the decision making, coordinating, data collection, and data evaluation phases were identified in preparation of this Report. Staff involved in the process are aware of the reporting requirement and are interested in collectively setting the tone for future changes necessary to bring the current condition to an improved condition. Reference and leverage existing documents that can serve as a foundation or to augment this Report so this Report is focused on results, discussion, and recommendations. In other words, existing monitoring at program-level was incorporated to provide a broad picture of overall condition.

For Everyone Else

The term “public” used in this document is a broad term that includes: private citizens, but also local, state, regional and national government entities, federally recognized Indian Tribes or Native Alaska Corporations, formal collaborative groups, cooperating agencies, special interest groups, community groups, and others.

Members of the public can use this report to understand how the Forest Service collected and evaluated monitoring data in the Forest and the basis for conclusions reached. Members of the public can also use this report to anticipate key steps in the overall monitoring program, including upcoming opportunities for public participation and how they will be informed of those opportunities, and how public input will be used as implementation of the monitoring program progresses. Members of the public can also use this report to better understand this document’s relationship to past monitoring reports, future biennial monitoring evaluation reports and the broad-scale monitoring strategy.

This Report will be posted on the Angeles National Forest website under planning. The public will have an opportunities to provide feedback (FSH 1909.12_42.14). Consider that the intent of public participation during monitoring is full transparency, to give people access to all information that is developed through monitoring activities, and to obtain public feedback on

what monitoring information suggests about the effectiveness of the land management plan (FSH 1909.12_42.14c). The public will be able to review the results of the Report.

Monitoring Evaluations for the PMP

This section describes the details of how monitoring data were collected, reported, and evaluated for the PMP to support the recommendation options.

From the LMP direction, there are 3 parts of monitoring.

Part 1 - Monitoring

Monitoring and evaluation provide information to keep the forest plan viable. Appropriate selection of indicators, and monitoring and evaluation of key results helps the Forest Service determine if the desired conditions identified in the Forest Plan are being met. Monitoring and evaluation also help the Forest Service determine if there should be changes to goals and objectives, or monitoring methods. The monitoring questions and the corresponding Forest Plan goals is summarized in this Table 3.

Table 3. Part 1 Monitoring Questions

Goals	Monitoring Questions
1.1	Has the forest made progress in reducing the number of acres that are adjacent to development within Wildland Urban Interface (WUI) defense zones that are classified as high risk?
1.1, 1.2, 3.2, 6.2	Are wildfires becoming larger, more frequent, or more severe, and is there a seasonal shift in fire activity?
1.2, 6.2	Is tree mortality increasing across the landscape, and is it distributed evenly across elevations?
1.2, 6.2	Are chaparral and coastal sage scrub vegetation communities type converting to non-native annual grasslands?
1.2, 3.2, 6.2	Are fire frequencies becoming more departed from the natural range of variation?
1.2.1	Is the forest making progress toward increasing the percentage of montane conifer forests in Condition Class 1?
1.2.1, 6.2	Is coast live oak mortality increasing across the landscape? (CNF/LPNF only)
1.2.2	Is the forest making progress toward maintaining or increasing the percentage of vegetation types that naturally occur in Fire Regime IV in Condition Class 1?
1.2.3	Has the forest been successful at maintaining long fire-free intervals in habitats where fire is naturally uncommon?
2.1	Are the national forests' reported occurrences of invasive plants/animals showing a stable or decreasing trend?
3.1	Are trends in indicators and visitor satisfaction surveys indicating that the forest has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction?
3.2	Are trends in indicators and visitor satisfaction surveys depicting the forest has provided solitude and challenge in an environment where human influences do not impede the free play of natural forces?
4.1a	Has the forest been successful at protecting ecosystem health while providing mineral and energy resources for development?
4.1a, 4.1b, 7.1	How many of each type of special use authorization, mining permit, and forest product permit are active on the forest?
4.1b	Has the forest been successful at protecting ecosystem health while providing renewable energy resources for development?
5.1	Is the forest making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds?
5.1, 5.2, 6.2	How do streamflows compare with historical records?
5.2	Is the forest increasing the proper functioning condition of riparian areas?
6.1	Is forest rangeland management maintaining or improving progress towards sustainable rangelands and ecosystem health?
6.2	Are trends in resource conditions indicating that habitat conditions for fish, wildlife, and rare plants are in a stable or upward trend?
7.1	Is the forest balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions?

Forest Goal 1.1: Community Protection (LMP, Part 1, pg. 19)

Goal: Improve the ability of southern California communities to limit loss of life and property and recover from the high intensity wildland fires that are part of California's ecosystem.

Activity, practice, or effect to be monitored: Vegetation treatments in the wildland/urban interface (WUI); fire activity on the landscape.

Monitoring questions: Has the Angeles National Forest made progress in reducing the number of acres that are adjacent to development within wildland/urban interface defense zones that are classified as high risk? Are wildfires becoming larger, more frequent, or more severe, and is there a seasonal shift in fire activity?

Indicator: Acres of High Hazard and High Risk in WUI Defense Zone; Total and Mean Fire Size, Ignition Density, Fire Severity, and Monthly Area Burned.

Results: In Fiscal Year 2017 (FY17), hazardous fuel treatments occurred on 1,854 acres in the wildland/urban interface (Table 4). These acres were reported accomplished in the Forest Activity Tracking System database (FACTS) because some acreages received more than one type of treatment. This contributes to the National Strategic Plan (Objectives 1.1 and 1.3). Approximately 57% of total treatment are within the threat zone, 31% within defense zone and 12% within the WUI interface environment zone. Interface environment zone is defined as part of National Forest that was outside of the threat and defense zone, including the maintenance of strategic fuelbreaks.

As of 2017, this is the first reporting on the WUI treatment acres to address this monitoring question. No trends were identified. Overall, the Angeles National Forest is making progress toward the Forest Goal 1.1 for community protection. In addition to suppression effort, fuels reduction and prevention treatment at the project level has demonstrated progress on approximately 1,854 aces within WUI zones.

Table 4. Acres of Treatment in FY2017 for WUI Threat, Environment, and Defense Zone

ACTIVITY	WUI Threat	WUI Envt	WUI Defense	Total
Broadcast Burning - Covers a majority of the unit	122	0	0	122
Burning of Piled Material	43	0	153	196
Piling of Fuels, Hand or Machine	78	0	198	277
Rearrangement of Fuels	299	72	0	371
Thinning or Pruning for Hazardous Fuels Reduction	382	78	218	678
Yarding - Removal of Fuels by Carrying or Dragging	138	72	0	210
Sum of all acres treated	1063	222	570	1854
Percent of total	57	12	31	100

Forest Goal 1.2: Restoration of Forest Health (LMP, Part 1, pg. 20)

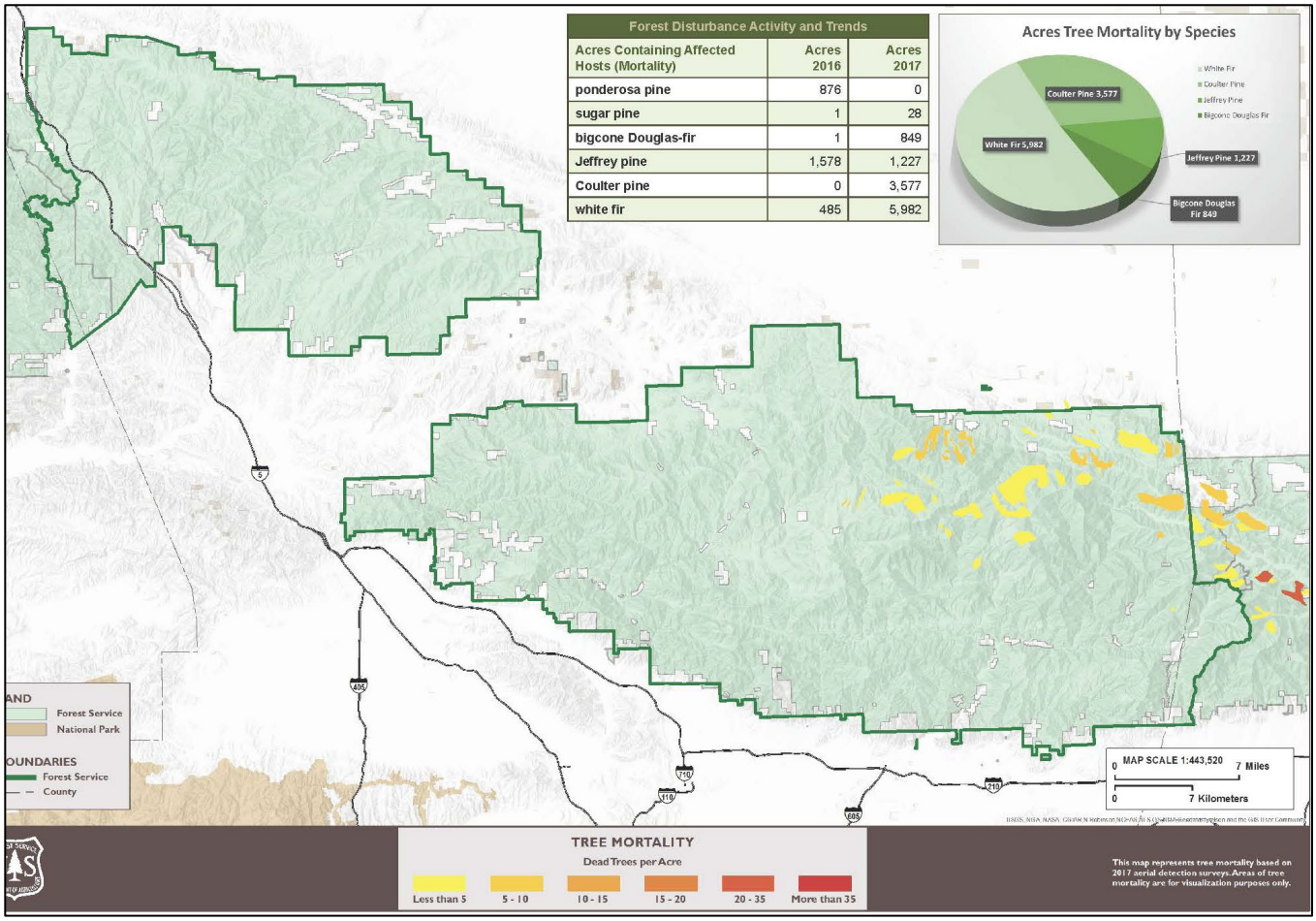
Goal: Restore forest health where alteration of natural fire regimes has put human and natural resource values at risk.

Activity, practice, or effect to be monitored: Tree mortality and fire return interval departure.

Tree Mortality

The protocol for tracking tree mortality continues is the aerial mapping project. Aerial detection surveys for tree mortality are conducted annually[1].

Figure 1. ANF (East) Aerial Detection Survey, 2010-2017



[1] http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696.

Figure 2. ANF (West) Aerial Detection Survey, 2010-2017

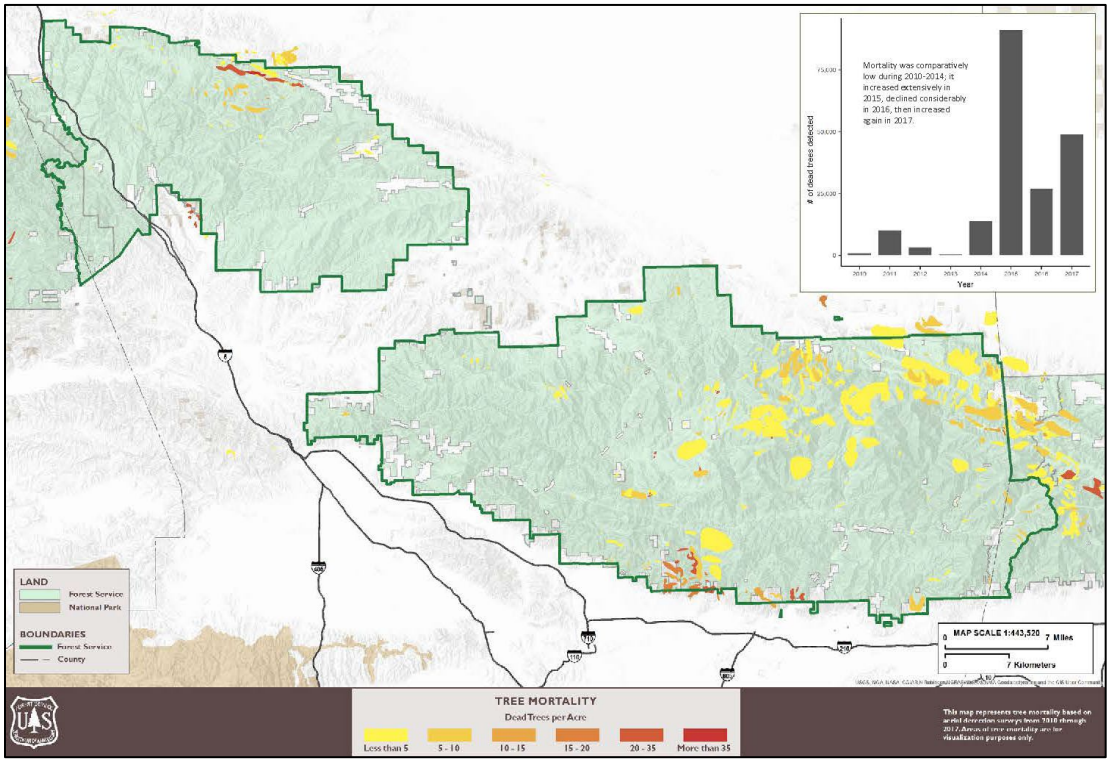


Table 5. Forest Disturbance Activity and Trends

Forest Disturbance Activity and Trends		
Acres Containing Affected Hosts (Mortality)	Acres 2016	Acres 2017
ponderosa pine	876	0
sugar pine	1	28
bigcone Douglas-fir	1	849
Jeffrey pine	1,578	1,227
Coulter pine	0	3,577
white fir	485	5,982

Highlights

- Estimated total tree mortality increased substantially from 27,000 trees across 3,100 acres in 2016 to 49,000 trees across 12,000 acres in 2017.
- White fir accounted for the largest increase going from an estimated 670 trees across almost 500 acres in 2016 to over 26,000 trees across almost 6,000 acres in 2017.
- Coulter, Jeffrey and ponderosa pine are intermixed on the Forest and mortality collectively decreased from 26,000 trees killed in 2016 to an estimated 5,000 in 2017.
- Singleleaf pinyon mortality increased from nothing detected in 2016 to over 600 trees in 2017.
- Douglas-fir/Bigcone Douglas-fir increased from 27 trees in 2016 to over 900 trees in 2017.

With two years of data, no trends can be determined. Most of the tree mortality was in the NE corner of the ANF and was mainly white fir. Of concern to ANF is the increased in Bigcone Douglas-fir and Singleleaf pinyon pine because these trees are not as common across the ANF.

The aerial detection surveys did not detect oak mortality, but there was a concerted effort to remove those oaks that were detected with gold-spotted oak borer beetles in the Green Valley area. ANF personnel continue to monitor the Goldspotted Oak Borer (GSOB)-infestation with a goal of containment. However, in 2018, the GSOB infected trees moved to Portal area on the Forest which will be difficult to treat.

Fire Return Interval Departure

Monitoring Question: Has the ANF been successful at reducing mortality risk? Is tree mortality increasing across the landscape, and is it distributed evenly across elevations? Are fire frequencies becoming more departed from the natural range of variation?

Indicator: Mortality Risk Assessment; Forest Health Protection Mortality Surveys; Proportion of Landscape in Departed Fire Frequency

Results: The tables below shows the acres in fire return interval departure classes. In the 2016 baseline condition, the ANF had approximately half of its acreages burning more often than was indicated by pre-Western settlement. About ¼ of the acreage was within the pre-Western settlement range of variation, 184,389 acres.

Table below shows Mean Condition Class (CC) Fire Return Interval in relations to total and percent acres in 2016. The Negative Condition Class indicates that fires were more frequent than the baseline of pre-settlement fire regimes. Positive Condition Class means that fires were less frequent. CC -1 to CC +1 are those acres within the pre-settlement range of variation. About 27.7% of ANF vegetation is CC -1 to +1 are within the range of variation of fire regimes when compared to the baseline of pre-Western settlement. About half of the ANF (348,241 acres) is in a negative condition class indicating that the vegetation is burning too frequently in wildland fires. A positive CC of +2 and +3 indicate that it is not burning as often as the baseline, 111,058 acres.

Table 6. Mean Condition Class (CC) Fire Return Interval in Relations to % acres Total in 2016

MeanCC FRI	Acres	% of total 2016
-3	30,992	5
-2	317,249	48
-1	142,639	21
1	41,646	6
2	51,044	8
3	60,014	9
Unclassified	22,017	3
	665,602	**100**

In FY17, treatments within various fire return interval departure classes by acres is shown in Table 6. The largest percentage in in the “-2” class and largest acres treated is within “-2” class

(786 acres). These acres were burning at too frequent an interval and had hazard trees which needed to be removed. Total acres treated is approximately 2,010 acres.

Table 7.Treatment by Acre in Various Fire Return Interval Departure Classes

ACTIVITY	-3	-2	-1	1	2	3
Broadcast Burning - Covers a majority of the unit	1	121	0	0	0	0
Burning of Piled Material	0.5	5	0.2	0	32	0
Piling of Fuels, Hand or Machine	0.5	14	9	0	32	0
Rearrangement of Fuels	18	257	7	0	0	0
Thinning or Pruning for Hazardous Fuels Reduction	19	208	17	0	62	2
Yarding - Removal of Fuels by Carrying or Dragging	18	183	0	0	0	0
Total	52	786	33	1	128	5.1

Monitoring question: Are wildfires becoming larger, more frequent, or more severe and is there a seasonal shift in fire activity?

Monitoring Indicators: Total and mean fire size, ignition density, fire severity and monthly area burned.

The following analysis centers on tracking fire severity patterns in conifer forests through time. The focus on conifer-dominated ecosystems stems from concern over the long-term persistence of this ecosystem under a variety of global changes, including drought, bark beetle mortality and altered fire regime. Pre-European settlement fire return intervals for Dry Mixed Conifer, Moist Mixed Conifer and Yellow Pine vegetation types are estimated to be 11, 16 and 11 years respectively (van de Water and Safford 2011). Given the aggressive fire suppression policies for much of California, many of these forested ecosystems are burning less frequently than they have in the past and as a result are at risk of experiencing stand replacing, high severity wildfire. The goal of this analysis is to track fire severity patterns within three conifer-dominated vegetation types from 1984 (beginning of Landsat-derived vegetation burn severity mapping) to 2017 when last available data was downloaded.

Prior to western settlement, the conifer stands burned with low severity, understory burns, and rarely burned in stand-replacing, high severity wildfires. In general, conifers do not survive when more than 1/3 of their crowns burn. The more recent wildland fires appear to have higher proportions of high-severity fires in conifer stands. When tracking fires in conifers, about 10-30% burned at high severity.

Figure 3. Conifer Annual Fire Severity by Percentage

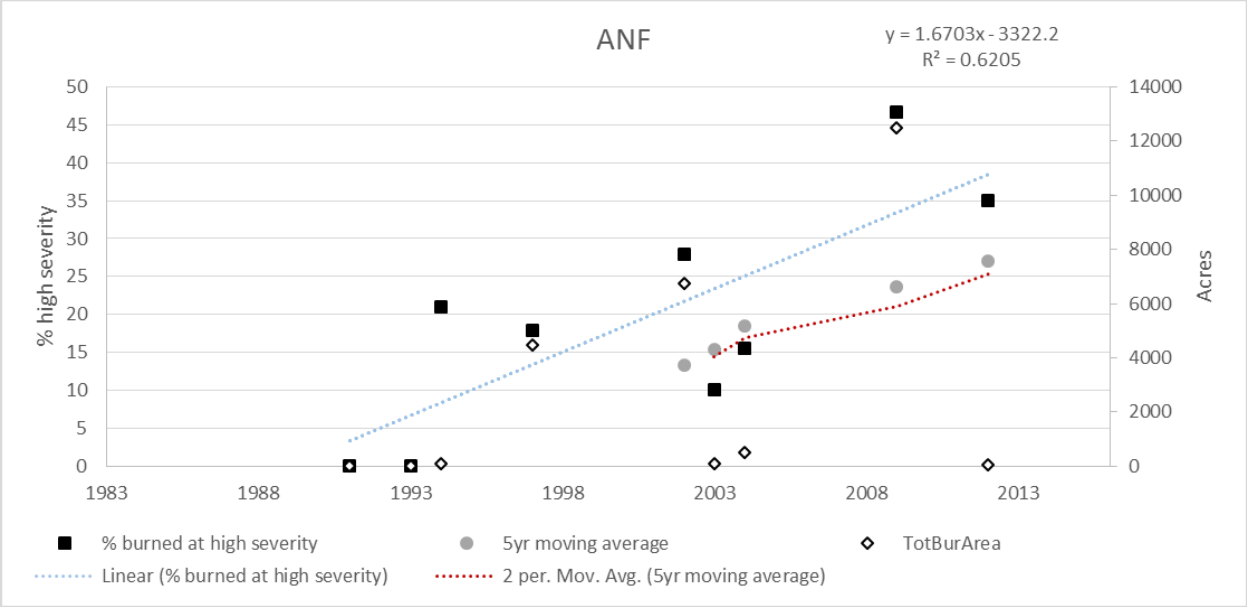
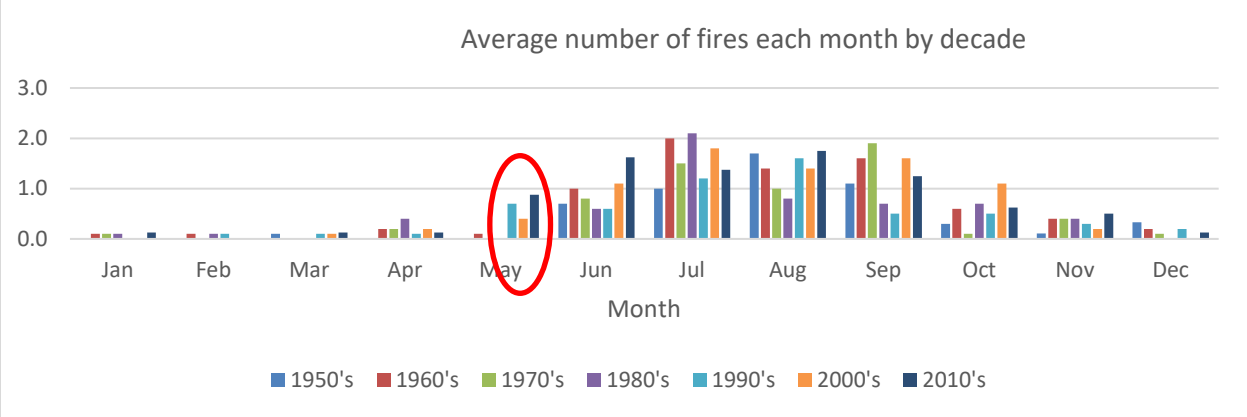
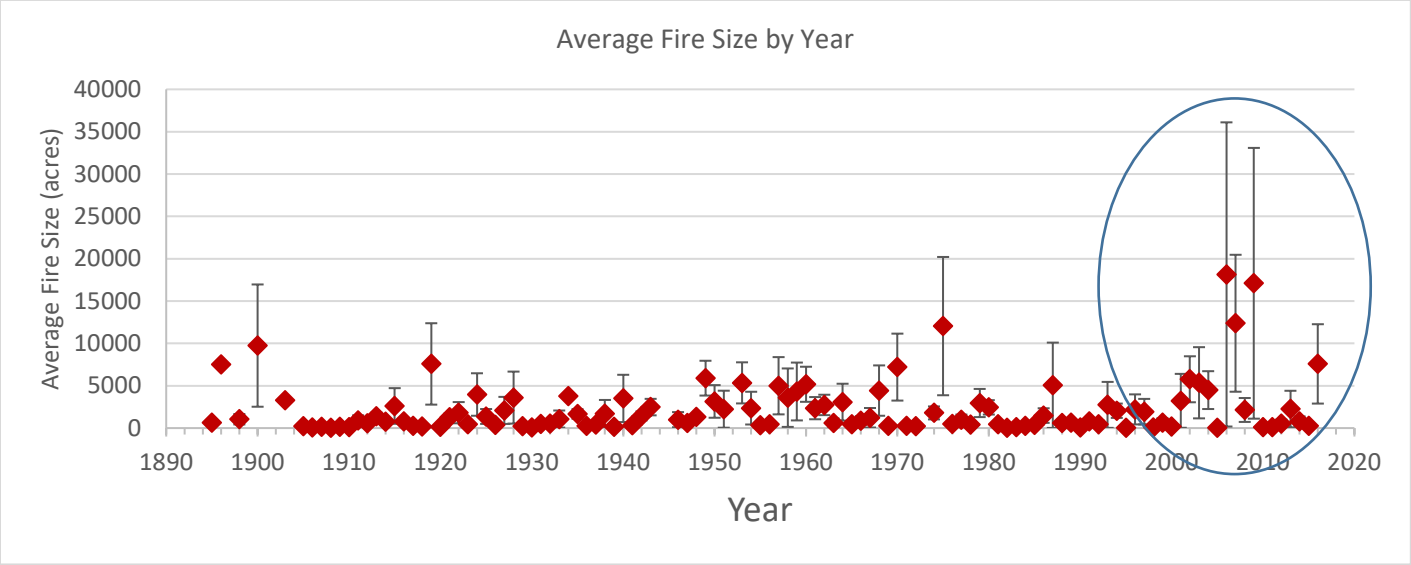


Figure 4. Average Number of Fires Each Month by Decade



Molinari (Forest Service Province Ecologist) noted that the baseline dataset that there were more fires on the 'shoulder' months of the fire season. In more recent years (yellow to red), the 'shoulder' months of May and October appear to have more fires than was reported in earlier years.

Figure 5. Average Fire Size by Year in Acres

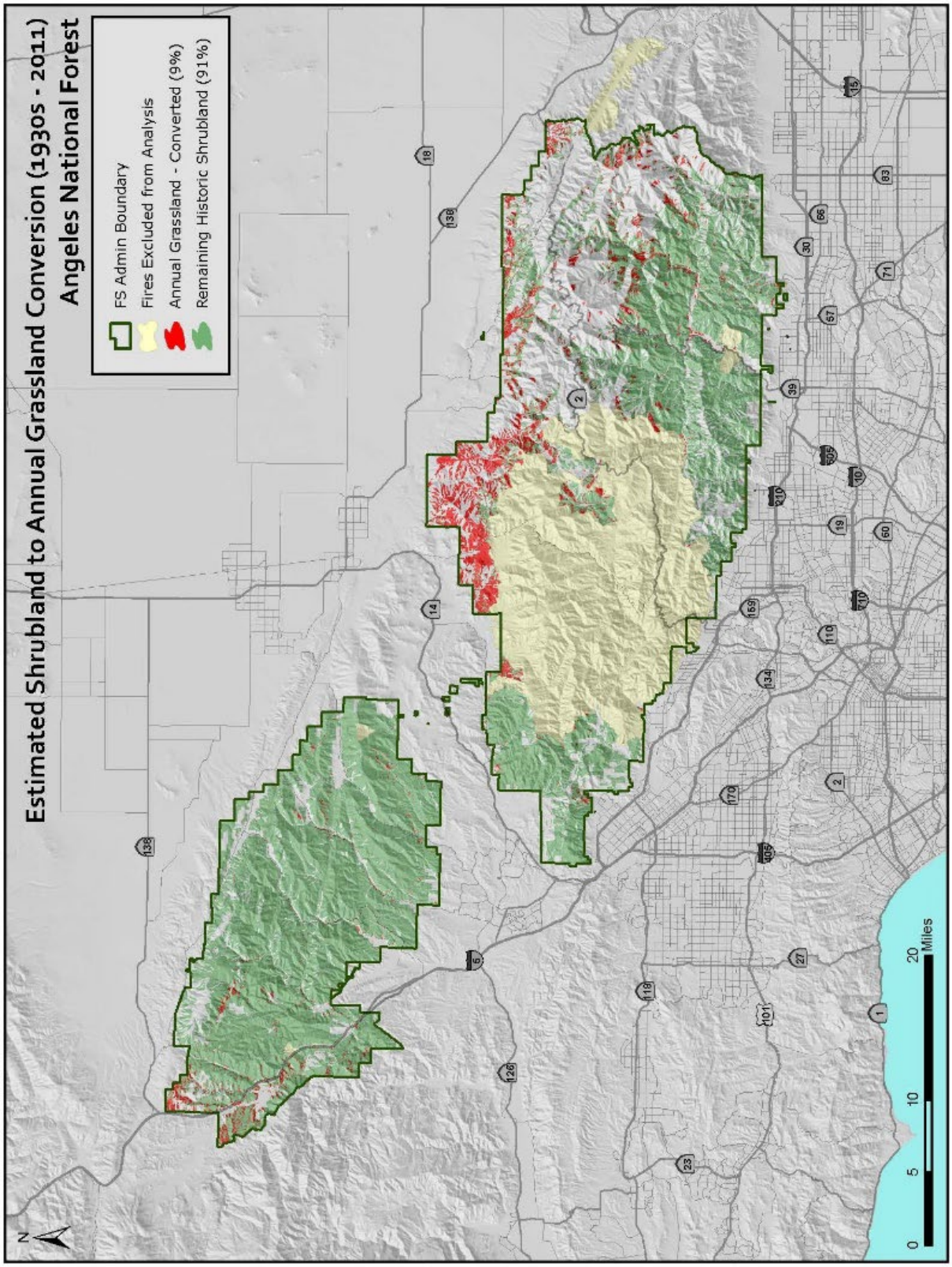


There appears to be an increase in the annual range of variation in fire size on the ANF.

Monitoring question: Are chaparral and coastal sage scrub vegetation community type converting to non-native annual grasslands?

It has been determined the number of acres of habitat type conversion from shrubland to annual grassland. The Wieslander Vegetation Type Map (VTM) was used as an historic baseline of shrubland vegetation type. This vegetation map (Figure 6) was created from data collected in the 1930s. The VTM was spatially compared to a 2011 model of herbaceous ground cover developed by Isaac Park (UC Riverside) and the ANF. The model capitalizes on phenological differences between evergreen (shrubland) and summer senescent vegetation (annual grasses and other herbaceous species) types. Any pixel of 30-m X 30-m within the historic VTM shrubland vegetation type that was greater than 50% herbaceous cover in 2011 was considered type converted. Areas that may have been recovering from fire (burned within the last 3 years) were excluded from the analysis.

Figure 6. Estimated Shrubland to Annual Grassland Conversion (1930s-2011)



Forest Goal 5.1 and 5.2: Watershed Function (LMP, Part 1, Pg.39) and Riparian Condition (LMP, Part 1, pg. 41)

Goals: (5.1) Improve watershed conditions through cooperative management. (5.2) Improve riparian conditions.

Activity, practice or effect to be monitored: general forest activities and watershed improvement projects; General forest activities; Streamflows.

Monitoring Questions: Is the ANF making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds? Is the Angeles Forest increasing the proper functioning condition of riparian areas? How do streamflows compare to historical records?

Indicators: Number of watersheds in each Condition Class. (Change in indicator score for aquatic habitat, aquatic biota and riparian vegetation. Monthly streamflows, timing and magnitude of peak flows, degree of variation.

Monitoring Actions: Compare baseline number of watersheds in each Condition Class from the 2006 Southern California Land Management Plans Analysis with the five-year Watershed Condition Assessment. Compare the change in score from the Watershed Condition Assessment indicators, coordinate with Goal 5.1.

Results: Using the 12-indicator watershed indicator model, watersheds on the ANF were rated in 2010 and 2016. This watershed model emphasizes riparian and aquatic conditions which counterbalances many of the new monitoring questions added in 2016 which use metrics of fire regime and forest health.

Figure 7. Watershed Condition and Prioritization Map for ANF Watersheds

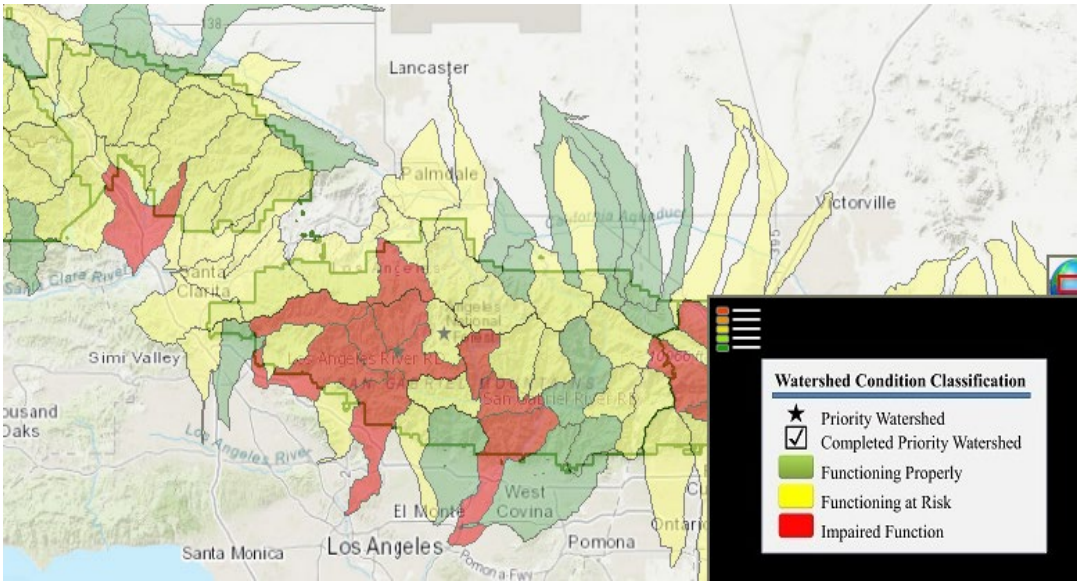


Figure 8. Watershed Condition Indicators (12 Indicator Model)

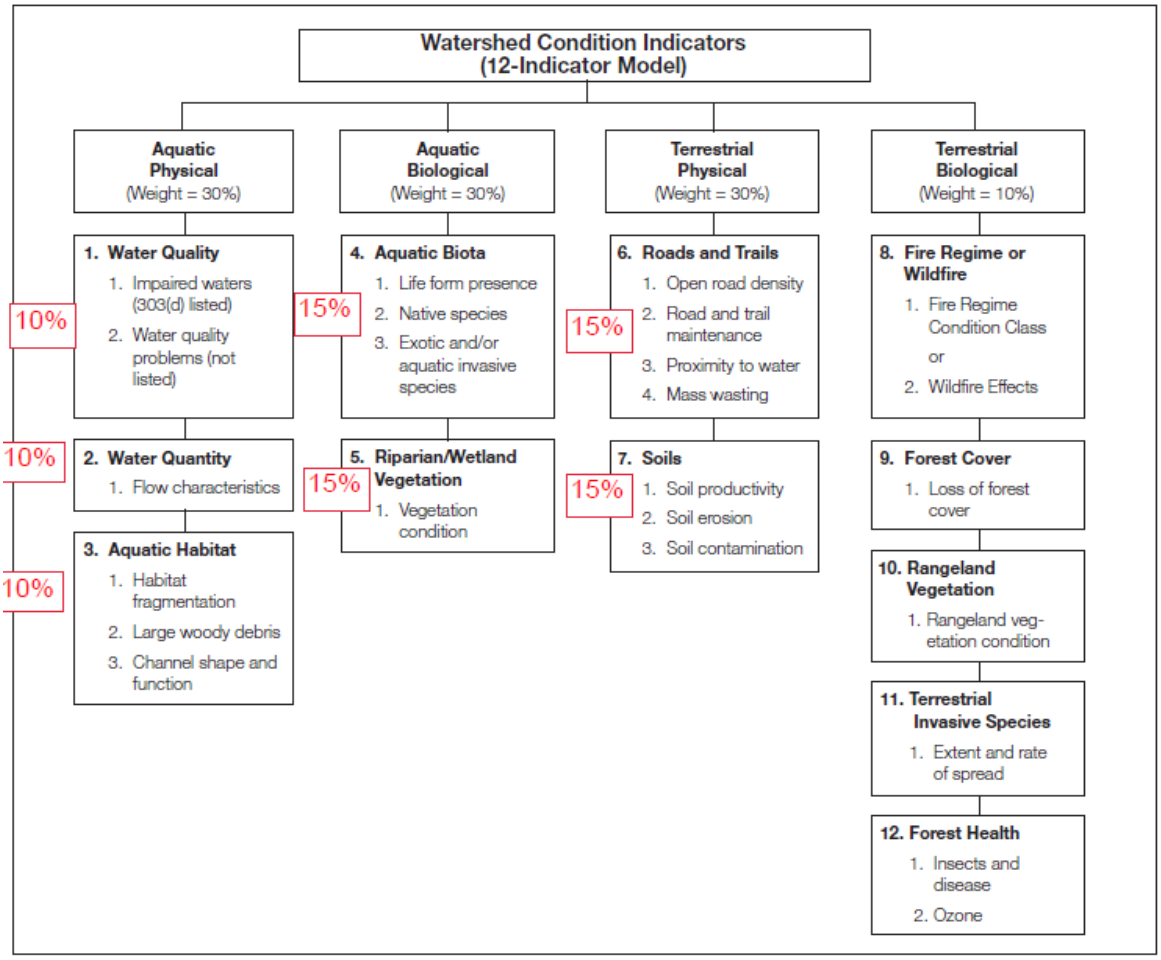


Table 8. Watershed Condition Framework - Initial Rating 2010

Outcome Indicator	Desired Condition	Baseline Watersheds	Trigger
Watersheds in Condition Class 1, Properly Functioning	Maintained condition ratings	15	Decrease in number of Class 1 watersheds
Watersheds in Condition Class 2, Functioning at Risk	Maintained or improved condition ratings	31	Decrease in number of Class 2 watersheds
Watersheds in Condition Class 3, Impaired Function	Improved condition ratings	14	Degrading conditions in Class 3 watersheds

Table 9. Watershed Condition Scores (2016)

Watershed Condition Rating	Count of Overall Rating
CLASS 1, GOOD	14
CLASS 2, FAIR	35
CLASS 3, POOR	13
Grand Total	**62**

Goal 5.1

In 2016, an Interdisciplinary Team of engineers and Resource Specialists re-evaluated the HUC12 watersheds using the schema as noted in the Watershed Classification and Assessment Tracking Tool (WCATT) diagrams. There was a change in the number of watersheds that were rated from 60 to 62. The two new watersheds were rated as Fair. One watershed decreased from Class 1 to Class 2, but one watershed increased from Class 3 to Class 2.

As of July 2018, no changes in the Watershed Condition Class or indicators have been documented since the initial ratings of 2010 and 2016, and so no trend is evident thus far. Therefore, **zero** watershed acres have improved for this reporting Fiscal Year.

Goal 5.2

In the Fiscal Year 2018, the Angeles National Forest continues to implement Watershed Restoration Action Plans. The action plans are targeted in two priority watersheds: Upper Big Tujunga Creek and Alder Creek. For both of the watersheds site-specific planning occurred for habitat surveying and identification of threatened and endangered species. Through the coming years we will continue to designate priority watersheds and track conditions. Additionally, the Angeles National Forest will assess watershed conditions as changes become evident through large disturbances such as fire or through assessments of surveys and habitat.

Streamflows

The protocol for tracking streamflows across Southern California National Forests has been completed and operational as of July 2018. The graphs below were generated using the current protocol to display and evaluate historical records for two gauged streams on the Angeles National Forest.

The current flow rate for Big Rock Creek is below normal flows. Big Rock Creek experienced its lowest flow rate in 1951 at nine hundred cubic feet per second and highest in 1978 with approximately fifty thousand feet per second. The median flow rate is approximately five thousand cubic feet per second. Big Rock Creek was at the lowest flows than were observed in 1951 at the beginning of the year. However, during the winter rains of Jan-Mar, the streamflow increased to about 2000 cfs or around the 50^{th} percentile of historic streamflows.

The current flow rate for Arroyo Seco is below normal. Arroyo Seco experienced its lowest flow rate on record in 2002 at approximately four hundred feet per second and highest in 1969 with approximately twenty thousand feet per second. The median flow rate is approximately five thousand cubic feet per second.

Figure 9. Historical Streamflow Record, Big Rock Creek

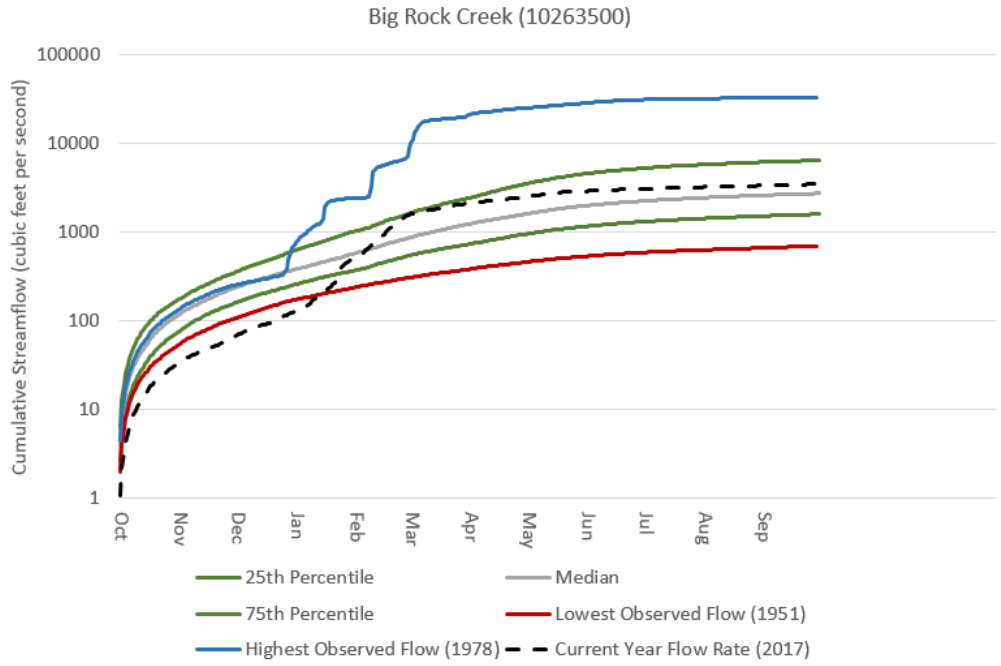
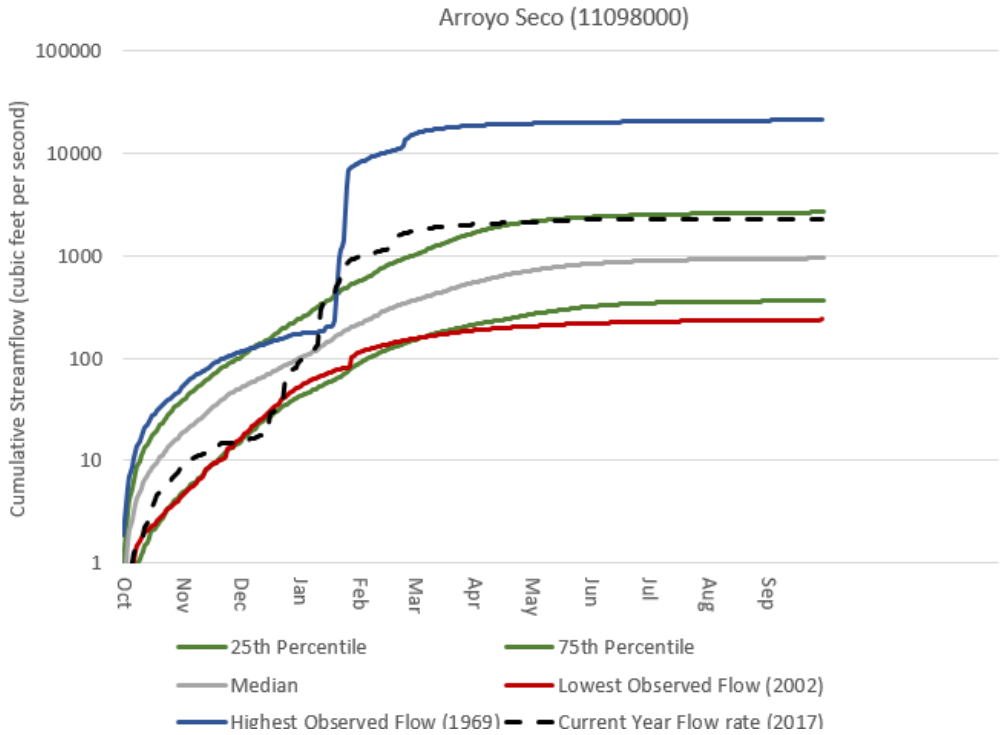


Figure 10. Historical Streamflow Record Arroyo Seco



Forest Goals 3.1 and 3.2: Managed Recreation in a Natural Setting (LMP, Part 1, pp. 33 to 36)

Goals: (3.1) Provide for public use and natural resource protection. (3.2) Retain a natural-evolving character within wilderness.

Activity, practice, or effect to be measured: Visitor use of the Angeles National Forest. Wilderness use.

Monitoring questions: Are trends in indicators and visitor satisfaction surveys indicating that the Angeles NF has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction? Are trends in indicators and visitor satisfaction surveys depicting the Angeles National Forest has provided solitude and challenge in an environment where human influences do not impede the free play of natural forces?

Indicators: Visitor satisfaction (National Visitor Use Monitoring);Wilderness condition

Results:

Background and Methods

The basic methodology is explained in detail in Forest Service National Visitor Use Monitoring (NVUM) Process: Research Method Documentation. In essence, visitation is estimated through a combination of traffic counts and surveys of visitors leaving a national forest or grassland. Both are obtained from random locations and days on a national forest or grassland over a period of one year. Results in the Visitor satisfaction report are derived by adding the results from the most recent survey fieldwork for each national forest and grassland. The results included here are from field work completed from FY2012 to FY2016.

Table 10. Annual Visitation Estimate

Visit Type	Visits (1,000s)	90% Confidence Level (%)#
Total Estimated Site Visits*	3,313	±21.5
→ Day Use Developed Site Visits	1,372	±24.2
→ Overnight Use Developed Site Visits	125	±30.7
→ General Forest Area Visits	1,525	±40.7
→ Designated Wilderness Visits†	292	±36.0
Total Estimated National Forest Visits§	2,880	±21.6
→ Special Events and Organized Camp Use‡	0	±0.0

Satisfaction Measures

Survey participants were asked to provide an overall rating of their recreation experiences on a 5-point Likert scale. A Likert scale is a numerical measurement of a respondent's level of agreement with a provided statement. About one-third of visitors were asked to rate their

satisfaction with and the importance of fourteen items related to the recreation facilities and services at the site or area at which they recreated. The Likert scale for importance ranges from not important to very important. The Likert scale for performance (satisfaction) ranges from very dissatisfied to very satisfied. Results are summarized by site type:

- day use developed
- overnight use developed
- undeveloped general forest, and
- Wilderness

Figure 11. Percent of National Forest Visits by Overall Satisfaction Rating

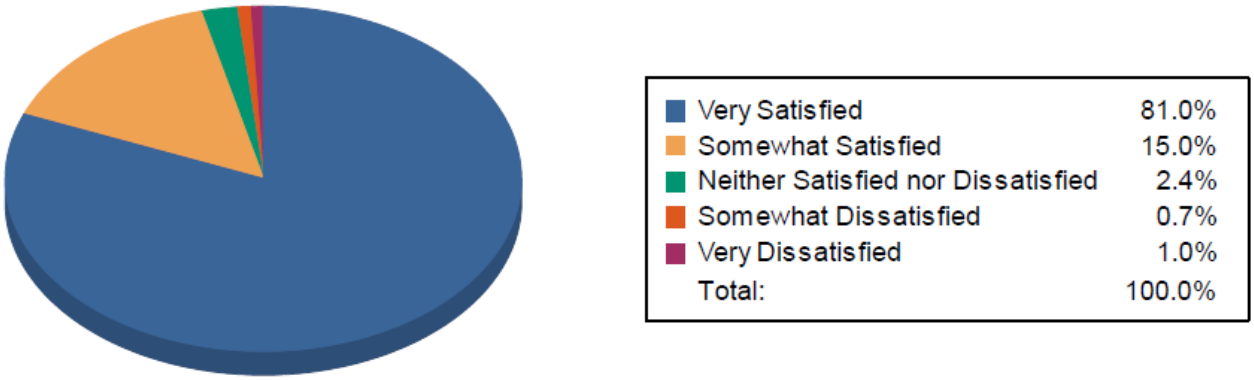


Figure 12. Satisfaction for Visits to Designated Wilderness

Satisfaction Element	Percent Rating Satisfaction as:					Mean Rating§	Mean Importance†	No. Obs‡
	Very Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Very Satisfied			
Restroom Cleanliness	9.0	15.5	19.5	13.3	42.7	3.7	4.5	51
Developed Facilities	0.0	0.0	20.4	19.5	60.1	4.4	4.7	44
Condition of Environment	0.0	0.4	5.7	14.5	79.3	4.7	4.8	60
Employee Helpfulness	0.0	0.0	10.6	14.7	74.7	4.6	4.8	24
Interpretive Displays	0.0	0.5	11.4	35.4	52.6	4.4	4.7	47
Parking Availability	0.8	15.2	7.7	16.7	59.7	4.2	4.7	59
Parking Lot Condition	0.4	9.1	10.6	7.7	72.1	4.4	4.8	57
Rec. Info. Availability	0.0	0.9	17.3	10.5	71.4	4.5	4.8	52
Road Condition	0.0	0.0	4.4	17.3	78.3	4.7	4.8	52
Feeling of Satefy	0.0	0.4	5.7	19.5	74.4	4.7	4.6	60
Scenery	0.0	0.0	3.3	9.8	87.0	4.8	4.8	60
Signage Adequacy	4.0	1.2	29.9	19.2	45.7	4.0	4.7	59
Trail Condition	0.4	3.3	6.1	25.2	65.0	4.5	4.7	60
Value for Fee Paid	0.4	0.4	4.3	6.7	88.1	4.8	4.9	47

Forest Goal 7.1: Natural Areas in an Urban Context (LMP, Part 1, pg. 46)

Goal: Retain natural areas as a core for a regional network while focusing the built environment into the minimal land area necessary to support growing public needs.

Activity, practice, or effect to be measured: Built landscape extent; land adjustment; special use authorizations

Monitoring questions: Is the Angeles National Forest balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions? How many of each type of special use authorization, mining permit, and forest product permit are active on the forest?

Indicators: Land Ownership Complexity; Authorized and Administrative Infrastructure; Miles of Unauthorized Motorized Routes; Number of special use authorizations and permits by type

Results:

Built Landscape Extent

Goal 7.1 calls for minimization of the built environment. In 2009, there were 100 disposed and 620 existing USDA Forest Service owned buildings on the ANF. In 2018, there are 299 disposed and 573 existing buildings. This indicates that over the past decade, approximately 200 buildings were removed, and the total number was reduced by 47 buildings.

The Subpart A report for transportation analysis is completed in 2018. The Subpart A report summarized the analysis and consideration given to status of roads and conclude with e list of "likely not needed roads". During 2017, almost no roads were decommissioned. The proper NEPA process will be completed prior to any ground disturbance activities occur for road decommission.

Special Use Authorizations

Table below shows the number and variety of special use authorizations and permits active (as of August 2018).

Table 11. Number and variety of special use authorizations and permits active

Use	#
Boat dock and wharf	1
Club	5
Organization Camp (see use code 143 for government owned improvements)	18
Shelter	2
Recreation residence	375
Caretaker residence (Authorize in recreation residence tracts only)	1
Resort	5
Concession Campground	3
Outfitting and Guiding Service	3
Winter recreation resort	4
Target range	4
Park or playground	3
Recreation event	20
Noncommercial group use	6

Use	#
Apiary	24
Fence	1
Church	1
Monument	3
Sign	2
Solid waste disposal site	5
Liquid waste disposal area	1
Sewage transmission lines	2
Debris disposal area	3
Residence, privately owned building	10
Residence, Government- owned building, G-T	1
School	1
Service building	4
Visitor center, museum	3
Site survey and testing	12
Resource survey	1
Experimental & demonstration	16
Research study	5
Weather station	6
Observatory	5
Military training area	1
Education center	4
Construction camp and residence	10
Warehouse and storage yard	7
Stockpile site	1
Commercial filming	2
Geological and geophysical exploration	3
Mineral material sale	1
Hydroelectric project, FERC licensed	1
Hydroelectric project, FERC exempted	1
Oil and gas pipeline	19
Oil and gas pipeline related facility	1
Powerline, REA financed	1
Powerline	29
Airport, heliport	1
Railroad right-of-way	2
Department of Transportation Easement	1
Forest Road and Trail Act easement	6

Use	#
Federal Land Policy and Management Act easement	7
Federal Land Policy and Management Act permit	127
Wilderness Act authorization for roads and trails	2
Tramway or conveyor	2
Amateur radio	11
Personal/private receive only	1
Microwave common carrier	12
Microwave industrial	16
Local exchange network	1
Private mobile radio service	20
Passive reflector	2
Cable television	1
Cellular/telephone and PCS	3
Natural resource and environmental monitoring	4
Commercial mobile radio service	16
AM & FM radio broadcast	4
Television broadcast	8
Facility manager	24
Telephone and telegraph line	21
Fiber optic cable	6
Other communication improvement	4
Irrigation water ditch	10
Irrigation water transmission, pipeline, less than 12" diameter	10
Water transmission pipeline, 12" diameter or more	8
Water transmission pipeline, less than 12" diameter	105
Water conveyance system easement, Act of October 27, 1986 (Pub. L. 99-545)	1
Debris and siltation impoundment	5
Dam, reservoir	44
Water diversion, weir	10
Well, spring, windmill	28
Wildlife water supply	1
Water storage tank	11
Total	**1,172**

Forest Goal 6.2: Biological Resource Condition (LMP, Part 1, pg. 44)

Background

Within the context of the LMP, the ANF proposes a number of activities occurring within occupied and designated critical habitats for federally listed species. In accordance with section 7 of the Endangered Species Act of 1973 (ESA), Angeles National Forest consulted with the U.S. Fish and Wildlife Service's (USFWS) regarding actions that may have effects to federally listed threatened and endangered species (T&E species). In 2013, the USFWS issued a Biological Opinion (BO) concerning the potential effects of ongoing activities that occur in the ANF on a regular basis. The 2013 BO was specific to areas where ongoing activities are within or have the potential to affect occupied or designated critical habitat for threatened or endangered species. Ongoing activities analyzed in the 2013 BO include road and trail use and maintenance, developed and dispersed recreation, and other activities.

Threatened and endangered species analyzed in the 2013 BO include the following: endangered arroyo toad (*Anaxyrus californicus*), southern California distinct population segment (DPS) of the mountain yellow-legged frog (*Rana muscosa*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), California condor (*Gymnogyps californianus*), least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*); the federally threatened California red-legged frog (*Rana draytonii*), Santa Ana sucker (*Catostomus santaanae*) and Coastal California Gnatcatcher (*Polioptila californica californica*); and critical habitat for these species where designated on the ANF.

This 2013 BO has extensive information regarding the general environmental baseline, status of the species, critical habitat including the primary constituent elements of the designated critical habitat, effects of the action on individuals and their designated critical habitat and effect of the action on recovery. The BO also includes conclusions and incidental take statements for each species, reasonable and prudent measures, terms and conditions and conservation recommendations.

As a requirement from the ongoing activities BO, monitoring for the above-mentioned species and their critical habitat will be conducted on an annual basis. The monitoring summary below are excerpts from the FY16 and FY17 ongoing activities BO monitoring report.

Additional information are from the Forest Service Watershed Improvement Tracking (WIT) corporate database reporting requirement.

Monitoring questions

- When was this monitoring question last updated?
    - Date of current evaluation: August 2018
    - Date of previous evaluation: Various monitoring reporting requirement contains information being summarized below.

- What other plan components – not listed in the PMP – are related, or linked, to the monitoring question and associated indictors (desired conditions, objectives, goals, standards, guidelines)?
    - 2013 ongoing activities Biological Opinion (BO) and Biological Assessment (BA).
- What monitoring activities have been conducted since the last monitoring evaluation?
    - Monitoring activities has been conducted to meet various requirements. This report is a summary of the monitoring requirement from the 2013 ongoing activities BO and the Forest Service WIT reports. Monitoring activities are listed below by each species. The evaluation has been reported regularly. This LMP monitoring report published in 2018 represents the first effort to summarize the monitoring results for public review. Detailed information can be requested through the Forest Biologist in ANF.
- Who collected these data?
    - Biological program manager in ANF and his staff.
- What protocols were used to collect these data?
    - Methodologies are described under each sections by species below.
- What is the target, or range (e.g., NRV) for the variable (indicator) being measured?
    - Indicators are described under each sections by species below.
- Is there an alert level (aka trigger, threshold), associated with the target that should be noted?
    - Results sections are described under each sections by species below.
- Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology?
    - BASI (if any) are described under each sections by species below.
- What other monitoring data (e.g., broader-scale monitoring strategy) have been collected that are directly relevant to this monitoring question?
    - This summary is from a broad-scale monitoring requirement from the 2013 Biological Opinion. The full monitoring report is available upon request.

- What management actions have taken place in the plan area since the last monitoring evaluation?

    - Ongoing activities BO describes the management actions as occurring routinely within ANF.

- Where are the data for this monitoring questions stored?

    - Watershed Improvement Tracking (WIT) corporate database and pinyon folder under Wildlife.

- Who is responsible for analyzing this monitoring question?

    - ANF Forest Biologist and his staff.

Monitoring Results

- What graphs, tables, or photos best represent and summarize the status and trend of the monitoring indicator(s)?

    - See descriptions below for each sections by species.

- What is the status and trend of the monitoring indicator in relation to the target?

    - See descriptions (if available) below for each sections by species.

- What level of confidence is there in the accuracy and precision?

    - High.

Monitoring Results Section by Species

The Ongoing Activities consultation outlines a range of required actions including monitoring, species protection and habitat protection/restoration. The six species and their habitat subject to monitoring include the following:

1. **Arroyo toad** (*Anaxyrus californicus*);
2. Southern California distinct population segment (DPS) of the **mountain yellow-legged frog** (*Rana muscosa*);
3. **Unarmored threespine stickleback** (*Gasterosteus aculeatus williamsoni*);
4. **California condor** (*Gymnogyps californianus*);
5. **California red-legged frog** (*Rana draytonii*); and
6. **Santa Ana sucker** (*Catostomus santaanae*).

Under each section, description about current status of the species, the survey location, methodology, survey results and conservation measures are included. Additionally, recovery actions such as non-native species removal and trash removal that will benefit rare species are included.

Arroyo toad (Anaxyrus californicus)

Introduction

Day and night surveys to document arroyo toad (ARTO) breeding activity were conducted in select areas of known occupied habitat.

Survey results

ARTO breeding activity was documented in Upper Big Tujunga Creek.

Psomas, a private consultant, conducted surveys in the Middle Big Tujunga watershed and confirmed the presence of a single adult arroyo toad. No breeding activity was confirmed.

Aspen Environmental Group, a private consultant, conducted surveys in Little Rock in the vicinity of Little Rock Reservoir and upstream of the reservoir. No arroyo toads were observed. However, biologists did document the presence of sculpin in the stream. This observation represents the first time sculpin have been recorded in the survey area.

Table 12. Conservation measures specific to the arroyo toad

Requirement	Comment
(1) Existing fencing will be maintained at Hidden Springs.	Accomplished. Existing fencing remains in place. Repairs will be made as needed.
(2) Except for administrative use, a seasonal closure will be maintained on Forest Road 4N18.2 from March 1 to July 31.	Accomplished. Forest Road 4N18.2 remains closed to the public.
(3) Barriers to reduce parking by 50 percent (from 60 parking spaces to 30) will be maintained at the Colby Trailhead parking lot. Barriers to parking in the area of Colby Bridge will be maintained and enhanced, as needed.	Accomplished. Parking capacity remains at 50%.
(4) A seasonal closure will be maintained at the Colby Bridge parking lot from March 1 to July 31. The ANF will reroute the Colby Trail (12W05) to connect the existing Colby Bridge trailhead with the trail at a higher point outside the 82-foot elevation contour. Once the trail is rerouted, a permit system will be implemented to allow trail users access to the parking lot during the March 1 to July 31 seasonal closure. This trail reroute will occur within 5 years of issuance of the biological opinion.	Accomplished. The parking area has been closed to vehicle traffic. There has been no trail maintenance on the Colby Trail since 2011. The ANF is currently analyzing options for rerouting the trail.
(5) Public education signs will be placed at key locations within designated critical and occupied arroyo toad habitat starting in 2014 to: (1) encourage appropriate use of the area, including but not limited to prevent building of recreational dams; (2) keep motorized vehicles, bikes, and pedestrian traffic on designated routes; and (3) Protect listed species and their habitats.	Accomplished. The Upper Big Tujunga arroyo toad occurrence is the most easily accessible by the public. Signs have been installed to restrict parking and discourage dam building and stream modification.
(6) In arroyo toad occupied habitat, road and trail maintenance will be implemented outside of March 1 through October 1. If road or trail maintenance must be implemented during this timeframe, an ANF biologist or a designated biologist will be present to monitor the work and minimize and avoid potential impacts to arroyo toads. If arroyo toads are present, a biologist will relocate adults and juveniles from the area of potential disturbance into nearby suitable habitat.	Accomplished. No road/trail projects occurred in occupied arroyo toad habitat during this reporting period.
(7) Nonnative plants will be removed from along at least 1 mile of arroyo toad occupied habitat annually. Areas for nonnative plant removal will be selected to maximize the benefit to the arroyo toad.	Accomplished. Nonnative plant removal occurred in upper Big Tujunga Canyon and targeted French

Requirement	Comment
Nonnative plant removal in Big Tujunga Canyon and Little Rock Creek will be conducted using the same measures as described in the February 27, 2007, biological opinion, as amended, or other existing consultations. Nonnative plant removal will not occur in Soledad Canyon or Castaic Creek area until consultation is completed on the Santa Clara Mojave Rivers Ranger District Invasive Plant Removal Project.	broom and Russian thistle. Nonnative plant removal also occurred in Fish Creek and focused on the removal of tamarisk.
(8) Recreation dam removal may occur within arroyo toad occupied or designated critical habitat. For any recreation dam removal activities that occur within arroyo toad occupied or designated critical habitat, the following measures will apply: (1) recreational dam removal will occur outside March 1 to October 1 within arroyo toad occupied habitat and (2) materials removed from recreational dams within arroyo toad occupied habitat will be placed outside of riparian areas and outside of concentrated sandy areas.	Accomplished. Staff is aware of this requirement. No dam removal occurred during this reporting period.
(9) Vegetation management activities within arroyo toad occupied or designated critical habitat will be implemented in accordance with general conservation measure 2 above. If arroyo toads are present, only a qualified biologist will be allowed to relocate adults and juveniles from the area of potential disturbance into nearby suitable habitat.	Accomplished. Activities were conducted in compliance with this requirement. No toads were encountered during nonnative plant removal efforts.

Mountain yellow-legged frog (Rana muscosa)

This section covers two topics: Mountain Yellow-Legged Frog (MYLF) survey and Non-Native Trout Removal

MYLF survey

Introduction

The southern California distinct vertebrate population segment of the MYLF was listed as federally endangered in 2002 and critical habitat was designated in 2006. Known occurrences on the ANF are monitored annually by USGS.

Methods or Techniques Used

The U.S. Geological Survey (USGS) staff visits each of the four drainages annually to visually locate and then capture adult and subadult MYLF while also recording the number of egg masses and tadpoles. Adults are implanted with a Passive Integrated Transponder (PIT) tag to track individual organisms. Adults are also swabbed for *Batrachochytium dendrobatidis* (i.e; Bd), a chytrid fungus linked to the significant decline of many amphibian species.

Data from these surveys are presented to the ANF, USFWS, CDFW, MYLF working group and disseminated for wildlife and habitat management consideration.

Realized/Expected Results

The United States Geological Survey (USGS) monitored four MYLF sites on the ANF. The MYLF sites surveyed/monitored in 2017 include presence/absence surveys and mark/recapture techniques to estimate population size. Collection of data on disease, water quality, habitat parameters, and site disturbance was also conducted. USGS prepares an annual report summarizing the results of their survey efforts. This report presents an analysis of population trends for all known occurrences and identifies factors believed to be affecting the MYLF and their habitat on the ANF. Survey results confirm that the Little Rock Creek population remains the largest MYLF population on the ANF.

Table 13. Conservation Measures Specific to the Mountain Yellow-Legged Frog

Requirement	Comment
(1) Coordination with the ANF Biologist will occur prior to implementing road or trail work in stream channels or at low water crossings where flowing water is present and is occupied by the mountain yellow-legged frog. When implementing road or trail work under these conditions, an ANF biologist or designated biologist will conduct predisturbance surveys and be present to monitor the work. In addition, the measures in subsections 3.21, 3.30, and 3.33 of the Forest Service Handbook 2509.22-Soil and WaterConservation Practices Handbook will be implemented (USFS 2005a).	Accomplished. No road/trail projects occurred in occupied mountain yellow-legged frog habitat.
(2) Public education signs will be placed at key locations within designated critical and occupied mountain yellow-legged frog habitat starting in 2014 to: a) encourage appropriate use of the area, including but not limited to prevent building of recreational dams; b) keep motorized vehicles, bikes, and pedestrian traffic on designated routes; and c) protect listed species and their habitats.	Accomplished. ANF staff is developing signs for placement at key locations within designated and occupied mountain yellow-legged frog habitat.

Requirement	Comment
(3) For any nonnative plant removals conducted within designated critical or occupied mountain yellow-legged frog habitat, measures described in the San Gabriel River Invasive Plant Treatment Project letter from the Service provided on September 30, 2011, will be implemented (Service 2011a).	Accomplished. Nonnative plant removal did not occur in designated or occupied mountain yellow-legged frog habitat during this reporting period.

Trout Removal Effort

Introduction

As part of an interagency effort between the ANF, USGS and Fisheries Resource Volunteer Corps (FRVC), trout removal was implemented in South Fork Big Rock Creek. This trout removal is considered a Recovery Action for the federally endangered MYLF. This seven day project targeted nonnative rainbow trout (Oncorhynchus mykiss) and occurred in the wetted stream above the South Fork Campground beyond a Forest Service constructed fish barrier, and extended upstream to a natural fish barrier waterfall. Introduced nonnative rainbow trout are a significant threat to the federally endangered MYLF and may be a contributing factor to MYLF decline in addition to recreation, wildfire, flood and drought conditions and stream modification (channelization, diversions and dams).

Long-term recovery of the species and habitat may include the establishment of trout-free stream reaches and additional exotic species control to protect and expand current populations. South Fork Big Rock Creek has undergone a significant non-native trout removal effort over the past four years to reduce predation and competition pressures on the MYLF. This survey will serve as an excellent tool to assess the impact of the non-native fish eradication activities on the distribution of MYLF in this drainage, particularly since FY 2017 is the first trout free year.

Trout removal was restricted to a stream segment approximately 3 miles in length between a manmade fish barrier constructed in 2008 and a natural fish barrier waterfall. The intent of this trout removal was to improve habitat conditions for the MYLF and increase the area suitable for occupancy. No trout were captured in the fall of 2016 after 3 complete passes, and the 2017 survey also concluded with no trout after one complete pass (4 complete passes within 12 months).

Methods or Techniques Used

Removal efforts included the use of two, backpack electrofishing units used in coordination with long handled dip-nets in the wetted stream. Crew members scanned stream sections, prior to shocking, to ensure no MYLF were present during removals. The entire reach was shocked each field day and the project continued until there were three consecutive days where no rainbow trout were captured. The technique, equipment and personnel utilized for removal efforts were selected to ensure that the risk of injury/mortality to non-target species is minimized. Removal efforts were conducted by personnel experienced in the performance of aquatic surveys and invasive removal.

Realized/Expected Results

Through the removal of trout, the ANF has successfully implemented a MYLF Recovery Action to reduce threats to the population and its habitat. After two subsequent removals efforts, trout captures decreased from 497 individuals in 2014 to only 10 individuals the following year. A total of 2.7 stream miles were enhanced by this project.

Unarmored threespine stickleback (Gasterosteus aculeatus williamsoni)

Survey and relocation

Introduction

Throughout their range, Unarmored threespine stickleback (UTS) have been impacted by drought and post-fire conditions. Stream conditions and concerns for extirpation of occurrences has prompted the salvage and relocation of UTS to National Forest System (NFS) lands.

Post-fire salvage

In July of 2016, the Sand Fire burned 41,432 acres in the Santa Clara River watershed. This area includes Soledad Canyon where a small population of the federally endangered UTS occupies the lower section of Soledad Creek, just outside of the Angeles National Forest administrative boundary. In a collaborative assessment between California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS) and the U.S. Fish and Wildlife Service (USFWS), it was determined that this population would likely be extirpated as a result of post-fire erosion compounded by lingering drought conditions. CDFW and USFWS led a rescue and translocation project to protect the Soledad UTS population from potential habitat elimination resulting from recently burned hillside erosion and subsequent sediment inundation.

Methods or Techniques Used

Optimal translocation sites for the UTS would be within the same sub watershed from which they are were collected. However, it was determined that suitable upstream habitat within Soledad Canyon was also at risk for high sediment loading from the burned watershed and was eliminated from consideration. Fish Canyon Creek on the Los Angeles Gateway Ranger District was then identified as an appropriate alternative, having similar habitat conditions to that of Soledad.

On October 26, 2016, block nets and dip nets were used to capture 171 fish (13 Arroyo chub inadvertently captured, 158 UTS) from Soledad Creek. At this time, water quantity and quality in Fish Canyon Creek was poor and trending downward, so the UTS were transported to the California State Fillmore Hatchery to wait out the winter until conditions in Fish Canyon improved.

CDFW regularly evaluated Fish Canyon and on April 14, 2017, the habitat had recovered and approximately 151 UTS were released into the stream system (7 UTS mortalities from the time of capture to release).

Realized/Expected Results

CDFW continues to monitor the populations post-translocation. Monitoring in 2017 confirmed the continued presence of UTS in Fish Creek. Through a combined effort between ANF, CDFW and USFWS, potential extirpation of an endangered fish population was avoided. The translocated UTS persist and their unique genetic strain remains intact. There is a discussion to

possibly begin captive breeding for this species. This post-fire salvage has preserved this unique population for future efforts to maintain the genetic diversity of this species.

Invasive Fauna Removal in San Francisquito Creek

Removal of nonnative aquatic species was implemented for the improvement of habitat for threatened and endangered species, specifically UTS and CRLF in San Francisquito creek. Night surveys were conducted using minnow traps that were baited with mackerel, anchovy, squid, largemouth bass or sardines. When checking traps, all aquatic species caught were identified and recorded. When traps were opened and native species were found, these individuals were returned to the stream. All invasive species were removed from the stream including 287 crayfish. Participants in this effort include ANF staff, Forest Service Field Rangers and volunteers.

California condor (Gymnogyps californianus)

Table 14. Conservation Measures Specific to the California condor

Requirement	Comment
(1)The ANF will coordinate with the Service when data indicate that any condor is in the action area and allow the Service to access the area so that visual observations of the bird(s) can be confirmed. The ANF will also allow the Service access to attempt to haze the bird away from the area by use of dogs, spraying the condor with water, noise making devices, or other deterrents. The Service will be allowed to attempt hazing as often and repeatedly as it deems necessary to prevent habituation or other injury to a condor. No one other than the Service will be authorized to conduct such hazing. If attempts at hazing are unsuccessful, the Service may determine that capturing a condor is required. If so, the ANF will allow the Service to access an appropriate area, as determined by the Service, to capture the condor for relocation or removal to captivity.	Accomplished. The ANF has provided the Service with keys necessary for access to gated areas. The ANF coordinates with the Service to provide support in all areas of access, communication, capture and hazing efforts.
(2) Diligent microtrash (e.g., bottle caps, pull-tabs, pieces of glass) cleaning efforts will be maintained during road and trail maintenance projects by daily inspecting and cleaning within the project area until the maintenance work is completed.	Accomplished. Road and trail maintenance has not occurred in areas identified as occupied by the California condor during this reporting period.
(3) USFS Order speed limit signs will be posted along the road to Contract Point by 2014.	Accomplished/Completed.
(4) The ANF will enhance 2 acres of condor habitat annually by removing microtrash from sites known to be used by condors including, but not limited to, Whitaker Peak and the area associated with Forest Road 3N17.8. The removal will be implemented in areas that maximize the benefit to the condor and their habitat. This action will occur until such time as the ANF and Service agree that the action is no longer needed or it is no longer deemed an effective method of condor habitat enhancement.	Accomplished. Two acres of microtrash clean-up was implemented in the area associated with FS Road 3N17.8 and Templin Highway.

California red-legged frog (Rana draytonii)

Introduction

The California red-legged frog (*Rana draytonii*) (CRLF) was listed as federally threatened species in 1996. Under the USFWS "Recovery plan for the California red-legged frog" (2002), a conservation management objective includes gathering biological and ecological data necessary for the conservation of the species.

In 2002, the Copper Fire burned through San Francisquito Canyon eliminating a considerable area of suitable stream habitat and reducing the CRLF population to only a few individuals. The Copper Fire also impacted the UTS population in San Francisquito Creek. The ANF is actively implementing aquatic invasive species eradication in San Francisquito Creek for both post-fire habitat restoration and CRLF and UTS species recovery.

In 2009, CRLF were confirmed in Aliso Canyon. This population was impacted by post-fire conditions following the Crown Fire Complex and Station Fire. USGS continues to monitor this population and has confirmed a downward trend in distribution and numbers on National Forest lands.

Methods or Techniques Used

USGS annually visits both drainages to visually locate and assess the number of CRLF adults, egg masses and tadpoles. The focus of the surveys was for the detection of egg masses, but biologists also recorded information regarding the presence of adult, tadpole, and juvenile CRLF. When egg masses were located, the following information was collected: GPS position, photos, type of substrate attached to, distance from stream bottom and stream bank, and air and water temperature. Each stream segment is visited three times in a season to evaluate changes in egg masses and to document the observance of new masses.

Table 15. Conservation Measures Specific to the California Red-Legged Frog

Requirement	Comment
(1) The road crossing within California red-legged frog occupied habitat at Aliso Creek will be examined for potential impacts to California red-legged frog Individuals or egg masses once annually during the breeding season.	Accomplished. USGS conducted CRLF monitoring in Aliso Creek. Illegal OHV use was documented and is having an adverse effect on CRLF habitat in this area.
(2) Coordination with the ANF Biologist will occur prior to implementing road or trail work in stream channels or at low water crossings where flowing water is present and is occupied by California red-legged frog. In California red-legged frog occupied habitat, efforts will be made to conduct work outside of November 1 through April 3. When implementing road or trail work within this timeframe, an ANF biologist or designated biologist will conduct pre-disturbance surveys and be present to monitor the work. In addition, the measures in sub-sections 3.21, 3.30, and 3.33 of the Forest Service Handbook 2509.22-Soil and Water Conservation Practices Handbook would be implemented (USFS 2005a).	Accomplished. No road/trail projects occurred in occupied California red-legged frog habitat during this reporting period.
(3) Public education signs will be placed at key locations within California red-legged frog occupied and designated critical habitat starting in 2014 to: a) encourage appropriate	Signs have not yet been installed within designated and occupied California red-legged frog habitat.

Requirement	Comment
use of the area, including, but not limited to, prevent building of recreational dams; b) keep motorized vehicles, bikes, and pedestrian traffic on designated routes; and c) protect listed species and their habitats.	
(4) Nonnative plant removals in Aliso Creek will be conducted using the same measures as described in the San Gabriel River Invasive Plant Treatment Project letter from the Service provided on September 30, 2011, for the mountain yellow-legged frog (Service 2011a). Nonnative plant removal will not occur in San Francisquito Creek until consultation is completed on the Santa Clara Mojave Rivers Ranger District Invasive Plant Removal Project.	Accomplished. Staff is aware of this requirement. Nonnative plant removal did not occur in Aliso Creek. Nonnative plant removal did occur in San Francisquito Creek and was in compliance with the Forest Wide Invasive Plant Management BO.

Santa Ana sucker (Catostomus santaanae)

Monitoring survey Information

Introduction

Big Tujunga Creek: Santa Ana sucker (SAS) were monitored in Big Tujunga Creek. This data will be used to establish a baseline data set in order to assess the impacts of an upcoming sediment clean out project proposed by Los Angeles Department of Public Works (LADPW). This monitoring has focused on Santa Ana sucker, arroyo chub and Santa Ana speckled dace and has collected data on habitat quality, macroinvertebrates, and invasive species present. This work was conducted by Psomas Consulting and followed a protocol developed by San Marino Environmental Associates to assess the habitat suitability for different life stages of the Santa Ana sucker. This data will be used to establish a baseline data set that will allow for effective monitoring over time for these special status species. This will allow for better management of this species over time and more informed decision making when the ANF is dealing with land management issues that may affect this species or its habitat.

San Gabriel Canyon: SAS habitat surveys were conducted in San Gabriel River system. Participants included ANF staff, Forest Service Field Rangers, Citrus College interns, FRVC, SERMA, Merkel and CDFW. Each site was assessed in pre-recreation season (before Memorial Day weekend) and in post-recreation season (after Labor Day weekend) to evaluate habitat quality changes as a result of human activity. Data collected include classification and counts of substrate (pebble counts), cobble embeddedness, canopy cover, stream habitat type (%), stream habitat maximum depth, wetted stream width, and turbidity measurements. To better quantify the impact of recreation activity to these sites, trash and user created rock dams were also counted within stream reaches. Adult suckers were observed during both seasons in the West Fork immediately above the OHV area. The non-native largemouth bass and green sunfish were prevalent throughout much of the East Fork from the San Gabriel Reservoir to Oaks Day Use Area. During 2017, 8 sites in the East Fork were monitored monthly to gather information on the variability of turbidity.

Table 16. Conservation Measures Specific to the Santa Ana Sucker

Requirement	Comment
(1) The ANF will install and maintain signs at strategic locations along sucker occupied habitat in the San Gabriel and Big Tujunga watersheds informing the public of the presence of the sucker and to prevent building of recreational dams. Signs will also address USFS requirements regarding recreational mining. Signs will be placed in 2014.	Accomplished. Installation of signs has begun. ANF is developing a comprehensive plan to identify signing needs. Under the recent Monument designation, San Gabriel Canyon is scheduled for multiple improvements including signs that will highlight the sensitive resources in the area.
(2) Recreational dam removal will occur along at least 3 miles of sucker occupied habitat annually. Areas for dam removal will be selected to maximize the benefit to the sucker. Recreational dam removal will be conducted using the same measures as described in the October 4, 2012, biological opinion for this activity (Service 2012a).	Accomplished. Volunteers removed dams in both Big Tujunga Canyon and San Gabriel Canyon. Approximately 3 miles of stream were included in these efforts.
(3) Parking capacity will be maintained, or if needed, decreased at developed/concentrated recreation areas including Cityline, Delta Flats, Wildwood, and Vogel	Accomplished. Parking capacity remained unchanged at Cityline, Wildwood and Vogel

Requirement	Comment
Flats/Stonyvale to manage for a sustainable recreation carrying capacity.	Flats/Stonyvale. There is currently no vehicle access to the parking lot at Delta Flats.
(4) A monitoring plan will be developed to measure habitat quality in sucker occupied habitat within the San Gabriel and Big Tujunga watersheds in accordance with the Aquatic Management Plan described above.	Accomplished. The monitoring plan has been completed and implemented.
(5) Coordination with the ANF Biologist will occur prior to implementing road or trail work in stream channels or at low water crossings where flowing water is present and is occupied by sucker. Efforts will be made to conduct work outside the primary sucker breeding season (March to July). When implementing road or trail work under these conditions, an ANF biologist or designated biologist will conduct pre-disturbance surveys and be present to monitor the work. In addition, the measures in sub-sections 3.21, 3.30, and 3.33 of the Forest Service Handbook 2509.22-Soil and Water Conservation PracticesHandbook will be implemented (USFS 2005a).	Accomplished. No road/trail projects occurred in stream channels or at low water crossings with flowing water or where occupied by Santa Ana sucker during this reporting period.
(6) Nonnative plants will be removed from within or adjacent to at least 1 mile of sucker occupied habitat annually. Areas for nonnative plant removal will be selected to maximize the benefit to the sucker. Nonnative plant removals will be conducted using the same measures as described in the San Gabriel River Invasive Plant Treatment Project letter from the Service provided on September 30, 2011.	Removal of invasive plants occurred in Big Tujunga Canyon. This invasive plant removal focused on arundo.

Recovery Action

Removal of User Created Recreational Dams

ANF biologists provided training on how to remove recreational dams in compliance with the current ongoing activities BO. Biologists worked with volunteers and other Forest Service staff and provided training to explain the status of the species, the regulatory framework and the need to implement this work in a safe, effective and BO compliant way. In the San Gabriel Canyon, 49 recreational dams were removed. In Big Tujunga Creek, dams were removed in stream stretches associated with dispersed recreation (Cityline) and developed recreation sites (Wildwood and Stonyvale). All dam removal occurred outside the SAS reproductive season. Stream flow and function was improved in areas where dams were removed or breached.

Big Tujunga Nonnative Removals

As part of their annual SAS monitoring, Psomas Consulting conducts electrofishing and snorkeling. All invasive species collected during these efforts are recorded and removed from the stream. In 2017, they removed crayfish, fathead minnows, largemouth bass, catfish, sunfish and bullfrogs. While this removal of nonnative fauna is not the primary focus of their work in Big Tujunga Canyon, it has contributed to a reduction in the nonnative fauna known to have an adverse impact on SAS. Big Tujunga Creek is impacted by drought, recreation use, Big Tujunga dam and the continuing post-fire conditions. As such, native species such as SAS in Big Tujunga Creek must endure persistent environmental stressors while competing for resources with aggressive invasive species.

In addition to SAS, other native species that will benefit from the removal of nonnative fauna include: arroyo chub (*Gila orcutti*), Santa Ana sucker (*Catostomus santaanae*), Santa Ana speckled dace (*Rhinichthys osculus*), rainbow trout (*Oncorhynchus mykiss*), California treefrog (*Pseudacris cadaverina*), Pacific treefrog (*Pseudacris regilla*) and the southwestern pond turtle (*Actinemys marmorata pallid*).

Methods or Techniques Used

Removal efforts included backpack electrofishers, dip-nets andseins. Removal efforts were implemented in conjunction with the annual SAS monitoring efforts. The consultant was in possession of all appropriate federal and state permits.

Realized/Expected Results

The removal of nonnative fauna reduces impacts to SAS in Big Tujunga and is consistent with the Recovery Actions developed by USFWS for the species.

Trash Clean Up

Introduction

Many day use areas and parking allotments are in close proximity to stream systems and the introduction of large quantities of trash can ultimately enter the waterways and alter many hydrological functions. Trash in the stream can also degrade overall habitat and water quality for native aquatic species. Due to this concern the California Water Quality Control Board (CWQCB) has set a TMDL of zero trash in a few rivers.

The ANF and Fisheries Resource Volunteer Corp (FRVC) conduct regular patrols of the East Fork San Gabriel River to clean up trash and litter as mandated by the East Fork San Gabriel River Trash TMDL report (CWQCB 2000). The ANF is an urban forest and on busy days upwards of 400 trash bags (32-gallon bags) can be collected from heavy recreation areas.

Methods or Techniques Used

FRVC members patrolled heavily recreated day use areas with trash pickers and trash bags to collect trash left behind from forest visitors. Trash bags were loaded into vehicles and trash was disposed of properly at designated trash reciprocals either on or off forest. ANF staff and the Mis Hermanos Pequentitos volunteer group collected trash during recreation rock dam removal operations and therefore trash removal sites mirrored recreation dam deconstruction sites.

Realized/Expected Results

Through the removal of trash from streams and stream banks, hydrological functions and water quality will improve.

Table 17. Trash removed by pound

Group	Stream	Trash Removed (lbs)
FRVC	Piru Creek	2,745
	Icehouse Canyon	82
	San Antonio Creek	878
	East Fork SGR	932
	North Fork SGR	2,375
	West Fork SGR	2,694
	Santa Anita Creek	222
ANF, Mis Hermanos Pequentitos	Big Tujunga	10,000
ANF, FRVC, Friends of the Angeles	East Fork SGR	400

Description of Benefits to Other Programs

The removal of trash from the stream system benefits habitat/populations, hydrology, wildlife, and recreation experience. Excessive trash in the streams not only impounds water, but also reduces water quality and impacts both wildlife and human safety.

Forest Goal 2.1: Invasive species (LMP, Part 1, pg. 31)

Goal: Reverse the trend of increasing loss of natural resource values to invasive species.

Activity, practice, or effect to be monitored: Invasive species.

Monitoring question: Are the ANF's reported occurrences of invasive plants/animals showing a stable or decreasing trend?

Indicator: Acres of treatments in reported occurrences

Results:

Objective/Purpose of Project

Our main objective is to remove invasive plant infestations to improve terrestrial and riparian habitat. The removal of invasive plant species will encourage and enhance native plant growth and improve habitat for native wildlife species.

Methods or Techniques Used

Manual and chemical removal techniques were applied across the Forest in multiple watersheds. Treatments were implemented by ANF staff, contractors, partners and volunteers.

Manual removal methods included the use of hand tools, chainsaws, and hand-pruners, while chemical removal methods included the use of approved herbicides applied by backpack sprayers, hand sprayers, and paintbrushes. Plants were treated at various times through the year, in accordance to the ideal time for chemical application depending on species for maximum effectiveness.

Because the ANF does not have sufficient staff or funding to assess trends in invasive species, it's difficult to confirm if they are increasing or decreasing. The ANF has forest-wide National Environmental Policy Act (NEPA) coverage for invasive treatment and this allows us to quickly treat infestation of invasive species using a wide range of either manual or chemical tools. Priorities for treatment include riparian areas (esp. those with special status species) and new populations of target species such as yellow star thistle (*Centaurea solstialis*), Russian thistle (*Salsola* sp) and tamarisk (*Tamarix* sp) Some of the species treated include the following: fountain grass (*Pennisetum sp*), annual grasses, Arundo (*Arundo donax*), Tamarisk (*Tamarisk sp*), Russian thistle (*Salsola* sp), perennial pepperweed (*Lepidium lathifolium*), annual grasses, Spanish broom (*Spartium junceum*).

For general project management, equipment brought on to the forest must be cleaned prior to entering the forest boundary. This includes heavy equipment, any vehicle driving on a dirt road, chainsaws, handtools and shoes of crews. This applies to our FS crews, Southern California Edison, Southern California Gas, Plains Pipelines, Mobile Pipelines, Department of Water and Power and all others who work on the ANF.

We also require large projects conduct pre-invasive treatment and post-invasive treatment as part of restoration that always includes invasive treatments.

Treatment areas include the following: Big Tujunga Canyon, Little Tujunga Canyon, Bouquet Canyon, San Francisquito Canyon, Castaic, San Gabriel Canyon, Angeles Crest Highway, Angeles Forest Highway, Highway 39 and Copper, Powerhouse, Sand, Fish, Creek and Sayre Fires areas.

Realized/Expected Results

The treated areas are expected to improve riparian habitat for ANF Threatened and Endangered Species by reducing excessive water extraction and allow native riparian species to propagate. The removal of Spanish broom and other noxious invasive plants will allow for diverse native vegetation cover and growth in affected watersheds. This enhanced habitat will provide native fauna with essential heterogeneous resources for growth and survival.

Part 2 - Monitoring

Monitoring identified in LMP Part 2 is focused on program implementation including inventory activities.

Part 2 Monitoring Questions and Results

Table 18. Part 2 Monitoring Questions and Results

Indicators	Results
Acres of Terrestrial Habitat Enhanced	2,000
Miles of Aquatic Habitat Enhanced	55
Acres of Noxious Weeds Treated	476
Acres of Vegetation Improved and Acres of Hazardous Fuel Reduction	6,934
Acres of Watershed Improved	0
Acres of Land Ownership Adjusted	0
Number of Heritage Resources Managed to Standard	1
Products Provided to Standard (Interpretation and Education)	19
Recreation Special Use Authorizations Administered to Standard	291
PAOT Days Managed to Standard (Developed Sites)	667,117
Recreation Days Managed to Standard (General Forest Areas)	105
Land Use Authorizations Administered to Standard	407
Number of Mineral Operations Administered	3
Number of Allotments Administered to Standard	0 (no active allotment)
Miles of Passenger Car Roads Maintained to Objective Maintenance Level	43
Miles of High Clearance & Back Country Roads Maintained to Objective Maint. Level	168
Miles of Road Decommissioned	0-1
Miles of Trail Operated and Maintained to Standard	3- improved 12-maintained

Air Quality Monitoring

Under the Interagency Monitoring of Protected Visual Environments (IMPROVE) program, a monitor near the Vetter Mountain Lookout measures the air quality for the San Gabriel Wilderness. This is one monitoring site of many located across the county in various National Parks, National Forests, and National Wildlife Refuges designed to determine to what degree air pollution is affecting visibility of these airsheds. The Clean Air Act and Congress have affirmed the agency's responsibility in protecting the visibility of airsheds known as Class I.

Data is collected every third day year-round at each of the sites. The data is then processed and compiled for each year, at this time, the 2016 data is the most recent results. Monitoring results from this site indicates visibility has been increasing in the San Gabriel Wilderness since monitoring begun, must noticeably for the haziest days as shown by the red line (Figure 13). The largest sources of haze in the wilderness are ammonium sulfate and ammonium nitrates (Figure 14). Under natural conditions, these pollutants would be in much lower concentrations. The agency will continue to assess wilderness visibility impacts as required by law of large stationary sources (such as power plants) under the Prevention of Significant Deterioration (PSD) program.

Figure below shows the monitoring results from the San Gabriel Wilderness site. Red lines indicate the worst days while blue indicates the best days. Both lines are gradually sloping downward indicating improving wilderness visibility since monitoring begun in 2001. A deciview (dv) reading of "0" indicates a clear view with no reduction in visibility.

Figure 13. Monitoring Results from the San Gabriel Wilderness Site

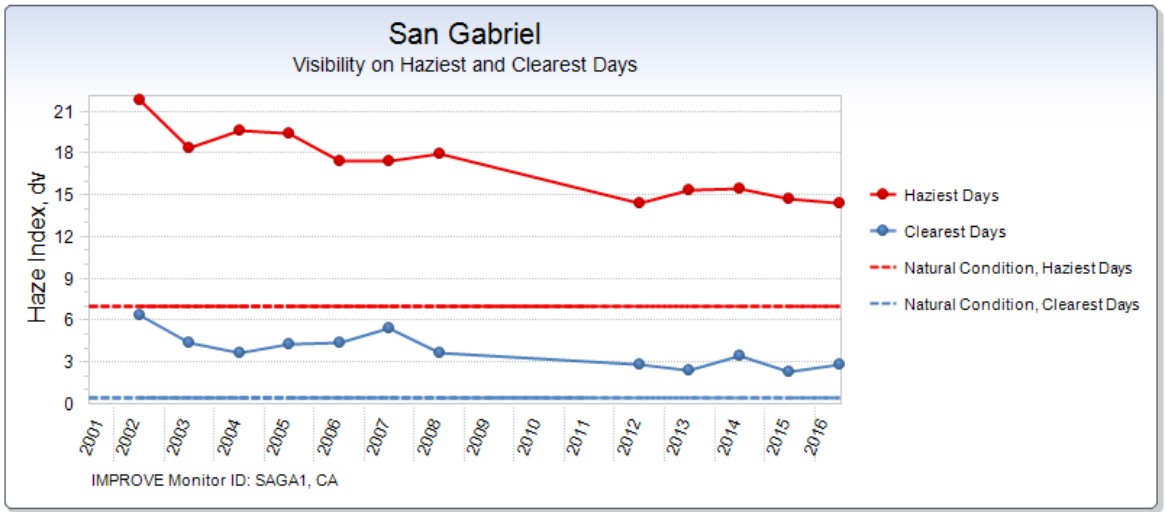
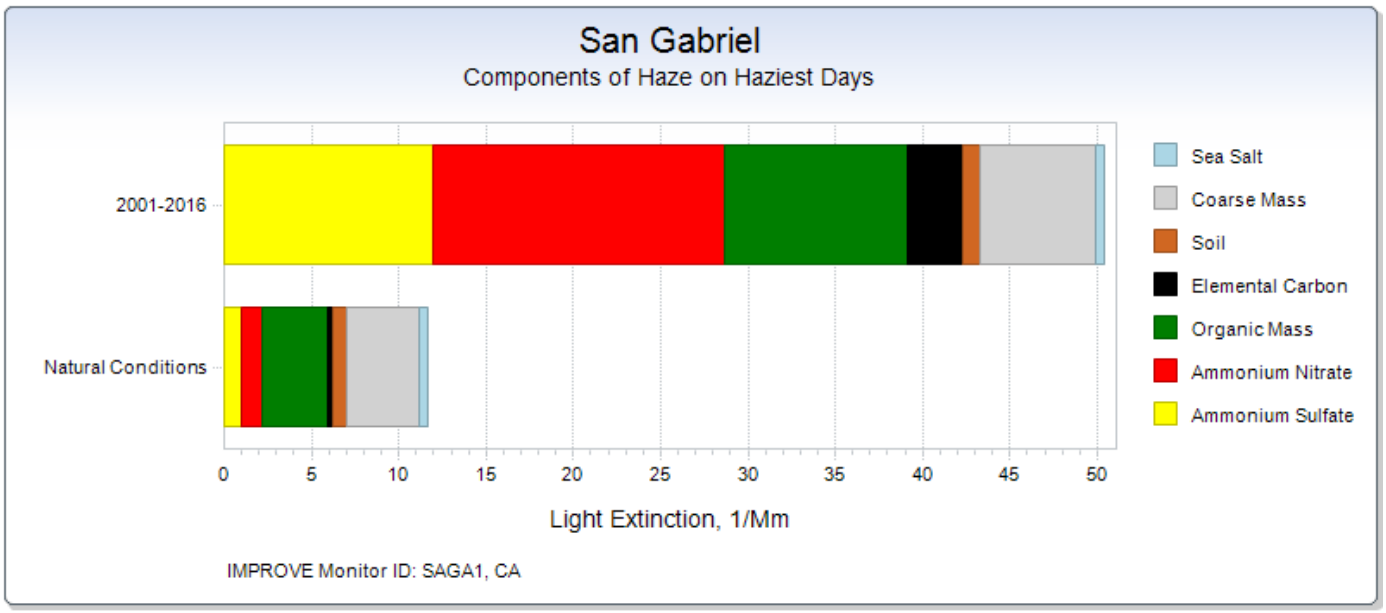


Figure below shows the haze components compared to natural background and amount of visibility each reduces in the San Gabriel Wilderness. Pollutants such as ammonium nitrates and sulfates (red and yellow in the chart below) are present in the air of the San Gabriel wilderness in much greater quanities than what would occure naturally and contribute to half of all the haze present.

Figure 14. Haze Components Comparison



More information may be found at the Federal Land Manager Environmental Database web site: http://views.cira.colostate.edu/fed/

Visibility/ scene monitoring was historically conducted at the San Gabriel Wilderness using a camera, these images can be found at the following URL: http://www.fsvisimages.com/. Scene monitoring and the continuing aerosol air quality monitoring (such as the IMPROVE program) to determine what varying levels of air pollution effect visibility of Class I wildernesses. Typical visual range in the western U.S. is 60 to 90 miles, reduced by about one-half from natural conditions due to air pollution. See Figure 15 below for an example of air pollution reduction in visibility at the San Gabriel Wilderness.

Figure below is an example of historical photo series depicting scenic visibility impacts due to air pollution in the San Gabriel Wilderness. An example of near pristine air quality on the left and poor air quality at the same location featured on the right.

Figure 15. Visibility Impacts Due to Air Pollution in the San Gabriel Wilderness

The ANF will continue to implement that following air quality goals set forth by the Southern California Forest Plans:

Air 1 - Minimize Smoke and Dust Control and reduce smoke and fugitive dust to protect human health, improve safety and/or reduce or eliminate environmental impacts.

- Incorporate visibility requirements into project plans.
- Use emission reduction techniques (ERT).

Air 2 - Forest Air Emissions Maintain and update the inventory for wildland fire emissions and other national forest resource management emissions within the current State Implementation Plan (SIP). The State Implementation Plan inventories establish levels of air pollution that meet the long-term federal air quality goals for bringing the nonattainment areas to attainment of the National ambient Air Quality Standards.

- Describe the magnitude and timing of prescribed and wildland fire emissions in each Air Pollution Control District.
- Provide input to AQMD on regional air quality issues for forest protection.

Heritage Program

According to the Heritage Program Managed to Standard (HPMtS) criteria established by the Washington and Regional Office Heritage Program, the Angeles National Forest Heritage Program was managed to standard in Fiscal Year 2017 (FY17). The indicators for a Heritage Program Managed to Standard Measures represents the goals of social, environmental, and economic sustainability in the Forest Service Public Services Strategy and the program responsibilities in the Heritage Program National Strategy to: protect historic properties; share their values with the public; and contribute information and perspectives to land management. Specific indicators include: program plans; section 110 survey; National Register evaluations and nominations; PHA condition assessment; PHA site stewardship; public outreach and study; and volunteer contributions.

Since the indicators and scoring for Heritage Program Managed to Standard were implemented in FY11, the Angeles has consistently scored at or above their target level of 45 points. During FY17, the Angeles scored above its HPMtS threshold, with 46. While the program met its target score, it is becoming increasingly difficult to achieve and maintain due to a number of factors (i.e. current budget and staffing levels, additional assigned duties - managing the Tribal Program, and supporting other Forest heritage programs, etc.).

This year's score was attained with our current level of staffing, comprising a permanent HPM, and two archaeological staff, maintaining the lowest staffing levels since 2003. During the first half of FY17, the ANF HPM was assigned additional duties that involved supporting the San Bernardino's NF heritage program. This involved assisting their supporting archaeologists with project reviews, and concurring with management recommendations on RPA undertakings, stipulations, protection measures, etc.

While these additional duties eventually ended by mid-FY17, the ANF HPM was assigned these same management responsibilities on the Los Padres NF in the latter part of FY17. These types of duties, principally associated with Section 106 compliance, did impact the ANF HPM's abilities to focus on the Forest's Section 106 and 110 responsibilities and accomplishments. For much of FY17, the ANF heritage program continued, and devoted significant time, to perform another set of collateral duties, involving our Tribal Program and Native American consultation responsibilities. Due to these conditions, the heritage staff primarily worked to ensure the Forest met its Section 106 responsibilities, thus, the Section 110 program areas did not improve in some critical areas as anticipated. Two areas most impacted by this lack of capacity involve National Register nominations and evaluations (Section 110), and inadvertent effects/foreclosure resolution (Section 106), both areas that the ANF could improve upon in the future, if feasible under the existing workloads and additional duties.

Due to their time consuming nature, any decreases in budgeting and staffing, has significantly affected the staff's ability to improve upon these elements. The Heritage Program was only able to carry out one Passport in Time project due to reduced staff and heavy Section 106 compliance workloads. This resulted in less points scored for the number of public outreach studies and reduced acres of Section 110 survey coverage.

During FY17, the ANF still managed to monitor 41 sites, outside of projects requiring Section 106 compliance, specifically to assess the conditions of sites, including those that were identified

as priority heritage assets due for condition assessments in FY17. These sites, visited by Forest Service Heritage Resource Personnel and volunteers, were assessed for site condition and to identify any agents, either natural (erosion) or human (vandalism) affecting those sites. This is another indicator or target that the ANF heritage program regularly meets, even over the last few years of fewer staff and less funding.

During this year's condition assessments and monitoring of PHA's, Heritage staff continued monitor and document the recurrence of looting activity that triggered one ongoing Archaeological Resources Protection Act of 1979 (ARPA) investigation. Heritage staff continues work with a Special Agent from Law Enforcement to purse both ARPA and violations of Forest Service regulations 36 CFR 261.9(g): *Digging in, excavating, disturbing, injuring, destroying, or in any way damaging any paleontological, prehistoric, historic or archaeological resource, structure, site, artifact or property*. During the investigation, Heritage staff and Law Enforcement installed cameras in and around the areas of disturbance, and the access road leading to the site, blocked access with OHV/vehicle barriers, in an effort to identify the individuals responsible for the damage. Currently, the investigation has stalled as no suspects have been identified, but the investigation remains active.

The Forest has also continued its relationships with local historical societies that do volunteer work on the Forest. The ANF renewed an MOU with California State University (CSU) Northridge in FY15 to continue our relationship and provide research opportunities and access to resources managed by the ANF. In FY17, the ANF Heritage staff maintained its relationship with CSU Northridge graduate studies program in helping to facilitate both student research and field site visits associated with a historical archaeology class. Other groups, such as the Mount Lowe Historical Society, Santa Clarita Historical Society, and Friends of Echo Mountain, work in partnership with the Forest to maintain trails and historic elements of the Mount Lowe Railway Historic District and Saint Francis Dam disaster site. The Old Ridge Route Preservation Society helps preserve and maintain the National Register property, and monitor and report on current site conditions.

In FY17, Heritage staff prioritized efforts to develop relationships with other historic groups in and around Los Angeles County interested in the historic resources located on the Angeles National Forest. These efforts were greatly enhanced by the publics' participation and involvement in the development of the San Gabriel Mountains National Monument Management Plan and Environmental Assessment. Heritage staff developed new points of contact with the Wrightwood Historical Society, the Arcadia Historical Society, the Santa Clarita Valley Historical Society, the Altadena Historical Society, and other interested individuals who have offered or provided support for the Forest's Heritage program and activities. The St. Francis Dam site, for example, is of particular interest to members of the Santa Clarita Valley Historical Society. Heritage staff, in FY17 met with the Santa Clarita Historical Society, collaborated with members of the SCVHS, and students from the College of the Canyons, in the second phase of the graffiti removal project at the ruins of the St. Francis Dam disaster site. The Heritage Program continued to develop its outreach and public participation efforts in FY17 involving social media. In association with Archaeology Month, the program has continued to broaden our outreach approach by providing historical photos and narratives of historic points of interest within the Forest. These were then posted to the Angeles National Forest and San Gabriel National Monument's Facebook and Twitter accounts. With the feedback and interest shown by

the public to the program through these types of social media outreach activities, the potential to increase public awareness, participation, and partnerships in the stewardship of the Forest's cultural resources appears high. Due to the public's response to these efforts, the ANF Heritage staff hopes to continue and expand our efforts involving the use of social media to in FY18.

As the Heritage Program continues to be stretched thin, staff has worked hard to find alternate strategies that meets both the Forest's Section 106 and Section 110 responsibilities. Developing collaborative relationships and partnerships is becoming increasingly important to maintaining these goals, responsibilities, and managed to standard targets or values. The program component that suffers from this lack of capacity tends to fall on our Section 110 heritage program. While we save the Forest hundreds of thousands of dollars operating under the RPA, Section 110 funding from the Regional Office back to the Forest's heritage programs has decrease considerably over the last few years, and is becoming more and more difficult to secure.

The ANF's heritage program has worked hard in FY17 to incorporate our 110 objectives into other funding streams, ecological or watershed restoration projects, and fire settlement type projects. The difficulties that we face in this integration stems from continuing fire borrowing, and the need to secure or obligate these funds by mid-year. In an effort to secure these funds, millions of dollars are obligated to our partners (National Forest Foundation, National Forest Wildlife Foundation, etc.) that have a strict conditions and criteria's on how these funds will ultimately be spent (usually with awarding these to outside public contractors whose primary focus is watershed health and ecological restoration). Thus far, on the ANF, we have succeeded in promoting and getting small, historical, interpretative, and public education elements included on watershed or ecological restoration type projects, but have yet to see a significant award that would be focused on our program area that would contribute or support our 110 plan and goals. Working towards this objective will be one of our Program's top priorities in FY18.

Table 19. Heritage Project Summary

Total Projects	36 CFR 800 Projects	RPA Projects	Survey Projects	Previously Surveyed	Screened Undertaking
41*	5	38	14	13	11

In FY17, Table 13 provides a summary undertakings that were analyzed and required heritage review for compliance with Section 106 of the National Historic Preservation Act (NHPA) for 38 undertakings using the Regional PA. Two of these undertakings were implemented and screened under the Recreation Residence Tract PA streamline procedures, and one undertaking was implemented under the Hazardous Fuels PA, for 41 total projects. An additional two projects continue to be managed and comply with Section 106 under their own project-specific programmatic agreements in accordance with 36 CFR 800, and SCE's Emergency Hazard Tree – Pole Replacement project, while derived from the R5 PA, is managed under a separate protocol developed between the RO and SHPO. A total of three other undertakings were not able to be managed under the R5 PA expedited procedures, and were managed pursuant to the NHPA implementing regulations (36 CFR 800).

Table 20. Historic Property and Survey Data

Acres Surveyed	New Sites Recorded	Sites Updated	Sites Protected	Sites Monitored	Inadvertent Effects
172	3	5	80	37	0

Part 3 - Project Level Monitoring

Implementation and effectiveness monitoring for Part 3 of the LMPs are conducted at the project level. Part 3 of the LMPs requires annual implementation monitoring of new projects and ongoing activities and sites. Project selection for monitoring will use the following protocol and will be reviewed and updated annually as needed.

Monitoring team will ask the following questions of project or ongoing activity:

1. Did we accomplish what we set out to do?
2. Has project design criteria been effective at improving environmental conditions as expected?
3. If not, why not?
4. What are we going to do next time?
    a. What activities should be continued to sustain success?
    b. Are changes needed to correct any implementation or effectiveness-related problems?
    c. If change is needed, will it require an amendment or administrative correction to the Land Management Plan?

Results, conclusions, and recommendations will be documented in the ANF LMP Monitoring and Tracking forms and used in the annual LMP Monitoring and Evaluation Report.

These projects were selected:

1. FY17 Sawmill Liebre Integrated Fuels Project;
2. Plains Pipeline Reroute Restoration;
3. Southern California Edison Tehachapi Renewable Transmission Powerline Restoration Segments 6 and 11;
4. Tanbark Fuelbreak; and
5. Gold Spotted Oak Borer Tree (GSOB) Removal.

Name:	**#1. FY 17 Sawmill Liebre Integrated Fuels Project**
Project Contact:	Steve Bear
Monitoring Team:	Steve Bear, Vilius Zukauskas
Monitoring Period	1/29/18-4/23/18 Inspection

Monitoring Questions for Review of Projects Ongoing Activity Sites	**If no, identify what phase of the process (i.e. NEPA or project administration) was deficient and describe deficiencies. If yes, identify any standard operating procedure or key reason(s) for the success.**
Were LMP goals, desired conditions and standards incorporated into operational plans (i.e. burn plans, allotment plans, facility master plan, etc.)? Review site-specific checklists.	Contract specs reflect treatment. Yes, goals in LMP for veg type, contract requirement reflected design criteria
What were the mitigation measures or LMP project design criteria and were they implemented as designed?	Flag and avoid cultural sites and sensitive plants and animals. Protect riparian areas with buffers.
What were the requirements from Biological Assessments/Evaluations and Heritage Evaluations (ARRs) and Watershed Assessments and were they Implemented?	RCA's, LOP for spotted owl were incorporated into contract specs. As were design criteria for biology and cultural.
Were legal and other requirements (LMP consistency review checklists) identified as applicable to the project or site addressed?	Yes. LMP consistency was maintained.
Were operational controls (listed above) effective at protecting the environment as intended?	Contract specifications were written to ensure desired condition of project. MP goals for mixed conifer and design criteria were enforced through completion of contract.

Name:	**#2. Plains Pipeline Reroute Restoration**
Project Contact:	Katie VinZant
Monitoring Team:	Katie VinZant, Janet Nickerman, Evy Rimbenieks

Monitoring Questions for Review of Projects Ongoing Activity Sites	**If no, identify what phase of the process (i.e. NEPA or project administration) was deficient and describe deficiencies. If yes, identify any standard operating procedure or key reason(s) for the success.**
Were LMP goals, desired conditions and standards incorporated into operational plans (i.e. burn plans, allotment plans, facility master plan, etc.)? Review site-specific checklists.	Yes. Design criteria in the EA adequately mitigated impacts to resources. The Restoration Plan written by the forest was essential to enforcing and defining what restoration activities needed to occur, a schedule, and success criteria to be achieved.
What were the mitigation measures or LMP project design criteria and were they implemented as designed?	See the permit or EA for Plains Line 63 Reroute Project for the mitigation measures. Yes the design criteria were implemented as designed.
What were the requirements from Biological Assessments/Evaluations and Heritage Evaluations (ARRs) and Watershed Assessments and were they Implemented?	These are the same as the design criteria listed in the box above.
Were legal and other requirements (LMP consistency review checklists) identified as applicable to the project or site addressed?	No.
Were operational controls (listed above) effective at protecting the environment as intended?	Yes, the design criteria and Restoration Plan have protected resources and leading to native habitat recovery, which is better than the previous condition.

Name:	**#3. Southern California Edison Tehachapi Renewable Transmission Powerline Restoration Segments 6 and 11**
Project Contact:	Katie VinZant
Monitoring Team:	Katie VinZant, Janet Nickerman, Lorraine Gerchas, Jason Jiminez, Ann Berkley, Dave Peebles, Jose Henriquez-Santos

Monitoring Questions for Review of Projects Ongoing Activity Sites	**If no, identify what phase of the process (i.e. NEPA or project administration) was deficient and describe deficiencies. If yes, identify any standard operating procedure or key reason(s) for the success.**
Were LMP goals, desired conditions and standards incorporated into operational plans (i.e. burn plans, allotment plans, facility master plan, etc.)? Review site-specific checklists.	Yes. Design criteria in the EIS adequately mitigated impacts to resources. The Restoration Plan written by the forest was essential to enforcing and defining what restoration activities needed to occur, a schedule, and success criteria to be achieved.
What were the mitigation measures or LMP project design criteria and were they implemented as designed?	For listing of mitigation measures see the TRTP Segment 6 and 11 EIS. Yes the design criteria were implemented as designed.
What were the requirements from Biological Assessments/Evaluations and Heritage Evaluations (ARRs) and Watershed Assessments and were they Implemented?	These are the same as the design criteria listed in the box above.
Were legal and other requirements (LMP consistency review checklists) identified as applicable to the project or site addressed?	No.
Were operational controls (listed above) effective at protecting the environment as intended?	Yes, the design criteria and Restoration Plan have protected resources and leading to native habitat recovery, which is better than the previous condition.

Name:	**#4. Tanbark Fuelbreak**
Project Contact:	Seth Mitchell
Monitoring Team:	Monument Staff

Questionnaire:

- Did we accomplish what we set out to do?
    - *Yes, FY18 ANF Planned 4 treatments (Cut and Lay, Crushing, Mastication and Rx Fire) with the exception of Crushing all were complete and contributed towards the purpose and need of the project.*
- Has project design criteria been effective at improving environmental conditions asexpected?
    - *Effected resources identified in the decision document were consulted prior to implementation. The design criteria was able to sustain the current environmental conditions with no real improvement or degradation with in the analysis area. In regards to meeting the purpose and need of the project*
    - If not why not?
        - *Botany is a challenge on fuel breaks, invasive plants will always be a management constraint as outlined in the project decision.*
- What are we going to do next time? What activities should be continued to sustain success?
    - *Flag & avoid, Herbicide, Sec 106 clearance*
- Are changes needed to correct any implementation or effectiveness-related problems?
    - *Improvement on internal communication when it comes to flag & avoid*
- If change is needed, will it require an amendment or administrative correction to the Land Management Plan?
    - *No*

Results, conclusions, and recommendations will be documented in the ANF LMP Monitoring and Tracking forms and used in the annual LMP Monitoring and Evaluation Report.

Monitoring Questions for Review of Projects Ongoing Activity Sites	**If no, identify what phase of the process (i.e. NEPA or project administration) was deficient and describe deficiencies. If yes, identify any standard operating procedure or key reason(s) for the success.**
Were LMP goals, desired conditions and standards incorporated into operational plans (i.e. burn plans, allotment plans, facility master plan, etc.)? Review site-specific checklists.	*Yes, The LMP goals were identified in burn plans, G&A and Contracts when they correlated with the project Decision Document*
What were the mitigation measures or LMP project design criteria and were they implemented as designed?	*Below is a list of mitigation measures for this project that were implemented.*

Heritage Resources:

- Ground disturbing activity such as mastication and crushing, along with prescribed burning and handlines and equipment staging, may not occur within the delineated cultural resource boundaries.
- Prescribed burning and hand treatments will only be permitted in localized areas (Ref # 2009SGR14ISP in project file).
- As a result of poor ground visibility and dense vegetation, Tanbark Fuelbreak Maintenance Environmental Assessment: mastication or other ground disturbing activities are not allowed in localized areas (Ref# 2009SGR14ISP in project file). Prescribed burning and hand treatments are allowed in these areas.
- If previously unknown cultural resources are encountered during implementation of the project, activities will be halted and the Angeles Heritage Program Manager will be notified.

Implementation practices used specific to Heritage mitigations:

- Updated 106 heritage compliance.
- Identified sites per Environmental Assessment.
- Flagged and buffered areas in order to prevent incursion by equipment or personnel.
- Had Heavy equipment used spotter to scout ahead.
- Reported possible new artifacts to Forest Archeologist.

Soils and Hydrology:

- Provide ground cover such as slash, wood chips, or masticated material adequate to prevent erosion in disturbed areas.

- A combination of natural barriers (rocks, logs, etc.), screening, and fencing will be used as required to prevent/discourage illegal vehicle activity during and after the project treatment. Fire Prevention Technicians and other staff will monitor the area, and if/when problem areas arise, remedial and preventative actions would be taken as appropriate. Coordination with adjacent landowners, public education, and signing would be used as appropriate.

- Any heavy equipment staging areas and access points will be rehabilitated and blocked after project completion. Rehabilitation would include returning the ground to natural contours; implementing de-compaction and erosion control measures as needed, and covering bare soil with slash, chips, needles, or cut brush as necessary.

- Plan prescribed fire to ensure that fire intensity and duration do not result in detrimentally burned soils. Whenever feasible, plan prescribed fire for when soils are wetter and fuels are dry to decrease damage to soils.

- Prescribed burning or crushing should not occur on slopes where only grass is growing.

- Surveys will be conducted in the areas identified as suitable habitat for the federally endangered thread-leaved Brodiaea (Brodiaea filifolia) during a season when they are identifiable, one to two years prior to implementation. Surveys will be conducted following a season with adequate precipitation to stimulate germination/flowering. If these conditions are not obtainable, areas considered to be suitable habitat will be excluded from treatment.

- Extend protection to any newly discovered populations of Threatened, Endangered or Forest Service Sensitive (TES) plants found before or during project implementation. In the event of the change in a plant's or wildlife protection status becoming Threatened, Endangered, or Forest Service Sensitive, additional analysis will be completed to determine potential impacts. If applicable, initiate U.S. Fish and Wildlife consultation.

- To prevent injury to individuals of Forest Service Sensitive urn-flowered alumroot (Heuchera elegans), treatment will be excluded from Sunset Peak as identified in the project file. This includes exclusion of all machinery—including vehicles—from the spur road at Sunset Peak off Forest Service Road 2N012.

Implementation practices used specific to Soils and Hydrology mitigations-

- Cut and Lay methods were used during Hand and Mechanical Treatments where cut material was left over bare areas to prevent erosion during wet months and then later burned.
- Roads were used to tie in treatments in order to avoid unnecessary mechanical treatment and minimize impacts to land.
- No mechanical treatment was done on slopes > 35%.
- Staging areas were confined to roads.
- Islands were left within drainages to prevent erosion.
- Possible access points were blocked with rocks to prevent use for unauthorized vehicles.
- Prescribed Burns were conducted to limit heat intensities. Regrowth soon after confirmed that methods used did not significantly alter soil integrity.
- No pesticides were used.

Invasive Specie:

- All equipment staging areas will be located away from known areas with invasive species occurrences.
- Livestock will not be used as part of this project.
- Protocol standards will be used in the washing of equipment to prevent the spread of non-native.
- Tanbark Fuelbreak Maintenance Environmental Assessment20invasive species. Documentation forms regarding this activity will be maintained by the Project Manager and forwarded to the Forest Botanist.
- To prevent further disturbance, no mechanized equipment will be permitted in the locations where invasive species are removed. Hand treatment will be permitted.
- To reduce seed spread, disposal of invasive weeds removed will be as follows: If no flowers or seeds are present – pull the weed and place it on the ground to dry out. If flowers or seeds are present and have the potential for the seed to be widely dispersed during treatment (such as Spanish broom) – remove the flowering head and place in container then pull the weed and place in an appropriate container for disposal.
- Areas with bare soil created by the treatment of noxious weed will be evaluated for restoration to prevent further infestations by the same or new invasive weeds. Whenever

possible, protect non-target vegetation to minimize the creation of exposed ground and the potential for re-infestation. A Forest Service Botanist will be consulted prior to any restoration implementation.

- Transport of removed invasive weeds with seeds or vegetative propagules will occur in enclosed disposal containers, or in an enclosed vehicle.
- Invasive weeds to be disposed offsite will be taken to a facility (landfill) that contains the disposed items.
- If burning of removed noxious weeds is to occur, burn piles will be monitored the following year to assess potential needs for revegetation or additional weed removal treatments.
- In order to limit the potential for spread of purple veldt grass, only two entry points are permitted: the gate at intersection of Tanbark Flats Road and Glendora Ridge Road. All vehicles and machinery entering the project at this point will exit through Sycamore Flat Motorway (FS Road. 1N152) or Big Dalton Canyon Road (FS Road 1N141). A second access point is permitted at Sunset Peak.
- The portion of the project area from Peacock Saddle to Sunset Peak will be treated first. Entry to this section of the project will be made from Sunset Peak. All equipment will exit at Sunset Peak as well.
- Monitoring and eradication of all new veldt grass seedlings will occur yearly, for no fewer than three years in areas treated adjacent to known infestation areas.

Implementation practices used specific to Invasive mitigations-

- Staging areas were confined to roads.
- Weed washes for equipment and dust-offs for personnel were done.
- Removed (cut plants) were kept on-site and burned.
- Post Prescribed Fire Field Surveys were conducted in order to monitor regrowth and spread rates.
- Followed vehicle route access plan mitigations.

Threatened, Endangered and Forest Service Sensitive Wildlife Species:

- A Limited Operating Period (LOP) will be in effect between March 1 and August 31 for California spotted owl to minimize disturbance during the species' breeding season.

List of specific mitigations taken for the project:

- Areas were identified prior to implementation by Botany and Wildlife specialists and Flag and Avoidance methods were used.
- Any previously unidentified individuals or groups later found in the field were communicated up the chain to resource units needing that knowledge.
- No herbicides were used.
- Areas of Concern were identified to crews and mitigations were taken.
- Nesting bird clearances were conducted.

What were the requirements from Biological Assessments/Evaluations and Heritage Evaluations (ARRs) and Watershed Assessments and were they Implemented?	n/a
Were legal and other requirements (LMP consistency review checklists) identified as applicable to the project or site addressed?	*All requirements in the EA were addressed*
Were operational controls (listed above) effective at protecting the environment as intended?	*Yes, the mitigations help stop unnecessary damage to natural resources.*

Name:	#5. Gold Spotted Oak Borer Tree Removal
Project Contact:	Dannon Dirgo
Monitoring Team:	Dannon Dirgo and staff

Monitoring site

The activity occurred in the north end of San Francisquito Canyon in the Gateway Ranger District upstream and adjacent to the Bouquet Reservoir. The purpose of this project is to fall and remove all marked and suggested trees infested with GSOB.

Results

The initial treatment of phase one was completed in 2017. The work was implemented using in house funding. The signed decision on March 6, 2017 initiated the removal of trees with evidence of GSOB or mortality caused by infestation. Work for phase one was initially performed by Angeles Forest then later contracted as the extent of infestation perimeters increased due to the dispersal distance of newly-emerged GSOB. The removal sites incorporated three locations; Green Valley Community Center, Spunky Canyon Campground and South Portal 7N02. A total of 75 infested trees identified within the boundaries were removed and disposed of according to the signed purposed action plan.

There was no extraordinary circumstances to warrant an EA. “Appendix A: Mitigation Measures for Resource Protection” outlines appropriate measures to ensure resource BMP protocols are followed. The monitoring team found no problems with the way the project was conducted as far as biological, soil or water resources. The work was monitored regularly throughout the course of implementation, and treatment efficiency is monitored annually. The initial treatment was successful and effective in the removal of tagged infested trees.

Conclusion

The project is consistent with the Goal 2.1 of the LMP, which directs the Angeles National Forest to reverse the trend of increasing loss of natural resource values due to invasive species (LMP, Part 1, pg.31) as well as an emphasis on other LMP standards and objective associated with invasive nonnative species (animals, plants).

Recommendations

Continue to monitor the site, aggressively retreat as necessary. Extend 2x beyond the known dispersal distance of newly emerged adult GSOB and preform preventative measures to slow the spread and reproduction rate. Explore and implement additional viable treatment methods.

Approval and Signatures

Jun 3, 2019.

Jerome E. Perez
Forest Supervisor
Angeles National Forest and San Gabriel Mountains National Monument

Date: June 3. 2019

Appendix A

2016 Watershed Condition Scores from the Watershed Classification and Assessment Tracking Tool (WCATT) are listed below:

Table 21. Watersheds in Class Condition 3, Poor

HUC12 Code	HUC12 Name	Rating
180701050209	Arroyo Seco	2.4
180701020507	Gorman Creek	2.3
180701020603	Lake Piru-Piru Creek	2.3
180701020509	Liebre Gulch-Piru Creek	2.3
180701050104	Little Tujunga Creek	2.3
180701050105	Lower Big Tujunga Creek	2.5
180701020202	Lower Bouquet Canyon	2.3
180701020305	Middle Castaic Creek	2.5
180702030701	San Antonio Canyon	2.3
180701050302	Santa Anita Wash-Rio Hondo	2.4
180701060601	Santa Fe Flood Control Basin-San Gabriel River	2.3
180701020201	Upper Bouquet Canyon	2.6
180701050205	Upper Pacoima Wash	2.5

Table 22. HUC12 Watersheds in Condition Class 1, Good

HUC12 Code	HUC12 Name	Rating
180902061002	Big Rock Creek	1.5
180902061303	Canyon del Gato-Montes	1.6
180902061902	Grandview Canyon	1.5
180902061401	Headwaters Amargosa Creek	1.4
180902080504	Horse Canyon-Fremont Wash	1.4
180902061601	Indian Bill Canyon	1.5
180902060902	Jesus Canyon	1.4
180902061308	Kings Canyon	1.5
180902061501	Lake Palmdale	1.6
180902060901	Le Montaine Creek	1.3
180902061903	Lovejoy Springs	1.4
180902061001	Pallett Creek	1.4
180902080401	Sheep Creek	1.6
180902061101	Upper Little Rock Creek	1.6