USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Land Management Plan Monitoring Report for the Angeles, Cleveland, and San Bernardino National Forests (2021-2022)

View from along the San Diego River Gorge Trail on the Cleveland National Forest showing the trailhead (developed recreation site), adjacent neighborhood in the wildland-urban interface, and National Forest System Lands all intermixed in our multiple use landscape. USDA Forest Service photo by Katherine Smith.

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Forest Supervisor's Message

I am pleased to present the 2021-2022 San Bernardino National Forest's Monitoring and Evaluation Report for your review. The purpose of the Monitoring and Evaluation Report is to share our determination of the effectiveness of the Land Management Plan and whether changes are necessary to the Plan, or in program or project implementation.

The lessons we learn from monitoring help improve our programs and projects. We continue to seek ways to increase efficiency and effectiveness of our monitoring and evaluation efforts. It is my commitment to keep you informed of the monitoring results by providing this report. If you would like to participate in future monitoring, please contact the Forest.

We have evaluated the monitoring results presented in this report for the San Bernardino National Forest and we do not recommend changes to the monitoring program or the plan components contained within the 2006 Land Management Plan and management activities as they pertain to the San Bernardino National Forest.

Your continued interest in the San Bernardino National Forest Land Management Plan is just one way for you to stay current with activities on your public lands. Additional information can be found on our website at https://www.fs.usda.gov/sbnf.

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Forest Supervisor, San Bernardino National Forest

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About our Plan Monitoring Program

Purpose

The purpose of this monitoring report is to describe the evaluation of information gathered through monitoring of the Southern California land management plan monitoring program. The Angeles, Cleveland, and San Bernardino National Forests share the same plan monitoring program. Viewing the results for all three Forests together can help identify shared trends and evaluate appropriate adaptive management responses. Therefore, the results for all three Forests are provided. This monitoring report summarizes key results; in depth results, including additional graphics and tables, are described in a supplemental report and is available upon request.

This report is not a decision document. Rather, this report has been developed in compliance with the National Forest Management Act policy 36 CFR 219.12. This report is a vehicle for disseminating to the public timely, accurate monitoring information as well as recommended changes and adaptive management responses.

How Our Plan Monitoring Program Works

Forest plans are required to have plan monitoring programs that inform the management of resources in the plan area by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress towards achieving plan components like desired conditions and objectives (36 CFR 219.12). The monitoring results help the Forest Supervisor determine whether a change is needed in forest plan direction, such as plan components or other plan content that guide management of resources in the plan area, management activities, the monitoring program, or whether a new assessment is warranted.

The monitoring questions cover the applicable, required topics under the 2012 planning rule, in addition to social, economic, and cultural sustainability (see box below). Some questions cover more than one topic. The monitoring questions are grouped by the seven goals in the land management plans: (1) community protection and restoration of forest health; (2) invasive species; (3) managed recreation in a natural setting and Wilderness; (4) energy and minerals production; (5) watershed function and riparian condition; (6) rangeland and biological resource condition; and (7) natural areas in an urban context. The monitoring questions, indicators, and results you'll read about in this report address these goals. The plan monitoring program and a separate monitoring guide that describes the details of how the plan monitoring program is implemented, including data sources and analyses, are available upon request.

Opportunity for Public Engagement and Partnerships

We welcome your questions, suggestions, and feedback. We also welcome opportunities for partnerships to implement this plan monitoring program. Please reach out to the environmental coordinators on the relevant Forests to share your ideas and feedback.

What Comes Next

The next reporting cycle would cover monitoring activities conducted during fiscal years 2023 and 2024. Some data to support this monitoring (e.g., fire perimeters, fire return interval departure) will be available in the late summer of 2025. We anticipate releasing our next report in spring 2026.

Monitoring reports should include relevant information from the regional broader-scale monitoring strategy. The Pacific Southwest Region broader-scale monitoring strategy (version 1) was published in June 2020. Results from this strategy, when they are available, will be made available to the forests for incorporation in future biennial monitoring evaluation reports.

Results Summary

This monitoring report describes the results of monitoring activities that occurred during fiscal years 2021 and 2022. Monitoring results for this 2021-2022 period are similar to those of the 2019-2020 monitoring period and indicate that, in general, all three forests are making progress at achieving the goals set forth in the 2006 Land Management Plan (Table 1). We do not see the need for changes or for a new assessment. However, all three Forests are facing extended drought conditions, climate change, and threats from invasive species such as the Gold-spotted oak borer and non-native grasses. These challenges coupled with landscapes that continue to remain departed from historic fire frequency in many cases make the urgency of forest management and fuels reduction even more pressing. These data indicate the need for an increase in the pace and scale of treatments to reduce fuels and restore resiliency of the ecosystems in these Plan areas.

Table 1. Summary of key findings for the Southern California land management plan monitoring and recommendations for action, adaptive management, or change.

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
MQ1. 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?	The Angeles treated 2,219 and 2,250 footprint acres in the WUI in 2021 and 2022, respectively. Of those acres, 50 and 66 acres were treated in the WUI defense zone. The Cleveland treated 1,952 and 1,994 footprint acres in 2021 and 2022, respectively. Of those acres, 368 and 373 were in the WUI defense zone. The San Bernardino treated 1,962 and 2,933 footprint acres in the WUI in 2021 and 2022, respectively. Of those acres, 413 and 379 were in the WUI defense zone. All Forests treated the most acres in the WUI threat zone. All Forests treated fewer footprint acres in 21-22 than in the previous monitoring period (19-20).	Increase pace of fuel reduction treatments in high-risk zones in the WUI, distributing effort across WUI zones based on need and risk, while monitoring previously treated areas to ensure they are treated before becoming high risk again.
MQ2. Are wildfires becoming larger, more frequent, or more severe, and is there a seasonal shift in fire activity?	Average wildfire size on National Forest System lands in 2021 and 2022 were consistent with the lower range of wildfire sizes during the previous fifty and twenty years. There were 19 and 20 ignitions in 2021 and 2022 that led to fires greater than 10 acres, respectively and during the peak months of May – October. Data for fire severity were not available for this	Although large or catastrophic fire events have not taken place during this reporting cycle, the threat of such events is persistent where the forests have fully departed from the natural range of variation and fire return interval. Landscape level forest health and ignition reduction treatments are

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
	monitoring period.	needed to adequately address this risk.
MQ3. Are fire frequencies becoming more departed from the natural range of variation?	Generally, fire frequencies are becoming less departed for all three Forests. However, about half of all National Forest System lands on each Forest are moderately and highly departed. Most of the departed acres on the Angeles and Cleveland are burning more frequently than the natural range of variation; departed acres on the San Bernardino are split with about 20% burning more frequently and 36% burning less frequently.	Increase the pace and scale of treatments to move the various fire regimes into class 1, with particular emphasis on moving montane conifer forests towards the natural range of variation.
MQ4. Is the forest making progress toward increasing the percentage of montane conifer forests in Condition Class 1?	As with the previous monitoring period, about 64%, 65%, and 91% of the montane conifer forests on the Angeles, Cleveland, and San Bernardino National Forests, respectively, are *burning less frequently* when compared to historic fire frequencies. Based on an evaluation of fuel reduction treatments, the Forests are all emphasizing treatments in the areas that are most departed.	Increase the pace and scale of prescribed fire projects at high elevation montane forest settings.
MQ5. 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?	Across all three Forests, ecosystems that comprise Fire Regime IV, predominantly chaparral and serotinous conifers like Coulter pine, are burning more frequently than under pre-settlement conditions. This pattern is especially true on the Angeles National Forest where roughly half of these ecosystems are burning more frequently. About one third of these ecosystems on the Cleveland and 25% on San Bernardino are burning with greater frequency.	Continue pursuing ignition reduction projects within foothill communities that are type converting to seasonal and invasive grasses.
MQ6. Has the forest been successful at maintaining long fire-free intervals in habitats where fire is naturally uncommon?	Desert scrub (Fire Regime V) on the Angeles and San Bernardino is burning with far greater frequency than historically. Cleveland does not have much of this ecosystem type.	None
MQ7. Is tree mortality increasing across the landscape, and is it distributed evenly across	Although greater than 2006 estimates, acres of tree mortality and number of dead conifers during the 2021-2022 period were relatively low compared	Continue seeking opportunities to thin overly dense stands to increase forest resilience.

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
elevations?	to the 2015-2019 period when conifer mortality peaked.	
MQ8 (CNF only). Is coast live oak mortality increasing across the landscape?	Number of dead oak trees and acres of oak mortality peaked in 2021 with 15,557 dead trees across 3,150 acres. This is greater than any other year since the Land Management Plans were signed (2006). Mortality remained fairly high in 2022 at an estimated 6,432 trees across 1,373 acres affected.	Increase efforts to remove goldspotted oak borer and reduce the spread of the species. Consider developing an early detection and action plan. Work with Forest Health Protection to ensure aerial detection surveys include coast live oak as one of the top four oak species included within the superhost group for evaluation.
MQ9. Are chaparral and coastal sage scrub vegetation communities type converting to non-native annual grasslands?	There has been a fluctuating trend in non-native invasive grass cover driven by precipitation and drought. We are seeing shrub cover increase post fire but that is using 50% cover as our definition of shrub cover. There was a peak in non-native grass cover in 2017 and 2018 due to a break in drought and un-masking the Zaca fire since it occurred 10 years before. The total percentage remains low (1.8 % across the three Forests in 2022).	Continued on-the-ground monitoring to identify where native annuals are most successful, and what management factors might contribute to their success in competing with non-native species.
MQ10. Are the national forests' reported occurrences of invasive plants/animals showing a stable or decreasing trend?	All three Forests treated fewer acres of invasive plants in 2021-2022 than the previous monitoring period (2019-2020).	Increase pace and scale of treatments. Add a monitoring indicator to look at trends in occurrences (not just acres of treatments) and the need for repeat treatment.
MQ11. Are trends in indicators and visitor satisfaction surveys indicating that the forest has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction?	National Visitor Use Monitoring will occur in calendar year 2024 for the Cleveland and San Bernardino. Data from the Angeles survey (2021) is not yet available.	None
MQ12. 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	Given the dense population of Southern California, Wilderness areas continue to be the primary opportunities for solitude. Additional trail systems outside of wilderness are available to the public and also provide similar experiences, although not as far removed from human influence. For the Cleveland National Forest, only	Continue maintaining trail heads, trails and access to open space.

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
forces?	Agua Tibia Wilderness Area is considered managed to standard. Scores are expected to improve during the next monitoring period because of key management action taken to address needs.	
MQ13. Has the forest been successful at protecting ecosystem health while providing mineral and energy resources for development?	There forests do not currently have large scale mineral or energy development projects other than the Mitsubishi and Omya mines on the San Bernardino, which continue to operate under current operating plans. The Cleveland National Forest has some active mining claims; no direct damage from mining to any sensitive resources was observed but the forest is working to enforce against some non-compliance issues. The Vulcan Mine on the Angeles National Forest has actively transitioned to reclamation phase. The forest has approved reclamation plans for 2 of 4 mined areas.	None
MQ14. Has the forest been successful at protecting ecosystem health while providing renewable resources for development?	The Forests do not currently have renewable energy projects that are feasible.	None
MQ15. How many of each type of special use authorization, mining permit, and forest product permit are active on the forest?	There has not been a meaningful or measurable change to this question from the last reporting cycle. The forests have been successful in issuing permits to those requested. The Cleveland offers a wide variety of permits when compared to other forests.	None
MQ16. Is the forest making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds?	There has not been a meaningful or measurable change to this question from the last reporting cycle. The Angeles and San Bernardino national forests were not able to conduct a re-assessment. For the Cleveland National Forest, watershed conditions have not changed classes and multiple essential projects in priority watersheds (Cedar Creek, Kitchen-Creek Cottonwood Creek, Arroyo-Trabuco Creek, and Boulder Creek-draft) have continued and are successfully improving	None

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
	conditions locally.	
MQ17. How do stream flows compare with historical records?	When compared to historical records from 1950-1980, Arroyo Seco and Big Rock Creek on the Angeles National Forest, Santa Ysabel Creek on the Cleveland National Forest, and East Twin Creek on the San Bernardino National Forest experienced relatively low flows in 2021. Arroyo Seco and Big Rock Creek flows were around median levels in 2022. Santa Ysabel flows were even lower in 2022 than in 2021. East Twin Creek flows were higher in 2022 but still below median for most of the water year.	None
MQ18. Is the forest increasing the proper functioning condition of riparian areas?	Invasive species continue to threaten the viability and health of riparian areas. Angeles National Forest has been working towards removing trash, removing invasive species, and working with partners to develop restoration plans. However, impacts from big weather events and users continue to need remediation. Several of the essential projects on the Cleveland National Forest positively impacted the proper functioning condition of riparian areas, including feral pig eradication monitoring, invasive weed treatment, aquatic invasive species removal, and recreation management actions.	Continue working with partners and seeking grants to treat invasive species.
MQ19. Is forest rangeland management maintaining or improving progress towards sustainable rangelands and ecosystem health?	Rangeland condition is stable and compliance monitoring showed allotments were within forage utilization standards. On the Cleveland National Forest, degradation is coming from illegal Off Highway Vehicle (OHV) use. The Angeles does not have designated rangeland allotments.	Continue to maintain forest grazing permits and livestock grazing opportunities. Continue to work to limit OHV trespass into sensitive meadow and rangeland areas.
MQ20. Are trends in resource conditions indicating that habitat conditions for fish, wildlife, and rare plants are in a stable or upward trend?	No incidental take was observed for the forests. Drought and extreme fires continue to degrade conditions for species. Some declining trends have been observed.	Continue, and increase where feasible (e.g., in projects), monitoring efforts for species and habitats to detect trends. Implement adaptation actions to increase resilience of

Monitoring Questions	Summary of Key Findings	Recommended action, adaptive management, or change
		wildlife, fish, and rare plant populations to climate variability.
MQ21. Is the forest balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions?	As previously reported, the urban interface continues to pressure the forest with high rates of visitation and unmanaged recreation continues to be a challenge. No new infrastructure was added on the Angeles or Cleveland national forests during this monitoring period.	None

Community Protection and Restoration of Forest Health

The first goal of the Southern California National Forests Land Management Plan emphasizes the need to improve resilience of our communities and ecosystems to wildfire. Goal 1.1 highlights community protection and the ability of southern California communities to recover from wildfire and limit the loss of life and property from wildfire. Goal 1.2 focuses on the need to restore forest health where alteration of the natural fire regime has put human and natural resource values at risk.

Wildland fire is a natural ecological process. However, many communities and ecosystems in southern California are experiencing uncharacteristic fire regimes. Many communities are built in remote areas leading to a relatively large amount of Wildland Urban Interface (WUI) that needs protection from wildfire. The desired condition is to have vegetation treated to enhance community protection and reduce the risk of loss of human life, structures, improvements, and natural resources from wildland fire and subsequent floods. Additionally, firefighters should have improved opportunities for tactical operations and safety near structures, improvements, and high resource values.

The present condition of the vegetation on the four southern California national forests has been influenced by a century of fire management (mostly fire suppression), as well as by other land-use practices such as logging, grazing and mining. The structure, function, and species composition of nearly all southern California plant communities is under the direct control of recurrent fire. The long-term goal of vegetation management is to perpetuate plant communities by maintaining or re-introducing fire regimes appropriate to each type while at the same time protecting human communities from destructive wildland fires.

Monitoring Questions

MQ1. 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? The indicator associated with this question includes acres of high hazard and high risk in the WUI defense zone.

MQ2. Are wildfires becoming larger, more frequent, or more severe, and is there a seasonal shift in fire activity? The indicators associated with this question include total and mean fire size, ignition density, fire severity, and monthly area burned.

MQ3. Are fire frequencies becoming more departed from the natural range of variation? The indicator associated with this question includes the proportion of landscape in departed fire frequency.

MQ4. Is the forest making progress toward increasing the percentage of montane conifer forests in Condition Class 1? Indicators for this question include (1) departure from desired fire regime and (2) acres by Fire Regime I.

MQ5. 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? Indicators for this question include (1)

departure from desired fire regime and (2) acres by Fire Regime IV.

MQ6. Has the forest been successful at maintaining long fire-free intervals in habitats where fire is naturally uncommon? The indicators for this question include (1) departure from desired fire regime and (2) acres by Fire Regime V.

MQ7. Is tree mortality increasing across the landscape, and is it distributed evenly across elevations? The indicators associated with this question include mortality risk assessment and Forest Health Protection Mortality Surveys.

MQ8 (CNF only). Is coast live oak mortality increasing across the landscape? (Cleveland National Forest only) The indicator for this question includes Forest Health Protection Mortality Surveys.

Key Results

Progress in treating the Wildland Urban Interface (WUI)

The Angeles, Cleveland, and San Bernardino National Forests conducted the most fuel reduction treatments[1] in the WUI threat zone followed by the WUI defense zone; the fewest acres were treated in the WUI Environment (Table 1). The Forests completed more treatments in 2022 than in 2021 but when compared with the previous reporting period[2], more acres were treated in the 2019-2020 period with the most acres treated in 2019 (see Table 1).

The data for these three southern California Forests show that activity acres are double (or near double) footprint acres, meaning that some areas experienced more than one treatment in a given fiscal year (see Table 1). *Activity acres* are the acres of management activities (FACTS Activity codes) conducted during a fiscal year (FY). Activity acres may overlap spatially. For example, a 100-acre area may have been thinned for hazardous fuels reduction (1160) and then followed in the same fiscal year by chipping (1154). The activity acres in this case would equal 200. *Footprint acres* are the acres of National Forest System lands that experienced any treatment. For the thinning and chipping example, the footprint acres would equal 100.

[1] Acceptable fuel reduction treatments are described in Tansey and Tanner (2023) Hazardous Fuels Reduction Treatments: Tracking and Accomplishment Reporting Requirements (version 3.5).

[2] Activity acres reported in the 2020 monitoring report may differ from those in this report. Since releasing the 2020 report in which we shared 2019 and 2020 activity acres, we updated our acceptable fuel reduction treatments (based on 2023 guidance), the spatial data for the WUI was updated, we improved our data source from Forest-level data to the Enterprise Data Warehouse Common Attributes Data layer (which is publicly available), and we calculated acres annually as opposed to for the entire biennial period. This new methodology will be applied to all future monitoring evaluations.

Table 1. Activity and footprint acres of fuel reduction treatments summed for the Angeles, Cleveland, and San Bernardino National Forests from 2019-2022.

Fiscal Year	WUI Defense	WUI Threat	WUI ENV	Sum
Activity Acres[1]				
2019	3,404	14,062	511	17,977
2020	2,226	9,096	546	11,869
2021	1,901	9,654	1,038	12,593
2022	1,704	10,835	1,357	13,897
Footprint Acres[2]				
2019	1,854	7,175	313	9,342
2020	1,237	5,518	396	7,152
2021	831	4,894	408	6,132
2022	818	5,374	985	7,177

At the level of the individual Forest, the Angeles and San Bernardino experienced a decrease in footprint acres treated at the start of the pandemic during FY2020 (see Figure 1). Since then, the Angeles has seen a steady increase in footprint acres treated (Table 2) and the San Bernardino, despite treating relatively few acres in both 2020 and 2021, treated the most footprint acres in 2022 (Table 4). The Cleveland National Forest treated the most acres of NFS lands in FY 2020. Please note that the Cleveland National Forest conducted approximately 1,000 activity acres of treatments on non-NFS lands in 2019 that are not included in this analysis.

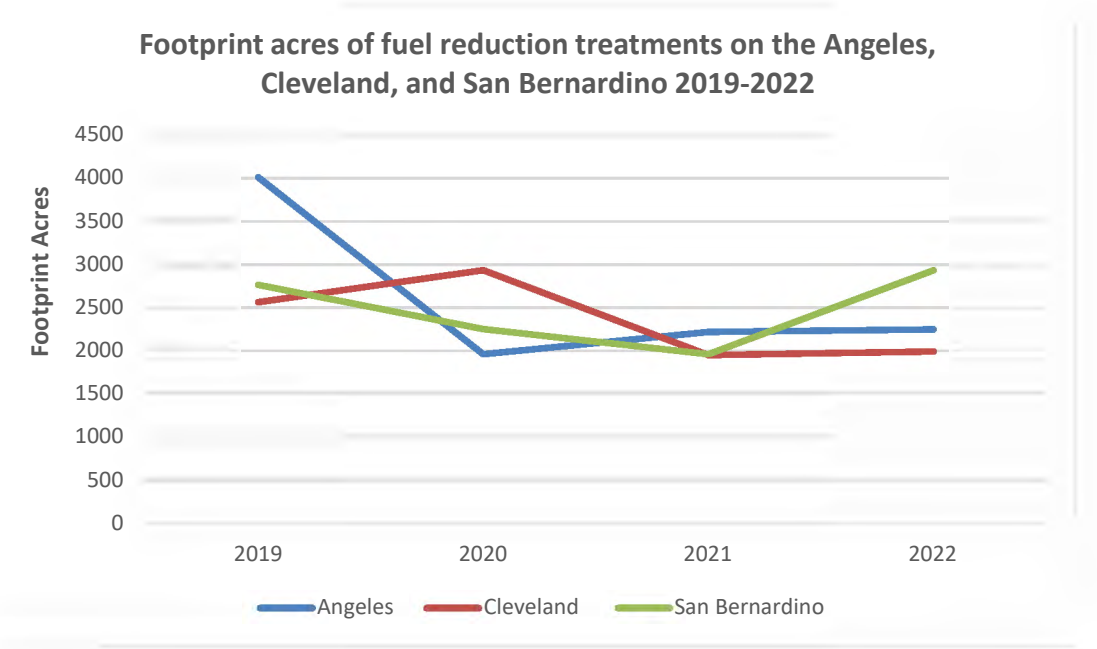


Figure 1. Acres of National Forest System lands (footprint acres) in the Wildland Urban Interface (WUI) defense zone, threat zone, and WUI Environment treated for fuels reduction on the Angeles, Cleveland, and San Bernardino National Forest between 2019 – 2022.

The most common fuel reduction treatments conducted by all three Forests during two monitoring periods (2019-2020 and 2021-2022) included invasive control using pesticides, creating and burning piles, and thinning for hazardous fuel reduction. Although reforestation is not considered a fuel reduction treatment, all three Forests conducted some level of reforestation during the 2021-2022

monitoring period.

Table 2. Annual activity and footprint acres of completed fuel reduction treatments in the Wildland Urban Interface (WUI) on the Angeles National Forest between 2019 and 2022.

Fiscal Year	WUI Defense	WUI Threat	WUI ENV	Sum
Activity Acres				
2019	143	5,358	368	5,869
2020	90	2,970	157	3,217
2021	136	4,508	36	4,680
2022	134	4,491	43	4,668
Footprint Acres				
2019	115	3,642	254	4,011
2020	52	1,777	134	1,963
2021	50	2,145	24	2,219
2022	66	2,153	31	2,250

Table 3. Annual activity and footprint acres of completed fuel reduction treatments in the Wildland Urban Interface (WUI) on the Cleveland National Forest between 2019 and 2022.

Fiscal Year	WUI Defense	WUI Threat	WUI ENV	Sum
Activity Acres				
2019	2,178	2,618	2	4,798
2020	1,169	4,043	144	5,356
2021	575	1,918	406	2,899
2022	598	3,427	443	4,468
Footprint Acres				
2019	1,087	1,477	2	2,566
2020	649	2,154	132	2,935
2021	368	1,373	211	1,952
2022	373	1,360	261	1,994

Table 4. Annual activity and footprint acres of completed fuel reduction treatments in the Wildland Urban Interface (WUI) on the San Bernardino National Forest between 2019 and 2022.

Fiscal Year	WUI Defense	WUI Threat	WUI ENV	Sum
Activity Acres				
2019	1,084	6,086	142	7,312
2020	967	2,083	245	3,295
2021	1,190	3,228	596	5,014
2022	972	2,917	872	4,761
Footprint Acres				
2019	652	2,056	57	2,765
2020	536	1,588	130	2,254
2021	413	1,376	173	1,962
2022	379	1,861	693	2,933

There is a growing recognition that the efficacy of mechanical or hand fuel reduction treatments is greatly enhanced when followed by prescribed fire[3]. We calculated the footprint acres of prescribed

[3] Prichard, S. J., *et al.* 2021. Adapting western North American forests to climate change and wildfires: 10 common questions. Ecological Applications 31(8):e02433. 10.1002/eap.2433

fire treatments conducted in 2021 and 2022 that spatially overlapped with a previous[4] mechanical or hand fuel reduction treatment (Table 5). The overwhelming majority of prescribed fire treatments on the three forests in both 2021 and 2022 were conducted in areas that had experienced hand/mechanical treatments in the previous 10 years.

Table 5. Acres of prescribed fire treatments that overlapped a prior hand or mechanical fuel reduction treatment and percent of total prescribed fire treatment acres that overlapped an area treated within the last 10 years.

Forest	2021 acres (percent of prescribed fire acres)	2022 acres (percent of prescribed fire acres)
Angeles	735 (100%)	386 (71%)
Cleveland	867 (96%)	894 (93%)
San Bernardino	904 (100%)	508 (74%)

Wildfire Trends[5]

During 2021 and 2022, the acres burned by wildfires and the average wildfire size on the Angeles, Cleveland, and San Bernardino National Forests were consistent with the lower range of acres burned and wildfire sizes over the previous five- and twenty-year periods (Table 6, Figure 2).

Table 6. Annual wildfire acres burned and average wildfire size on the Angeles, Cleveland, and San Bernardino National Forest for the last five years (2018-2022).

Year	Approximate Wildfire Acres Burned	Average Wildfire Size
2018	45,220	2,510
2019	9,300	1,550
2020	215,670	9,380
2021	4400	220
2022	36,650	1,930

Kalies E. L., and Yocum Kent, L. L. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives: A systematic review. Forest Ecology and Management, 375: 84-95.

[4] A previous mechanical or hand treatment is one that was conducted in the previous 10 years plus the concurrent fiscal year (e.g., 2021 and 2022).

[5] We lack data for wildfire severity during 2021-2022 because the wildfires during this period were either too small (< 1,000 acres), not within forested ecosystems, and/or not on enough of National Forest System lands to be evaluated by Rapid Assessment of Vegetation Condition After Wildfire program.

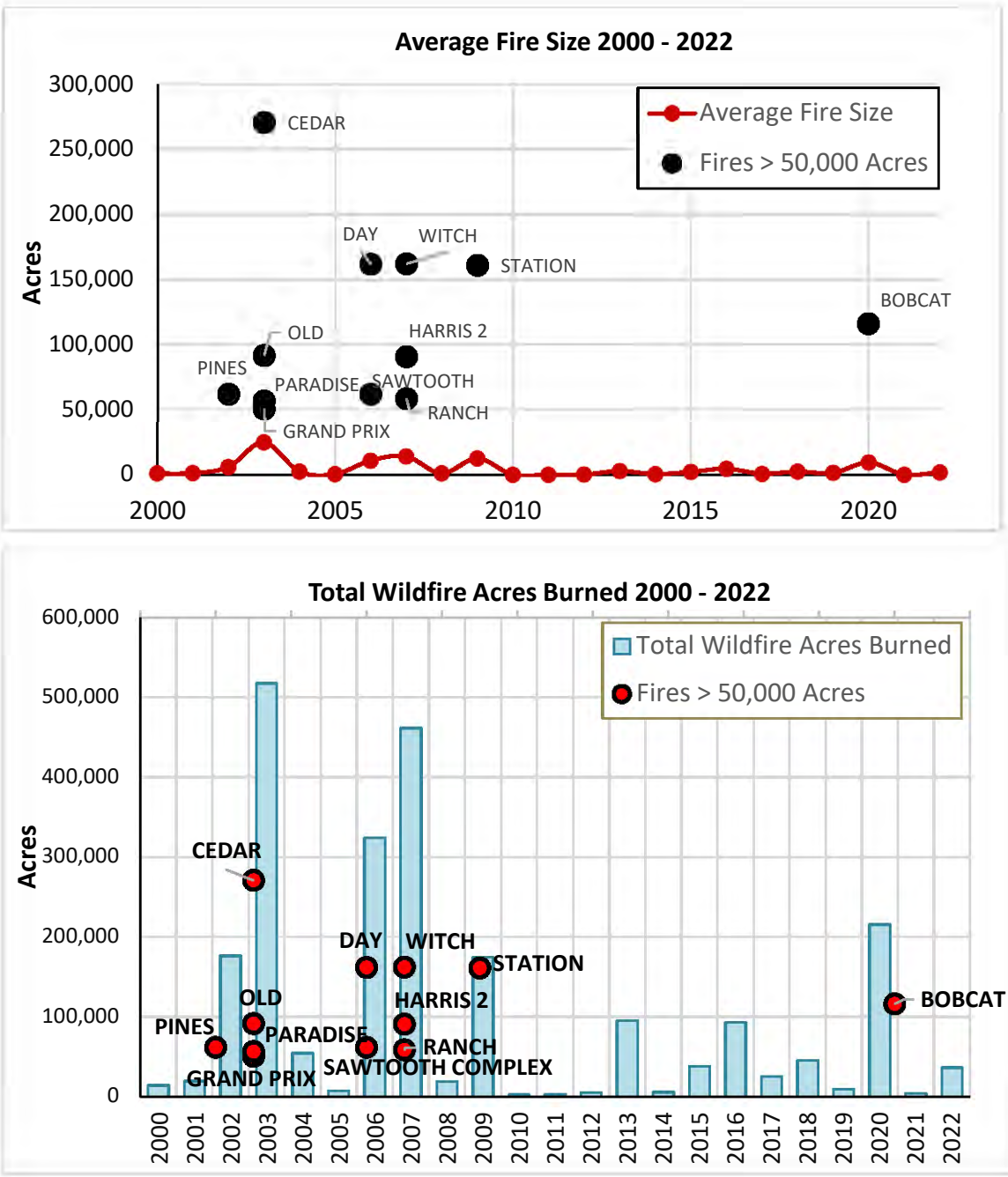


Figure 2. Annual average wildfire size (top) and total wildfire acres burned (bottom) and extreme fires (greater than 50,000 acres) on the Angeles, Cleveland, and San Bernardino National Forests from 2000 – 2022.

There were 20 wildfire ignitions in 2021 and 19 in 2022; these numbers are consistent with the number of ignitions over the last five years except in 2019 which was a relatively less active year (Table 7). It should be noted that the number of ignitions excludes many fires that were contained before reaching 10 acres in size; therefore, this may underestimate the total number of ignitions. Most fires are ignited between May and October (Table 7, Figure 3). This analysis focuses on the *number* of ignitions by

month, but it's also important to point out that many of the *largest* fires in southern California occur in fall and coincide with extreme wind events. The delayed onset of winter precipitation can result in low live fuel moisture, thereby allowing for large conflagrations into the winter months.

Table 7. Number of fire ignitions by month on the Angeles, Cleveland, and San Bernardino National Forest for the last five years (2018-2022). The number of ignitions generally do not include fires that are extinguished at fewer than 10 acres.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Sum
2018	0	0	0	0	0	4	5	2	4	1	1	0	17
2019	0	0	0	0	0	0	0	1	2	2	1	0	6
2020	0	0	1	0	1	0	6	7	5	1	1	2	24
2021	1	0	0	1	3	3	2	7	3	0	0	0	20
2022	0	0	1	1	2	4	1	5	4	1	0	0	19
Sum	**1**	**0**	**2**	**2**	**6**	**11**	**14**	**22**	**18**	**5**	**3**	**2**	

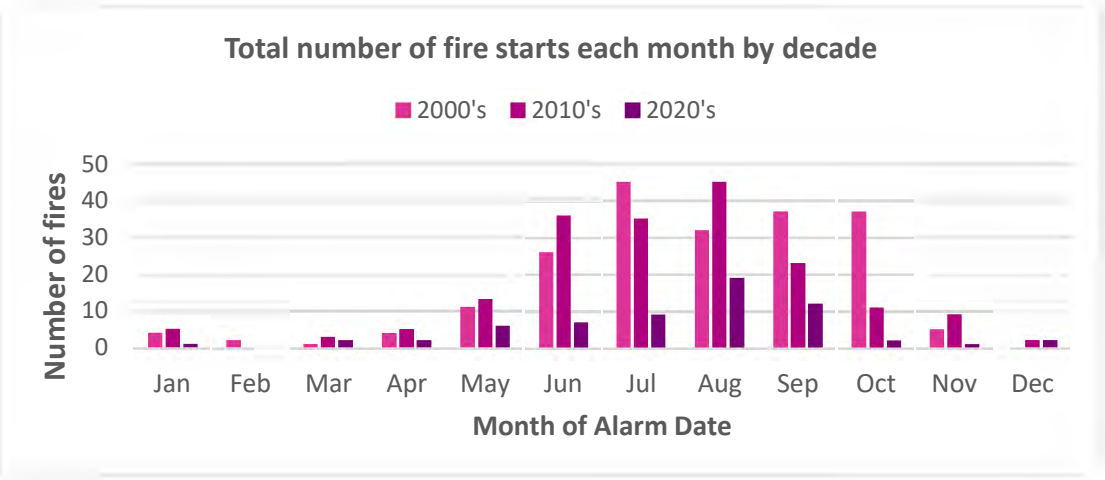


Figure 3. Total number of wildfire starts (ignitions) each month on the Angeles, Cleveland and San Bernardino National Forests from 2000 – 2022. Note that the 2020's only represents three years of data (2020, 2021, 2022). The number of ignitions generally do not include fires that are extinguished at fewer than 10 acres.

Fire Return Interval Departure

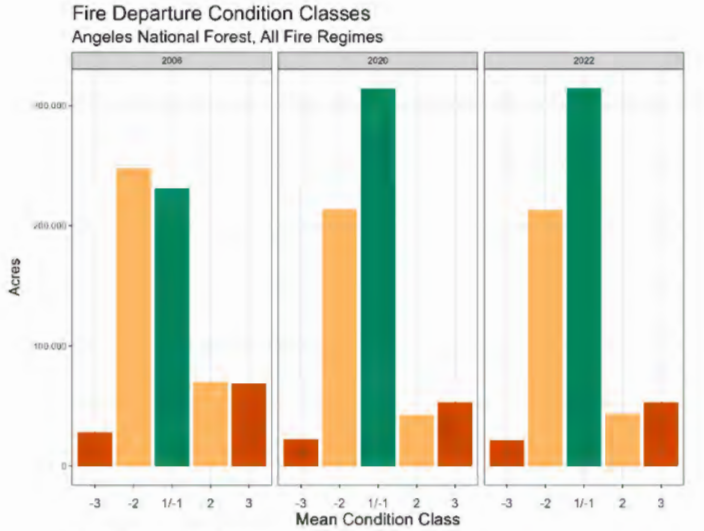
We examined the extent of fire departure from the natural return interval to get a sense of whether the landscapes, and their representative ecosystems, are experiencing more frequent or less frequent fires than historically (pre-European settlement). This analysis provides a basis to identify areas on the landscape that are at high risk of type conversion or threshold-type responses and can be prioritized for treatment (Safford and Van de Water 2014).

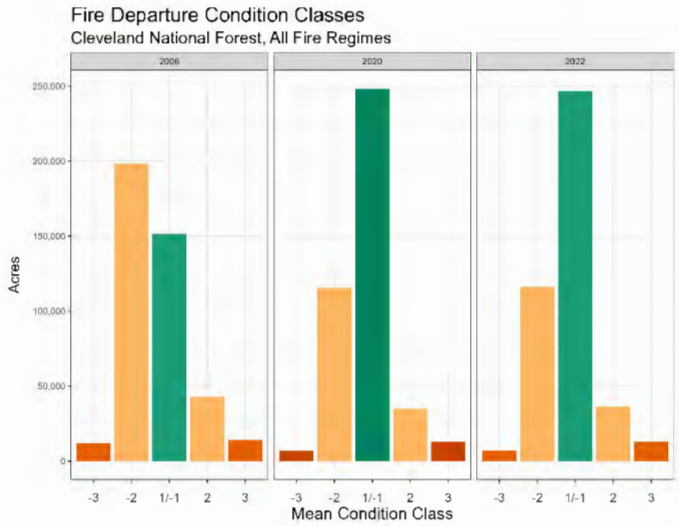
When compared to presettlement conditions, large areas in southern California are burning at higher frequencies due to human-caused ignitions. This pattern largely represents the dominant vegetation type, shrubland. Frequent fire in shrublands can lead to type-conversion from native woody species to non-native highly flammable grasses. Conversely, much of our montane conifer forests in Southern California are missing the frequent, low severity wildfires characteristic of these ecosystems which increases their vulnerability to high severity stand replacing wildfire. Fire frequencies on the Angeles and Cleveland National Forests between 2006 and 2022 are moving towards the range of natural

variation but half (or nearly half) of these landscapes are in a moderate (CC 2/-2) and highly (CC 3/-3) departed state primarily burning more frequently compared to presettlement fire conditions. Fire frequencies on the San Bernardino are generally very departed from the natural range of variation. In 2022, approximately 55% of the San Bernardino National Forest is moderately (CC 2/-2) or highly (CC 3/-3) departed from historic fire frequencies, burning both more and less frequently than the natural range of variation. The disparate results for the San Bernardino, where some areas are burning too frequently and others are missing key fire return intervals, are representative of the varied ecosystem types and typical fire regimes represented on this National Forest.

The Southern California Forest Plan provides direction to protect natural resources, including by building in resilience to these landscapes and decreasing the gap between current conditions and the natural range of variation, particularly for wildfire. These monitoring results suggest that we should prioritize projects that move the shrubland and forested ecosystems toward the natural range of variation at a more rapid pace and larger scale. This area has the Nation's highest concentration of high-risk firesheds and is home to 25 million people. There is a large wildland-urban interface throughout the landscape, as well as Tribal lands, watersheds that provide municipal drinking water, and utility infrastructure. The southern California landscape has been selected as a Wildfire Crisis Strategy Priority Landscape under the U.S. Forest Service 10-year Wildfire Crisis Strategy and there is a focus on reducing fire risk through reducing roadside ignitions and promoting the use of prescribing fire in montane forest ecosystems. These management activities will be moved forward through partnership with the Southern California Montane Forest Project, National Forest Foundation, conservation finance partners (e.g. Blue Forest, Conservation Investment Management) and Regional Fire and Forest Capacity Block Grantees.

In areas burning far more frequently, there is an opportunity to evaluate ecosystem condition after fire to determine recovery actions and priorities. The Forest Service recently released the *Postfire Restoration Framework for National Forests in California* (Meyer et al. 2021) that is currently being applied to the Bobcat fire on the Angeles National Forest. Moving forward, the Forests may identify guidelines that trigger when a post-fire restoration evaluation is needed.





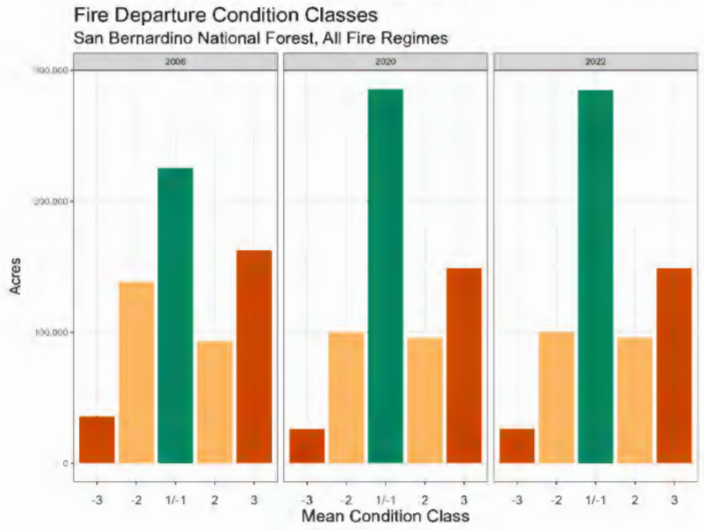


Figure 4. Trend in degree of departure from presettlement fire regimes on the Angeles (top left), Cleveland (top right), and San Bernardino (bottom left) National Forests in fiscal year (FY) 2006 (left; first year of the Land Management Plan), 2020 (middle; previous monitoring period), and 2022 (right, current monitoring period). Mean Condition Class (CC)1: within historic range/slight departure (0-33%), CC2: moderate departure (33-67%), CC3: high departure (>67%). Negative values: burning much more frequently today than under presettlement conditions. Positive values: burning much less frequently today than under presettlement conditions.

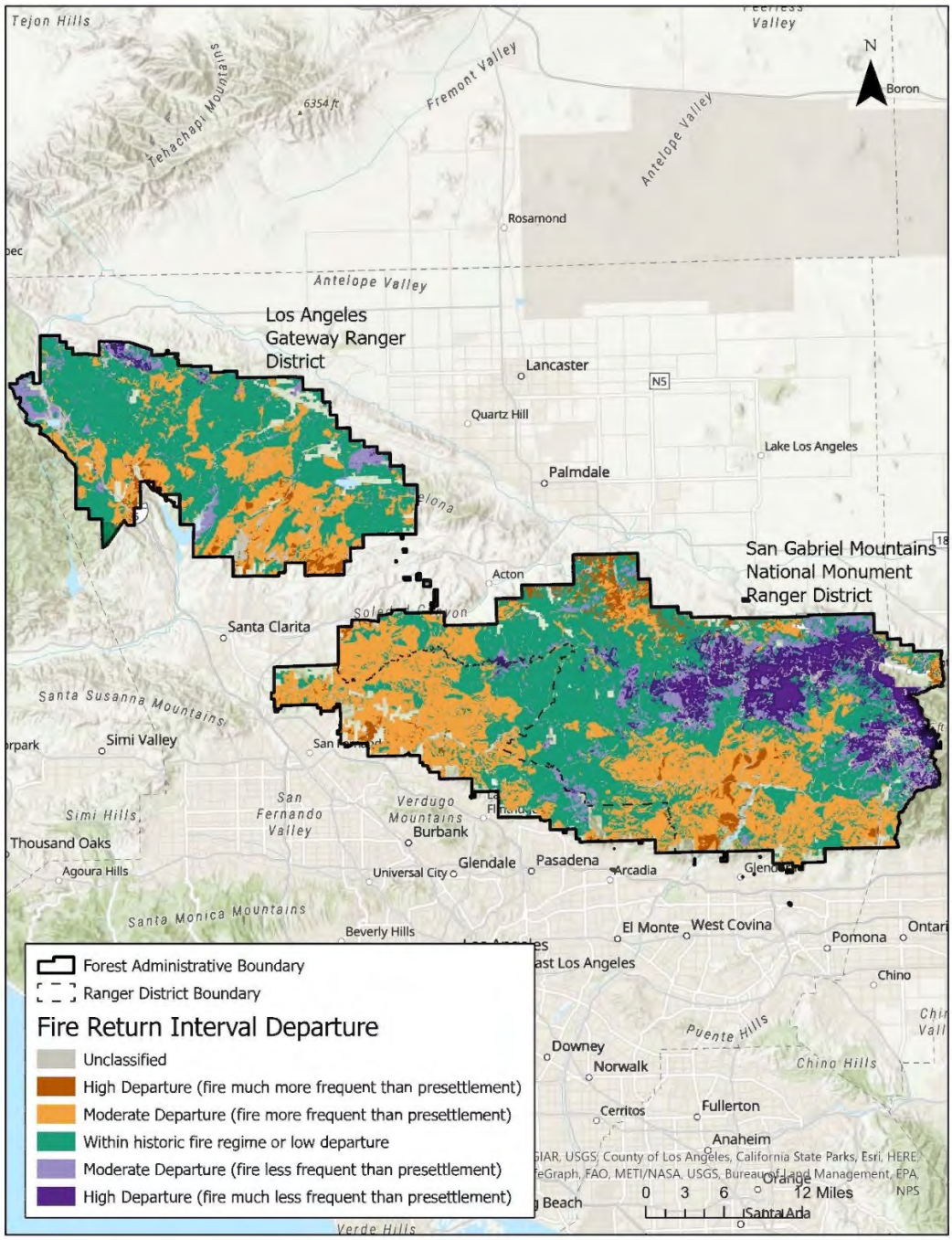


Figure 5. Fire Return Interval Departure for the Angeles National Forest in 2022. Red and orange colors represent areas on the landscape that are burning much more frequently than historically. Purple areas are those that are burning much less frequently than historically. Green areas are within or slightly departed from the historic fire frequencies.

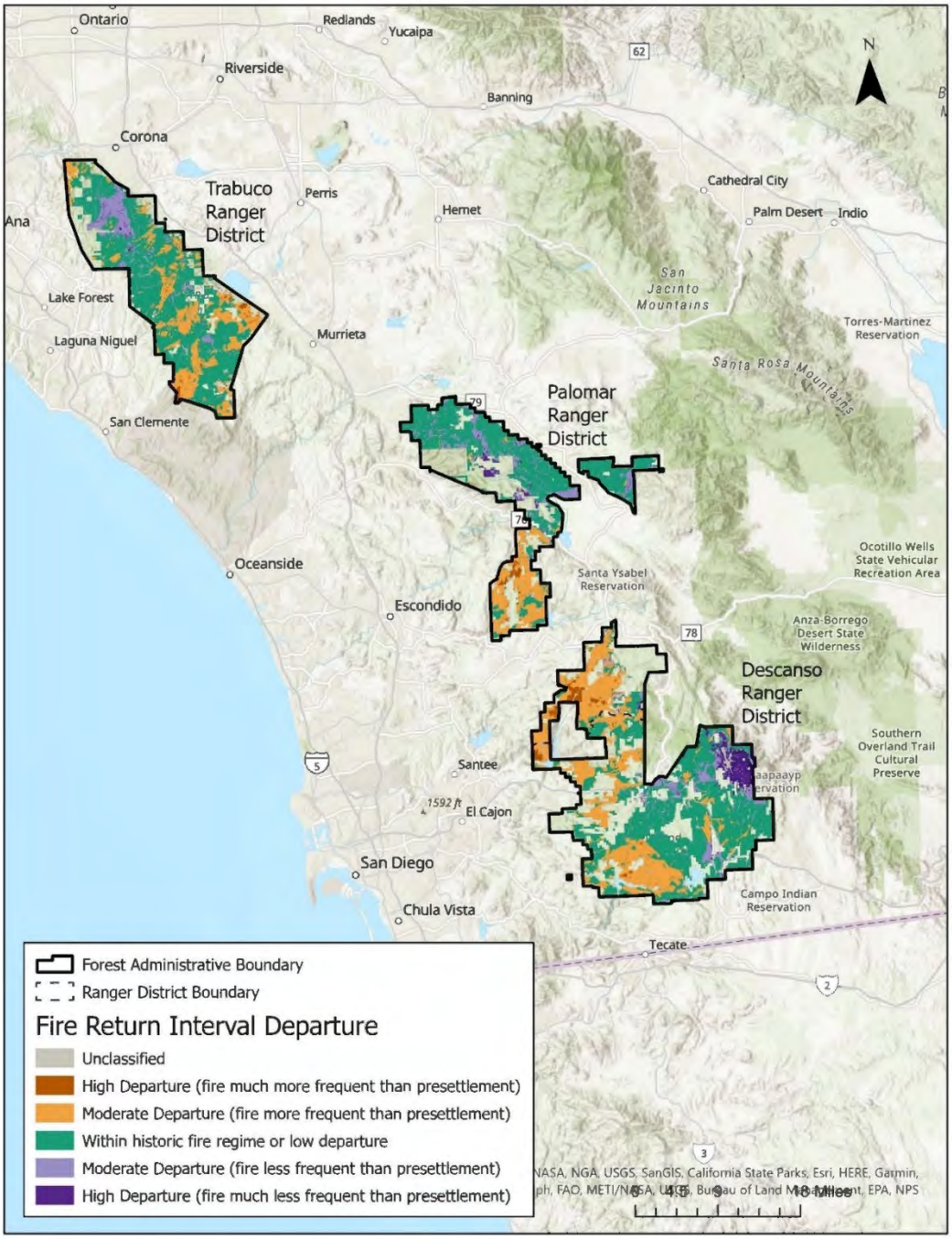


Figure 6. Fire Return Interval Departure for the Cleveland National Forest in 2022. Red and orange colors represent areas that are burning much more frequently than historically. Purple areas are those that are burning much less frequently than historically. Green areas are within or only slightly departed from the historic fire return interval.

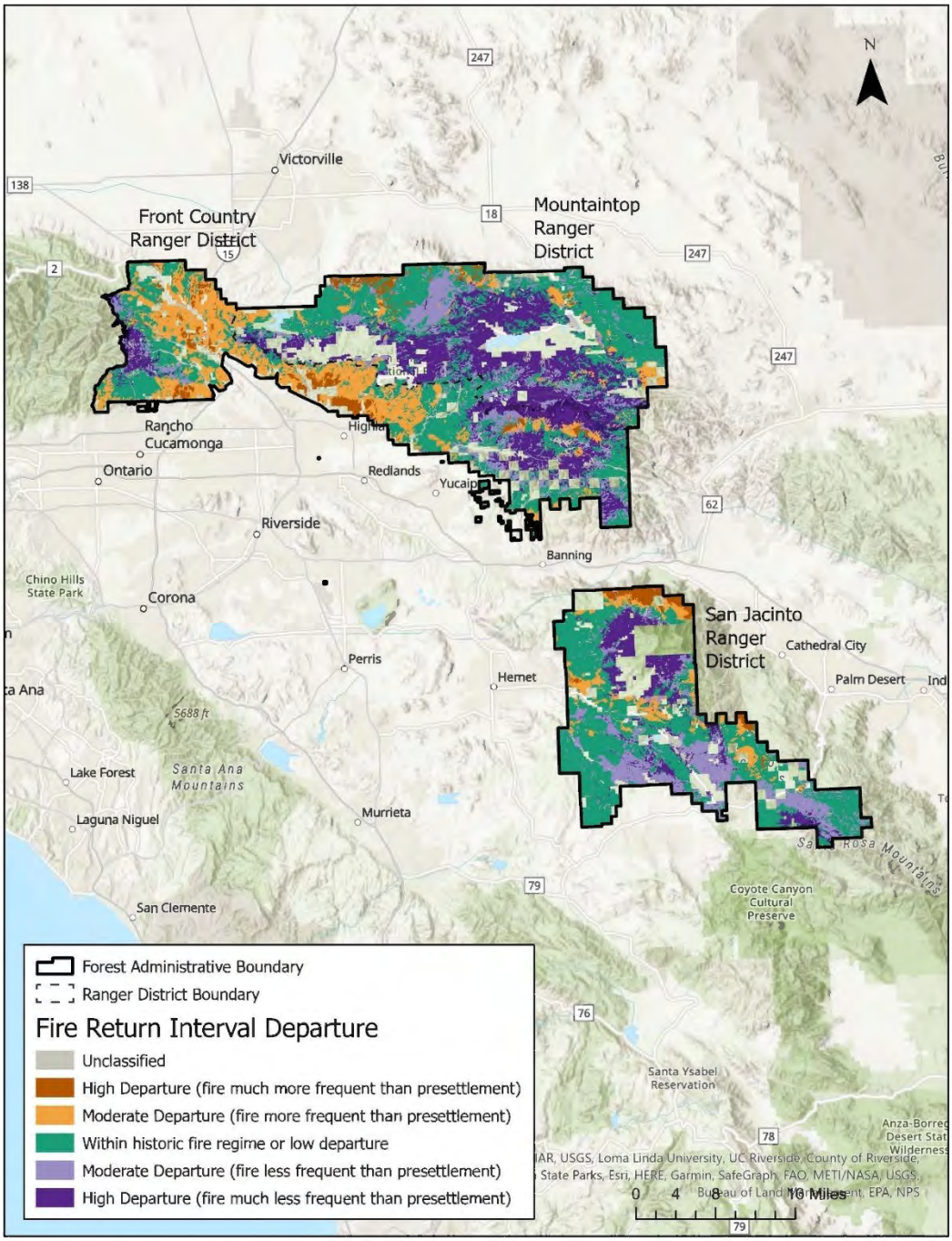


Figure 7. Fire Return Interval Departure for the San Bernardino National Forest in 2022. Red and orange areas are those that are burning much more frequently than historically. Purple areas are those that are burning much less frequently than historically. Green areas are within or only slightly departed from the historic fire return interval.

Montane Forest (Fire Regime I)

Montane conifer forests are characterized by frequent (0-35 years), low severity fire. Although there was a positive trend from 2006 to 2022 in the acres of montane conifer forests (Fire Regime I) that are experiencing fire intervals within or slightly departed from the historic fire frequency, the data overwhelmingly indicate that the montane conifer zones of these Forests are *burning far less frequently than historically* (Figures and Tables). Approximately 64%, 65%, and 91% of the montane conifer forests on the Angeles, Cleveland, and San Bernardino National Forests, respectively, are *burning less frequently* when compared to historic fire frequencies. This mirrors the results from the previous monitoring period.

In the absence of regular, low intensity wildfires, montane conifer forests may have an accumulation of fuels in the understory and an increasing density of small diameter trees, in addition to other changes in the ecological structure and composition. These areas become less resilient to wildfire, insects and disease, and drought. The Forests have emphasized fuel reduction treatments in the montane conifer forests that are the most departed, burning less frequently than they would historically and perhaps experiencing the most accumulation of fuels (Figure 8).

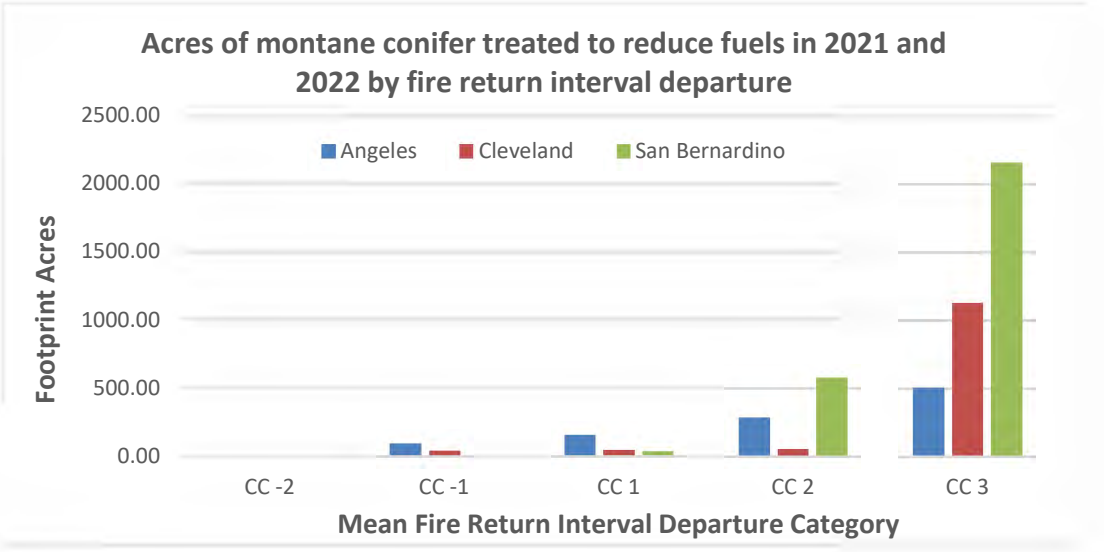


Figure 8. Footprint acres of fuel reduction treatments in Fire Regime I (montane conifer) forests by mean fire return interval departure category (CC). Positive CC values mean an area is burning less frequently than historically; negative CC values mean an area is burning more frequently than historically. A "3" indicates high departure whereas a "1" represents low level of departure. Acres are summed across 2021 and 2022.

The three Forests are part of a multi-jurisdictional, collaborative partnership with the Climate Science Alliance, Institute for Ecological Monitoring and Management at San Diego State University, and the Southwest Climate Adaptation Science Center create a conservation strategy for southern California's montane forests. As part of this partnership, the San Bernardino National Forest and a key partner Headwaters Resiliency Partnership engaged in a one-day workshop to identify vulnerabilities and priority assets for montane ecosystems. This information was integrated and combined with data on exposure to climate change to produce a prioritization map for forest health treatments. The application of the montane forest prioritization framework is a key step to identifying opportunities and strategies for increasing forest resilience.

Shrubland and Chaparral (Fire Regime IV)

Ecosystems in fire Regime IV primarily include chaparral and serotinous conifers (84%), pinyon juniper (5%), coastal sage scrub (4%), semi-desert chaparral (3%), and big sagebrush (3%). These ecosystems are characterized by stand replacing fires every 35-100+ years. Across all three Forests, these ecosystems are *burning more frequently than under historic conditions*. This pattern is especially true on the Angeles National Forest where roughly half of these ecosystems are burning more frequently. About one third of these ecosystems on the Cleveland and 25% on the San Bernardino are burning with greater frequency. A potentially emerging pattern that will continue to be tracked over monitoring periods is the slight increase from 2020 to 2022 in the proportion of this ecosystem burning with less frequency on the San Bernardino.

Scrub (Fire Regime V)[6]

The ecosystem included in Fire Regime V includes desert mixed shrub. This ecosystem is characterized by stand replacing fires every 200+ years. Data for the Angeles and San Bernardino indicate that 80% of this ecosystem type is burning with far greater frequency than historically. This degree of departure has increased since 2006.

Drought and insect-related tree mortality

Approximately 3.3 and 2.1 million acres were surveyed on all lands in the southern California area in 2021 and 2022, respectively. Acres of tree mortality and the estimated number of dead conifers on NFS lands were relatively low compared to the 2015-2019 period when conifer mortality peaked (Figure 9). Although greater than 2006 estimates, the acres and number of dead conifers on NFS lands were the lowest since 2018 (Table 8).

Table 8. Estimated acres of conifer mortality and dead conifer trees on National Forest System lands on the Angeles, Cleveland, and San Bernardino National Forests.

Year[1]	Estimated Acres of Conifer Mortality	Estimated Dead Conifer Trees
2006	1,770	2,500
2018	10,700	57,600
2019	17,400	46,600
2021	4,800	15,000
2022	4,300	21,700

[1] Aerial detection surveys were not flown in 2020 due to the COVID 19 pandemic.

[6] Cleveland National Forest has very few acres of this fire regime so are not included in the analysis.

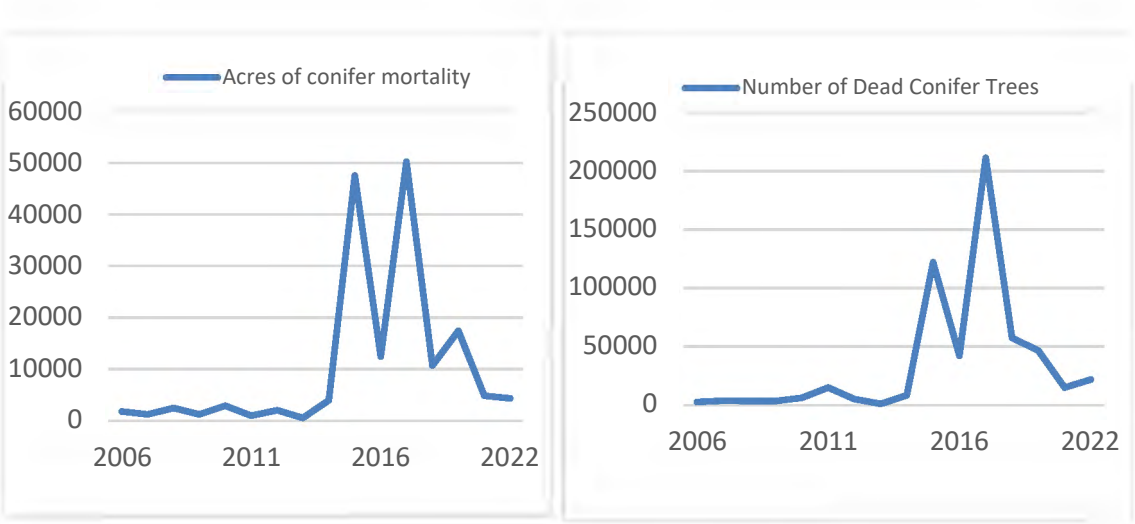


Figure 9. Estimated acres of conifer mortality (left) and number of dead conifer trees (right) since 2006 on the Angeles, Cleveland, and San Bernardino National Forests.

Angeles National Forest

Acres of conifer mortality and estimated number of dead conifer trees on the Angeles National Forest were relatively lower during the 2021-2022 monitoring period than peak year (Figure 10). White fir comprised most of the mortality in the 2021-2022 monitoring period with an estimated 950 acres of white fir mortality and 8,830 dead white fir trees. Unlike the Cleveland and San Bernardino, more mortality occurred during 2022 than 2021.

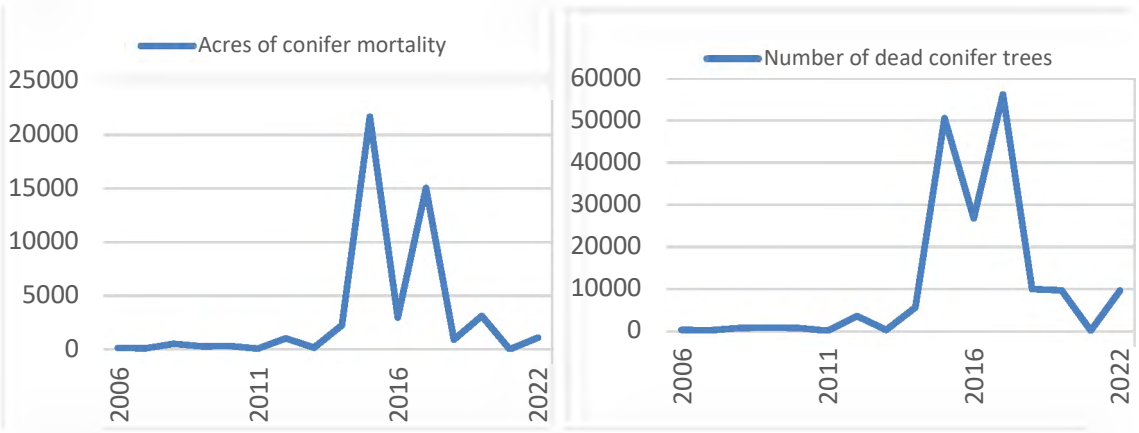


Figure 10. Estimated acres of conifer mortality (above) and number of dead conifers (bottom) since 2006 on the Angeles National Forest.

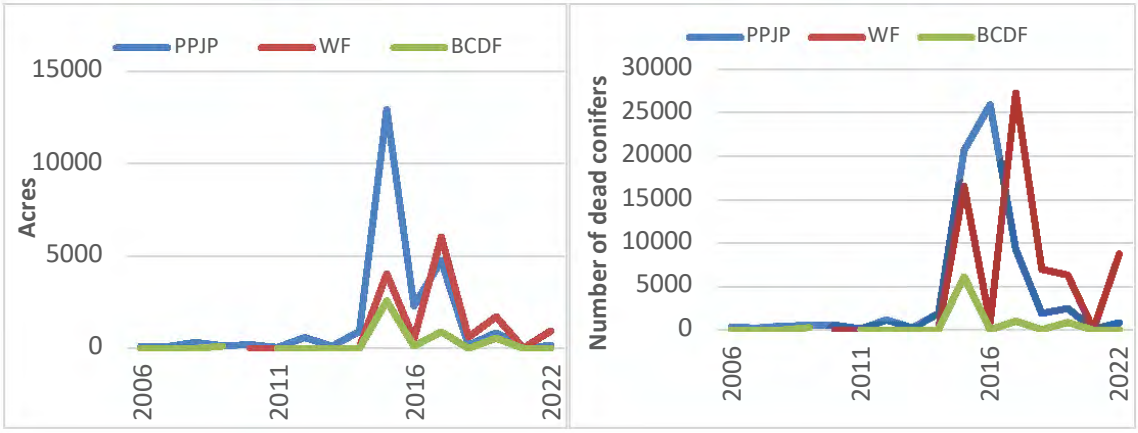


Figure 11. Estimated acres of conifer mortality (left) and number of dead conifers (right) by species since 2006 on the Angeles National Forest. PPJP = Ponderosa pine and Jeffrey pine, WF = white fir, BCDF = Bigcone Douglas fir.

Figure 12. Map depicting conifer tree mortality on the Angeles National Forest in 2022.

Cleveland National Forest

Conifer mortality on the Cleveland National Forest was relatively low in 2021 and 2022 compared to the peak mortality in 2015 (Figure 13) and when compared to the Angeles and San Bernardino National Forests; this southernmost Forest has comparably fewer conifer trees. Unlike the Angeles National Forest, more conifer trees died in 2021 than in 2022. In fact, surveys did not detect any dead white fir, Jeffrey pine, or ponderosa pine in 2022 but detected an estimated 12 Bigcone Douglas fir trees in 2022 (Figure 14).

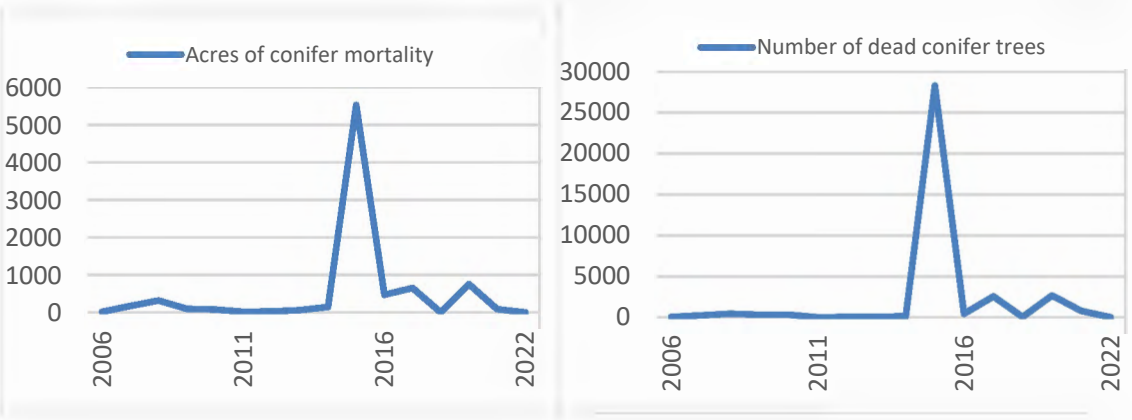


Figure 13. Acres of conifer mortality (left) and estimated dead conifer trees (right) since 2006 on the Cleveland National Forest.

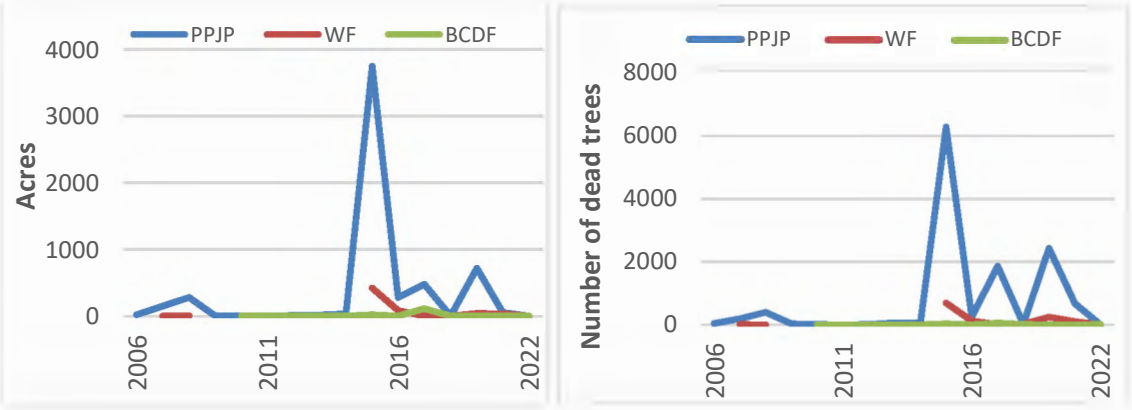


Figure 14. Acres of conifer mortality (left) and estimated dead conifer trees (right) by species since 2006 on the Cleveland National Forest. PPJP = Ponderosa pine and Jeffrey pine, WF = white fir, BCDF = Bigcone Douglas fir.

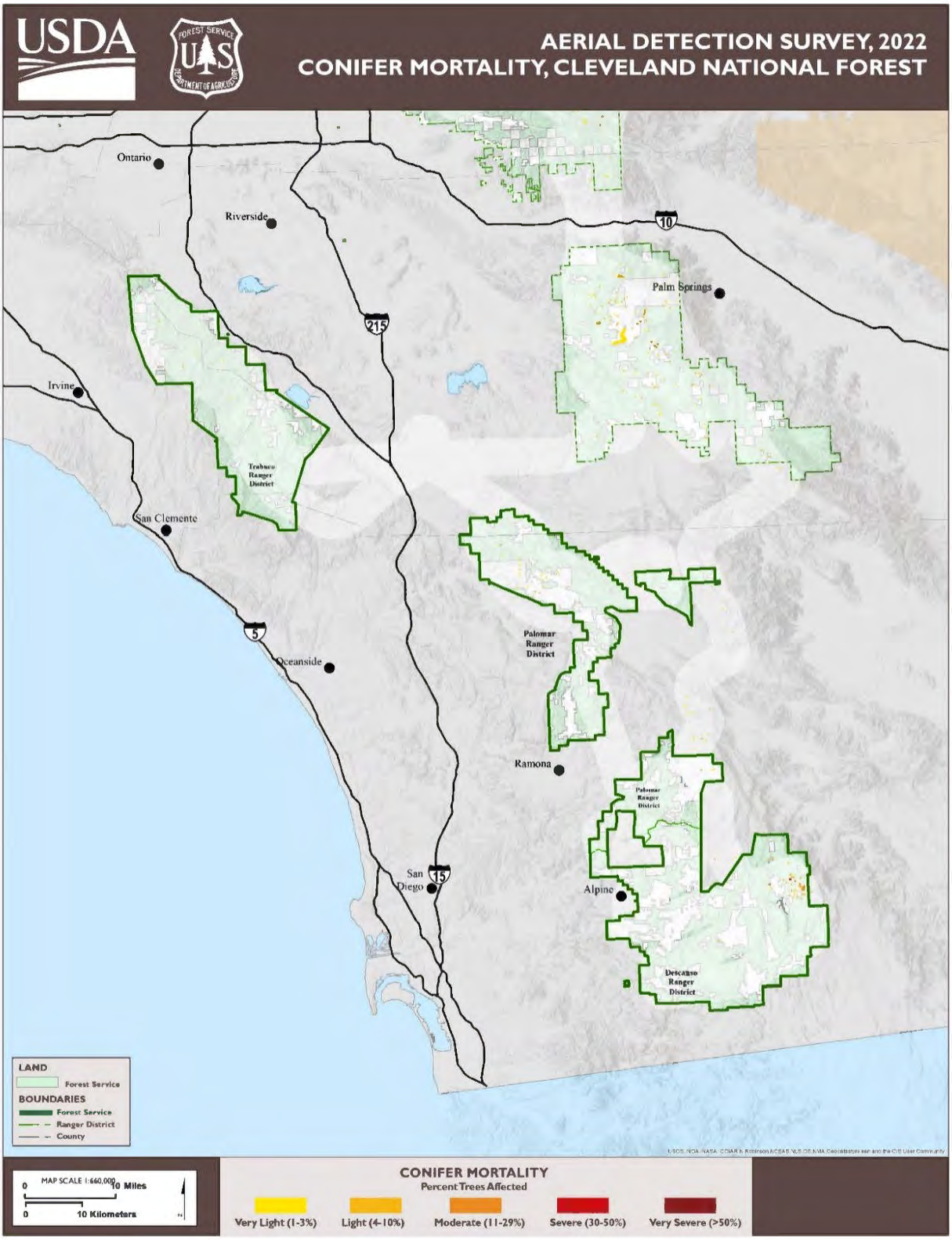


Figure 15. Map depicting conifer tree mortality on the Cleveland National Forest in 2022.

In terms of oak mortality on the Cleveland National Forest, mixed oak mortality was observed across 3,150 acres of all surveyed lands in 2021. Oaks included Engelmann, black, and interior and canyon live oaks. Coast live oak was not called out specifically by Forest Health Protection Aerial Detection Surveys in 2021 but it is very possible that coast live oak is part of the oak ecosystem experiencing mortality. The mortality ranged from very light to severe but was mostly categorized as moderate intensity. The most widespread area of mortality occurred south of Palomar Mountain. A new area of oak mortality was observed in and around Bedford Canyon on the Trabuco Ranger District.

In 2022, mixed oak mortality was observed across 1,600 acres of lands surveyed. Oaks included black and Engelmann oaks, as well as coast, interior, and canyon live oaks. The mortality was mostly categorized as moderate intensity. Oak mortality was observed in and around Bedford Canyon on the Trabuco District; however, the most widespread area of mortality occurred south of Palomar Mountain.

More acres were affected by oak mortality and more oaks were identified as dead in 2021 than any other monitoring year. Oak mortality levels in 2022 were lower than in 2021 but still similarly high to other peak years like 2015, 2017, and 2018 (Table 8).

Table 8. Estimated acres of oak mortality and dead oak trees on National Forest System lands on the Cleveland National Forest.

Year[1]	Estimated Acres of Oak Mortality	Estimated Dead Oak Trees
2006	2357	1170
2017	1562	6435
2018	798	4701
2019	311	1019
2021	3150	15557
2022	1373	6432

[1] Aerial detection surveys were not flown in 2020 due to the COVID 19 pandemic.

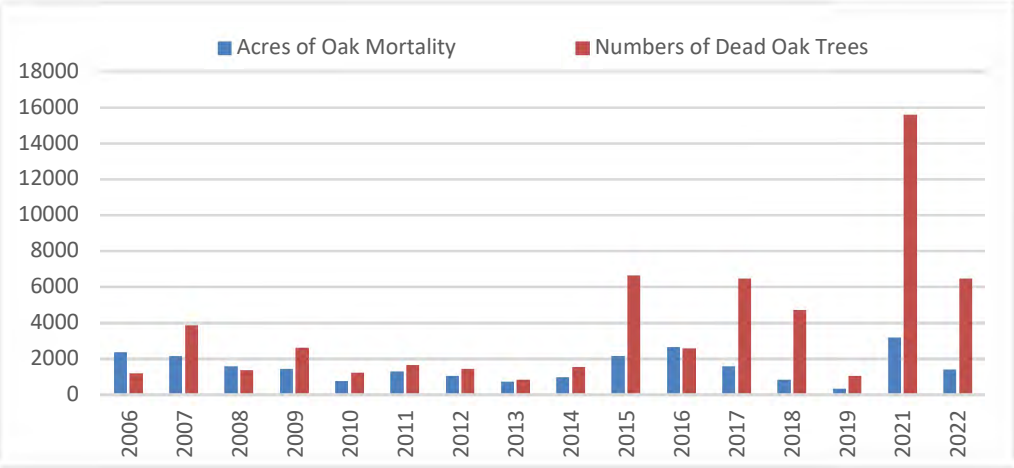


Figure 16. Estimated acres of oak mortality and number of dead oak trees on the Cleveland National Forest between 2006 and 2022.

San Bernardino National Forest

Conifer mortality on the San Bernardino National Forest was relatively low in 2021 and 2022 compared to the previous monitoring periods, especially the peak years between 2015-2019 (Figure 30). More conifer trees died, and a greater acreage was affected in 2021 than in 2022. However, like the Angeles National Forest, more white fir trees died in 2022 than in 2021.

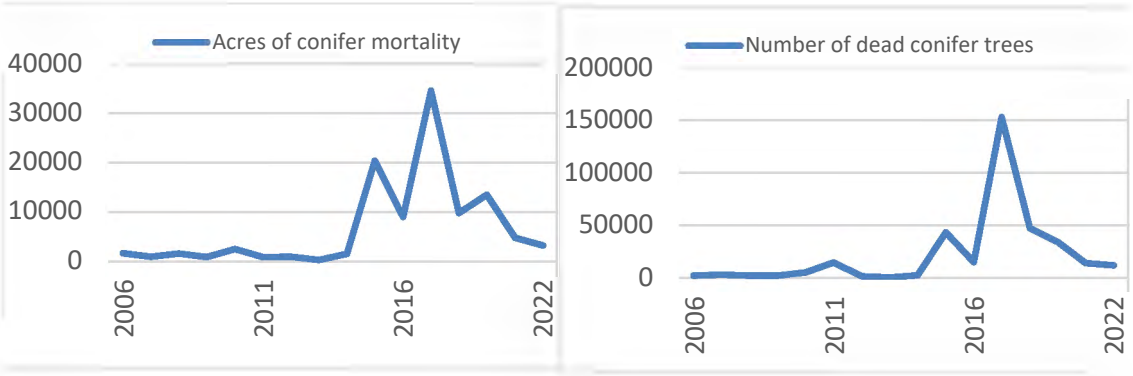


Figure 30. Acres of conifer mortality (left) and estimated number of dead conifers (right) on the San Bernardino National Forest.

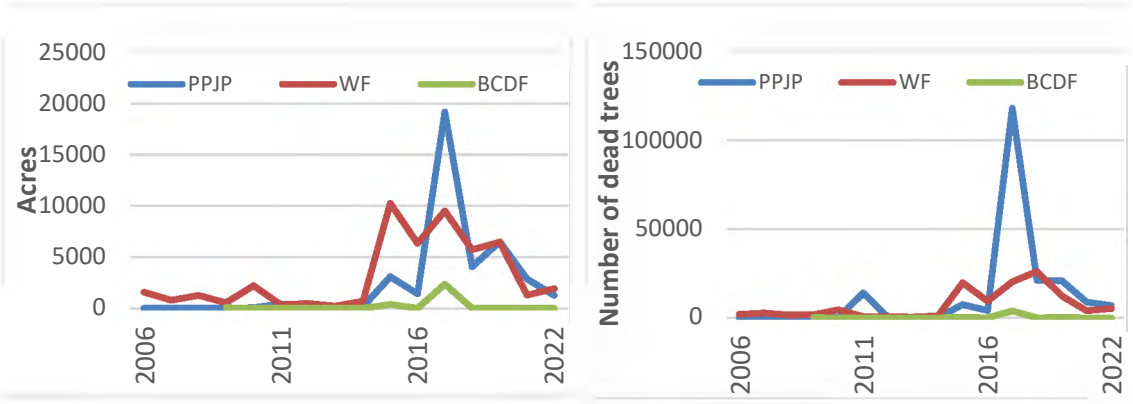


Figure 31. Acres of conifer mortality (left) and estimated number of dead conifers (right) by species on the San Bernardino National Forest.

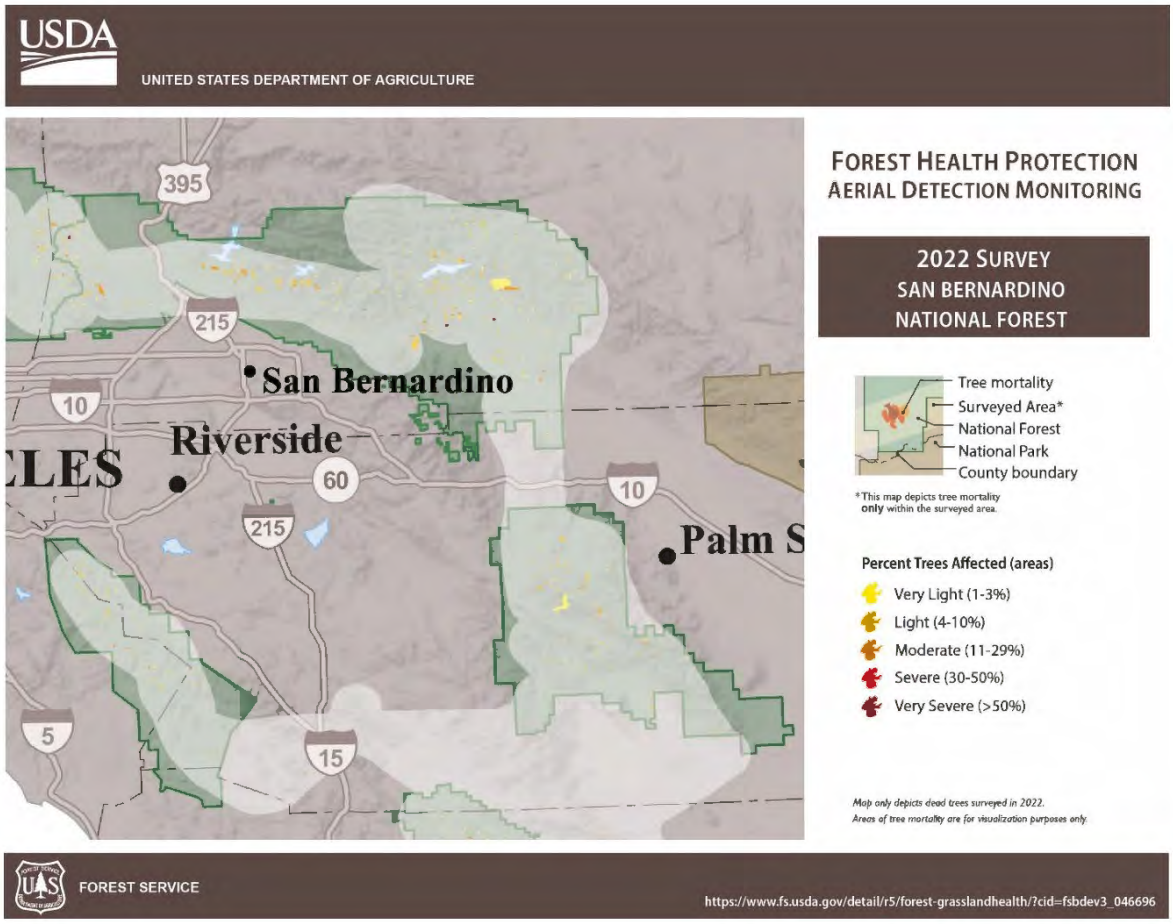


Figure 32. Map of conifer mortality on the San Bernardino National Forest in 2022.

Recommendations

- Increase pace of fuel reduction treatments in high-risk zones in the WUI, distributing effort across WUI zones based on need and risk, while monitoring previously treated areas to ensure they are treated before becoming high risk again.
- Although large or catastrophic fire events have not taken place during this reporting cycle, the threat of such events is persistent where the forests have fully departed from the natural range of variation and fire return interval. Landscape level forest health and ignition reduction treatments are needed to adequately address this risk.
- Increase the pace and scale of treatments to move the various fire regimes into class 1, with particular emphasis on moving montane conifer forests towards the natural range of variation.
- Increase the pace and scale of prescribed fire projects at high elevation montane forest settings.
- Continue pursuing ignition reduction projects within foothill communities that are type converting to seasonal and invasive grasses.
- Continue seeking opportunities to thin overly dense stands to increase forest resilience.

- Increase efforts to remove gold-spotted oak borer and reduce the spread of the species. Consider developing an early detection and action plan. Work with Forest Health Protection to ensure aerial detection surveys include coast live oak as one of the top four oak species included within the superhost group for evaluation.

Invasive Species

The second goal of the Southern California National Forests Land Management Plan emphasizes the desire to manage and/or eradicate invasive species on the southern California National Forests. Specifically, Goal 2.1 focuses on reversing the trend of a loss of natural resource values due to invasive species. Invasive plant and animal species, when unchecked, often demonstrate a capacity for spread at the expensive of endemic species. These species can cause extraordinary damage to ecosystem composition, structure, and function. Some invasives are already so prevalent that they are unlikely to be eradicated, therefore the objective is to control their spread into novel sites. There is also a continuous threat of the introduction of new invasive species. In these cases, the emphasis may be to eradicate them before they become ubiquitous as well as to prevent future introduction of invasives. Due to heavy use the recreating public, as well as a diverse suite of special uses on all southern California National Forests, the introduction and spread of invasive species will likely always be a primary management concern.

Monitoring Questions

MQ9. Are chaparral and coastal sage scrub vegetation communities type converting to non-native annual grasslands? The indicator for this question includes extent of non-native annual grasses.

MQ10. Are the national forests' reported occurrences of invasive plants/animals showing a stable or decreasing trend? The indicator for this question is acres of treatments in reported occurrences.

Key Results

Shrubland conversion to non-native grasses

Zonewide, changes in non-native grass cover in the last 10 years appear driven mostly by precipitation and drought. In general, we are seeing shrub cover increase post-fire (using our threshold of 50% shrub cover as success). The total percentage of non-native grasses remains low (1.8% across the three Forests in 2022).

The trend in non-native invasive grass cover peaked in 2017 and 2018 (Table 9). The peak in 2017 and 2018 are driven by two primary factors:

1. A break in the drought that leads to a flush in grass production.
2. In 2017, we also start including non-native grasses in the Zaca footprint which occurred 10 years previously (and had been masked out).

It's important to recognize that there is some model uncertainty in differentiating between native and non-native annuals grasses and forbs. Continued on-the-ground monitoring is recommended to identify where native annuals are most successful, and what management factors might contribute to their success in competing with non-native species.

Lastly, in conducting this analysis, we re-evaluated data for the past years to:

- Clip out private inholdings and

- Ensure each year of evaluation excluded fire perimeters from the prior 10-year period (9 years + the concurrent model year).

We found that this method was inconsistently applied in the past with some years having 11 years of data masked and others have 9 years masked. Therefore, we have now updated all data with the same methods.

Table 9. Acres of shrubland and grassland (and percent of the landscape) on the Angeles, Cleveland and San Bernardino National Forests between 2009 and 2022.

Year	Shrubland (Acres)	Grassland (Acres)	Total (Acres)	Shrubland (%)	Grassland (%)
2009	642,779	5,612	648,391	99.13%	0.87%
2011	658,079	3,054	661,134	99.54%	0.46%
2013	768,709	7,184	775,893	99.07%	0.93%
2015	776,985	7,953	784,938	98.99%	1.01%
2017	842,338	19,992	862,329	97.68%	2.32%
2018	825,162	18,182	843,344	97.84%	2.16%
2020	842,513	8,818	851,331	98.96%	1.04%
2022	825,006	15,050	840,056	98.21%	1.79%

Invasive species treatments

All three Forests treated fewer acres of invasive plant species during this monitoring period (2021-2022) than the previous one (2019-2020).

Angeles National Forest

Both ranger districts of the Angeles National Forest treated nearly 700 acres of invasive plants during the 2021-2022 monitoring period; 372 acres were treated during fiscal year 2021 and 323 acres were treated during fiscal year 2022 (Figure 17). Most of the treatments (673) were pesticide applications while the rest (24) were mechanical/physical treatments. Acres treated during this monitoring period (2021-2022) were much lower than the most recent monitoring period (2019-2020) (see Figure 17).

Invasive species that were treated during the fiscal year 2021-2022 period include Spanish broom (*Spartium junceum*), saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), tall tumblemustard (*Sisymbrium altissimum*), compact brome (*Bromus madritensis*), sweetclover (*Melilotus officinalis*), prickly Russian thistle (*Salsola tragus*), soft brome (*Bromus hordeaceus*), shortpod mustard (*Hirschfeldia incana*), tree of heaven (*Ailanthus altissima*).

Treatment areas included Big Tujunga Creek, San Francisquito Canyon, and San Gabriel River which provide critical habitat for special status species.

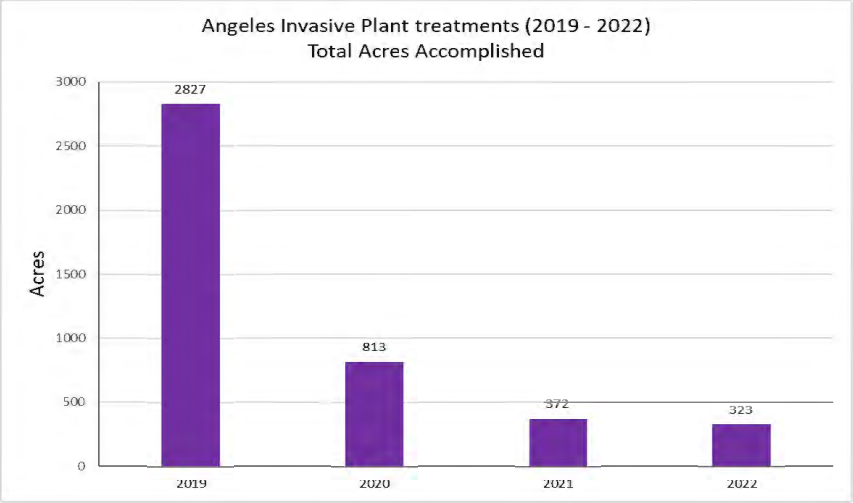


Figure 17. Acres of invasives treatments on the Angeles National Forest from 2019-2022.

Cleveland National Forest

The Descanso and Palomar Ranger Districts on the Cleveland National Forest treated approximately 558 acres of invasive plants during fiscal year 2021 and 92 acres during fiscal year 2022 for a total of 650 acres of treatment (Figure 18). All treatments consisted of pesticide applications. Fewer acres were treated during this monitoring period than the previous one (2019-2020) (see Figure 18).

Invasive species that were treated during the FY 21-22 period include tamarisk (*Tamarix spp.*), crimson fountaingrass (*Pennisetum setaceum*), and Spanish broom (*Spartium junceum*).

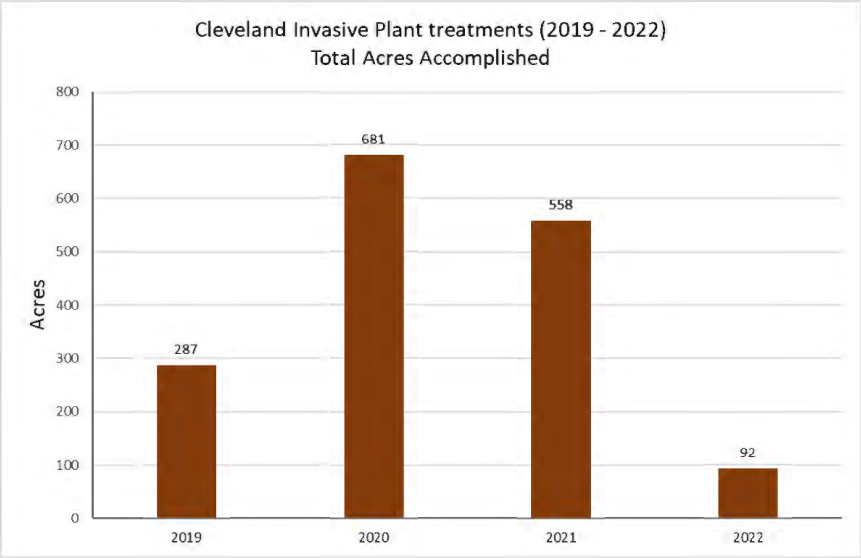


Figure 18. Acres of invasives treatments on the Cleveland National Forest from 2019-2022.

San Bernardino National Forest

All three ranger districts of the San Bernardino National Forest treated a total of 73 acres of invasive plants during this monitoring period; 51 acres were treated in 2021 and 22 acres were treated in 2022 (Figure 19). Most of the treatments (52) were mechanical/physical while the rest (21) were pesticide

applications. Fewer acres were treated during this monitoring period than the previous one (2019-2020) (see Figure 19). For infestations we are able to treat it is possible that there is a decreasing trend, however, for all invasive plants the trend is likely stable to increasing.

Invasive species that were treated during the FY 21-22 period include Spanish broom (*Spartium junceum*), garlic mustard (*Alliaria petiolata*), bull thistle (*Cirsium vulgare),* saltcedar (*Tamarix ramosissima*), crimson fountaingrass (*Pennisetum setaceum*), tall tumblemustard (*Sisymbrium altissimum*), Asian mustard (*Brassica tournefortii*), Dalmatian toadflax *(Linaria dalmatica ssp. dalmatica*), perennial pea (*Lathyrus latifolius*), shortpod mustard (*Hirschfeldia incana*).

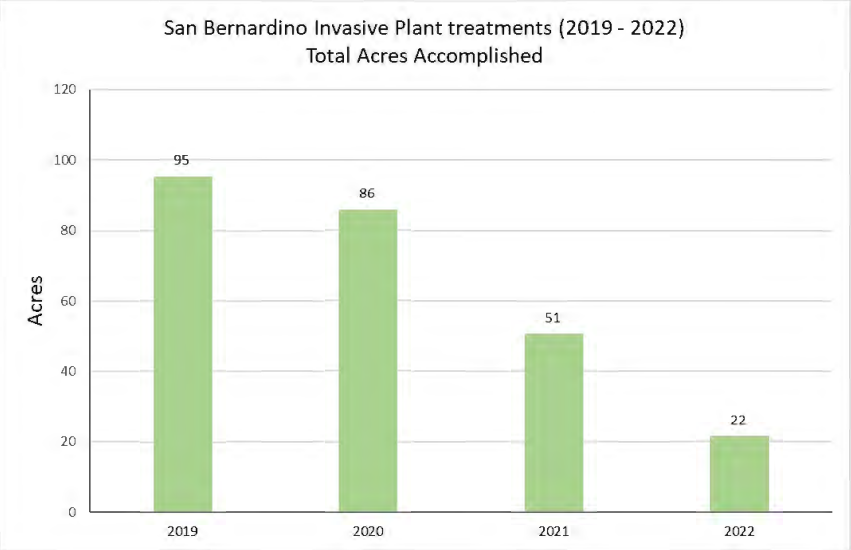


Figure 19. Acres of invasives treatments on the San Bernardino National Forest from 2019-2022.

Recommendations

Continued on-the-ground monitoring to identify where native annuals are most successful, and what management factors might contribute to their success in competing with non-native species. Revisit our definition of 50% shrub cover as being “success”.

Increase pace and scale of treatments. Add a monitoring indicator to look at trends in occurrences (not just acres of treatments) and the need for repeat treatment.

Managed Recreation and Wilderness

The third goal of the Southern California National Forests Land Management Plan emphasizes managed recreation and wilderness values. Goal 3.1 seeks to provide public use while simultaneously managing natural resource protection in the face of soaring demand for outdoor recreation from heavily populated southern California. This includes sustainably managed recreation facilities, conservation education, Tribal use, safe and well-designed roads and trails. Further, these recreational needs must be balanced with habitat protection, heritage site protection and other resource protection goals. Goal 3.2 is to retain a natural evolving character within wilderness. The desire condition for wilderness includes the maintenance of untrammeled ecological processes, vegetation and fire management, high air quality and opportunities for solitude for the recreating public.

Monitoring Questions

MQ11. Are trends in indicators and visitor satisfaction surveys indicating that the forest has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction? The indicator for this question is visitor satisfaction.

MQ12. 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? The indicator for this question is Wilderness condition.

Key Results

Visitor Satisfaction

The Cleveland and San Bernardino National Forests reported on their visitation in the last monitoring report which covered their most recent survey information (2019). The most recent National Visitor Use Monitoring (NVUM) survey was conducted on the Angeles National Forest in 2021. The results for visitor satisfaction are not yet available. These results will be described in the next monitoring report.

Wilderness Condition

This question was answered for the Cleveland National Forest. Wilderness Stewardship Performance (WSP) scores were the same in 2022 as in 2020 for all four Wilderness areas (Table 10). Scores over 60 are considered “managed to standard”. Currently, only Agua Tibia Wilderness Area is considered managed to standard. Trends are constant from 2020 through 2022 but are expected to improve in 2024 due to key scoring indicators being addressed in fiscal year 2024.

Table 10. Wilderness Performance scores for four wilderness areas on the Cleveland National Forest.

Year	Agua Tibia	Hauser	Pine Creek	San Mateo Canyon
2015	38	20	22	26
2016	38	24	22	26
2017	54	48	44	48
2018	56	48	44	48
2019	62	52	48	52
2020	64	58	58	56
2022	64	58	58	56

Recommendations

Continue maintaining trail heads, trails, and access to open space.

Energy and Minerals Production

The fourth goal of the Southern California National Forests Land Management Plan emphasizes energy, renewable energy, and mineral production. The aim is to provide opportunities for mineral extraction and renewable and non-renewable energy resource development while continuing to sustain the land's productivity for other uses and its capability to support biodiversity goals and ecosystem health. The desired condition is approved mineral and energy developments are managed to facilitate production of mineral and energy resources while minimizing adverse impacts to surface and groundwater resources and protecting or enhancing ecosystem health and scenic values.

Monitoring Questions

MQ13. Has the forest been successful at protecting ecosystem health while providing mineral and energy resources for development? The indicators for this question include the number of mineral and energy development projects proposed and approved, and minerals and energy success at protecting ecosystem health.

MQ14. Has the forest been successful at protecting ecosystem health while providing renewable resources for development? The indicators for this question include the number of renewable resource projects proposed and approved, and renewable resources success at protecting ecosystem health.

MQ15. How many of each type of special use authorization, mining permit, and forest product permit are active on the forest? The indicator for this question is the number of special use authorizations and permits by type.

Key Results

Mineral and Energy Development

The forests do not currently have large scale mineral or energy development projects other than the Mitsubishi and Omya mines on the San Bernardino, which continue to operate under current operating plans.

The Vulcan Mine on the Angeles National Forest has actively transitioned to reclamation phase. The Forest has approved reclamation plans for 2 of 4 mined areas. Due to the significant portion of the forest that is withdrawn from mineral uses, no new mining authorizations have been issues or are anticipated. The forest will continue to monitor reclamation implementation at Vulcan operations.

The Cleveland National Forest has multiple active mining claims, although the demand for energy development on the is minimal. The forest receives several inquiries from prospective miners each year interested in various minerals, primarily gold, quartz and tourmaline. The forest works to respond to all inquiries about mining in a timely manner with clear and factual information about mining on national forest lands.

In FY21, noncompliance for occupancy and mining without an approved POO at Cryo-Genie mine was successfully enforced. Cryo-Genie is a legacy Tourmaline mine with a multi-decade history of non-

compliance and previous unsuccessful attempts by Forest Service staff to secure a reclamation bond of the appropriate amount. Claimants stopped mining, ceased occupancy, removed all vehicles and infrastructure and the majority of equipment. This action reduced immediate threats to the environment at the mine from occupancy and active mining.

Maple Lode claim was closed in FY22, and the forest added a lock to the mine road gate to prevent the public from accessing the mine and cliff.

No direct damage from mining to any sensitive resources was observed, however the SPMA Starlight and Lindsey K are out of compliance with the forest – mining has occurred that may require POO due to volumes of sediment disturbed. There are also locations with inappropriate waste rock disposal in steep berms at the top of inner gorges and hillslopes (Cryogenie, Maple Lode, Lindsey K). In locations where legacy mining activity has left open pits or mining roads as scars on the landscape, the loss of soil organic matter has been severe (Cryogenie). Waste rock from lode mines on the Cleveland typically are very high in silica content and can limit or prevent any natural vegetative recovery on abandoned or unrehabbed mine sites. Long-term impacts of small-scale mining is evident on the landscape from remaining waste-rock deposits devoid of any vegetative recovery, most notably at Maple Lode and Cryogenie.

Renewable Resource Development

The Angeles, Cleveland, and San Bernardino national forests did not have any renewable energy development projects proposed during fiscal years 2021 or 2022.

Special Use Authorizations and Permits

There has not been a meaningful or measurable change to this question from the last reporting cycle. The forests have been successful in issuing permits to those requested. The Angeles and San Bernardino have not provided a detailed response, but the Cleveland can serve as an example of permits issued. The Cleveland offers a wide variety of permits when compared to other forests (Tables 11 and 12).

Table 11. Number and type of special use authorizations and permits in fiscal year 2021.

Type	#	Type	#	Type	#
Club	4	Construction Camp and Residence	2	Cellular	1
Shelter	1	Warehouse and Storage Yard	0	Resource Monitoring Site	4
Recreation Residence	294	Commercial Still Photography	1	Commercial Mobile Radio Service	3
Resort	2	Motion Picture and TV Location	1	Facility Manager	16
Concession Campground	1	Geological and Geophysical Exploration	2	Telephone and Telegraph Line	13
Recreation Event	3	Powerline	5	Fiber Optical Cable	3

Type	#	Type	#	Type	#
Apiary	8	Other Utility Improvement	1	Other Communication Improvement, not REA	1
Convenience Enclosure	0	Airport, Heliport	2	Navigation Equipment	1
Church	1	DOT Easement	5	Irrigation Water Trans- Pipeline >= 12” Diameter	1
Marker	4	Forest Road and Trail Act Easement	6	Irrigation Water Trans- Pipeline < 12” Diameter	9
Monument	1	Federal Land Policy and Management Act Easement	8	Water Trans- Pipeline >= 12” Diameter	1
Service Building	9	Federal Land Policy and Management Act Permit	73	Water Transmission Pipeline < 12” Diameter	5
Site Survey and Testing	0	Wilderness Act Auth-, Roads and Trails	1	Dam, Reservoir	5
Resource Survey	1	Amateur Radio	2	Water Diversion, Weir	1
Experimental Station	0	Microwave-Common Carrier	5	Well, Spring, or Windmill	6
Research Study	3	Microwave-Industrial	6	Wildlife Water Supply	2
Weather Station	2	Local Exchange Network	1	Water Storage Tank	16
Observatory	1	Private Mobile Radio Service	36	Water Treatment Plant	1
Military Training Area	3	Passive Reflector	0	Special Forest Product Permit (volume sold)	672
Non-disturbing Use (Arch Investigation)	8	Cable Television	1	Active Mineral Operations	0
Disturbing Use (Arch Investigation)	1	Outfitting and Guiding Service	4	Non-Commercial Group Use	1
Education Center	1				
				TOTAL [1]	600

[1] Based on number reported in Special Use database (SUDs), forest product permits (separate database), and mining claims (currently not reported in SUDs/SUDs not accurate).

Table 12. Number and type of special use authorizations and permits in fiscal year 2022.

Type	#	Type	#	Type	#
Club	4	Construction Camp and Residence	2	Cellular	1
Shelter	1	Warehouse and Storage Yard	0	Resource Monitoring Site	3
Recreation Residence	293	Commercial Still Photography	4	Commercial Mobile Radio Service	4
Resort	2	Motion Picture and TV Location	7	Facility Manager	14
Concession Campground	1	Geological and Geophysical Exploration	2	Telephone and Telegraph Line	13
Recreation Event	10	Powerline	5	Fiber Optical Cable	3
Apiary	8	Other Utility Improvement	1	Other Communication Improvement, not REA	1
Convenience Enclosure	0	Airport, Heliport	2	Navigation Equipment	1
Church	1	DOT Easement	5	Irrigation Water Trans- Pipeline >= 12” Diameter	1
Marker	4	Forest Road and Trail Act Easement	6	Irrigation Water Trans- Pipeline < 12” Diameter	9
Monument	1	Federal Land Policy and Management Act Easement	8	Water Trans- Pipeline >= 12” Diameter	1
Service Building	10	Federal Land Policy and Management Act Permit	73	Water Transmission Pipeline < 12” Diameter	5
Site Survey and Testing	0	Wilderness Act Auth-, Roads and Trails	1	Dam, Reservoir	5
Resource Survey	1	Amateur Radio	2	Water Diversion, Weir	1
Experimental Station	0	Microwave-Common Carrier	5	Well, Spring, or Windmill	6
Research Study	3	Microwave-Industrial	5	Wildlife Water Supply	2
Weather Station	2	Local Exchange Network	1	Water Storage Tank	16
Observatory	1	Private Mobile Radio Service	35	Water Treatment Plant	1
Military Training Area	4	Passive Reflector	0	Special Forest Product Permit (volume sold)	412

Type	#	Type	#	Type	#
Non-disturbing Use (Arch Investigation)	10	Cable Television	1	Active Mineral Operations (from Tori S.)	0
Disturbing Use (Arch Investigation)	1	Outfitting and Guiding Service	5	Non-Commercial Group Use	1
Education Center	1				
				TOTAL [1]	616

Recommendations

None

[1] Based on number reported in Special Use database (SUDs), forest product permits (separate database), and mining claims (currently not reported in SUDs/SUDs not accurate).

Watershed Function and Riparian Condition

The fifth goal of the Southern California National Forests Land Management Plan focuses on improving riparian and watershed condition. The watersheds throughout the southern California National forests are the headwaters and primary source areas for the majority of the rivers across southern California. They provide aquatic and riparian species habitat. Watersheds are quantitively assessed based on a variety of indicators and riparian areas are conserved through the establishment of Riparian Conservation Areas (RCAs) which offer additional protections and consideration, particularly through the project planning process. Ultimately, the desired condition regarding watersheds and riparian areas are properly functioning, healthy, dynamic and resilient, and capable of supporting healthy populations of desired native and desired nonnative riparian dependent species.

Monitoring Questions

MQ16. Is the forest making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds? The indicator for this question is the number of watersheds in each condition class.

MQ17. How do stream flows compare with historical records? The indicators for this question include monthly stream flows, timing and magnitude of peak flows, degree of variation.

MQ18. Is the forest increasing the proper functioning condition of riparian areas? The indicators for this question include the change in indicator score for aquatic habitat, aquatic biota and riparian vegetation.

Key Results

Watershed Conditions

The Angeles National Forest was unable to conduct a watershed reassessment in 2021. For the San Bernardino, there has not been a meaningful or measurable change to this question from the last reporting cycle.

For the Cleveland National Forest, watershed conditions have not changed classes. Essential projects in the priority watersheds (Cedar Creek, Kitchen-Creek Cottonwood Creek, Arroyo-Trabuco Creek, and Boulder Creek-draft) have continued and are successfully improving conditions locally. Current condition class ratings of Functioning Properly (Cedar, Boulder and Kitchen-Cottonwood Creek) and Functioning at Risk (Arroyo-Trabuco Creek) were maintained and remain the same. Essential projects included feral pig eradication monitoring, invasive weed treatment, aquatic invasive species removal, insect prevention/treatment, and recreation management. Feral pig eradication monitoring and invasive weed treatment within Cedar, Boulder, and Kitchen-Cottonwood Creek watersheds, improved the terrestrial invasive species ratings. Feral Pig eradication monitoring also improved water quality, riparian vegetation, and channel shape and function. Invasive weed treatment and aquatic invasive species removal that occurred within Cedar and Boulder creeks improved riparian and wetland vegetation and invasive species under the aquatic biota category. Insect prevention/treatment in

Cedar Creek watershed of GSOB at Pine Hills station improved the insect and disease rating. Recreation management (trail work, brushing, and graffiti removal) in Cedar Creek and Boulder Creek improved soils and water quality near the improved trails (Three Sisters, Eagle Peak, and San Diego River Gorge trails). All these treatments contributed to maintaining the current overall watershed condition class ratings.

Proper Functioning Condition

Invasive species continue to threaten the viability and health of riparian areas.

Four watersheds have been selected by the Angeles National Forest for assessment: Elizabeth Lake Canyon, San Francisquito Canyon, Cattle Canyon, Upper West Fork San Gabriel River. Although a comprehensive assessment was not conducted in 2021, below is a qualitative description of key events, trends, and recommendation for the three watersheds that have had recent site visits and/or work conducted.

Elizabeth Lake Canyon

The fire scar from the August 2020 Lake Fire received intense precipitation on September 11, 2022. County roads were inundated with mud and debris; culverts were plugged. ln October 2022, storm damage monitoring found that the county had almost completed cleared roads and culvert inlets. Monitoring found mostly upland shrub-scrub species within the riparian conservation area. The channel coming from Shake campground to Pine Canyon Road was moist and full of sediment.

The Angeles National Forest is responsible for meeting the objectives of a trash TMDL, a zero-trash tolerance, with annual monitoring and reporting to the California State Water Quality Control Board. The forest is not in compliance with the TMDL. However, monitoring at Elizabeth Lake found very little trash. The day use area had all trash receptacles functioning with minor amounts of trash in the closed parking area. We believe the upgrades we have made to the site meet the TMDL intentions and would like to make the waterboard aware and discuss future monitoring needs.

Riparian monitoring in Cottonwood campground showed improvement from the hand-removal of invasive tree-of-heaven. Erosion, sediment burial of some tables, and low water ford flooding issues from the storm were observed, but water quality appeared clear in Canyon Creek with 62^{o} F water and 80^{o} F air temperatures.

At Prospect campground, a small seep and wetland are at risk of erosion from undermining the access road near the gate. The terrace, where the campground sits, was covered with fresh sediment from flooding by tributaries to the main Canyon Cr. below the terrace. Garbage had been dumped on the terrace. A hazardous materials contract has since cleaned up the site, but reports of dumping have continued. The wide floodplain and cottonwoods were buried with fresh sediment but within a range of natural disturbance. The terrace banks are shored up with landing track and were eroding. Water quality appeared clear with 68^{o} F water and 82^{o} F air temperatures. We can work towards identifying better locking systems to prevent dumping at the site. We can also work towards a plan to address the potential erosion of the riparian area along the banks.

Riparian and water quality monitoring at Ruby Canyon found flood damage to the riparian vegetation and the 6N24 Ruby – Clearwater OHV route low-water ford where improvements had unraveled. Four-

inch concrete block blankets had been lifted up and carried downstream. Water quality otherwise looked good. We can identify ways to removing these concrete blocks.

San Francisquito Canyon

The Angeles National Forest, in partnership with the National Fish and Wildlife Foundation, are planning stream and riparian habitat restoration for San Francisquito Creek. In May 2022, pre-project monitoring of site conditions found that the creek was dry. We determined that water quality and riparian vegetation would improve under the restoration plan. The restoration would be designed to improve riparian conditions and aquatic habitat conditions for the federally endangered unarmored three-spine stickleback (*Gasterosteus aculeatus williamsoni*) and the threatened California red-legged frog (*Rana draytonii*).

West Fork San Gabriel

Upper West Fork San Gabriel was not visited or monitored during this period, however, approximately 30.8 inches of precipitation for spring of 2022 resulting in 7 CFS inflow into Cogswell Reservoir and 32.3 inches of precipitation in the fall resulting in 1 CFS outflow to the river in addition to contributions from adjacent small watersheds was reported by the West Fork Working Group. The Cogswell Reservoir Post-Fire Emergency Restoration Project (Cleanout Project) removed sediment and debris from Cogswell Reservoir to the Cogswell Sediment Placement Site. Debris flows from post-fire precipitation events increased woody debris and sediment storage in the river over the pre-fire condition.

In November 2022, the Lower West Fork San Gabriel River, below Cogswell Reservoir to the confluence with East Fork San Gabriel was reviewed for rehabilitation. The riparian large sycamores and alder vegetation appear in properly functioning condition along the riparian zone. The water was clear with deep mud and debris flow and secondary erosion of the sediment terraces.

The West Fork Road 2N25 has been closed to recreationists since the 2020 Bobcat Fire except on weekends and federal holidays for safety. Some recreation activities conflict with habitat for the threatened, endangered, proposed, candidate and sensitive species – including bank trampling and user-created rock dams. The rock dams are often removed by volunteer organizations or washed out from high flows. It is recommended that we remove user-created dams early each year.

Cleveland National Forest

Several of the essential projects on the Cleveland National Forest positively impacted the proper functioning condition of riparian areas, including feral pig eradication monitoring, invasive weed treatment, aquatic invasive species removal, and recreation management actions. Feral pigs damage riparian areas, rooting in sensitive soils, negatively impacting water quality, and consuming riparian vegetation. Invasive weed treatments occurred primarily in riparian areas, removing species that use more water than native species and compete with native species for resources. Tamarisk changes soil chemistry creating a more inhospitable environment for native species. Tamarisk removal is essential to protect soil productivity and riparian habitats. Aquatic invasive species removal improved conditions for native species and aquatic biota by reducing predation and competition for resources.

Stream Flows

When comparing flows on select Southern California streams to historical records from 1950-1980, Arroyo Seco and Big Rock Creek on the Angeles National Forest, Santa Ysabel Creek on the Cleveland National Forest, and East Twin Creek on the San Bernardino National Forest experienced relatively low flows in 2021. Arroyo Seco and Big Rock Creek flows were around median levels in 2022. Santa Ysabel flows were even lower in 2022 than in 2021. East Twin Creek flows were higher in 2022 but still below median for most of the water year.

Flows on the Sweet Water on the Cleveland National Forest and Santa Ana River on the San Bernardino were around median or 75th percentile levels in both 2021 and 2022.

See Figures 20-25 below.

Recommendations

Continue working with partners and seeking grants to treat invasive species.

Angeles National Forest

Flows in 2021 on Arroyo Seco were very dry, near the driest year on record (2002) whereas flows in 2022 were around median levels. Similarly, 2021 flows on Big Rock Creek were near the 25th percentile but 2022 flows were close to median levels. Early season flows (October-December) in 2021 were high, higher than the highest observed flows in 1978 but rapidly attenuated to very low flows.

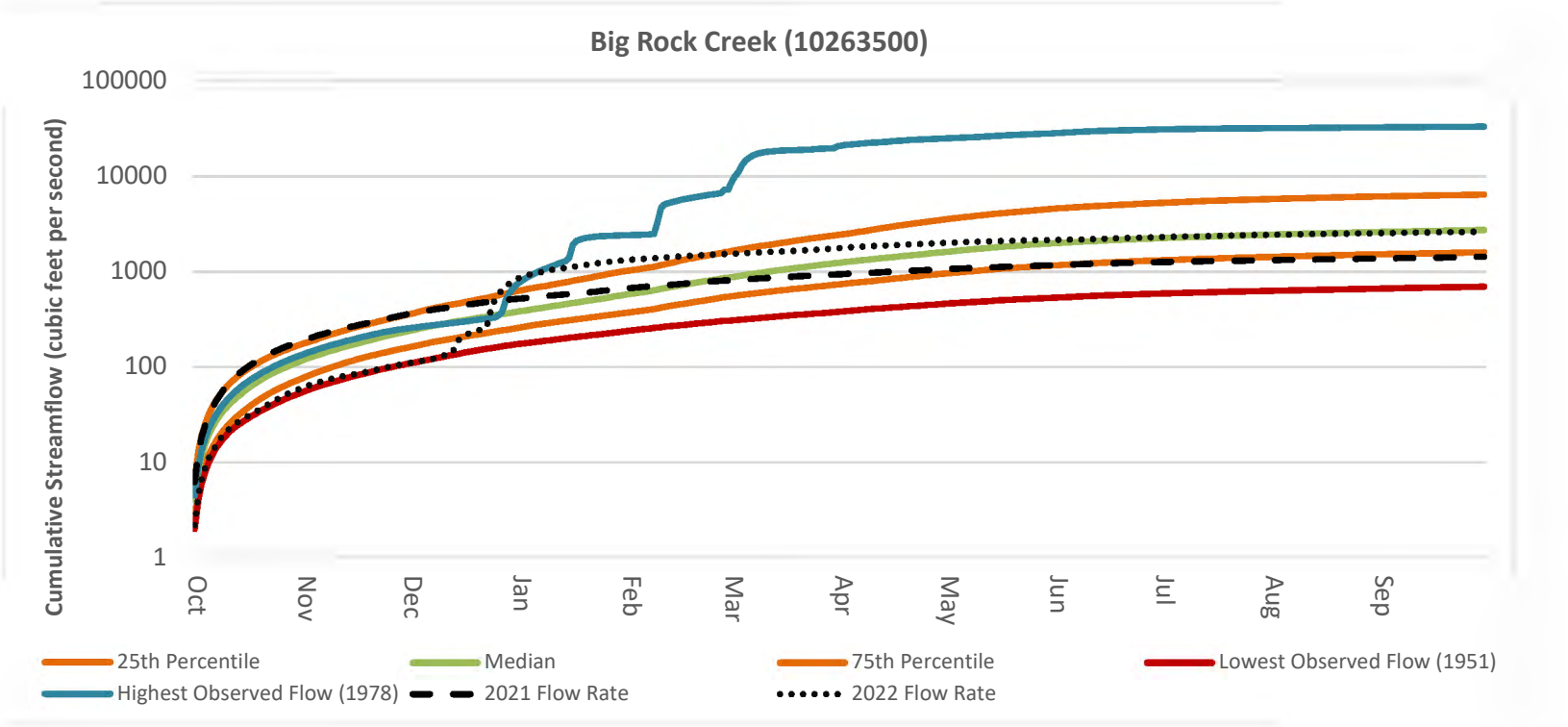


Figure 20. Big Rock Creek stream flows in 2021 and 2022 compared with historical flow data (high, low, 25th and 75th percentile, and median historic flow).

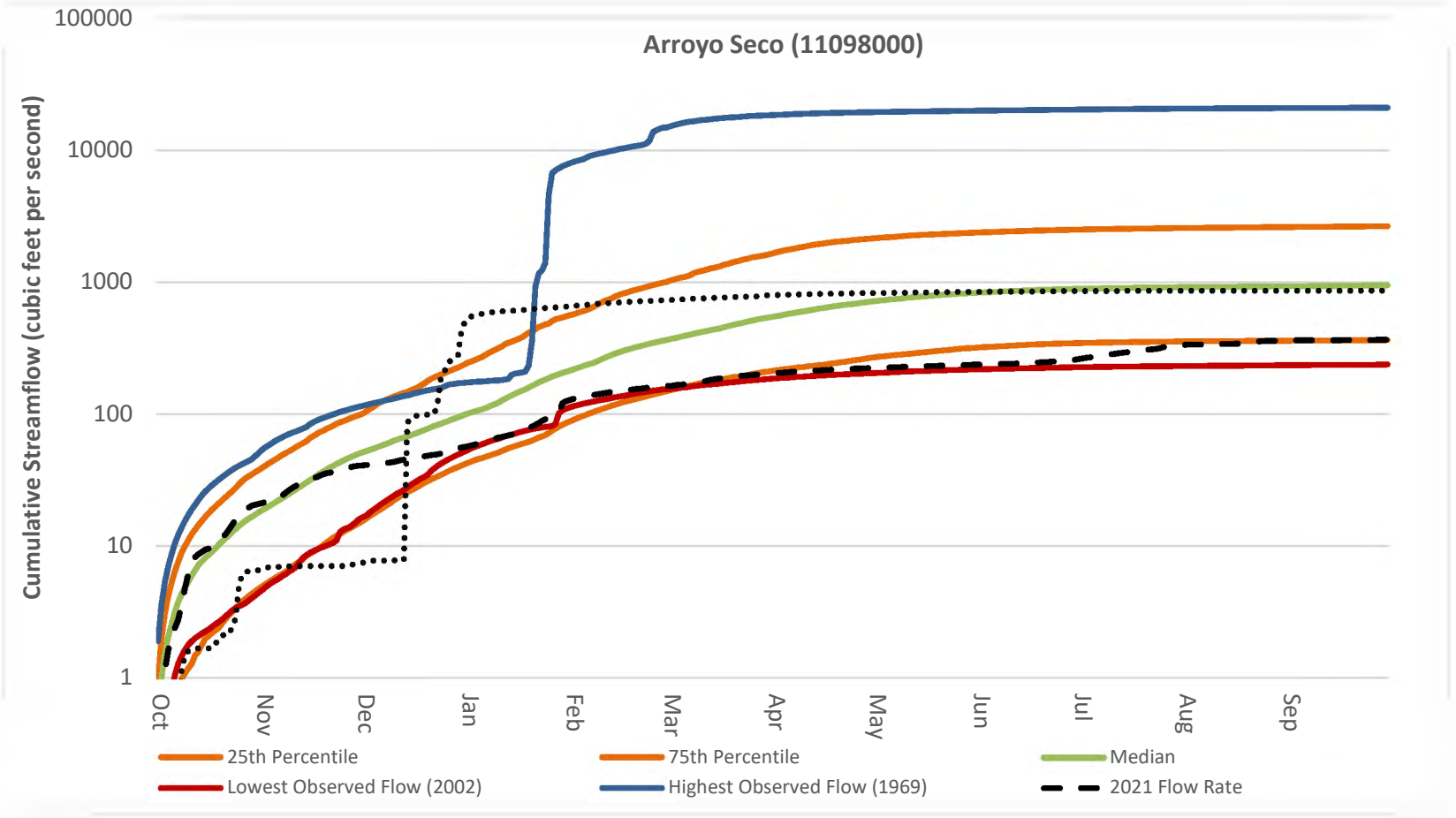


Figure 21. Arroyo Seco Creek stream flows in 2021 and 2022 compared with historic flow data (high, low, 25th and 75th percentile, and median historic flow).

Cleveland National Forest

Flows on Santa Ysabel Creek were relatively low in both 2021 and 2022. In 2021, flows were near the 25th percentile but flows were lower in 2022 though not as low as the driest year on record (1961). In contrast, flows on the Sweet Water River were around median levels in both 2021 and 2022.

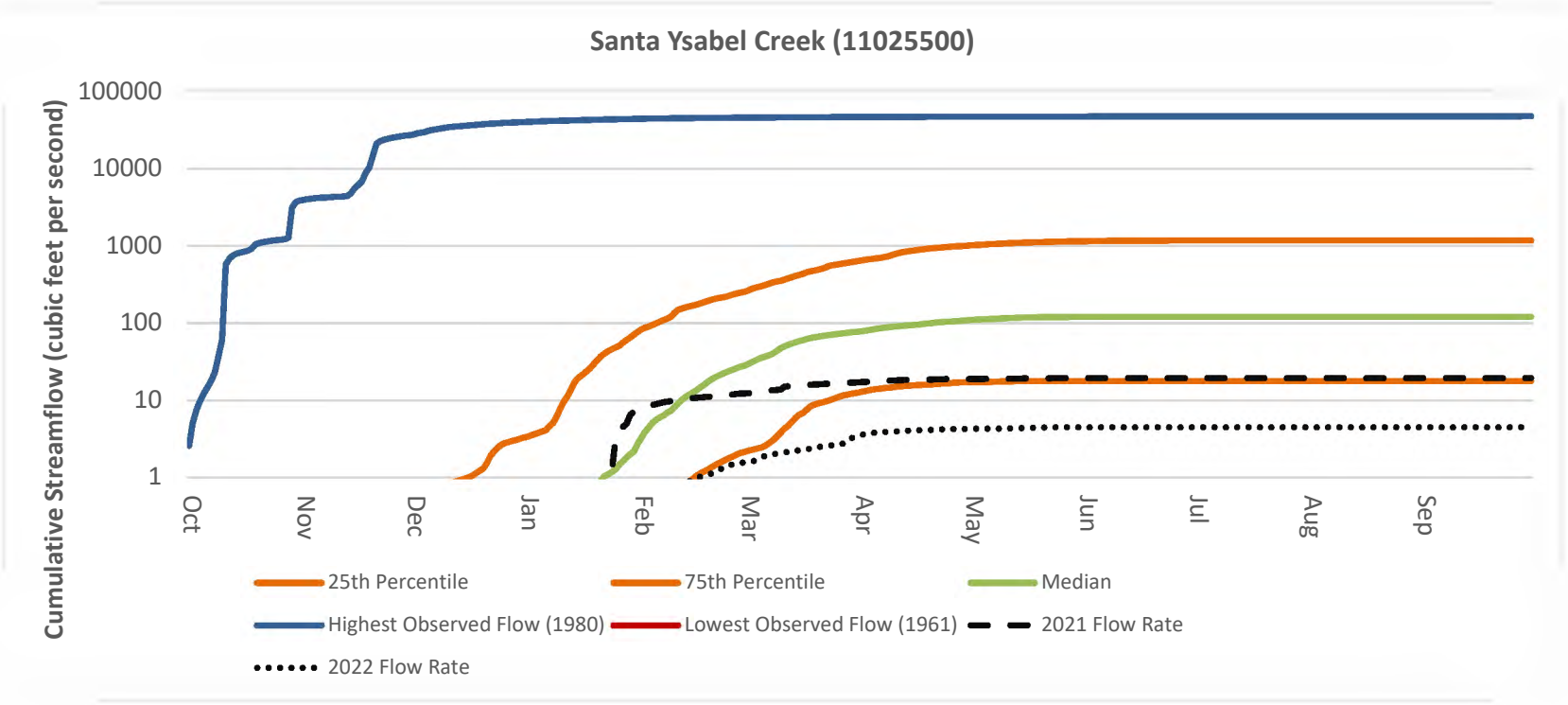


Figure 22. Santa Ysabel Creek flows in 2021 and 2022 compared with historic flow data (high, low, 25th and 75th percentile, and median historic flow).

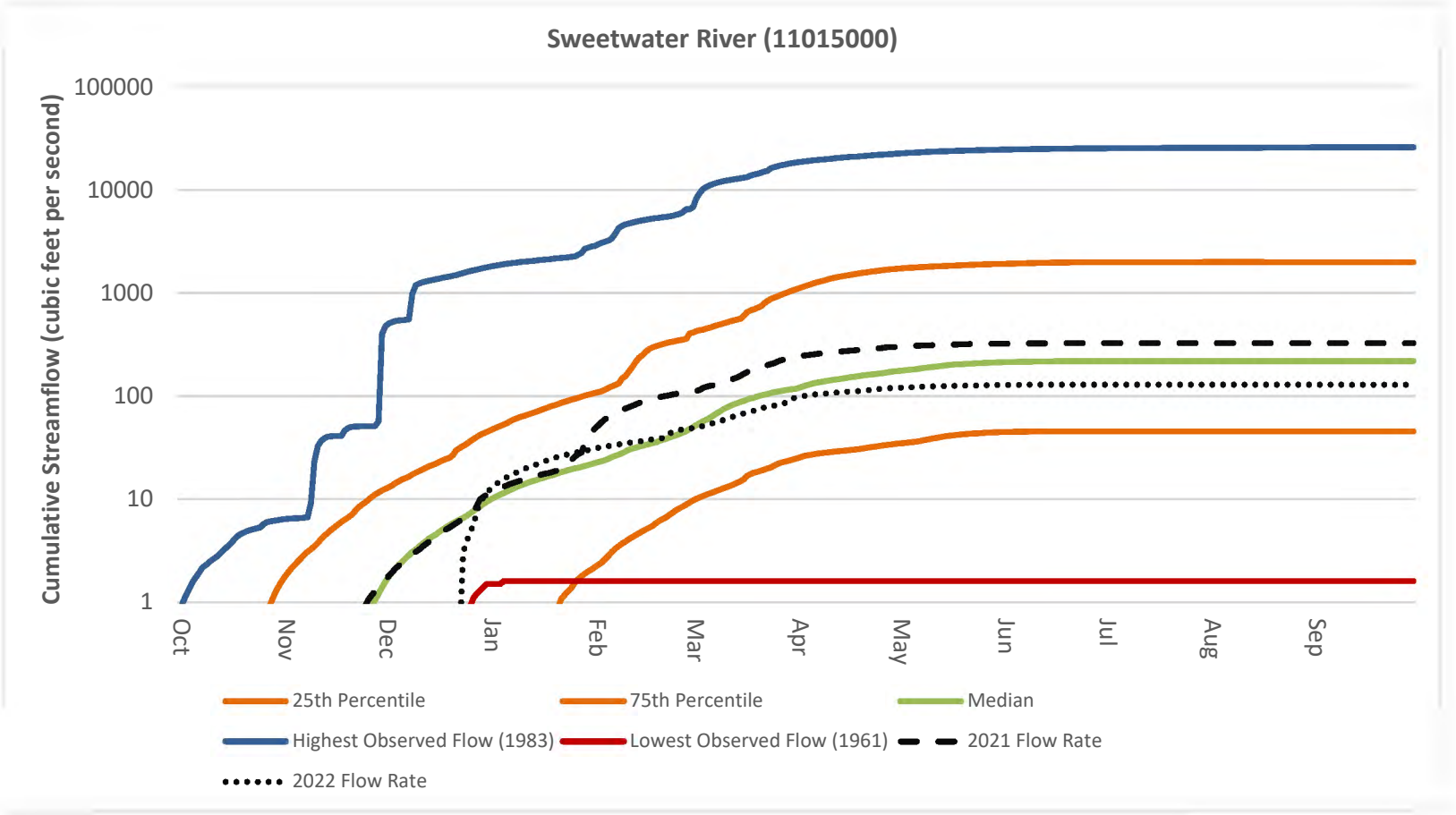


Figure 23. Sweetwater River flows in 2021 and 2022 compared with historic flow data (high, low, 25th and 75th percentile, and median historic flow).

San Bernardino National Forest

Flows on the Santa Ana River and East Twin Creek in 2021 and 2022 were exhibiting different patterns. Flows on the Santa Ana River were consistent with the 75th percentile flows and began the water year at higher levels than typical. In contrast, flows on East Twin Creek during both years were near the 25th percentile.

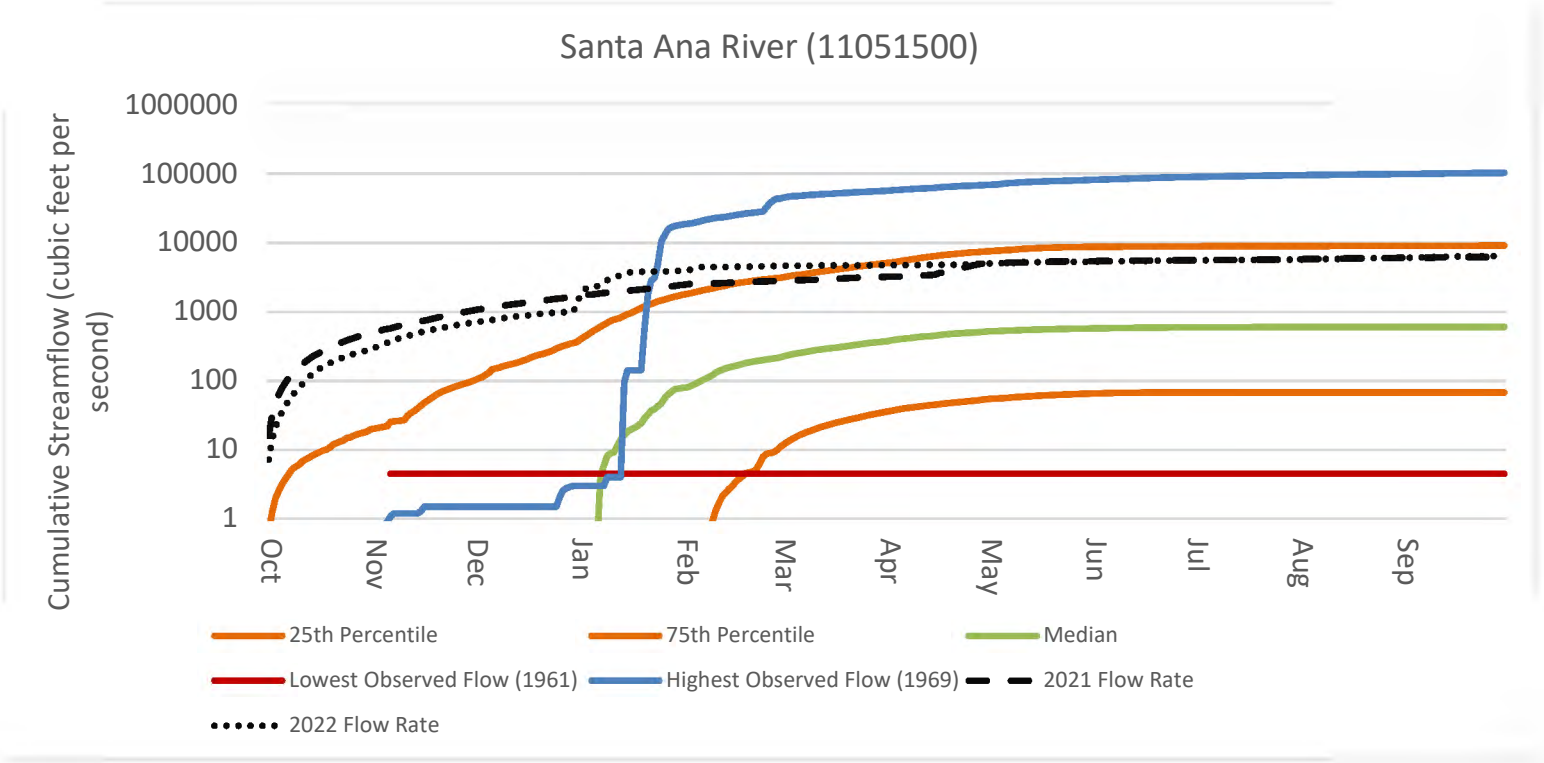


Figure 24. Santa Ana River flows in 2021 and 2022 compared with historic flow data (high, low, 25th and 75th percentile, and median historic flow).

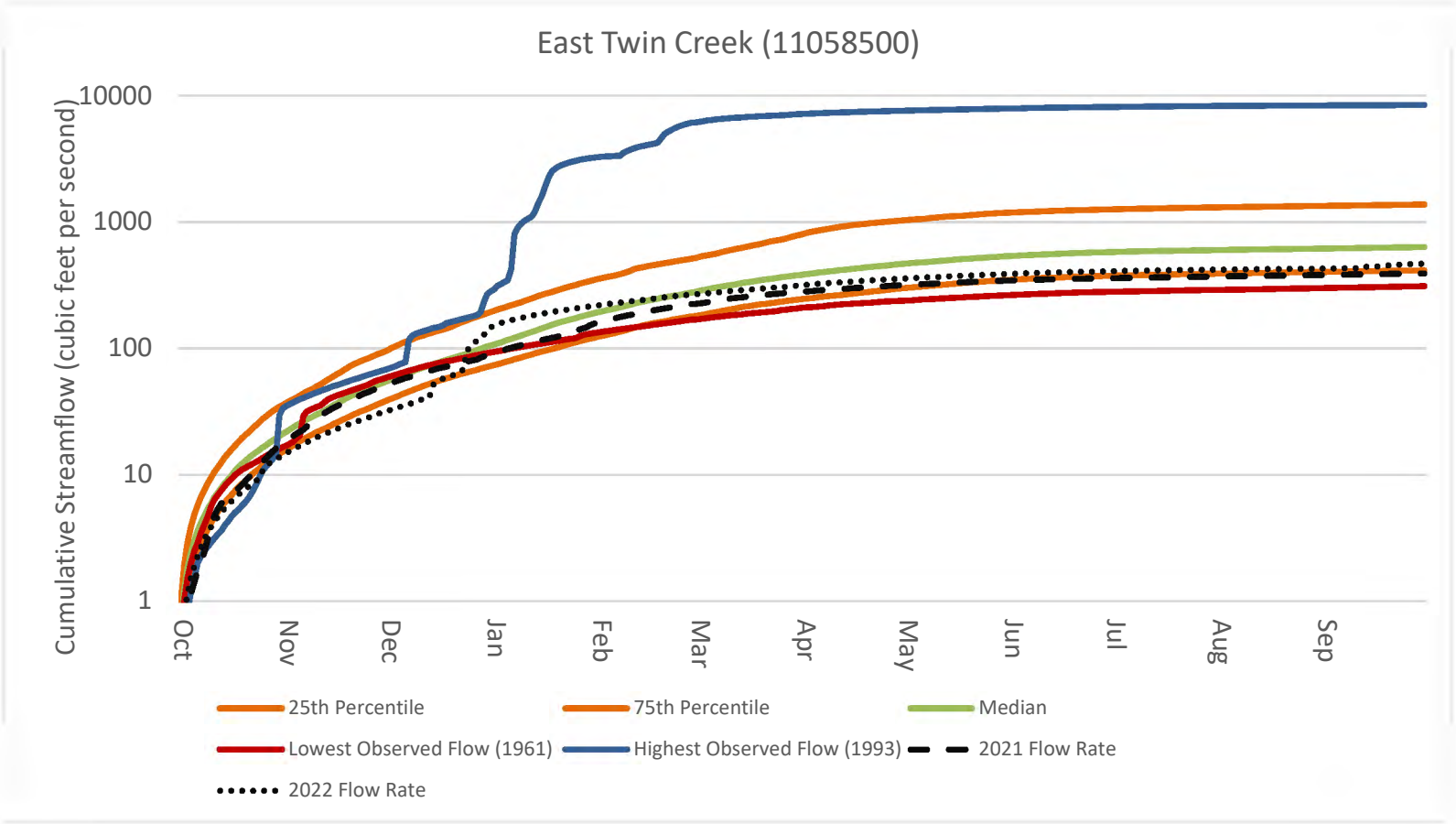


Figure 25. East Twin Creek flows in 2021 and 2022 compared with historic flow data (high, low, 25th and 75th percentile, and median historic flow).

Rangeland and Biological Resource Condition

The sixth goal of the Southern California National Forests Land Management Plan emphasizes the management of ecological conditions to improve rangeland and habitat for native and desired non-native species.

Goal 6.1 highlights a desire to move towards improved rangeland conditions as indicated by key range sites throughout the southern California National Forests. Sustainable rangeland management of livestock grazing areas requires moderate utilization in order to maintain forage cover, soil productivity, wildlife habitat, water quality and overall ecosystem health. Goal 6.2 focuses on providing sustainable ecological conditions for wildlife and plant species and uses Management Indicator Species (MIS) to monitor population and habitat trends.

These trends help in the management of federally-listed threatened and endangered (T/E) species on the southern California National Forests. Goal 6.2 is inseparable from other Land Management Plan (LMP) goals such as Goal 1.2 which aims to manage vegetation condition towards the desired condition identified for each habitat type, as well as properly functioning watersheds (Goal 5.1) that support riparian and aquatic habitat types that are essential for certain federally listed species, and properly functioning rangeland (Goal 6.1).

The desired condition for these two goals is that livestock grazing opportunities are maintained and are managed for sustainable, healthy rangelands that contribute to improving watershed conditions towards a fully functional and productive condition and that habitats for federally listed species are conserved, and listed species are recovered or trending towards recovery.

Monitoring Questions

MQ19. Is forest rangeland management maintaining or improving progress towards sustainable rangelands and ecosystem health? The indicator for this question includes the percent of key areas in active allotments meeting or moving towards desired conditions.

MQ20. Are trends in resource conditions indicating that habitat conditions for fish, wildlife, and rare plants are in a stable or upward trend? The indicator for this question is habitat condition of at-risk species.

Key Results

Rangeland Condition

The Angeles National Forest does not have designated rangeland allotments.

For the Cleveland National Forest, rangeland conditions are stable overall. Table 13 shows the current condition of monitored allotments.

Several issues with range condition are tied to illegal Off Highway Vehicle (OHV) use and not grazing management. These include areas on the Corte Madera Allotment and on the Laguna Allotment. Work has occurred to block off sensitive meadow areas from vehicular trespass at Bear Valley and along

Kitchen Creek Road. Monitoring has shown that damage from OHV remained relatively stable in Bear Valley in fiscal year 2020 and reduced sharply along Kitchen Creek Road.

Table 13. Grazing Allotment Conditions on the Cleveland National Forest.

Allotment, pasture	Condition	Assessment type	Year
Black Mountain	Good—stable	Annual compliance monitoring, BMP monitoring	2018
Corte Madera, Lower Bear Valley	Fair – Signs of reduced OHV trespass damage, drought impacts highly visible, grazing season shortened	Annual compliance monitoring	2019
Guatay	Good – Stable	Region 5 long-term trend monitoring in 2010; annual compliance monitoring	2022
Indian Creek	Un-grazed, not monitored	--	n/a
Laguna, Kitchen Valley	Moderate	Annual compliance monitoring	2022
Laguna, Cameron, La Posta Creek	Moderate	Region 5 long-term trend monitoring in 2010; annual compliance monitoring	2022
Laguna, Joy Pasture	Low—2006 , Low – 2011 Visual assessment in 2013 showed improvement and reduction on OHV impact – Fair condition in 2017	Region 5 long-term trend monitoring in 2017; annual compliance monitoring	2022
Laguna, Long Canyon Pasture	Low—2006; Moderate—2009	Region 5 long-term trend monitoring in 2009; annual compliance monitoring	2016
Laguna Meadow, mid-meadow plot	Good—moderate grazing pressure well within standards	Annual compliance monitoring	2022
Laguna Meadow, Las Rasalies plot	High 2000, moderate 2005, moderate 2009, trend stable	Region 5 long-term trend monitoring, annual compliance monitoring	2011
Love Valley	High—stable, large area used as temporary helicopter yard for powerline construction. This area is recovering.	Annual compliance monitoring,	2022
Mendenhall, Lower	Good	Annual compliance monitoring	2022
Mendenhall, Upper	High	Region 5 long-term trend monitoring in 2011; annual compliance monitoring	2022
Mesa Grande, Kelley unit	Fair – difficult to monitor	Rapid	2008
Miller Mountain	Good – burned in 2020	Annual monitoring compliance	2020
Samataguma	Good	Annual monitoring compliance	2022
Tenaja	Good – un-grazed	Region 5 long-term trend monitoring	2011
Verdugo	Good	Annual compliance monitoring	2021
Warner Ranch	Good	Annual compliance monitoring	2018

San Bernardino National Forest

Compliance monitoring showed allotments were within forage utilization standards. Six long-term monitoring plots on the Garner Allotment were read in FY2021. The Ratliff Condition Class Scores were Excellent (4), Good (1), and Fair (1).

There are currently two active and one inactive allotment on the San Jacinto Ranger District and one active allotment on the Mountaintop Ranger District. All are currently administered to standard.

A term permit for 180 head, year-round, was issued in 2019 for the Garner Allotment on the San Jacinto District. On December 22, 2021, the Garner Allotment – Cattle Grazing Program Decision Notice and Finding of No Significant Impact was signed. The term permit holder and the Forest Service have adjusted the number of cattle as needed depending upon adequate forage production, precipitation rates and personal use. Actual use by the term permit holder during the 2020 and 2021 grazing seasons was well below the permitted numbers in mutual agreement with the Forest Service, due primarily to drought conditions.

In addition to the term permit, a temporary one-year permit was issued for several of the Garner Allotment subunits for the 2020 and 2021 grazing seasons. The temporary permit holder grazed a total of 65 head in 2020 for part of the year and 68 head in 2021 for part of the year.

A term permit was issued for the Wellman Allotment on the San Jacinto District in 2011 for up to 50 head, year-round. In 2021, a new term permit was issued for up to 50 head, year-round. Actual use by the term permit holder during the 2020 and 2021 grazing seasons was below the permitted numbers in mutual agreement with the Forest Service, due primarily to drought conditions.

Habitat Conditions

Angeles National Forest

Continued drought in fiscal years 2021 and 2022 stressed wildlife, particularly riparian and aquatic species. Removal of invasive weeds and trash has improved habitats including in steam and riparian areas.

Sediment removal projects involved the removal of Santa Ana Sucker from work areas, resulting in > 1,000 moved and > 200 killed in fiscal year 2021 at the San Gabriel Reservoir.

Restoration of native habitats in burned areas was implemented at Powerhouse, Copper, and Sayre fires including restoration in riparian areas, native conifer planting, milkweed and perennial grass seeding. Two special status plants, slender mariposa lily and Nevin's barberry, were targeted during post-fire restoration efforts. Barriers were also placed to prevent off-route OHV use in post-fire areas.

For multiple animal species, available data indicated uncertain trends (perhaps declining for some species) for fiscal years 2021 and 2022.

- California Condor: U.S. Fish and Wildlife Service recorded populations for wild condors are 329, 334, 347 for 2020, 2021, 2022, respectively. Largest cause of mortality was lead poisoning and not related to habitat. Trend: stable
- Arroyo Toad: For both years, 1 of 3 known sites occupied (33%). Trend: possible decline.

- Mountain Yellow-legged Frog: For fiscal year 2021, 6 of 9 known sites occupied (67%). For fiscal year 22, 8 of 10 known sites occupied (80%). Releases of captive bred at 5 locations. Trend: stable or possible decline.
- California Red-legged Frog: Across both years, 1 of 2 known sites occupied (50%). Trend: possible decline
- Santa Ana Sucker: 28 individuals were moved from drying river segment (off forest) upstream to Big Tujunga Creek on the forest. Twenty-three recreational dams were removed across the two years to improve habitat. San Gabriel Reservoir clean out: >1000 moved, >200 killed in fiscal year 2021. Regular habitat monitoring was not completed during this time period. Trend: unknown
- Unarmored Threespine Stickleback: For fiscal year 2021, 4 of 4 sites occupied (100%). For fiscal year 2022, 1 of 1 site occupied (100%). Trend: stable
- Southwestern Willow Flycatcher: status on the forest unknown, but rare and presumed to be only migratory individuals. Trend: unknown
- Least Bell's Vireo: Status on forest unknown. Only 4 locations on forest for 2021/22 in eBird. Trend: unknown
- California Gnatcatcher: Status on forest unknown. Habitat on forest may be only used by transitory individuals and not breeding. Trend: unknown
- Monarch: Designated as a candidate for ESA listing due to declines range-wide, but presence on the forest is unknown. USFWS determined that listing was warranted but precluded. Trend: unknown
- California Spotted Owl: For fiscal year 21, 2 of 7 sites occupied (29%). For fiscal year 22, 5 of 31 sites occupied (16%). Species is proposed endangered for Southern California (as of Feb 2023).

Cleveland National Forest

In 2021-22, the Cleveland National Forest continued monitoring under the biological opinions. No incidental take was observed for any threatened or endangered species in 2020 from LMP ongoing activities.

Due over 20 years of drought and frequent and extreme fire events, some species and habitats are stable but many species and habitats are in decline.

- Arroyo Toad – no roadkill were detected. In general, protection measures were implemented and were working well. Habitat improvement work (including noxious weed removal) was completed in Trabuco and San Juan Canyons. The Forest is also continuing work on a dam removal project that will result in the removal of 81 check-dams that are impairing stream function. The project has already improved fish passage in San Juan Creek, and the resident Arroyo Chub (FS sensitive species) has expanded its range in this watershed. When completed, the project will have substantial benefits for arroyo toad populations in San Juan and lower Trabuco Creeks as it will restore more natural flows of water and sediment in the stream. A companion project, replacement of 8 concrete fords with bridges, is about half done with 4

concrete fords replaced with bridges and one removed.

- California Gnatcatcher – Coastal sage restoration work is underway at San Diego River. This project is located within designated critical habitat for the gnatcatcher, and it is funded through the Witch Fire settlement (multi-year project). The Forest also completed protocol surveys for California Gnatcatcher in 2021, with one pair detected at San Diego River Gorge trail. The California Gnatcatcher population at San Diego River has declined from about 12 pairs to 1-2 pairs, mostly due to too-frequent fire over the last 30 years.
- Least Bell's Vireo - A Least Bell's Vireo survey was conducted in San Diego River to check the status of this small population. Four vireos were detected. The population at San Diego River appears to be stable or increasing slightly. This species has met recovery goals.
- Southwestern Willow Flycatcher – U.S. Geological Survey (USGS) continued the 5th year of 5-year monitoring and research program at the upper San Luis Rey River in 2020. About 5 pairs of Southwestern Willow Flycatcher were detected on the Forest in 2020. Nest monitoring will resume next year, and no incidental take has been detected. This population has declined from about 10 pairs to no pairs, largely due to drought and the amount of oak mortality at the San Luis Rey River.
- California Spotted Owl – Declined from about 25 pairs in the 1990s to about 5 pairs now. Remaining pairs are on the Palomar Ranger District. Drought and wildfire have reduced the availability and suitability of habitat for this species, which is now proposed for federal listing as Endangered.
- Stephen's Kangaroo Rat – apparently stable and was downlisted from Endangered to Threatened in 2022.
- Quino Checkerspot – apparently stable, based on monitoring of populations near Warner Springs.
- Hermes Copper Butterfly– The Forest has conducted additional surveys for this species and has implemented a number of management actions to protect its habitat including gates and barriers to prevent OHV traffic and restoration of nectar sources after fire. The Forest has also reseeded some recent burned areas such as Valley Fire with Buckwheat, in an effort to improve nectar source availability. This species appears to be in extremely rapid decline due to the extended drought. Only 3 populations remain, 2 of which are on the Cleveland National Forest. Of these only one population appears to be of a sustainable size. Road brushing is a big concern for this species as most populations occur along roads.
- Laguna Mountains Skipper – Skipper surveys were conducted at Palomar Mountain sites by Forest staff. Fence enclosures at Observatory Campground, Mendenhall Valley and Mount Laguna were maintained. Monitoring fire effects to the Skipper's host plant, Cleveland's horkelia (*Horkelia clevelandii*), continued in select fuels treatment blocks. Initial results demonstrated that prescribed fire was not detrimental to plant populations. Monitoring will continue into future years and efforts expanded into additional treatment blocks. Laguna Mountains Skipper is now being reintroduced to the Laguna Mountains, but so far, a new population has not been established.

- Munz's Onion – Improved habitat by maintaining barriers and fencing at Elsinore Peak to exclude OHV traffic, along South Main Divide Road.
- San Bernardino Bluegrass – Pre-grazing checks were completed for populations at Laguna and Mendenhall Meadows. Several populations appear stable, while other small populations have disappeared, possibly due to exclusion of grazing.
- San Diego Thornmint – Implementation continued for grass-specific herbicide treatment to control or eradicate non-native Purple False Brome in occupied habitat along Viejas Grade Road to improve habitat for San Diego Thornmint. This work will continue for several years and is being implemented by the SanDiego Gas and Electric (SDG&E) as part of the mitigation for the Sunrise Powerlink Project. In partnership with the San Diego Management & Monitoring Program, several populations were monitored as part of a coordinated landscape-scale conservation effort. San Diego Thornmint populations seem to have declined in numbers and area occupied since the 1990s, largely due to drought and invasions by non-native grasses.
- Southern Steelhead – In 2020, additional planning was done for removal of 81 check-dams. The Forest is currently working with several partners including Caltrans, Orange County Parks, U.S. Marine Corps, and Orange County Transportation Authority; all these partners are expected to contribute funding toward the completion of the dam removal project. In 2020, spider excavators removed 8 dams from Trabuco and Holy Jim creeks, and Marines removed 12 dams from Holy Jim Creek. Over the next 5- 10 years, the endangered Southern Steelhead is expected to return to spawn on the Forest. This project has already improved fish passage for a Regional Forester's sensitive list species, Arroyo Chub.

San Bernardino National Forest

Annual reports are prepared for the U.S. Fish and Wildlife Service in accordance with their Biological Opinion on Programmatic Biological Opinion for the Revised Land Management Plans for the Four Southern California National Forests, California, issued September 30, 2013 (FWS-05B0017-05F0009-R002). The monitoring results for the San Bernardino National Forest are included in the 2020 and 2021 reports. No incidental take was reported in either calendar year. The reports also provide the monitoring results for five Land Management Plan Ongoing Activities Biological Opinions (BOs) and several project-specific BOs. These reports are available upon request.

Recommendations

- Continue to maintain forest grazing permits and livestock grazing opportunities. Continue to work to limit OHV trespass into sensitive meadow and rangeland areas.
- Continue, and increase where feasible (e.g., in projects, other), monitoring efforts for species and habitats to detect trends. Implement adaptation actions to increase resilience of wildlife, fish, and rare plant populations to climate variability.

Natural Area in an Urban Context

The seventh goal of the Southern California National Forests Land Management Plan aims to retain the natural character of the southern California National Forests in the face of urbanization and a rapid increase in Wildland Urban Interface (WUI) areas. Specifically, goal 7.1 seeks to retain natural areas as a core for a regional network while focusing the built environment into the minimum land area needed to support growing public needs.

Goal 7 seeks to reduce ownership complexity, maintain habitat linkages and wildlife corridors with the desired condition that natural and cultural features of landscapes that provide their 'sense of place' are intact; that Back Country area retain their undeveloped character; facilities and infrastructure are high quality, well maintained and are clustered on existing sites or designated corridors.

Monitoring Questions

MQ21. Is the forest balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions? The indicators for this question include land ownership complexity, authorized and administrative infrastructure, and miles of unauthorized motorized routes.

Key Results

As previously reported, the urban interface continues to pressure the forest with high rates of visitation and unmanaged recreation continues to be a challenge. No new infrastructure was added on the Angeles and Cleveland national forests during this monitoring period.

Recommendations

None