

# CLIMATE AND HABITAT RESILIENCY PLAN

## Pescadero Creek County Park



*Prepared for:*



San Mateo County Parks Department

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## EXECUTIVE SUMMARY

Historically, many areas within the Santa Cruz Mountains have been affected by prolonged and extensive drought, intensive land use and development, wildfire suppression, forest pathogens, and climate change. Regional forest ecosystems, as a result, have developed impairments to their native conditions that often perpetuate a decline in forest health and resiliency. These impairments may involve excessive or overly dense conifer regeneration, the encroachment of invasive or competing vegetation, displacement of existing dominant vegetation, or overly dense post-wildfire regeneration. Through adaptive and careful management of these sensitive resources, recognizing the sources of their impaired existing conditions and potential future threats to forest health, natural systems within the Santa Cruz Mountains may be restored to promote ideal ecological habitat dynamics and maintain a resilient future in an era of unprecedented, large-scale disturbance regimes.

Pescadero Creek County Park (PCCP) in San Mateo County, California is a 5,943-acre, publicly accessible park located in the Pescadero Creek Watershed near the town of Loma Mar. Auten Resource Consulting (ARC), under the directive of San Mateo County Parks (SMCP) conducted extensive reconnaissance, forest trend monitoring, and assessments of PCCP and its natural resources for the purpose of developing a management-focused plan that utilizes the most effective, efficient, and environmentally prudent methods feasible to achieve the ecological and recreational goals of SMCP.

This Climate and Habitat Resiliency Plan (CHRP), developed in accordance with the standards, expectations, needs, and resource availability of SMCP, provides comprehensive support of select management scenarios and the necessary regulatory framework designed to enact a wide range of management objectives. Components of this CHRP are intended to allow for streamlined implementation of:

- Ecologically restorative Forest Health Fuels Reduction treatment activities
- Forest Density Reduction projects and selective management of forest resources
- Sensitive resource protection, impact avoidance, and mitigation measures
- Long-term monitoring, education, and research opportunities
- Infrastructure protection and routine maintenance in proximity to park facilities
- Additional actions intended to foster the resiliency and ecological health of PCCP lands

This Climate and Habitat Resiliency Plan is intended to live in perpetuity as a living, breathing document capable of being amended by San Mateo County Parks over time or as environmental, social, or regulatory conditions change.

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## GOALS AND OBJECTIVES FOR PESCADERO CREEK COUNTY PARK

The overarching goal for the Climate and Habitat Resiliency Plan (CHRP) is to promote the presence and enhancement of native species, habitats, and ecosystems in the Pescadero Creek County Park (PCCP) landscape that are resilient in the face of disturbance and climate change. Subcategories for CHRP goals are categorized as follows:

### Conserve and protect biodiversity, habitat, wildlife, fisheries, soil, and watershed resources.

- Protect, restore, and enhance the significant natural values of the forest, grassland, and stream ecosystems
- Promote the development of functional old growth habitat characteristics observed in late-successional stands<sup>1</sup>
- Improve forested wildlife habitat and fisheries to foster healthy populations and promote biodiversity
  - Promote stand characteristics suitable for marbled murrelet nesting habitat
  - Provide watershed protection through ongoing sediment reduction efforts
  - Conduct creek restoration and enhance anadromous fish habitat
- Control and/or eradicate exotic invasive species by utilizing Integrated Pest Management (IPM) practices

Pescadero Creek County Park hosts a significant array of diverse habitat types and forest and non-forest resources that support sensitive species. The old growth redwood stands that define much of the north side of Pescadero Creek offer a special look back to a time when large diameter, uneven-aged redwood groves dominated the landscape in the Santa Cruz Mountains. Since the point of European contact in the region and the contentious practices that followed, these forest systems have experienced a significant departure from natural ecological regimes and the applications of indigenous peoples that supported them. While individual old growth redwood trees and isolated stands are still present south of the creek and in other areas of the park, the presence of late seral stage, complex redwood systems within the property have been challenged by extreme climate events and atmospheric shifts, intensive historic harvesting practices, and resource competition among overstocked, relatively even-aged second growth stands.

In an effort to promote long-term complexity and the continued development of old growth redwood stands and the habitat features they promote, this Climate and Habitat Resiliency Plan facilitates the reintroduction of low-severity ecological disturbance mechanisms designed to realign these sensitive forest ecosystems with more natural

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<sup>1</sup> <https://sempervirens.org/news/old-growth-what-it-means-and-why-it-matters/>

successional dynamics. The intended long-term outcomes of treatments designed to achieve this goal include:

- A resilient landscape mosaic of redwood, mixed conifer, and hardwood dominant stands rich in biodiversity, habitat complexity, and proportionate levels of native regeneration
- Fortified footprints of native grasslands currently being encroached on by non-allied tree species and intensive reduction of non-native or invasive vegetation
- Diversification of vegetation dynamics, stand age distribution, and associated guilds of sensitive wildlife species



*Figure 1 Two panoramic photos comparing conditions in an old growth forest(top) and a neighboring second growth forest(bottom) in Prairie Creek Redwoods State Park. Redwoods in the second growth forest suffer from high competition and lack the fully develop canopies seen in the old growth forest. The large multilayered canopy of an old growth redwood allows these trees to grow so large and provide critical habitat for wildlife. Photo by Andrew Slack, Save the Redwoods League*

## Increase resiliency to disturbance and climate change and reduce catastrophic wildfire in forest stands and associated ecosystems.

- Create a mosaic with heterogeneity of stand age class and density, to provide a representation of varied and late seral stages in the forest stands
- Reduce downed and ladder fuels to reduce the threat of stand replacing wildfire events and crown fires
- Promote carbon sequestration through stand thinning, and promoting tree maturity and late seral stages
- Reintroduce fire to the landscape to assist in promoting a healthy ecosystem and reducing fuel loads

During August of 2020, Pescadero Creek County Park experienced the largest and most severe wildfire in its 50-year history and perceivably within the time of modern records. The high intensity nature of the CZU Fire produced significant mortality across the park. Approximately 2,839 acres of PCCP were affected, which accounts for approximately half the property area. Primary causes of the high severity rates within PCCP relate to the extensive accumulation and continuity of horizontal and vertical vegetative fuels present within the park, as well as similar conditions present on adjacent landscapes that provided a catalyst for extreme fire behavior. These conditions are the product of low severity ecological disturbance regimes<sup>2</sup> being virtually absent from the landscape.

In general, fires observed in well-spaced stands of moderate to large diameter trees typical of old growth, late seral stage redwood forests result in lower mortality rates and a much lower risk of destructive crown fire<sup>3</sup>. Existing conditions at PCCP in areas dominated by overstocked second growth redwood involve hazardous ladder fuels<sup>4</sup> that are responsible for transporting fire up the boles of trees and ultimately into the crown, increasing its mobility and lethality. Treatments utilized under this plan are designed to reduce, rearrange, and remove vegetative fuel accumulations and dense understory components to promote change in how future fires will move across the landscape at PCCP<sup>5</sup>. In time, the reintroduction of low severity fire in a prescribed setting will promote system realignment with more natural fire regimes and ecological disturbance intervals. Additional details on the description and concepts of forest resiliency are discussed in the *RESILIENCY* section that follows.

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<sup>2</sup> [https://www.nrs.fs.fed.us/sustaining\\_forests/natural\\_disturbance/](https://www.nrs.fs.fed.us/sustaining_forests/natural_disturbance/)

<sup>3</sup> <https://www.savetheredwoods.org/redwoods-magazine/how-will-redwoods-fare-under-wildfires-in-a-changing-climate/>

<sup>4</sup> Ladder fuels are fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning. From National Wildfire Coordinating Group (NWCG)

<sup>5</sup> <https://www.usda.gov/media/blog/2019/03/01/making-forests-stronger-through-active-management>

Additional details regarding the post-disturbance assessment efforts that took place at PCCP and the quantitative data supporting the development of this goal can be found in the *FIELD INVESTIGATIONS, CURRENT CONDITIONS and DISCUSSION OF MONITORING RESULTS* section of this document.

### **Conduct innovative monitoring, research, demonstrations, and education.**

- Provide for recreational opportunities which are compatible with the property and the goals of the forest
- Advance scientific research on active management in coast redwood and Douglas-fir forest stands through partnerships with universities and other academic institutions
- Demonstrate forest management and restoration techniques for public education and interpretation
- Conduct long-term forest monitoring to inform adaption of management techniques and success of the efforts in achieving the outlined goals

The purpose and ecological objectives described within this plan are wholly successful when goals regarding prudent monitoring and research, effective public outreach, and education are additionally recognized and achieved. The landscape on which PCCP exists provides exceptional opportunities for public engagement and long-term monitoring strategies that serve to strengthen and maintain the adaptive viability of this plan. Potential content related to new observations, research results, survey data, educational programs, and similar opportunities may be amended into future iterations of the Climate and Habitat Resiliency Plan. Further information on monitoring and research opportunities can be found in the *Subwatershed Restoration Priority Results and Discussion & Species/Wildlife Monitoring* subsections of this document.

### **Provide an actionable Plan for the Parks Department**

- Outline an implementation strategy including restoration potential, treatment specifications, best management practices, and permitting and budget frameworks
- Provide realistic “value” of the restoration opportunities in terms of maximizing the value of conducting restorative practices that address habitat benefit and resiliency, regional resource related goals, time, cost, permitting, access, research, and potential collaboration

The development of this Climate and Habitat Resiliency Plan relies on its maintenance as a living, breathing document that may be amended in perpetuity by San Mateo County Parks. As conditions change and develop within the park, new information regarding the specified treatments, forest monitoring and results, ecological response, pathways to resiliency, regulatory requirements, and more may be included into the plan at a later time to effectively recognize, update, and respond to the dynamic environmental, economic, and social aspects of this CHRP.

In its current form, this CHRP focuses primarily on Forest Density Reduction and Forest Health Fuels Reduction Treatments that will set the stage for future projects related to the restoration and management of additional resources within the park boundary.

## INTRODUCTION

### Structure of this Document

This Climate and Habitat Resiliency Plan (CHRP) document was designed to adapt to environmental, social, and regulatory changes, in perpetuity, by maintaining an amendable nature through in-house approval processes within the San Mateo County Parks Department (SMCP).

As the environment transitions, park infrastructure and natural conditions change over time, project monitoring efforts are implemented, and opportunities for future restoration arise, the resource descriptions and project standards included in this document will be revised or amended to address the aforementioned dynamics in an effort to promote adaptive, prudent management of the park's ecological and social values.

The CHRP is ultimately meant to act as a site-specific planning document that includes a detailed set of treatments, prioritized treatment units, and a set of permitting standards that can be applied to multiple permitting processes to expedite ecologically restorative treatments to increase resiliency.

### Resource Scoping

*RESILIENCY, PROPERTY INFORMATION, PARK INFRASTRUCTURE, GENERAL RESOURCES, VEGETATION, BIOLOGICAL RESOURCES, and CULTURAL RESOURCES* sections included in the CHRP are primarily the product of historic planning and permitting document review (under *EXISTING PLANS AND REPORTS*), literature review, and field investigations. More detailed information regarding current conditions at PCCP can be found under *FIELD INVESTIGATIONS, CURRENT CONDITIONS, and MONITORING PROGRAM*. As a result of field investigations and information development, areas within the park that are deemed a priority for restorative action were delineated and are defined further within the *TREATMENT UNITS* section of this document. The *MANAGEMENT STRATEGIES* section describes the opportunities available pursue the resiliency and habitat goals set by San Mateo County Parks.

### Biological Resources

Recognizing the significance and sensitivity of biological resources within PCCP, further information related to presumed species presence, habitat availability, and species descriptions can be found in *APPENDIX B*. Information used to develop this section was sourced from the California Department of Fish and Wildlife's California Natural Diversity Database (CNDDDB) and California Wildlife Habitat Relationships (CWHR).

### Cultural and Historic Resources

Detailed information on historic and cultural heritage in proximity to PCCP can be found in *APPENDIX C* of this document. This section includes logging and land use history, information on geographically affiliated indigenous peoples, and the sensitive resources

that may be present at PCCP. Information from this section may be utilized in archaeological documentation pursuant to permitted work.

### **Permit Framework**

Proposed and future ecologically restorative projects within PCCP will be dependent on a set of standards and protocols developed to comply with respective permitting mechanisms that may be utilized to implement the recommended actions.

The *CONSIDERATION OF PERMIT FRAMEWORK* section of this CHRP features two subsets of treatment project standards that, depending on the type of project and target permitting mechanism, should be incorporated into project design, regulatory compliance, and implementation. Future treatment activities consistent with this CHRP may be planned and implemented by SMCP in collaboration with private and public entities with a vested interest in the ecological outcomes of proposed projects.

### **Forest Health Fuels Reduction Prescriptions**

Treatments designed to reduce vegetative fuels and promote the health and resiliency of forested and non-forested systems are generally implemented over large acreages and prioritized in areas that provide strategic access for fire suppression resources.

Projects of this type would utilize **Forest Health Fuels Reduction Treatment Standards (FHFRs)** permitted by the California Vegetation Treatment Program (CalVTP) and designed to pursue best management practices related to large-scale fuel reduction treatments. Some FHFRs may not apply to similar projects implemented under the existing San Mateo County Routine Maintenance Program. These measures are intended to avoid or minimize environmental impacts during and after treatment activities.

### **Forest Density Reduction Prescriptions**

High density forests, often measured by trees per acre (TPA), are commonly the product of historic disturbance or intensive land use that has led to excessive regeneration of a single tree species or its dominance in areas undergoing a certain successional state and a lack of periodic low to moderate disturbance regimes.

Projects related to the selective removal of trees to promote forest health and reduce excessive tree densities will address standards and requirements defined by the California Forest Practice Rules (CFPR) under Title 14 of the California Code of Regulations and specialized standards developed specifically for conditions at Pescadero Creek County Park. These actions will utilize **Forest Density Reduction Treatment Standards (FDRs)** under a CAL FIRE Timber Harvesting Plan (THP). Included in the FDRs are key additions to provide increased site-specific protection measures along Pescadero Creek while still allowing for restorative opportunities, increased basal area retention requirements, and a set of standards that will facilitate permit development for biological resources. Forest

Density Reduction treatments may also utilize CAL FIRE Exemption permits which involve standards that vary on a permit-by-permit basis; in which case, some FDRs may not apply.

The long-term intent of Forest Density Reduction treatments is to develop a large, well-spaced, and vigorous forest of redwood trees and their allied species from the existing, overstocked second growth stands PCCP currently comprises. The intent is also that these large trees will develop old growth characteristics such as goose pens, reiterated tops, thick bark, large limbs, epicormic branching, and other old growth traits over time with prudent consideration of the FDR treatment standards.

### ***Revenue-Generating Projects***

When conducting forest restoration work, it is sometimes necessary to reduce competition for resources. This may include removing redwood and Douglas fir trees. There are a variety of ways in which these trees can be used to further advance management and restoration of Pescadero Creek County Park. Some trees can be chipped on site to create mulch that enhances soil composition, some can be repurposed for habitat and stream restoration project, and some can be sold to generate revenue that advances management practices. It is part of SMCP's mission to restore and preserve parklands, and in this endeavor, SMCP will only consider removing trees if it achieves habitat and resiliency benefits and enhances the ecological function of the forest. At no point will SMCP remove trees for the purpose of financial gain.

If SMCP removes redwood and Douglas fir trees during a restoration project and it is determined that the best use of the timber is to be sold for commercial purposes, SMCP will deposit revenue generated from the commercial sale of timber into a trust account that will be established for the sole benefit of Pescadero Creek County Park. Funds from this trust can only be used to advance restorative projects in Pescadero Creek County Park and cannot be used for operations or recreational improvements. These funds are also not eligible to be deposited into the SMCP's budget for discretionary uses or the County General Fund for budgetary purposes.

Upon adoption of this Climate and Habitat Resiliency Plan, the Board of Supervisors, by resolution, will establish the trust and spending restrictions detailed herein.

### ***Project Permit Implementation Strategy***

Figure 1 shows a flow chart for decisions on which permit process to utilize depending on key factors in the proposed project actions, simply stated:

If the project proposes ecologically restorative treatments for Forest Health and Fuels Reduction treatments, then the permitting process considers the California Vegetation Treatment Program (CalVTP) or a Categorical Exemption depending on potential impacts.

If the project proposes ecologically restorative treatments for density reduction that are expected to generate revenue, then the project would utilize a CAL FIRE permit such as a Timber Harvest Plan (THP) or Exemption depending on potential impacts. Any revenue generated as part of the proposed density reduction project will be utilized for additional ecologically restorative treatments in San Mateo County parks.

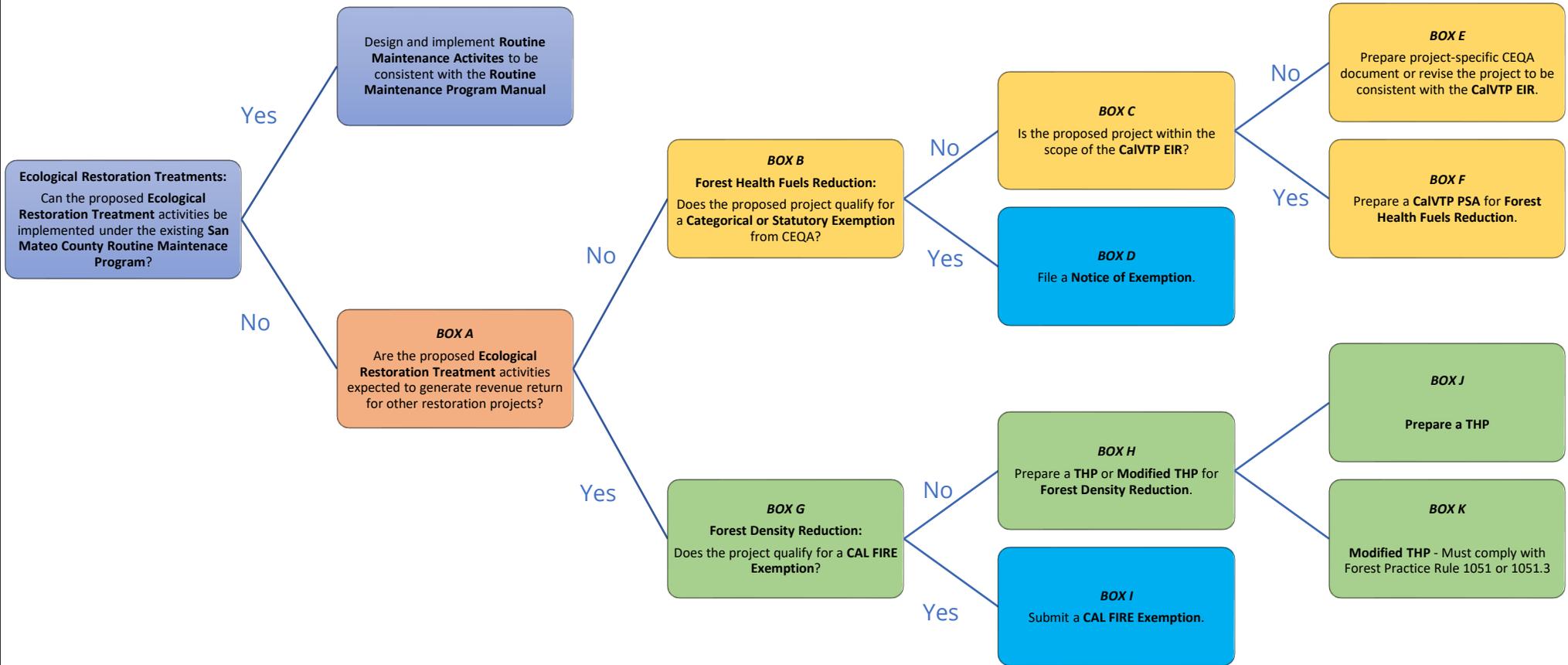


Figure 2 Permit and Project Implementation

### ***California Vegetation Treatment Program***

In 2019, the California Board of Forestry and Fire Protection approved the California Vegetation Treatment Program (CalVTP), which is a statewide vegetation treatment program designed to streamline landscape level forest health fuels reduction treatments across California's treatable landscape. The CalVTP defines vegetation treatment activities, treatment types, and associated environmental protections that may occur for projects to improve forest health and reduce wildfire risks to increase pace and scale in response to California's wildfire crisis. A Programmatic Environmental Impact Report (PEIR) was completed which specified impacts and thresholds related to the various treatment types and treatment activities outlined in the CalVTP.

The CalVTP is not an alternative to CEQA but a novel permit strategy under which one of the first dozen projects successfully utilizing the Program was accomplished in San Mateo County at Huddart and Wunderlich County Parks; the project accomplished forest health fuels reduction treatments on nearly 400 acres. The CalVTP allows a set of management actions bound by Standard Project Requirements (SPR) that provides planned permitted treatments into the future, including maintenance treatments, if environmental conditions don't change significantly. It is a tremendous opportunity for public and private landownerships to conduct ecologically restorative projects across large acreages and prepare treatment plans for when future grant opportunities become available.

### ***Timber Operations Generating Revenue for Density Reduction Treatments***

If a proposed treatment activity meets the definition of timber operations for commercial purposes in PRC Section 4527(a) (i.e., projects that involve the sale, barter, exchange, or trade of forest materials), it may require the preparation of a Timber Harvest Plan (THP) or in some cases, a modified THP (a more restrictive form of a THP 14 CCR 1051 or 1051.3). Some timber operations for commercial purposes under the CHRP may qualify for an exemption from the requirement to prepare a THP, consistent with the CFPR (14 CCR Section 1038) (Figure 1, *Box I*). To determine if a timber operation for commercial purposes is exempt from the preparation of a THP, the project implementer would compare the proposed project to the exemption criteria in 14 CCR 1038 or 1052.

If the project is exempt from the preparation of a THP, San Mateo County Parks would prepare an exemption notice and confidential archaeological letter and submit them to CAL FIRE for review in compliance with 14 CCR Section 1038.1 or 1052, as applicable. Timber operations that qualify for an exemption under the CHRP may still require review under CEQA. Any selective timber harvest operation conducted under a THP (Figure 1, *Box J*), Modified THP (Figure 1, *Box K*), or exemption (Figure 1, *Box I*), also referred to as "density reduction treatments", will act as the permitting vehicle for ecologically restorative activities that generate future project revenue. This revenue shall be utilized to support additional ecologically restorative treatments on San Mateo County Park lands.

## RESILIENCY

Resilience, in its simplest form, is the capacity of a system to persist or respond positively despite adversity or disruption. Forestlands of North America have faced adversity across millennia, beyond human occupation on earth, through tremendous episodes of resource scarcity, shifting climate models, disease, and natural disaster. The phenomenon of resilient forested systems, particularly in regions of high climate-driven risk such as California, not only resides within their ability to overcome extreme trials, but their ecological adaptability to natural variance and dynamic environmental circumstances.

In the modern era; however, our forests are facing unprecedented challenges. Emerging megadisturbances to temperate forests<sup>6</sup>, or events that deviate significantly from what is considered normal or predictable, are providing a sobering indication of the ecological thresholds present within natural systems. These thresholds are responsible for governing protection or loss of ecosystem services. Dynamic natural systems rely on a manageable level of disturbance that fosters rejuvenation and promotes biological health and the adaptability needed to survive into the future. Novel, high-severity events that continue to affect systems in excess of their ecological capacity have substantially increased the vulnerability of communities and forests alike.

Due to the unparalleled magnitude of modern disturbance events, relating recent circumstances to those throughout history is complicated. Comprehensive analysis of past ecological regimes and understanding how they might inform current or future management strategies relies on interpretations developed from examining changes over time. Simply referencing historic conditions and attempting to shape existing landscapes to fit those models may prove futile without considering the social and environmental dynamics that influenced them. Therefore, facilitating ecological resilience requires a systematic approach to resource management that incorporates adaptive strategies.

This Climate and Habitat Resiliency Plan attempts to address dynamic environmental conditions at Pescadero Creek County Park by providing a living, breathing resource management document approved and amendable by San Mateo County Parks in perpetuity. Forest health improvement recommendations, regulatory and permitting frameworks, environmental protection standards, general resource scoping measures, and proposed monitoring programs included in this plan all serve to promote the long-term goals and objectives expressed by San Mateo County Parks.

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<sup>6</sup> [https://www.fs.fed.us/psw/publications/millar/psw\\_2015\\_millar002.pdf](https://www.fs.fed.us/psw/publications/millar/psw_2015_millar002.pdf)

## Monitoring Ecological Thresholds

### Understanding Disturbance Regimes

Since 2002, an estimated 18.6 million acres of wildland have burned in California, a number that represents close to 20% of California's land area. Almost a quarter of that acreage burned in 2020 alone — affecting approximately 4.1 million acres, it is the largest wildfire season ever recorded in California. Nevertheless, it is not the presence of fire on wildlands that is problematic, but the magnitude and destructive nature of modern fire seasons that calls for action.

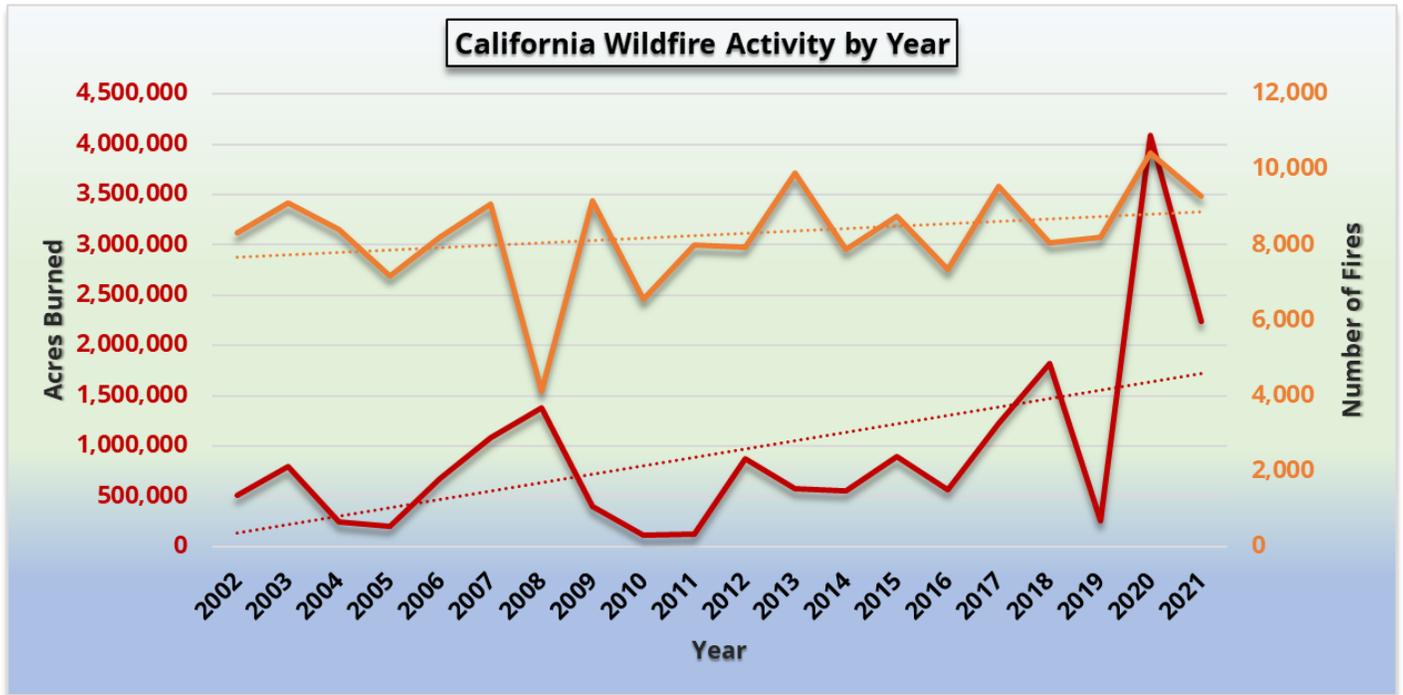


Figure 3 Wildfire activity in California has increased over the last two decades both in number of fires and acres burned. Not only are there more fires per year, but the magnitude of each event has increased greatly on average.

A nearly century-long era of focused fire suppression in the U.S, initiated as a federal policy in the early 1930s<sup>7</sup>, produced forested landscapes and wilderness areas devoid of an important ecological function<sup>8</sup>. Observable results of eliminating fire from the landscape have been overstocked forests, significant accumulations of live and dead fuels, loss of wildlife habitat, impairments to forest and soil health, shifts in vegetation dynamics, and heightened risk to developed communities. Seemingly capitalizing on the absence of frequent, low-intensity disturbance, fire-dependent ecosystems have developed an

<sup>7</sup> <https://foresthistor.org/research-explore/us-forest-service-history/policy-and-law/fire-u-s-forest-service/u-s-forest-service-fire-suppression/>

<sup>8</sup> <https://www.fire.ca.gov/media/5425/benefitsoffire.pdf>

excessive accumulation of fuel, ultimately allowing for the extreme, replacement-level events being witnessed across the western landscape.

Additionally, of the 20 largest wildfires in California's history, at least 10 have been the product of ignition caused by human activity or utility infrastructure.<sup>9</sup> While it is primarily weather conditions and fuel composition that determine the scale of a wildland fire, the phenomenon of anthropogenically sourced incidents is one that should be carefully evaluated when considering prudent resource protection measures. Among the primary causes for anthropogenic wildfire is faulty or damaged transmission lines, arson, unattended campfires, recreational pyrotechnics, and discarded cigarettes. Management actions that address the presence and ecological influence of humans in natural systems are generally focused on protecting life and property, emergency resources access, and promoting long-term, sustainable recreation opportunities.

Understanding and incorporating societal impacts into resource protection efforts and treatment design is crucial for developing comprehensive management strategies. Among those impacts, regional shifts in climate patterns and the cascading effects they have on disturbance regimes are leading motivators for adaptive management. Existing and projected changes in temperature and precipitation cycles continue to promote declines in ecosystem services, both directly and indirectly, at landscape level scales (Figures 3 & 4). Hotter, drier seasons promote loss of soil function, boring insect and disease outbreaks, and longer, more severe wildfires. The annual moisture variability and overall decrease in precipitation facilitating prolonged and more intense drought conditions only exacerbate the hazardous vegetative conditions leading to megadisturbance events. It is expected over the next century that temperatures across California forests will continue on an upward trend. The product of warmer climates as it relates to forest dynamics is that systems dependent on cooler, moister conditions are projected to adjust their respective geographic ranges to adapt to climatic changes. Native redwood forests, such as those defining Pescadero Creek County Park and much of the West Coast, thrive in humid, cool environments where sufficient winter precipitation and summer fog sustain the necessary growing conditions year around.

In periods of resource scarcity, however, allocating what resources are available to the most resilient, tolerant individuals in a forest stand requires selective rearrangement of natural systems. This is achieved not by imitating but initiating a level of disturbance analogous to what natural processes provide at a level that prevents or attempts to avoid catastrophic incidents. Treatments of this kind may involve mechanical or manual

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<sup>9</sup> [https://www.fire.ca.gov/media/4jandlhh/top20\\_acres.pdf](https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf)

processing of vegetative material, prescribed broadcast or pile burning, managed herbivory, or targeted chemical agents.

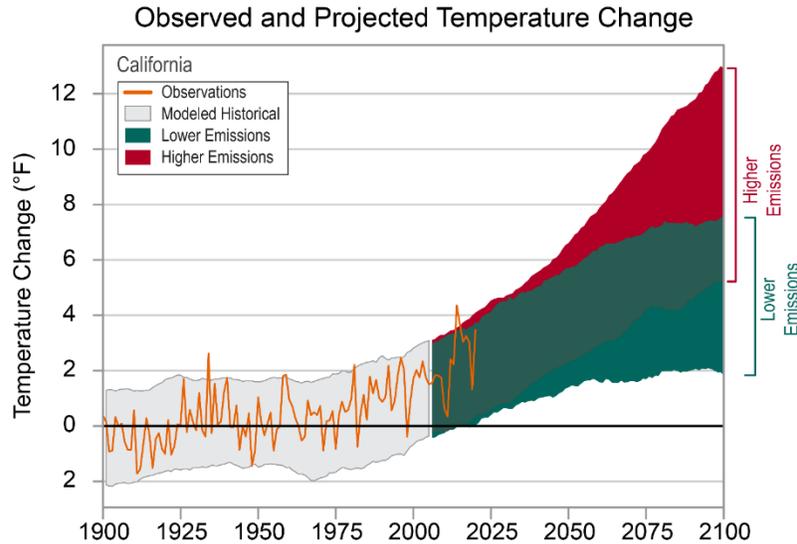


Figure 4 Observed and projected temperature change in California between 1900-2100 based on lower-emission and higher-emission models. Graphic provided by North Carolina Institute for Climate Studies.

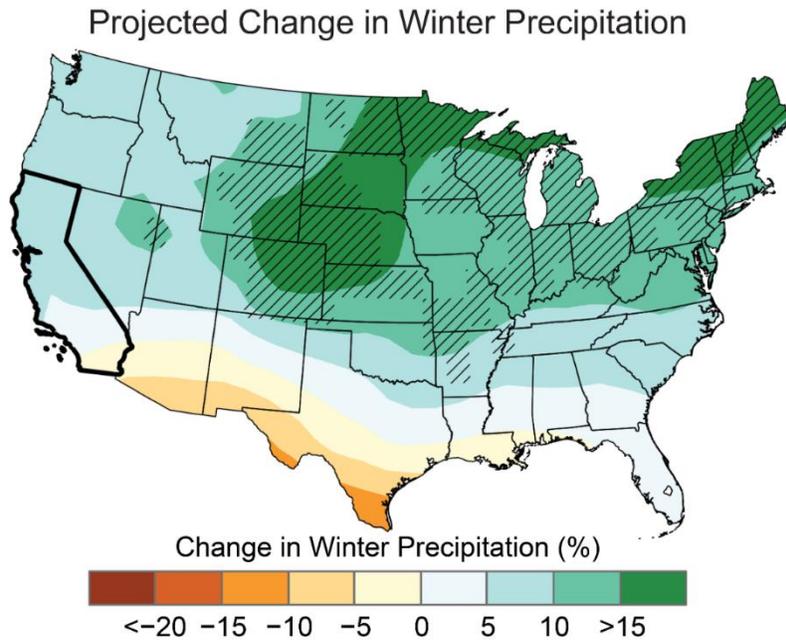
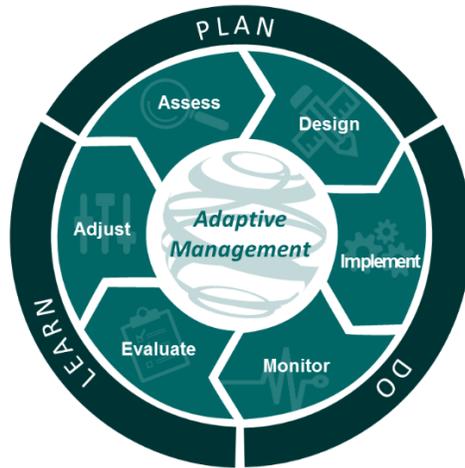


Figure 5 Projected change in winter precipitation across the United States. Graphic provided by North Carolina Institute for Climate Studies.

## Creating Opportunities for Resiliency

### *Adaptive Management and Treatment Diversification*

Prudent, landscape-level management is a product of forward-thinking treatment design and maintaining a feasible level of mobility throughout project implementation. Lessons learned from the outcomes of completed projects should be incorporated into the frameworks of future projects, allowing for ecological, social, or economic developments to inform improved decision making.



Project planning should incorporate a general assessment of conditions, goals, objectives, and possible outcomes that drive treatment design. Implementation of projects should be done so under professional supervision to ensure operations are consistent with the proposal, standards, and expectations developed in the planning phase. Monitoring of the project and the effects it has on the landscape can begin as soon as the project hits the ground.

Post-project evaluation is possibly the most critical aspect of adaptive management. During this phase, outcomes from the project both during and following implementation are evaluated against their intended effects and used to inform decision making for future project designs. Adjustments needed to be made for future projects are then empirically sound to justify treatment activities and increase the efficacy of landscape-level management where it is prioritized based on professional discretion.

The most effective and ecologically beneficial treatment activities and/or restoration projects are those that diversify proposed actions based on observations made during previous projects. There is no “one size fits all” answer to the existing dynamics across PCCP or forested ecosystems as a whole. Site-specific measures must be taken to maximize the biological integrity of a natural system. This CHRP attempts to diversify treatment activities and adapt to fluid conditions by recognizing and promoting the resilient nature of diversity, often referred to as the *landscape mosaic*.

### ***Fostering a Resilient Future***

The effectiveness of landscape-level management depends wholly on our understanding of climatic patterns, vegetative and faunal dynamics, resource allocation, biological trends, and the lasting effects our decisions have on the land. Addressing unprecedented challenges necessitates a novel approach to develop such an understanding that likely incorporates reinforced collaboration, enhanced project mobility, and more rigorous monitoring; values that San Mateo County Parks has demonstrated through key actions on several ecologically restorative projects focused on vegetation management:

#### **2018 – Present: Fitzgerald Marine Reserve**

*Coast Yellow Leptosiphon Habitat Expansion*

#### **2019: Wunderlich County Park**

*Eucalyptus removal and oak woodland restoration/Pacific Gas and Electric mitigation (16 acres)*

#### **2019: Huddart County Park**

*Kings Mountain Road Shaded Fuel Break*

#### **2019 – Present: Quarry Park**

*Invasive species density reduction of Eucalyptus (140 acre)*

#### **2020 – 2022: Huddart and Wunderlich County Park**

*CAL FIRE Forest Health Grant – Forest health and fuels reduction (402 acres)*

#### **2020 – 2022: San Bruno Mountain Park**

*Gorse removal (13 acres)*

#### **2022: Edgewood Park**

*Eastern/Southern Property Boundary Shaded Fuel Break (9 acres)*

#### **2022: Edgewood Park Scrub**

*Pile-burn grassland restoration (5 acre)*

The future of California forests is increasingly vulnerable without prudent intervention. Facilitating manageable levels of disturbance and variation that concurs with projected environmental change is critical to maintaining sustainability. San Mateo County Parks continues taking actionable steps towards a resilient future by implementing adaptive projects focused on landscape health. This Climate and Habitat Resiliency Plan represents the next ecologically progressive step for San Mateo County Parks and the lands they manage.

## MANAGEMENT STRATEGIES

### Treatment Prescriptions and Silviculture

Silviculture is the practice of managing forest composition, structure, and growth. Silvicultural prescriptions can depend on the goals of a forest management project, which in this case is for ecological restoration, habitat resiliency, and forest health fuels reduction. In general, silvicultural prescriptions would be intended to achieve and maintain residual basal areas (i.e., the surface area covered by the trunks of living trees) of 150 to 180 square feet (sq. ft.) per acre depending on the site class of the stand.

Only uneven-aged management<sup>10</sup> shall be used, and any density reduction treatments will maintain minimum basal area standards for Site Class II and III lands of 180 and 150 square feet of basal area per acre, respectively. In addition, SMCP will also meet the following standards:

- a 10-year re-entry period shall apply to plans that propose to remove  $\leq 50$  percent of trees  $> 18$ " DBH.
- Density reduction treatments will retain 50% or more of trees  $> 18$ " DBH.
- For second growth trees  $> 38$ " DBH, a minimum retention average of 10-15 trees per acre shall be maintained across a treatment area when existing stand conditions allow for it.
  - During any 10-year re-entry period, no more than 33% of second growth trees  $> 38$ " DBH may be removed within any treatment area.
  - Within treatment areas, an average of 10-15 trees  $> 38$ " DBH per acre at a minimum shall be marked with a "W" on the bole to be retained as a "development tree". Development Trees are those selected for long-term resiliency in a stand as individuals with potential for becoming future old growth trees. "W"s marked on trees shall face away from roads, trails, and the public viewshed to the extent feasible.
    - It is possible these trees may need to be substituted or replaced for various issues over time including, but not limited to, becoming a hazard, death or dying, damage by fire, or its position in the grove is compromised with respect to another tree that is healthier, more vigorous and has taken the appropriate dominant position in the grove to become the new "W" tree.

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<sup>10</sup> Uneven-aged stands are sometimes referred to as all-aged stands, but generally are considered those containing more than two or three distinct age classes or age cohorts. Management of these stands is often associated with the maintenance of the targeted diameter distribution. (Bettinger et al., 2016)

- Leave trees shall be thrifty coniferous trees, which are dominant or co-dominant in crown class prior to timber harvesting or which have crowns typical of such dominant or co-dominant trees. They shall be free from significant damage caused by timber operations. No conifer shall be cut which is more than 22.9 m (75 feet) from a leave tree 30.5 cm (12 in.) DBH or larger located within the logging area.

In general, proposed treatments may include a combination of the following silvicultural prescriptions, with the specific prescription for each treatment activity based on site-specific characteristics and goals:

### ***Shaded fuel break/defensible space***

Shaded fuel breaks and defensible space treatments alter vegetation to reduce the potential for high-severity wildfire and to promote conditions that increase the ability of fire crews to suppress wildfire. This treatment is intended to reduce the rate of wildfire spread, duration, intensity, fuel ignitability, and to provide safe access for wildfire suppression resources. This method involves removal of surface (i.e., ground), ladder (i.e., branches and small trees that can allow a ground fire to burn higher into the forest canopy), and crown (i.e., forest canopy) fuels such that the treated stand exhibits reduced vertical and horizontal fuel continuity. Generally, this approach is similar to thinning from below, where the smaller diameter trees and surface fuels are targeted for removal or rearrangement, leaving a stand of the largest, most fire resilient trees available in a discontinuous array.

### ***Single-tree and group selection***

Single-tree selection and group selection are uneven-age methods that support and enhance uneven stand structure (i.e., a variety of tree sizes and ages). Utilizing these methods, trees are removed individually or in small groups ranging from 0.25 to .5 acres in size, although only 20 percent of the total treatment area may be covered by the group clearings. Implementation of these silvicultural methods is intended to hasten the growth of remaining trees; reduce competition for water, sunlight, and soil nutrients; support stand health and vigor; and support site conditions required for natural regeneration of the stand. Minimum standards apply to use of this prescription to ensure the retention of an uneven-age stand, and also require that the remaining trees have full crowns that are capable of seed production and represent the best species characteristics available in the stand.

### ***Tree thinning***

Individual trees can be removed to promote forest growth and vigor. This silvicultural prescription is similar to the shaded fuel break/defensible space prescription above but is focused on forest health as well as fire behavior. It is intended to maintain or increase the average tree diameter in the stand through reduction of tree density, which ultimately hastens tree growth on residual trees. Thinning prescriptions may be focused on or include

dead, dying, or diseased trees to maintain or improve the overall health of the stand. Minimum standards apply to use of this prescription to ensure that the average stand diameter of the post-treatment stand is equal to or greater than that of the pre-treatment stand. Tree thinning would reduce fuels and would also promote forest growth, improve forest resiliency, and reduce the potential for insect infestation. Tree thinning could be included in non-commercial and commercial projects.

### ***Grassland, meadow, and wet-area restoration***

Grassland, meadow, riparian, and wet-area restoration is a special prescription intended to restore, retain, or enhance such areas for their ecological value by removing encroaching conifers and shrubs, where applicable. The impaired conditions of the grassland, meadow, riparian, and/or wet area are identified, which often includes encroachment by other vegetation and excessive shading by conifers. Treatment measures are based on the site-specific conditions, but typically involve the removal of conifers and/or shrubs to reduce shading and competition with grassland, meadow, or other wet-area communities.

## **Description of Treatment Activities**

### ***Prescribed Burning***

Prescribed burning is the intentional application of fire to vegetation under specified conditions of fuels, weather, and other variables. The intent is for the fire to stay within a predetermined area to achieve site-specific resource management objectives. Prescribed low intensity surface fires may be used to control vegetation by enhancing the growth, reproduction, or vigor of certain species, in addition to managing fuel loads and/or maintaining a targeted vegetation community.

Prescribed burning can be used to restore the ecological function in areas that have departed from their natural fire regime. Fire suppression has changed fire activity in the 20th century, and prescribed burning is a tool that can restore and maintain appropriate fire regimes.<sup>11</sup>

Typically, prescribed burning would require the construction of control lines (fuel breaks) using manual or mechanical treatments. In some cases, extensive or mature shrubs may be trimmed or removed manually by hand crews or by mechanical equipment in advance of burning, or vegetation may be pretreated with herbicides to kill the aboveground portions and cause them to dry before burning. Prescribed burning may be used where other activities are not feasible because of rocky soils, steep slopes (i.e., greater than 65 percent or 50 percent in high erosion areas), or irregular terrain; although, prescribed

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<sup>11</sup> <https://fireecology.springeropen.com/track/pdf/10.1186/s42408-019-0041-0.pdf>

burning is limited to situations where sufficient fuel is available and arranged properly to carry the fire.

Factors that are considered when designing and implementing a prescribed burn include risk to structures and property, land use, environmental impacts, weather conditions, soil stability, slope and aspect, soil type, vegetation types and density, fuel moisture content, time of year, fire return interval, and the efficacy of alternative activity methods. Another consideration is how often prescribed burning may need to be applied to achieve a particular outcome. There is considerable variability in the historic fire return intervals (FRI) of ecosystems throughout the state of California. Previous studies conducted in the geographic region of PCCP have indicated an FRI of 12.0 years based on data collected in old-growth redwood forests similar to those north of Pescadero Creek.<sup>12</sup>

Burning may occur throughout the year, but it is usually conducted during late spring when the ground is still wet, or during the fall or winter when precipitation is imminent, and plants have completed their yearly growth cycle and their moisture content has declined. Considerations when timing a prescribed burn include public safety, animal and plant reproduction cycles, the natural fire return interval for the ecosystem, and the timing of annual grasses drying out in May. In brush or chaparral communities, fall burning may not be desirable because of the possibility of high fire intensities. Some chaparral species may benefit from spring burns to help germinate seed, while other chaparral species may benefit from fall sprouting.<sup>13</sup>

Depending on a specific activity's objectives, fuel modeling, and environmental conditions, a broadcast burn can be used to treat various fuel sizes. "Understory burn" prescriptions, using patterned lighting techniques and timing the fires during periods of high humidity and high fuel moisture content, typically result in partial removal of understory or groundcover vegetation. The goal of understory burns is to conduct a low intensity burn that only burns the targeted fuel types (i.e., ground and litter fuels). The existing groundcover vegetation would be partially retained in a mosaic pattern in forest and shrub communities. Fire behavior and burn severity would also depend on the properties of various fuel layers and the horizontal and vertical continuity of those layers.

### ***Mechanical Treatment***

Mechanical treatment involves the use of motorized equipment (rather than hand or manual equipment), such as wheeled tractors, crawler-type tractors, or specially designed vehicles with attached implements designed to cut, compact, or mulch target vegetation.

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<sup>12</sup> <https://doi.org/10.4996/fireecology.0101002>

<sup>13</sup> <https://www.fs.fed.us/psw/publications/4403/Evaluating.pdf>

The selection of a mechanical treatment and associated equipment is based upon several factors such as the characteristics of the vegetation, seedbed preparation and re-vegetation needs, topography and terrain, soil characteristics, climatic conditions, and a comparison of the improvement cost to the expected increase in productivity or public and/or private benefit. In some cases, mechanical treatment can be used to create a desired stand structure and composition without having to use prescribed burning, or in areas where there are risks and uncertainties with prescribed burning. Mechanical treatment methods that may be used include mowing, masticating, grubbing, and chipping, among others. For projects located in forested landscapes, the use of mechanical equipment can create and maintain a desired forest floor condition in various settings.

Mechanical treatment is effective for removing dense stands of vegetation and is typically used in shrub and tree fuel types. Some mechanical equipment can masticate (mulch) or lop and scatter vegetative debris concurrently with vegetation removal. Mastication involves the use of a large, mechanized device for chopping and is used in areas with shrubs and trees to break up the fuel pattern and decrease combustibility by placing fuels on the ground. Mechanical treatments may be the best tool to restore forest overstory health and has also proven to reduce fire hazards while maintaining the healthy overstory over time.<sup>14</sup> Mechanical treatments are appropriate where a high level of control over vegetation removal is needed, such as near residential areas, communities, or in sensitive habitats and are often used instead of prescribed burning or herbicide application. Unless followed with targeted application of herbicides, mechanical treatment has limited use for noxious weed control, as the machinery tends to spread seeds and may not kill invasive root systems.

### **Manual Treatment**

Manual treatment would involve the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Activities could include the following:

- ▶ thinning trees with chainsaws, loppers, or pruners;
- ▶ cutting undesired competing brush species above ground level to favor desirable species and spacing;
- ▶ pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; and
- ▶ placing mulch around desired vegetation to limit competitive growth.

Accumulations of vegetation debris created by manual treatments may be disposed of by mechanical applications such as chipping or mulching, prescribed pile or broadcast

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<sup>14</sup> <https://doi.org/10.1890/14-0971.1>

burning, or a portion may be left in place to promote wildlife refugia and maintain vegetative complexity on the forest floor.

Ground disturbance from manual treatments is typically less than mechanical treatment within an equivalent area. Manual treatments are effectively used in sensitive habitats, such as riparian areas and wet areas, areas where prescribed burning or herbicide application would not be appropriate, around structures, to install control lines for prescribed burns where mechanical equipment cannot be used, and in areas that are inaccessible to vehicles.

### **Prescribed Herbivory**

Prescribed herbivory (also known as “targeted grazing”<sup>15</sup>) is the use of domestic livestock to accomplish specific and measurable vegetation management objectives. Those would include things like removing biomass (fine fuel loads), reducing populations of specific plant species, slowing the re-establishment of shrubs on burned or mechanically thinned sites, and improving plant community structure for wildlife habitat values.

Cattle, sheep, and goats are the animals most commonly used for this purpose because they are relatively common and easy to manage. Grazing/browsing by these animals is best used for green herbaceous plants that produce fine fuels and smaller diameter woody species that produce highly flammable 1- and 10-hour fire fuels.<sup>16</sup> Animals are best selected according to the types of vegetation that need to be managed. Goats are typically best suited to shrubs, and cattle are better suited to herbaceous plants, especially grasses. Sheep graze selectively but may consume both herbaceous and woody vegetation. Dietary preference among species is not absolute as diet is also driven by the availability of vegetation, nutritional needs, experiences, and inherited or learned behaviors.

Prescribed grazing can enhance habitat for wildlife in addition to controlling fire fuel loads. For example, cattle and sheep feeding in the spring and early summer can thin understory forbs and grasses, reducing competition for light, nutrients, and water for desirable shrub species. The shrub species will then increase their vegetative output for winter browsing by deer and other wildlife.

Whenever prescribed herbivory is considered, the needs of the livestock as well as the other multiple use objectives for the area must be considered. A herder, fencing, mineral block, and/or a watering site may be required to keep the animals within the desired area.

Portable electric fencing is typically used for prescribed herbivory. Many weed species are less palatable than desired vegetation, so the livestock may overgraze desired vegetation rather than the weeds. Additionally, some weeds may be toxic to certain livestock and not to

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<sup>15</sup> <https://forages.oregonstate.edu/oregon/topics/harvest/grazing/targeted-grazing%C2%A0>

<sup>16</sup> [https://ucanr.edu/sites/UCCE\\_LR/files/203022.pdf](https://ucanr.edu/sites/UCCE_LR/files/203022.pdf)

others, which would influence the treatment activity selected. Proper management of the livestock is extremely important for this method of activity to be successful. Consulting with a Certified Rangeland Manager (CRM) is advised when prescribed grazing is being considered as a treatment. Effectiveness of these treatments depend on a number of things that CRMs have familiarity with, including the palatability of plant species on the site to the animals available for use; how terrain, water availability, and environmental conditions during the grazing period are likely to influence animal behavior; and other potentially complicating factors like predators (including domestic dogs); public access; and setting up adequate facilities up for gathering and loading animals arriving at or being removed from the site.

### ***Herbicide Application***

Herbicides are chemicals that damage or kill plants and can be classified by their mode of action. They include growth regulators, amino acid inhibitors, grass meristem destroyers, cell membrane destroyers, root and shoot inhibitors, and amino acid derivatives, all of which interfere with plant metabolism in different ways.

Herbicides can also be categorized as selective or non-selective. Selective herbicides kill only a specific type of plant, such as broad-leaved plants, which allows the herbicide to be used to control weeds while maintaining grass species. Other herbicides, such as glyphosate (Roundup®), are non-selective and kill any type of plant. These must be used carefully to avoid damaging non-target plants. Herbicides that may be applied to treat noxious vegetation are:

- ▶ Borax (tetraborate decahydrate);
- ▶ Clopyralid (monoethanolamine salt);
- ▶ Glyphosate (isopropylamine salt, potassium salt, dimethylamine salt & diammonium salt);
- ▶ Hexazinone;
- ▶ Imazapyr (isopropylamine salt);
- ▶ Sulfometuron Methyl;
- ▶ Triclopyr (butoxyethyl ester & triethylamine salt);
- ▶ Nonylphenol 9 Ethoxylates (NP9E);
- ▶ Cleantraxx (penoxsulam & oxyfluorfen);
- ▶ Velpar (hexazinone); and
- ▶ Indaziflam.

Herbicide application must comply with the U.S. Environmental Protection Agency (EPA) label directions, as well as California Environmental Protection Agency and Department of Pesticide Regulation (DPR) label standards. The application method chosen would depend

on the written recommendations of an independent Pest Control Advisor (PCA) licensed by DPR for the targeted weed species and characteristics of the site to which the treatment is proposed.

Herbicides may be applied to targeted species in various ways. Under the CalVTP, herbicides would only be applied on the ground from equipment on vehicles (including all-terrain vehicles and tractors) or by manual application devices. At the direction of the licensed PCA, herbicides may be applied to green leaves with a backpack hand-appliator or spray bottle, wick (painted or wiped on), hand wand (sprayed on), or hand applied as pellets to the ground surface. Herbicides may also be applied to trees around the circumference of the trunk on the intact bark (basal bark), to cuts in the trunk or stem (frill, or “hack and squirt”), to cut stems and stumps (paint on cut stumps) or injected into the inner bark with a hypo-hatchet.

Restricted use herbicides must be applied per written recommendations from a licensed PCA per the label and by an herbicide applicator certified by DPR. San Mateo County Parks maintains an annual permit from the County Agricultural Commissioner (CAC) to apply restricted herbicides through annual reporting, inspections, and renewals. Site specificity is achieved by having a clear description of the site prior to herbicide application. Because permits are issued for a 12- or 24-month period, time-specificity is achieved by SMCP posting clear notification signage within park bounds up to 24 hours before the scheduled application. This notice allows the CAC an additional opportunity to review the planned application and apply additional restrictions if needed.

### ***Treatment Maintenance***

Most treatments require maintenance; however, the maintenance interval varies widely. For example, treatment in tree-dominated vegetation types might initially involve a mechanical or manual treatment to reduce surface and ladder fuels. Following that initial activity, prescribed burning could be used at 10- to 15-year intervals to maintain the lower fuel hazard in consideration of the natural fire return interval of the vegetation community and other environmental factors as well as treatment objectives. Maintenance intervals may vary greatly and are generally related to the vegetation life form, landscape location (e.g., climate and soil types influence plant regrowth), and activity type.

Vegetation communities are dynamic, and treatment activities should change over time and space to reflect that. Often the maintenance treatment is different than the original treatment, such as a prescribed burn followed by herbicide application(s) to control shrub regrowth, or manual treatment using chainsaws to create shaded fuel breaks along public roads followed by periodic prescribed burning to keep sprouting and fuel loads low.

A proposed treatment project, depending on the permitting mechanism used by SMCP, would identify the time frame to complete the initial treatment and any anticipated maintenance. The treatment may be considered complete once either the time frame for

accomplishing the treatment has concluded, the treatment objectives have been met, or the contractual agreements in place between the project proponent and landowner/land manager expire. SMCP or a qualified designee will consider whether additional treatment is warranted.

## PROPERTY INFORMATION

### Park Description

Pescadero Creek County Park (PCCP) in San Mateo County, California<sup>17</sup> is a publicly accessible, 5,943-acre park located in the north-central region of the Santa Cruz Mountains. PCCP is used for general recreational purposes throughout the year such as hiking, camping, backpacking, horseback riding, cycling, and wildlife viewing.

Historically, Pescadero Creek and its coast side tidal estuary served as a key source of food for geographically affiliated indigenous groups. As European settlers and post-gold rush developments emerged in the area by the early 1860s, the town of Pescadero became a major town and transportation hub, ultimately perpetuating impacts to nearby resources. As the lumber industry grew and demand for building materials continued to increase into the 20<sup>th</sup> century, the forestlands within and surrounding the Pescadero-Butano Watershed were subject to intensive logging practices that drastically reduced old growth forest characteristics along the coast.

PCCP is bisected by Pescadero Creek which, from a resource management standpoint, has traditionally divided the park into two subsets – the north and south side of the property. Today, the park is widely made up of second-growth redwood, which refers to redwood communities that have developed as resprouts from former old growth stands. Most old growth redwood remaining in the park is north of Pescadero Creek where past logging has chiefly been limited to selection harvests in more recent decades. Douglas-fir, non-forested openings, and hardwood dominant stands are intermixed throughout the park and provide opportunities to maintain an ecological mosaic across the property.

### Plan Location

Pescadero Creek Park is the largest of three parks that make up the 8,020-acre Pescadero Creek Park Complex in San Mateo County. At the time of development, this plan applies solely to the 5,943 acres of Pescadero Creek County Park (Map 1).

PCCP is a relatively remote property situated between Highway 84 and Highway 9, approximately 2 miles east of the community of Loma Mar and approximately 10 miles east of State Route 1 (HWY 1) in San Mateo County, California. From the town of Pescadero,

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<sup>17</sup> <https://parks.smcgov.org/pescadero-creek-park>

the park can be accessed from its western entrance on Wurr Road by traveling Pescadero Creek Road east for approximately 7.5 miles. The northeastern portion of the park is accessible from Camp Pomponio Road off Alpine Road, approximately 6 miles south of La Honda.

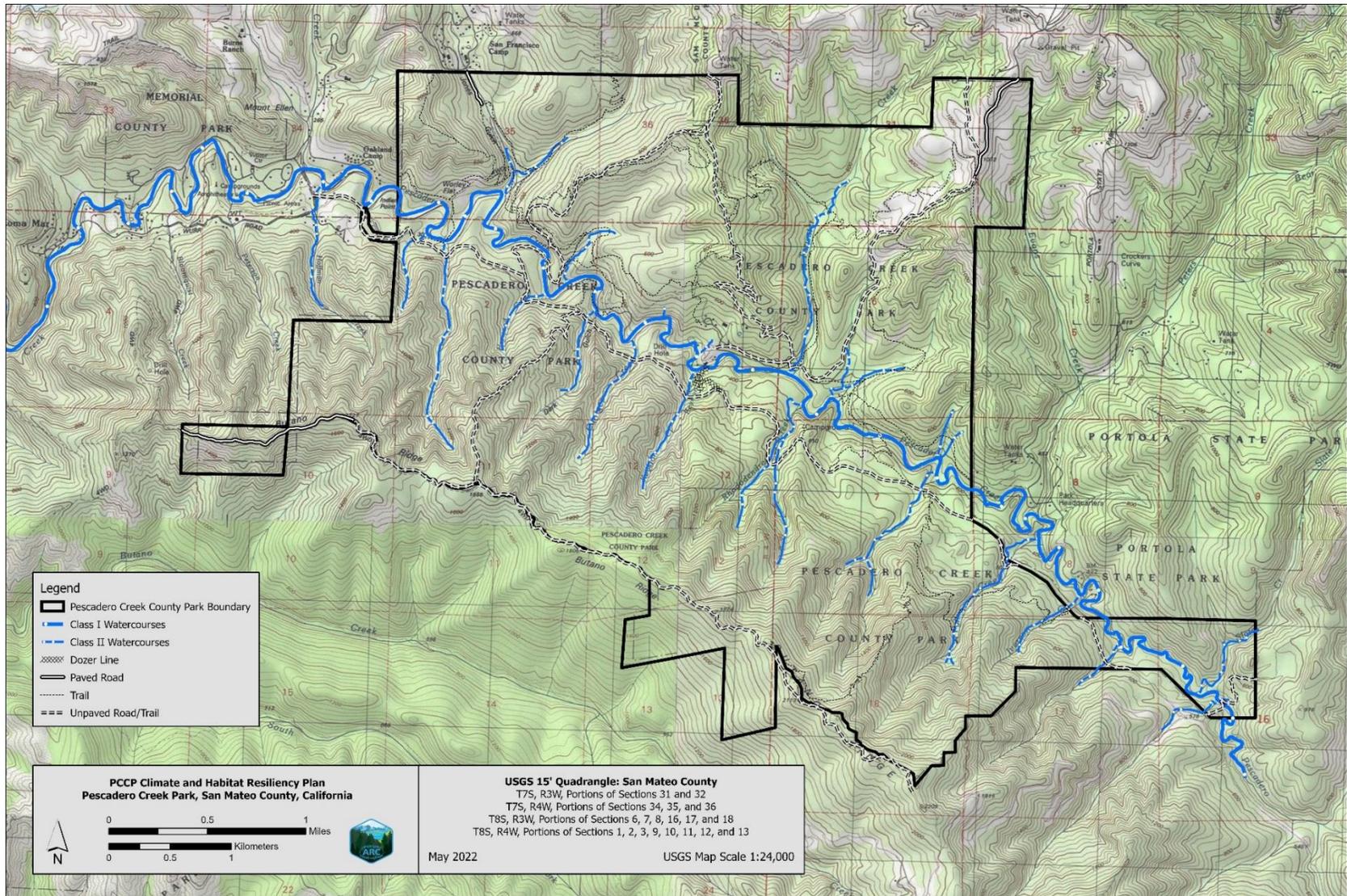
Coordinates for the approximate centroid of PCCP are 37.2605°N, 122.2471°W.

As defined in the 2022 California Forest Practice Rules<sup>18</sup> (Title 14 of the California Code of Regulations, Section 895.1), PCCP is located within the Southern Subdistrict of the Coast Forest District and is therefore subject to Special Harvesting Methods outlined in section 913.8 as well as rules specific to San Mateo County contained in sections 928.1 through 92.

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<sup>18</sup> [https://bof.fire.ca.gov/media/3qebuoma/2021-forest-practice-rules-and-act\\_final.pdf](https://bof.fire.ca.gov/media/3qebuoma/2021-forest-practice-rules-and-act_final.pdf)

# Property Map



Map 1 Pescadero Creek County Park, San Mateo County

## Landowners

PCCP is owned, managed, and maintained by the San Mateo County Department of Parks (SMCP). Sam McDonald Park to the north and Memorial Park to the west are also under the ownership and management of SMCP, collectively known as the Pescadero Creek Park Complex.

Forested lands adjacent to PCCP are owned and managed by various public and non-governmental entities including, but not limited to, California State Parks, Midpeninsula Regional Open Space District, and Redtree Properties LP.

## Property Legal Information

PCCP overlaps four USGS 7.5-minute quadrangles that encompass the park property: La Honda, CA 7.5-minute Quadrangle; Franklin Point, CA 7.5-minute Quadrangle; Mindego Hill, CA 7.5-minute Quadrangle; and Big Basin, CA 7.5-minute Quadrangle. PCCP is defined by T7S, R3W, Portions of Sections 31 and 32; T7S, R4W, Portions of Sections 34, 35, and 36; T8S, R3W, Portions of Sections 6, 7, 8, 16, 17, and 18; T8S, R4W, Portions of Sections 1, 2, 3, 9, 10, 11, 12, and 13; San Mateo County, California; MDBM.

Table 1 identifies the San Mateo County Assessor's Parcel Numbers (APNs) that define PCCP property.

*Table 1 San Mateo County Assessor's Parcel Numbers (APNs) included within PCCP property*

<b>Property</b>	<b>County</b>	<b>APN</b>
Pescadero Creek County Park	San Mateo	83340020
Pescadero Creek County Park	San Mateo	83340160
Pescadero Creek County Park	San Mateo	84071290
Pescadero Creek County Park	San Mateo	84120070
Pescadero Creek County Park	San Mateo	84130110
Pescadero Creek County Park	San Mateo	84130120
Pescadero Creek County Park	San Mateo	84160010
Pescadero Creek County Park	San Mateo	85080010
Pescadero Creek County Park	San Mateo	85090080
Pescadero Creek County Park	San Mateo	85100140
Pescadero Creek County Park	San Mateo	85150080
Pescadero Creek County Park	San Mateo	85180110
Pescadero Creek County Park	San Mateo	89140030
Pescadero Creek County Park	San Mateo	89140040

## **PARK INFRASTRUCTURE**

### **Roads**

Approximately 14.6 miles of roads exist within PCCP. Mostly unpaved, the road network within the park is predominantly used for recreation and emergency/maintenance access. Vehicle use on roads is limited to parks staff.

### **Recreation and Trails**

A variety of recreational opportunities exist at PCCP, ranging from traditional hiking and walking trails, equestrian trails and horse camps, picnic grounds, and hike-in campsites. Old Haul Road serves as the primary road and access into the park, from which most trailheads and adjoining fire roads are accessed.

### **Hiking Trails**

Approximately 29 miles of dedicated walking and hiking trails exist in PCCP. Variable terrain and distances between trailheads offer a range of skill levels for hikers from easy to strenuous. Map 7 in *APPENDIX A* shows existing hiking trails, their associated trail markers, and distances within the Pescadero Creek Park Complex.

### **Visitor Use**

The Pescadero Creek Park Complex is considered a high-use recreational area and has been shown to have the highest visitor use within the San Mateo County Parks system based on previous surveys. Majority of the high visitor rate is driven by campground use at Memorial County Park but is supplemented by hiking and general recreation along the extensive trail systems within the park complex.

Frequent and long-time visitors of Pescadero Creek County Park and neighboring properties within the complex tend to be very involved in project planning and park development. Additionally, the top ranked budget priority indicated by participants of previous visitor use studies is natural resources management (e.g., protecting wildlife, watersheds, and open spaces).

The August 2020 CZU Lightning Complex Fire, hereinafter referred to as the CZU Fire, caused hazardous post-fire conditions adjacent to publicly accessible roads and trails, resulting in full or partial park closures following the incident. In 2022, portions of the park have been reopened to the public. Areas where hazards to visitor safety still exist remain closed.

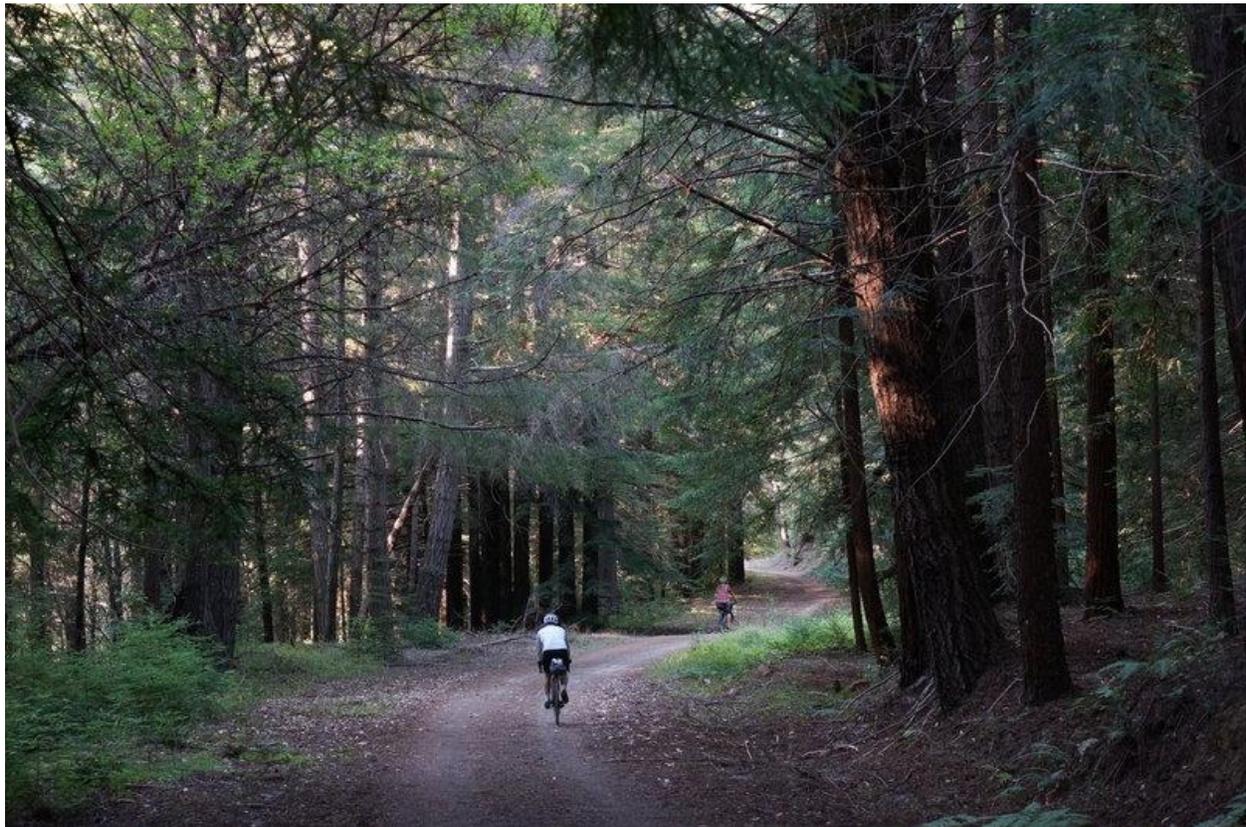
### **Old Haul Road**

Old Haul Road is the central, 5.9-mile vehicle and pedestrian access route through the central portion of the park and the primary road most trail networks and fire roads within the property connect to. Old Haul Road serves as an important ingress and egress route for

wildfire suppression resources and played a vital role in providing fire crews access to the north front of the CZU Fire.

Historically, as its namesake suggests, Old Haul Road was a primary haul route for timber during the logging era surrounding the early- to mid-1900s. Up until approximately 1950, the Santa Cruz Lumber Company<sup>19</sup> maintained a rail line along the existing corridor that transported logs harvested from the watershed up to a pond mill at Waterman Gap.<sup>20</sup>

Today, the road is frequented by park visitors and San Mateo County Parks staff as a recreational and maintenance access corridor. See Figure 5 for a photo of a portion of Old Haul Road.



*Figure 6 Portion of Old Haul Road in PCCP facing east. Photo provided by MTB Project*

Old Haul Road has been identified as the most significant potential source of road related sediment to Pescadero Creek per a 2022 assessment of 65.1 miles of county roads within the Pescadero-Butano Watershed. Over the next 20 years, Old Haul Road is expected to be responsible for over 70% of all sediment delivery from park roads. Archaic, untreated

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<sup>19</sup> <http://www.santacruzlumberco.com/realsclco01.htm>

<sup>20</sup> <https://www.santacruztrains.com/2016/01/santa-cruz-lumber-company.html>

stream crossings along the road have been a focus point for restorative projects within the park as the considerable amount of fill material used historically to construct the rail line accounts for over 90% of the fill volume estimated across all county park roads.

### Existing Fire Roads

A network of existing fire roads is present within the park that serve as important ingress and egress routes for fire suppression resources. Camp Pomponio Road, Baker Fire Road, Bravo Fire Road, and Towne Fire Road are primary access routes existing on the north side of Pescadero Creek that have long been maintained as shaded fuel breaks. Butano Ridge Fire Road south of Pescadero Creek, which roughly forms the southern boundary of PCCP, is another fire access route that should be prioritized for maintenance by SMCP and neighboring entities and preserved as a primary fuel break for the southern portion of the property.

### Proposed Road Treatments

Treatments proposed by this plan and the General Assessment and Recommended Actions report focus initially on implementing a 200-foot-wide road treatment along Old Haul Road, involving 100-foot-wide treatments on both sides of the road, as well as 60-foot-wide treatments along the remaining existing fire roads listed above. Road treatments will predominantly focus on density reduction of trees and understory shrubs, and removal of dead, dying, and diseased trees.

The proposed treatments will capitalize on work and maintenance achieved previously along these routes by recognizing existing road corridors within PCCP as infrastructure strongholds for fire suppression access. Treatable ground accessible from existing road infrastructure may be prioritized for treatment to further increase the efficacy of the road-based shaded fuel breaks. See the section on *TREATMENT UNITS* for more details on proposed initial treatment areas.

### Stream Crossings

A 2022 survey of 65.1 miles of existing roads managed by SMCP and County of San Mateo Department of Public Works inventoried and described all stream crossings present within PCCP property.

A total of 105 stream crossings of different types were inventoried at PCCP. Of those, 21 stream crossings were inventoried along Old Haul Road. Stream crossings vary from ditch relief culverts and stream culverts to bridges and wet fords. Table 2 relates roads within PCCP to the number of stream crossings present. For more information and descriptions of each stream crossing within PCCP, a comprehensive table can be found in *APPENDIX E*.

*Table 2 Stream Crossings Along Roads within PCCP*

<b>Road/Trail Name</b>	<b># of Stream Crossings</b>
Old Haul Road	21
Baker Fire Road	6
Camp Pomponio Road	27
Pomponio Trail	2
Lower Towne Road	6
Upper Towne Fire Road	3
Bravo Fire Road	2
Jones Gulch	7
Ward Road	5
Honor Camp Road 63	6
Honor Camp Road 64	1
Honor Camp Road 65	1
Parke Gulch Trail	3
Shingle Mill Trail	4
Tarwater Trail	11
<b>TOTAL</b>	<b>105</b>

**Restoration Projects**

In 2018, sediment reduction projects at the Keyston Creek and Harwood Creek crossing sites where they intersect Old Haul Road were completed by SMCP that involved replacing an undersized culvert, installing a new ditch relief culvert, and excavating approximately 5,000 cubic yards of residual fill material from the sites.

A similar, larger scale project was completed at the Dark Gulch Crossing on Old Haul Road in October 2020 to remove approximately 35,000 cubic yards of fill material to address a failing crib log structure and major source of sediment for Pescadero Creek.

The objective of these projects, as well as future planned projects, is to reduce sediment delivery into the channel of Pescadero Creek and help meet the goals and requirements identified in the Butano-Pescadero Watershed Sediment TMDL<sup>21</sup>.

In June of 2021, the main bridge along Baker Fire Road that crosses over Pescadero Creek was severely damaged by a fallen Douglas-fir tree, see Figure 6. The incident is not a product of the 2020 CZU Fire as the location of the bridge is outside of the burn scar. Restoration efforts to repair the bridge are expected to begin in 2022 or 2023.

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<sup>21</sup> [https://www.waterboards.ca.gov/sanfranciscobay/water\\_issues/programs/TMDLs/pescaderobutanocrkstmdl.html](https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/pescaderobutanocrkstmdl.html)



*Figure 7 Baker Fire Road Bridge before (left) and after (right) tree damage*

## **Facilities**

### ***Camp Pomponio/Honor Camp***

The most substantial developed facility at PCCP is that of Honor Camp, an inactive lodging complex located centrally within the property bounds that was abandoned in 2003.

Originally called Camp Pomponio, the site is located just north of Pescadero Creek at the southern end of Camp Pomponio Road where it terminates at the main camp complex. The most recent use of the facility, under the management of the San Mateo County Sheriff's Office, was to house and rehabilitate low-risk inmates who maintained the camp infrastructure and its surroundings while also providing public services such as general brush clearing and installing fire breaks within the vicinity of PCCP.

### ***Tarwater Trail Camp***

Tarwater Trail Camp is one of two primitive, hike-in campsites within PCCP. At approximately 360 feet of elevation, the camp is situated just north of Pescadero Creek where Baker Fire Road meets the Pomponio Trail. No water is available on-site and facilities are limited to vault style toilets. An overnight permit is required to stay at the campsite. Campfires are not currently permitted in the trail camps or elsewhere in the park.

### ***Shaw Flat Trail Camp***

Shaw Flat Trail Camp sits at approximately 380 feet in elevation just north of Pescadero Creek and is accessed by Shaw Flat Trail from Lower Towne Fire Road in the west-central portion of the park. No water is available on-site and facilities are limited to vault style toilets. An overnight permit is required to stay at the campsite. Campfires are not currently permitted in the trail camps or elsewhere in the park.

## Parking Areas

### Old Haul Road/Hoffman Creek Parking

Adjacent to the park entrance off Wurr Road near Hoffman Creek, an approximately 4,200-square-foot clearing exists that serves as the main parking area for access into the west side of the park. Visitor access from here includes Old Haul Road and trail systems within neighboring Memorial Park directly across Wurr Road, see Figure 7.



*Figure 8 Parking area at Hoffman Creek Trailhead; facing east, PCCP*

### Tarwater Trailhead Parking

The Tarwater Trailhead Parking Area is an approximately 5,600-square-foot unpaved turn-off from Camp Pomponio Road in the northeastern corner of the park. This parking area provides park visitors and staff access to Tarwater Trail, Camp Pomponio Road, Shingle Mill Trail, and Upper Coyote Ridge Trail. Additionally, the location serves as a vital staging area and incident response post for fire suppression resources, see Figure 8.



*Figure 9 Parking area at Hoffman Creek Trailhead; facing east, PCCP*

### *Utilities*

Municipal or otherwise potable sources of water are virtually non-existent within the park. Existing water tanks and wastewater infrastructure present within the site of Honor Camp are non-operational, were not fully decommissioned following the camp's closure, and will likely need to be completely replaced if water distribution at this location is restored, see Figure 9 for water tanks above the Honor Camp.



*Figure 10 Existing water tanks above Honor Camp*

San Mateo County Public Works operates County Service Area No. 7 (CSA 7) in proximity to PCCP but only serves customers in the La Honda community as well as Camp Glenwood Boys Ranch and Sam McDonald Park.

Additional utilities within the park include a PG&E electrical distribution line which runs to the site of the Honor Camp from Sam McDonald Park along Upper Towne and Bravo Fire Roads. Electric power utilities are not currently utilized in Honor Camp as of 2022.

## EXISTING PLANS AND REPORTS

### ***Pescadero-Butano Watershed County Road Inventory and Sediment Assessment (March 2022)***

This report summarizes the findings of a road erosion inventory of 65.1 miles of County of San Mateo Department of Public Works (PW) and Parks Department (CP) roads within the Pescadero-Butano watershed. Total Maximum Daily Load (TMDL) measures specific to the Pescadero-Butano Watershed, outlined in the San Francisco Bay Regional Water Quality Control Board Resolution No. R2-2018-0027 (RWQCB Plan), include a requirement to produce an inventory of roads that may contribute sediment to impaired watercourses and actions designed to mitigate those potential impacts.

### ***County of San Mateo Routine Maintenance Program Manual (July 2020)***<sup>22</sup>

The Routine Maintenance Program Manual is a deliverable of San Mateo County's Routine Maintenance Program, a comprehensive approach to conducting and permitting routine maintenance activities. The program is intended to maximize the efficiency of routine maintenance by implementing a consistent framework for projects on county-maintained land and infrastructure. While the document is widespread across many types of routine upkeep projects, the program is limited in landscape-level vegetation treatment guidance.

### ***Santa Cruz County - San Mateo County Community Wildfire Protection Plan (updated April 2018)***<sup>23</sup>

The San Mateo - Santa Cruz County Community Wildfire Protection Plan (CWPP) examines wildfire risks that transcend county lines while identifying the hazards to life and property associated with those risks. The CWPP provides strategies and prioritization frameworks intended to promote a more resilient, fire-safe landscape across San Mateo and Santa Cruz Counties. The CWPP was developed by CAL FIRE in association with local Resource Conservation Districts.

### ***Honor Camp Alternative Park Compatible Reuse Feasibility Study (August 2017)***

The Honor Camp Feasibility Study is a comprehensive analysis focused on the potential to repurpose former Camp Pomponio/San Mateo County Sheriff's Honor Camp infrastructure located within Pescadero Creek County Park for recreational use. The study defines the environmental, regulatory, social, and economic constraints associated with various potential reuse opportunities and provides recommended actions for decision-makers as the future of the site continues to be assessed.

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<sup>22</sup> <https://www.smcgov.org/publicworks/county-san-mateo-routine-maintenance-program>

<sup>23</sup> <https://firesafesanmateo.org/projects/19-projects/110-cwpp>

***Decision-Making Guidelines for Vegetation Management, San Mateo County Parks (June 2006)***<sup>24</sup>

This document is intended to help San Mateo County Park staff in making informed decisions about future vegetation management priorities and actions. This report is not a plan of action, but simply a series of guidelines to help guide future decisions about vegetation management.

***Sediment Assessment of Roads and Trails within the Pescadero/Memorial/Sam McDonald County Park Complex (February 2003)***<sup>25</sup>

In January 2002, Pacific Watershed Associates (PWA) was contracted by San Mateo County Parks and Recreation (SMCPR) to inventory 65 miles of roads and trails within the Pescadero/Memorial/Sam McDonald County Park Complex for sites of future erosion and sediment delivery to streams, and to prepare a prioritized erosion prevention plan. This assessment and report serve as one of the first attempts to identify and mitigate significant sources of sediment within the parks system that have led to impairments in the Pescadero-Butano Watershed.

***San Mateo County Parks Vegetation Resources (March 2002)***<sup>26</sup>

The purpose of this document is to summarize and update available vegetation information for thirteen parks within the San Mateo County Parks system. Plant classifications and communities present in the parks system, general plant health, native and invasive species maps, and detailing sensitive and endangered vegetation communities are all aspects of the document that attempts to encapsulate the dynamic flora across all SMCP lands.

***San Mateo County Trails Master Plan (updated 2001)***<sup>27</sup>

The third iteration of this county-wide trails plan was intended to revise its former versions with updated trails information, objectives, and implementation strategies for new policies and guidelines related to proposed and existing recreational access on public lands. Approximately 304.45 miles of trails were proposed in the 2001 plan that would be additional to the existing 166.5 miles of trails present at the time.

***San Mateo County General Plan (November 1986)***<sup>28</sup>

The County's General Plan Policies generally describe policies with regard to future development actions. Some goals and policies pertain to the treatment of vegetation,

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<sup>24</sup> <https://parks.smcgov.org/documents/vegetation-management-guidelines>

<sup>25</sup> <https://parks.smcgov.org/documents/sediment-assessment-pescadero-parks-complex>

<sup>26</sup> <https://parks.smcgov.org/documents/vegetation-resources>

<sup>27</sup> <https://parks.smcgov.org/documents/trails-master-plan>

<sup>28</sup> [http://www.co.sanmateo.ca.us/smc/departments/es/home/0,2151,5557771\\_9420293,00.ht](http://www.co.sanmateo.ca.us/smc/departments/es/home/0,2151,5557771_9420293,00.ht)

although they are very general in nature and do not provide prescriptive information regarding vegetation management.

### ***Natural Resources Management Program (June 1983)***

A Natural Resource Management Program (NRMP) for Pescadero Creek, Sam McDonald, and Memorial County Parks was prepared in 1983 by Western Ecological Services in association with Ralph Osterling Consultants, providing recommendations to the Parks Department on resource management needs, with a particular focus on forest and fuel management. Since the publication of this NRMP, resource management activities within the Park have been limited to targeted tree removals, fuel reduction along fire roads and around facilities, invasive species control, sediment reduction and stream crossing repair projects, and management around campgrounds and facilities.

## **GENERAL RESOURCES**

### **Climate**

Measurable shifts in natural, climate-driven processes on a global scale continue to impact billions of acres of forested land each year, as evidenced by increased demand for carbon sequestration, severe drought, extreme wildfire events, pest and pathogen epidemics, habitat deterioration, and rapid forest migration.

In 2020, over 4 million acres burned in California due to wildland fires, far greater than any other state in the U.S. and nearly 4.2 times the extent of land burned in the second most burned state of Arizona the same year. In 2021, over 2.2 million acres burned, at least 8.5 times the area burned in the prior year of 2019.<sup>29</sup> The vast majority of forested acreage burned in California each year is on land owned by the U.S Forest Service. Decades of fire suppression and the absence of prudent management on lands under federal jurisdiction have resulted in stand conditions that promote large, highly destructive wildfire events that are counterproductive to preventative treatments often implemented on adjoining properties. The importance of treatment contiguity at a landscape level should not be undermined, recognizing that varied landowner and resource management objectives ultimately coalesce into what may be considered a robust environmental mosaic.

While we are able to study past records, documents, aerial imagery, and data that help form perspectives around historic natural conditions, it is important to understand the rapid, unprecedented changes occurring to existing global ecosystems that warrant a forward-thinking approach to land management. Methodologies and project frameworks

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<sup>29</sup> <https://www.nifc.gov/fire-information/statistics>

should be adaptive in nature and acknowledge the vulnerability of these ecological systems and the risks they face.

Comprehensive assessment and management of resources facing climatic or human-induced vulnerability requires an understanding of the ecological thresholds within natural systems and the points at which they are crossed.<sup>30</sup> Progressive decision-making practices regarding forest health and long-term resiliency are wholly dependent on those understandings meant to inform efforts that drive forested ecosystems into a dynamic future rather than attempt to restore them to a former, historically vulnerable state.

### **Temperature**

Pescadero Creek County Park is represented by coastal California's temperate Mediterranean climate; made up of generally warm, dry summers and cool, wet winters. The Köppen-Geiger climate classification system defines PCCP as being within a "Warm-summer Mediterranean climate" (*Csb*)<sup>31</sup>.

Average annual temperatures in the area of PCCP generally range from approximately 50-62°F. Temperature highs may reach around 75-78°F in late-August to September.<sup>32</sup> December and January typically see the lowest temperatures of approximately 50°F. Overcast skies are common in the area and along the coast, occupying 30-40 percent of daylight hours, primarily during the morning.

### **Precipitation**

Average rainfall at PCCP ranges between 20-60 inches per year. The wettest months for San Mateo County are typically December through February while July and August are generally the driest months, averaging virtually no rainfall.

PCCP is located within the coastal California fog belt and maintains a marine fog layer throughout most of the year. During the warmer summer months, inland temperatures draw the marine fog inland from the coast where it settles in low-lying drainages and topographic depressions. Summer fog provides moisture to redwood ecosystems where relatively sustained humidity levels throughout the year benefit redwood trees as well as other species within their respective vegetative alliance.

### **Fire History**

Available information on historic fires within and adjacent to the property is limited to a few events within the last 100 years.<sup>33</sup>

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<sup>30</sup> <https://doi.org/10.3389/fmars.2015.00095>

<sup>31</sup> <http://koeppen-geiger.vu-wien.ac.at/present.htm>

<sup>32</sup> <https://www.weather.gov/>

<sup>33</sup> <https://ucanr.edu/sites/fire/>

In 1962, two separate wildland fire events occurred in proximity to, but not within, Pescadero Creek County Park property based on CAL FIRE FRAP data.

The Hanna Property Fire in the Butano Creek Watershed burned approximately 242 acres of forestland just east of current day boundary of Butano State Park. The fire scar lies entirely within San Mateo County.

In the same year of 1962, a much larger wildfire event in the Lincoln Hill Fire occurred across county lines south of PCCP, burning approximately 3,235 acres in both San Mateo and Santa Cruz Counties. Collectively, the two historic fires affected approximately 3,478 acres that now exist completely within the burn scar of the 2020 CZU Fire.

The CZU Fire was a monumental event in the Santa Cruz Mountains and the largest wildland fire incident in the region's recorded history at 86,509 acres. The event affected San Mateo and Santa Cruz Counties and persisted for 37 days until it was fully contained in September 2020.<sup>34</sup> Post-fire vegetation severity levels across the burn scar are widely varied; however, fuel structures across the affected area and extreme northwest prevailing winds resulted in burn dynamics that produced significantly high mortality rates for trees. Within PCCP, the CZU fire burned approximately 2,839 acres or nearly 48% of the park.

## **Forest Health**

### **Succession**

Out of the vast majority of PCCP acreage, approximately 96% is forested. The 2020 CZU Fire caused high levels of mortality on the southern side of Pescadero Creek, predominantly at higher elevations along Butano Ridge and its lateral ridges that divide the tributaries on the north-facing aspect of the park. Within the basin of the Class II drainages, where a large portion of the dense second growth redwood stands occur, mortality is chiefly limited to understory trees and shrubs. While the consumption of very small diameter trees helped to reduce the number of trees per acre, redwood resprouting is prolific in these areas and will likely result in overstocked stands, high levels of competition, and similar vertical and horizontal fuel arrangements over the next 25-50 years.

### **Douglas-fir Encroachment**

Small grassland and shrub communities exist in the northeast portion of the park where encroachment by conifers, predominately Douglas-fir, has been observed. Douglas-fir seeds are carried by wind to occupy areas of the forest floor and forest edge to regenerate. Seedlings are shade intolerant, resulting in poor Douglas-fir regeneration within forests that exhibit dense understories and more successful regeneration occurring in light gaps or along the forest edge, or vegetative transition zone. Douglas-fir regeneration is often

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<sup>34</sup> <https://www.fire.ca.gov/incidents/2020/8/16/czu-lightning-complex-including-warnella-fire/>

prolific in vegetative transition zones between forests and grasslands or shrublands, where seedlings have ample light and reduced competition to support growth. Seedlings established in grasslands and shrublands continue to grow and overtop the existing vegetation expanding the forest footprint. Without fire to kill off Douglas-fir seedlings, the succession process repeats itself, furthering the encroachment of conifers into grassland and shrubland communities. Douglas-fir encroachment poses the threat of the loss of grassland and shrubland communities and their associated ecosystem services over the landscape.

### **Oak Woodland Taking Over Chaparral**

Chaparral communities lacking fire are subject to alterations in ecosystem dynamics, such as oak succession. Following fire, chaparral species are adapted to regenerate readily through basal sprouting or obligate seeding. However, the lack of fire promotes non-native species abundance and oak succession within chaparral communities. Woodrats often facilitate the spread of acorns within chaparral vegetation, where shrubs are utilized to build nests that are hidden and difficult to access by predators. Similarly, oak seedlings establish within manzanita, where it can avoid herbivory, and later outcompetes the manzanita and shades out the surrounding chaparral vegetation. Oaks are most prolific on north-facing aspects and lower slopes where more moisture is retained. Oak succession threatens to impair chaparral community occupancy across the landscape, ultimately influencing the overall health and vigor of native chaparral species.

### **Pathogens, Pests, and Disease**

#### **Sudden Oak Death**

The pathogen, *Phytophthora ramorum* (*P. ramorum*), which causes the disease Sudden Oak Death (SOD), infects coastal forests throughout California and Oregon and kills susceptible species including tanoak, coast live oak, California black oak, Shreve oak, canyon live oak, and madrone saplings. Pescadero Creek County Park is located within a zone of high-risk for SOD infection. Non-oak foliar host species that may occur within the project area include, but are not limited to, California bay laurel and Pacific madrone. Identification of the disease and infected individuals is paramount to preventing or minimizing the spread of the pathogen<sup>35</sup>. In areas where infection is not apparent or confirmed, foliar or bark samples may be analyzed by trained specialists to confirm the presence of *P. ramorum*. All hand equipment and field gear, including boots, should be sanitized and heavy equipment should be hosed off prior to operations or when departing from areas where the spread of SOD is possible. The California Oak Mortality Task Force website contains additional

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<sup>35</sup> <http://ipm.ucanr.edu/PMG/PESTNOTES/pn74151.html>

information regarding diagnosis, treatment, and disposal measures for vegetation infected with SOD<sup>36</sup>.

SOD is present on PCCP property and effects of the disease have been observed in stands of heavy tanoak occupation, primarily on the north-facing slope of the park where pre-fire conditions offered moist, temperate conditions for pathogen transmission.

### ***Phytophthora - Madrones***

Mature Pacific madrone tree roots are susceptible to infection of two fungi, *Phytophthora cactorum* (*P. cactorum*) and *Pytophthora cinnamomi* (*P. cinnamomi*), responsible for root rot and the development of cankers at the base of the tree and along the tree trunk. *P. cactorum* is most common in the Pacific Northwest, whereas *P. cinnamomi* requires warmer temperatures and is more common throughout California. Both pathogenic fungi, like *P. ramorum*, require water to survive as spores in soils and running water or rain splash to spread, often infecting wounds or roots. Infected trees exhibit discolored, or dark brown to black, bark and/or sapwood and crowns display upper foliage loss and abnormally small leaves with curled margins or wilting. Where possible, mitigation for this disease can be implemented by reducing irrigation to madrones, avoiding concentrations of mulch at the base of susceptible trees, and pruning branch and twig cankers during initial establishment. Pruning should occur in dry conditions to avoid or lessen the chance of transmission between individual madrones.

### ***Heterobasidion annosum (Fomes annosus) - Douglas-fir***

Annosus root disease is caused by an infection of the fungus *Heterobasidion annosum* (*H. annosum*), previously named *Fomes annosus*, and is commonly referred to as root rot or butt rot. This root disease is responsible for group killing in conifers, such as pines or Douglas-fir. Airborne spores are released from conks and germinate in fresh wounds, usually at the base of a tree or in cavities of stumps where it then spreads through the contact of root systems. Infected living trees often have basal conks in or near the duff layer that appear light gray to brown on the upper surface and creamy white to light brown on the porous underside. Popcorn conks, or tiny conks, are occasionally found growing under bark or on roots. Tree crown symptoms include shortened needles, needle retainment at the tips of branches, and chlorotic discoloration, all of which are generally expressed from the bottom and inside of the crown up and outward. Stunted or reduced growth is common in infected trees. Management strategies vary by host species; general management of annosus root disease is dependent on early detection and evaluation of infected trees. In recreational areas, early detection and removal of infected trees can reduce hazards caused by deterioration and may improve chances of prevention in

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<sup>36</sup> <http://www.suddenoakdeath.org/>

residual trees. In pines and true fir, the USFS recommends that freshly cut stumps get treated with Sporax, a borax fungicide. PCCP has areas of Douglas-fir stands that may be susceptible to *H. annosum*.

### ***Phellinus (Fomes) pini* – Douglas-fir**

Conifers along the Pacific Coast are susceptible to infection of the fungus *Phellinus (Fomes) pini* (*P. pini*), that is responsible for causing red ring rot. *P. pini* had been placed in several genera since the 1800's, subsequently giving it many taxonomic names, and is commonly recognized as *Fomes pini*. This fungus is commonly hosted in conifers like Douglas-fir, pines, larch, hemlocks, and true firs and primarily has the greatest impact on older forest stands. *P. pini* spores are carried by wind and germinate in wounds and on branch stubs. Trees infected with *P. pini* often exhibit exterior hoof-shaped to bracket-like perennial conks that are dull gray to brownish black on the upper surface with a light margin and a rich brown underside, often referred to as a cinnamon color. Interior heartwood decay appears red to purple initially, then develops small pockets of white mycelium decay as it advances. Typically, the more conks that appear on a tree indicate increasing interior decay. Management practices for this disease include removing trees with conks and amounts of rot that may render them hazardous in recreational areas, avoid wounding trees, and remove infected trees prior to excessive interior decay occurs. *P. pini* may persist for a short period of time in slash, however, it does not rely on nourishment from decaying organic matter. In PCCP, this disease is most likely to impact mature Douglas-fir stands.

### **Topography**

PCCP hosts rugged topography in areas surrounding those frequented by park visitors. Terrain dynamics at PCCP are variable. The north-facing aspect of the park, south of Old Haul Road, is predominantly composed of steep drainages and inner gorges separated by quick-rising ridges that trend from the southern property boundary at Butano Ridge down and to the north where they eventually intersect Old Haul Road.

PCCP elevation ranges from approximately 188 feet along Pescadero Creek to approximately 2,230 feet along Butano Ridge based on Digital Elevation Model data produced in 2017. The substantial elevation changes and topographic relief from the park basin to its southern ridgetop boundary generates a dynamic array of ecotones across the property. The riparian corridor of Pescadero Creek extends across the property in an east/west orientation that is frequently incised throughout its reaches but has a well-developed floodplain along the lowermost portions as Pescadero Creek approaches the tidal estuary. Tributaries to Pescadero Creek, including Schenly Creek, Harwood Creek, Dark Gulch, Carriger Creek, Keyston Creek, Rhododendron Creek, Hooker Creek, and Fall Creek work their way through and along geologic features such as the Butano Fault and uplifted marine terraces of Santa Cruz mudstone. These stream channels define a complex

array of slopes and ridges whose length, steepness and aspect have resulted in growing conditions that range from highly productive to nearly sterile.

Approximately 42.5% of the terrain at PCCP exceed 50% slopes, the majority of which are on the southern portion of the property, south of Old Haul Road. Approximately 28.25% of the terrain at PCCP is represented by slopes of less than 30%, primarily occurring immediately adjacent to and north of Pescadero Creek. The remaining 29.25% of land at PCCP is comprised of slopes that are between 30-50%.

## Geology

As is the case across the majority of the Santa Cruz Mountains, PCCP and the Pescadero-Butano Watershed are defined by rapid uplift and erosion rates due to frequent tectonic activity along the central coast.

Two major fault systems run in proximity to PCCP. The San Gregorio fault zone occurs approximately 4 miles west of PCCP on a north-south trend along the coast from northern San Mateo County to the Santa Lucia Range in Big Sur. The much larger San Andreas fault zone occurs approximately 6 miles east of PCCP property in Santa Clara County where it travels along CA State Route 35 for a portion of its 800-mile stretch.

A third, smaller tectonic fracture that directly influences the geomorphology of Pescadero Creek is the approximately 29-mile long Butano fault. The northwest-southeast trending Butano fault line runs from Tahana Gulch north of Pescadero to Lake Elsman Reservoir in the Los Gatos Creek Watershed. The geological significance of this fault line relates to its occurrence directly adjacent to or below Pescadero Creek across the entire extent of the park; an expression of the ancient seismic activity responsible for sculpting the park's landscape in tandem with hydrologic processes at the surface.

The southern half of PCCP is made up of a series of hillslopes predominantly comprised of sandstone and mudstone outcrops intermixed with shallow, mesic soil regimes.

## Hydrology

### *Streams, Wetlands, and Ponds*

The park comprises many subwatersheds, small drainages, and tributaries that serve Pescadero Creek and transport sediment loads across the lower Pescadero-Butano Watershed. Between 1952 and 2021, Pescadero Creek has maintained an average discharge rate of approximately 40.54 cubic feet per second based on data taken at USGS Gage 11162500 located near Loma Mar, California<sup>37</sup>.

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<sup>37</sup> [https://waterdata.usgs.gov/nwis/inventory/?site\\_no=11162500](https://waterdata.usgs.gov/nwis/inventory/?site_no=11162500)

### Class I Streams

Pescadero Creek is defined as a Class I stream per Section 916.5 in the 2022 Forest Practice Rules. Class I streams are watercourses that provide domestic uses of water, including springs, and/or are always or seasonally fish-bearing including habitat to sustain migration and spawning. Pescadero Creek is the only Class I stream within PCCP property, though it extends over 26 miles from its headwaters west of Castle Rock State Park to the coast at Pescadero State Beach.

### Class II Streams

Streams that provide habitat for aquatic life other than fish and/or have fish always or seasonally present within 1,000 feet downstream are considered Class II watercourses. Within the PCCP property, there are several Class II streams that are tributaries to Pescadero Creek located both on the north and south sides of the park. However, not all streams that are tributaries to Pescadero Creek are considered Class II streams. Class II drainages were used in the project development and planning phase of this plan to delineate subwatersheds within the park.

### Class III Streams

Smaller, seasonal or intermittent drainages capable of sediment transport to perennial watercourses under normal high flow conditions are generally referred to as Class III streams. Class III streams do not host aquatic life and are typically only active during and temporarily following precipitation events. Watercourses within PCCP that fall into this category are predominantly located on the south side of Pescadero Creek adjacent to Class II streams or around the headwaters of Class II streams. Class III streams may also serve as tributaries to Class I waters.

Monitoring watershed and stream conditions, such as staff gauge flow rate records and steelhead or coho habitat conditions, in proximity to proposed treatment areas may create an opportunity to observe watershed-level responses to changes in vegetative cover over the landscape. Following the reduction of understory vegetation and select trees, more water becomes available to the residual forest stand and there is potential for fluctuations in groundwater tables and waterflow in streams to occur in proximity to treated vegetation.

### *Watershed and Stream Conditions*

The Pescadero-Butano Watershed, see Figure 10, is the largest drainage area in San Mateo County, principally defined by Pescadero Creek and its major tributary of Butano Creek which, combined, drain a total area of approximately 81 square miles<sup>38</sup>. Prior to flowing into the Pacific Ocean, the confluence of Butano and Pescadero Creeks feed into sensitive

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<sup>38</sup> <http://www.sanmateorcd.org/pesc-butanoassess.pdf>

coastal marsh and estuarian habitats at the Pescadero Marsh Natural Preserve<sup>39</sup>. Hunting and fishing are prohibited activities within PCCP as Pescadero Creek serves as vital habitat for steelhead trout (*Oncorhynchus mykiss*) and endangered coho salmon (*Oncorhynchus kitsutch*).

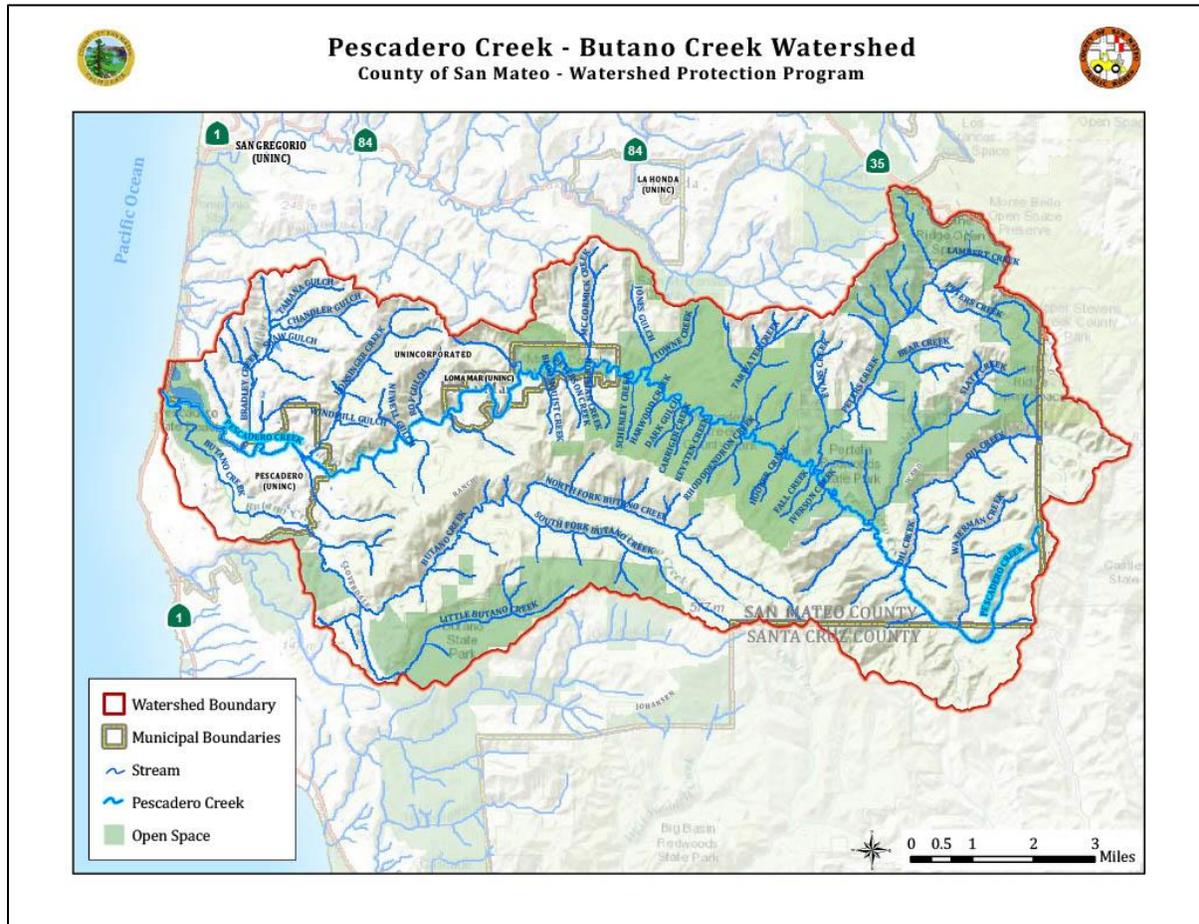


Figure 11 Pescadero-Butano Watershed in San Mateo and Santa Cruz Counties

Pescadero Creek was listed in 1998 as an Impaired Water Body per Section 303(d) of the Federal Clean Water Act due to sedimentation and siltation that has affected water quality and beneficial uses; primarily those that serve migration and spawning of coho and steelhead trout. Notable sources of excessive sediment input within the bounds of PCCP are primarily products of disturbance caused by past logging and land use practices. Failures along legacy logging roads, Humboldt style stream crossings, and skid trails within the drainages south of Pescadero Creek have aggravated sediment input into adjacent stream channels and drainage features over a historic timescale, see Figure 11.

<sup>39</sup> <https://www.coastsidestateparks.org/pescadero-marsh-natural-preserve>



*Figure 12 A failed, historic "Humboldt crossing" on an ephemeral stream, PCCP*

Moreover, storm occurrences during recent El Niño years of 1982/83, 1997/98, and 2015/16 likely exacerbated existing sediment sources and erosion in these areas, chiefly along lower elevation reaches where historic ground disturbance is more pronounced.

Multiple sediment reduction projects have been completed within PCCP between 2018 and 2020 that recognized failing legacy stream crossings along Old Haul Road as major sediment delivery sources for Pescadero Creek. Collectively, the mitigation projects addressed pending road failures that had the potential of delivering over 40,000 cubic yards of residual fill material to the main stem of Pescadero Creek.

See Table 3 for CalWater Planning Watersheds and APPENDIX A, Map 6 for a map of these planning watersheds that influence PCCP.

Table 3 CALWATER 2.2 Planning Watersheds across PCCP

CALWATER 2.2 Planning Watersheds		Regional Watershed	County	CALWATER 2.2 Super Planning Watershed	HUC 12		HUC 8	
2202.400302	Butano Creek	San Francisco Bay	SAN MATEO	Butano Park	180500060102	Butano Creek	18050006	San Francisco Coastal South
2202.400103	Teawater Creek	San Francisco Bay	SAN MATEO	Pescadero	180500060103	Lower Pescadero Creek		
2202.400104	Honsinger Creek	San Francisco Bay	SAN MATEO	Pescadero				
2202.400101	Slate Creek	San Francisco Bay	SAN MATEO	Pescadero	180500060101	Upper Pescadero Creek		
2202.400102	Peters Creek	San Francisco Bay	SAN MATEO	Pescadero				
2202.400106	Waterman Creek	San Francisco Bay	SAN MATEO	Pescadero				

### Soils

See Table 4 for the 29 soil map units within the property boundary of Pescadero Creek County Park as defined by the Natural Resources Conservation Service, an agency of the United States Department of Agriculture<sup>40</sup>. The majority of these map units indicate high erodibility and surface runoff.

PCCP is predominantly made up of *Hugo and Josephine* series loams and sandy loams of San Mateo County, which typically form below coniferous forestland from paralytic shale or sandstone parent material that sits at a depth of approximately 45-60 inches below the soil surface. Soils of these classifications typically have a Mean Annual Soil Temperature (MAST)<sup>41</sup> of 8 to <15 °C (46.4 to <59 °F) for mesic soils and 15 to <22 °C (59 to <71.6 °F) for thermic soils. Approximately 98.4% of the soils at PCCP have been classified as having mesic soil temperature regimes. While *Hugo* series soils are considered to be well or excessively drained, the steep slopes at PCCP do not always allow for water percolation into the soil profile. During periods of saturated conditions, predominantly through winter to early spring, the relatively shallow slopes of PCCP that sit upon sedimentary bedrock have a notable history of mass wasting, as evident by exposed bedrock outcrops across multiple drainages and in areas of intensive historic logging practices.

<sup>40</sup> <https://websoilsurvey.sc.egov.usda.gov/>

<sup>41</sup> [https://www.nrcs.usda.gov/wps/PA\\_NRCSConsumption/download?cid=nrcseprd1809831&ext=pdf](https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd1809831&ext=pdf)

Table 4 NRCS Soil Map Units within PCCP

Map Unit Symbol	Map Unit Name	Acres PCCP	Percent of PCCP
GbF2	Gazos loam, very steep, eroded	36.1	0.6%
GoF3	Gazos and Lobitos soils, steep and very steep, severely eroded	28.6	0.5%
GsE2	Gazos and Lobitos stony loams, steep, eroded	4.7	0.1%
HuC	Hugo and Josephine loams, sloping	109.4	1.8%
HuD	Hugo and Josephine loams, moderately steep	150.9	2.5%
HuD2	Hugo and Josephine loams, moderately steep, eroded	3.7	0.1%
HuE	Hugo and Josephine loams, steep	272.2	4.6%
HuE2	Hugo and Josephine loams, steep, eroded	9.7	0.2%
HuF	Hugo and Josephine loams, very steep	1512.7	25.5%
HvC	Hugo and Josephine loams, very deep, sloping	23.7	0.4%
HyC2	Hugo and Josephine sandy loams, sloping, eroded	36.3	0.6%
HyD2	Hugo and Josephine sandy loams, moderately steep, eroded	131.6	2.2%
HyE2	Hugo and Josephine sandy loams, steep, eroded	445.2	7.5%
HyF	Hugo and Josephine sandy loams, very steep	986.9	16.6%
HyF2	Hugo and Josephine sandy loams, very steep, eroded	1807.7	30.4%
HzC	Hugo and Josephine sandy loams, very deep, sloping	10.0	0.2%
HzD	Hugo and Josephine sandy loams, very deep, moderately steep	3.0	0.1%
LdC2	Lobitos loam, deep, sloping, eroded	3.5	0.1%
LlC2	Lobitos loam, sloping, eroded	29.0	0.5%
LlD2	Lobitos loam, moderately steep, eroded	48.8	0.8%
LlE2	Lobitos loam, steep, eroded	48.8	0.8%
LlF2	Lobitos loam, very steep, eroded	52.6	0.9%
Ma	Mixed alluvial land	17.0	0.3%
MdF	Mindego clay loam, very steep	40.8	0.7%
PpC2	Pomponio loam, sloping, eroded	9.7	0.2%
PpD2	Pomponio loam, moderately steep, eroded	30.1	0.5%
Rb	Rough broken land	66.0	1.1%
SaF2	Santa Lucia loam, very steep, eroded	17.0	0.3%
TxC2	Tunitas loam, sloping, eroded	7.5	0.1%
<b>Totals for Pescadero Creek County Park</b>		<b>5943.2</b>	<b>100.0%</b>

## Forest Resources

### Forest Types

Forested stands were classified by their dominant vegetation type and respective site quality classification for second growth redwood stands, which is a measurement of a redwood stand's productivity potential based on the heights of its dominant and codominant trees at 100 years old. In addition, the following occupation percentages are used to delineate forest types in Table 5.

*Table 5 Forest Type designation for PCCP*

Forest Type	Description
OGRW	Contiguous <b>Old Growth Redwood</b> stand that may also have old growth Douglas-fir components
RWII	<b>Redwood Site II</b> - occupied by 75% second growth redwood with the capability of growing a redwood tree 155-179 feet tall in 100 years
RWIII	<b>Redwood Site III</b> - occupied by 75% second growth redwood with the capability of growing a redwood tree 130-154 feet tall in 100 years
CHRW	<b>Conifer-Hardwood, Redwood Dominant</b> - over 50% and less than 75% redwood, the remainder being hardwood or douglas-fir
CHDF	<b>Conifer-Hardwood, Douglas-fir Dominant</b> - over 50% and less than 75% redwood, the remainder being hardwood or redwood
HW	<b>Hardwood</b> - greater than 50% hardwoods
DF	<b>Douglas-fir</b> - greater than 75% Douglas-fir

### Forest Stand Conditions

Dense second-growth redwood stands occupy much of the south portion of the property, predominantly at lower elevations within the various drainages that exist in this area of the park as tributaries to Pescadero Creek. Extensive land use practices, namely the intensive logging that occurred within the park during the late 1800s through the mid-20<sup>th</sup> century, have directly resulted in overly dense tree and shrub regeneration that prevent light penetration to the forest floor and promote high levels of competition. In conjunction with climatic and social changes to historic natural fire rates and cultural burning practices, the absence of frequent, low-intensity disturbance regimes has encouraged unhealthy forest conditions, horizontal and vertical fuel loading, and public safety hazards where dead, dying, or diseased trees pose a threat to park visitors and staff. See Figures 12 & 13 for representations of current conditions.



*Figure 13 High mortality conifer and hardwood stands post-fire, PCCP*



*Figure 14 Unburned, overly dense stand; high continuity of vertical and horizontal fuel loading, PCCP*

The forestlands throughout PCCP as a whole have been largely unmanaged in recent years apart from general maintenance around campsites and existing road infrastructure. The 2020 CZU Fire, while providing beneficial disturbance to some areas of the park, burned at low to moderate severities across much of the lower elevations throughout the property, causing high mortality rates but leaving behind standing dead trees and vegetation that will ultimately become a catalyst for dense ground fuels as they inevitably fall within the next 3-5 years. Needle drop from scorched lower canopies following the fire has added fine fuel composition to the forest floor in many parts of the burn area, which would facilitate a low-lying, low intensity fire band within a more adequately spaced forest. However, above ground-level vegetation needs to be selectively treated prior to any prescribed fire activities or to promote a more resilient environment prior to future natural fire patterns.

### **IFCC**

Impaired Forest Condition Class<sup>42</sup> (IFCC) is a subset of specific vegetation circumstances developed to classify, describe, and ultimately treat factors responsible for forest stands being outside the range of natural variability for their respective local environment. IFCCs used to evaluate PCCP are as follows:

- **IFCC-1: Dense redwood regrowth stands**

In the riparian areas of canyon bottoms, dense redwood sprouting following the clearcut of the early 20th century has served to maintain redwood composition within the canopy of regrowth stands, but the size and vigor of redwood canopy trees is variable, and dense pockets exist. Radial growth of regrowth redwoods is incongruously low relative to the apparent site quality and the species' potential.

- **IFCC-2: Advanced redwood regrowth engulfed by tanoak regrowth (redwood isolates)**

In proximity to swales and draws, where redwood dominated drainages prior to the clearcut, redwood sprout regeneration occurred in competition with hardwoods, such as tanoak. Tanoak sprouts successfully reached canopy positions, which essentially segregated the more up-slope redwood resprouts from the redwood dominated stands along streams, formulating pockets of isolated redwood regrowth and impairing the continuity of the conifer forest, the growth and vigor of redwood isolates, and overall forest resiliency.

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<sup>42</sup> Save The Redwood League: San Vicente Redwoods Management Plan

- IFCC-3: Dense upland hardwoods; displaced Douglas-fir**

IFCC-3 describes upland habitats mostly unsuitable for redwood that historically supported old growth Douglas-fir accompanied by larger diameter hardwoods. Sites within PCCP believed to have been historically dominated by Douglas-fir predominantly resided at higher elevations and uplands within the park, likely in proximity to Butano Ridge. In areas of PCCP that experienced high levels of Douglas-fir mortality, hardwood resprouting, primarily in tanoak, is vigorous and occurring in high densities. Long-term persistence of tanoak may be likely.
- IFCC-4: Conifer and brush encroachment into mature hardwood/conifer stands**

Through fire suppression, areas of mature mixed hardwood/conifer stands have developed a dense understory of shrubs, hardwoods, and Douglas-fir sprouts. In some areas, vigorous Douglas-fir have reached canopy positions and are shading out hardwoods as their crowns expand. These areas exhibit extremely high fuel loads. Fire hazard is enhanced by presence of ladder fuels.
- IFCC-5: Dense post-wildfire redwood stump sprout regeneration**

In burned areas, redwood stump sprouts regenerate at prolific rates creating a high density of stump sprout clumps. Untreated stump sprout clumps experience a period of competitive self-thinning that inhibits the potential growth of individual sprouts and may influence the growth of structurally unsound redwoods on top of stumps that cannot physically support larger regrowth. Areas with dense post-wildfire redwood stump sprout regeneration often exhibit decelerated growth due to competition for resources, ultimately creating a dense understory comprised of stressed saplings more conducive to carrying future wildfire into the overstory canopy.

### Vegetation Communities/Alliances

The California Native Plant Society's Manual of California Vegetation, Second Edition <sup>43</sup> is a system for classifying and describing vegetation alliances or repeating patterns of plants across a landscape as it pertains to the effects of environmental factors, such as climate or disturbance. The classification system developed in the Manual of Vegetation is intended to be utilized to describe vegetation in a consistent manner across the state. Defined alliances and associations represent predictable patterns that result from specific plant interactions with specific environments. Vegetative communities also consider species composition,

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<sup>43</sup> <https://vegetation.cnps.org/>

structure, and environmental conditions; however, the Manual of Vegetation further identifies specific classifications.

### **Redwood Forest & Woodland Alliance**

PCCP is principally characterized by the *Redwood Forest & Woodland Alliance*, as defined by the California Native Plant Society in the Manual of California Vegetation, Second Edition<sup>44</sup>. The *redwood forest and woodland alliance* describes forested stands that are occupied by 50% relative cover of redwood in the tree canopy, or >30% relative cover with other conifers such as Douglas-fir (*Pseudotsuga menziesii*) or with a lower tier of hardwood trees such as tanoak (*Notholithocarpus densiflorus*). The forest at PCCP contains all the above membership scenarios.

Commonly, redwood dominant stands will contain a level of Douglas-fir, particularly where shallower, more mesic soil conditions occur along ridges and south facing aspects. At higher elevations within the property, Douglas-fir is commonly intermixed with dense hardwood systems mainly comprising tanoak, live oaks, and Pacific madrone (*Arbutus menziesii*). Redwood is still present in these areas; however, it is mostly localized to clusters of second growth, with the exception of scattered old growth individuals and small groves of tall, old redwood near the headwaters of Rhododendron Creek.

The distinction between Douglas-fir dominant systems and redwood dominant systems in areas where the two conifer species intermix is not easily defined as redwood occurs throughout the park at all elevations and aspects and is virtually never secondary to Douglas-fir at any considerable level. Areas that host these vegetation dynamics are more accurately defined as mixed conifer or mixed evergreen forest, as denoted in the 1983 Natural Resources Management Program, yet are likely the product of the extensive logging that took place across the park which provided a catalyst for successional ecological processes that accommodate Douglas-fir and hardwood recruitment.

### **Douglas-fir Forest & Woodland Alliance**

Membership rules that define the *Douglas-fir Forest & Woodland Alliance* require a >50% relative cover of Douglas-fir in the tree canopy and successful reproduction dynamics; conditions that are not generally observed across the property outside of heavily disturbed areas or portions of the park where conifer encroachment on grasslands is pronounced. Additionally, the 2020 CZU Fire caused high mortality levels of Douglas-fir across the southern portion of the property and no evident signs of Douglas-fir regeneration have been observed following the event. It is more likely that the redwood component in these areas will remain in dominant canopy positions.

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<sup>44</sup> <https://vegetation.cnps.org/alliance/93>

### **Shrubland Communities**

A very small proportion of shrubland, or what may be referred to as coastal scrub, exists within the northern portion of the property and predominantly comprises coyote brush (*Baccharis pilularis*) dominant systems that occur in mesic transitional zones between conifer and grassland communities and openings within mixed evergreen forests or oak woodlands. Other species common within this community are blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum*), bracken fern (*Pteridium aquilinum var. pubescens*), sticky monkey flower (*Diplacus aurantiacus*), elderberry (*Sambucus spp.*), coffeeberry (*Frangula californica*), and mugwort (*Artemisia douglasiana*).

### **Grassland Communities**

In the upper reaches of Tarwater Creek and Evans Creek within the boundary of PCCP, a portion of grassland, approximately 150-160 acres in size, occurs. Grasslands, or coastal prairies, are dominated by a nearly continuous cover of grasses and herbaceous species with little to no tree and shrub occupancy. Native grasslands can support a highly diverse composition of grasses, wildflowers, and sensitive species, offering unique habitat characteristics. Grasslands that lack wildfire often succumb to encroaching conifers, shrubs, and invasive species, such as thistles and bromes.

### **Invasive Species**

#### **French broom**

French broom (*Genista monspessulana*) is a problematic invasive species due to its ignitability, ability to carry fire into tree canopies, shading out seedlings, and replacing the native plants and forage species. This species has a large seed bank and re-sprouts readily from the root after cutting, freezing, and fire (California Invasive Plant Council, Cal IPC, 2020). Cal IPC recommends pulling French broom to remove the entire plant including its roots to eliminate resprouting. The UCWRIC recommends the following chemical treatments that may be applied: Glyphosate (Roundup and Roundup Pro Max), Imazapyr (Arsenal, Chopper, Habitat, Stalker, and Polaris), and Triclopyr (Garlon 3A and Garlon 4)<sup>45</sup>. Application methods may vary between chemicals; however, the UCWRIC recommends cut stump and basal bark application immediately following the cut. The removal of this species is a priority due to its increased fire hazard and adverse impacts to habitat and aesthetics. Additional information about French broom control and treatments are located on the Cal IPC website. See the attached link for additional information and to monitor changes in French broom treatment recommendations:

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<sup>45</sup> DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.  
[https://wric.ucdavis.edu/information/natural%20areas/wr\\_G/Genista.pdf](https://wric.ucdavis.edu/information/natural%20areas/wr_G/Genista.pdf)

<https://www.cal-ipc.org/plants/profile/genistamonspessulana-profile/> and [https://wric.ucdavis.edu/information/natural%20areas/wr\\_G/Genista.pdf](https://wric.ucdavis.edu/information/natural%20areas/wr_G/Genista.pdf)

### Cape Ivy

Cape Ivy (*Delairea odorata*) is an invasive species that occupies over 500,000 acres in California, primarily occurring in coastal forests from Del Norte County to San Diego County. The invasive was introduced in California in the 1950s as an ornamental species. Cape ivy readily smothers other vegetation in its proximity, forming a solid cover over neighboring plants and blocking sunlight out. Large portions of cape ivy can easily take over plant and animal habitats, rendering protected natural reserves useless when occupied by the invasive. Cape ivy contains pyrrolizidine alkaloids such as retronecine that are known to be toxic to some insects and wildlife. Due to its shallow root system, cape ivy can contribute to substantial stream bank erosion when riparian areas are infested and colonized by the plant. Removal of cape ivy is difficult due to fragmenting of plant parts when pulled and its ability to grow from any remaining fragment of the invasive. Management is timing-based, as the plant produces rapid growth from February to June and experiences some dieback due to lack of constant water during July to October. Cal IPC recommends management and control of cape ivy can be physical, biological, or chemical. Physical management involves the labor-intensive manual removal of both invasive and native plant material to gain visual and physical access to cape ivy stems. Roots and stems must be pulled from the ground by hand or with mini-rakes or hoes. Cape ivy tissue should not be put through a chipper, as it is likely to result in the spread of the invasive. Biological control of cape ivy is possible but still in development. Moth and beetle larvae, and root-, stem-, and seed-feeding insects show promise as biocontrol agents of cape ivy but are not fully accepted as effective resources for control. Chemical control involves the use of herbicides to target the invasive, primarily a foliar-sprayed mixture of 0.5 percent glyphosate (as Roundup) + 0.5 percent triclopyr (as Garlon 4). More information and recommendations on management of cape ivy can be found at the Cal IPC link provided:

<https://www.cal-ipc.org/resources/library/publications/ipcw/report41/>

## FIELD INVESTIGATIONS, CURRENT CONDITIONS, and DISCUSSION OF MONITORING RESULTS

### Forest Trend Monitoring

#### *Subwatershed Stand Examination*

The purpose of the Subwatershed Stand Examination (SSE) form is to gather a broad set of Forest Trend Plot (FTP) data through a 500' x 500' systematic random sampling system utilizing one 1/5<sup>th</sup> acre fixed plot with each assessment unit across a set of broad, pre-selected forest types. The purpose of gathering “snapshots” through forest trend monitoring establishes a set of qualitative analyses and structural tree measurements for a point in time that can be remeasured for a comparison of changing vegetative alliances, stand composition, and forest health. In some cases where a high degree of homogeneity exists, inferences about forest conditions can be made.

The property boundary of Pescadero Creek County Park was divided into 64 subwatershed units by utilizing natural land features and existing infrastructure to compartmentalize assessment areas and ensure representative coverage of the park. Subwatershed units were assessed by establishing an FTP within each visited subwatershed and conducting quantitative and qualitative analyses of stand features such as forest type and site quality, recent wildfire burn information, plot photos, tree count, tree measurement, radial growth measurement, and understory vegetation.

#### Forest Type and Site Quality

Forested stands are classified by their dominant vegetation type and respective site quality classification, which is a measurement of a stand's productivity potential based on the heights of its dominant and codominant trees at 100 years old. In addition, the frequency of dominate tree species by percentages are also used to delineate forest types in Table 5 above.

#### Recent Wildfire Burn Information

Areas that were examined within the burn scar of the 2020 CZU Fire are dynamic and provide valuable insight into the variability of existing and former stand conditions that provided catalysts for low, moderate, and high severity burns. Evaluations in these areas include valuation of fire severity, limb, bole, and stump resprouting on redwood, information on height, vigor, and vegetative response to the CZU Fire.

#### Plot Photos

Five photos are taken at each plot in cardinal directions from plot center including one overhead photo to capture existing canopy. These photos may be recreated in future visits to each plot center or cataloged for long-term monitoring efforts.

### Tree Count

Seedlings and saplings from 1 – 12 inches diameter at breast height (DBH) within the FTP are tallied by living status providing an estimation of stand densities, volume, growth rates, and mortality trends associated with each forest type.

### Tree Measurements

Species, DBH, and tree heights (every 4<sup>th</sup> tree) are taken for all trees greater than 12 inches DBH within an FTP.

### Radial Growth Measurements

Radial tree core samples are extracted from representative trees within an FTP and closely examined for tree or stand age, historic wildfire occurrence, growth rates, history of suppression and stand release, major geologic events, and confirming harvest history.

### Understory Vegetation

Understory vegetation composition is broadly assessed in major species groups as a baseline to see future trends and utilized to potentially stratify FTP data sets to see clear trends for data analysis.

## Watershed Monitoring

### *Subwatershed Restoration Priority*

The Subwatershed Restoration Priority analysis was developed to broadly assess forested *Conditions* by ownership, based on PCCP goals at a landscape scale, and prioritize where restorative treatments should be implemented. These *Conditions* are Impaired Forest Class Condition, Fire Resiliency, Sediment Input Potential, Sudden Oak Death, Marbled Murrelet Habitat Suitability, and Invasive Species. In order to implement restorative treatments based on *Conditions*, *Criteria* such as Treatment Access, Value, and Public Access must also be answered. Each *Condition* and *Criteria* are given a score between 1 and 5, where a score of 1 represents a high priority subwatershed, then a weighted average is calculated for both the *Conditions* and *Criteria* to ultimately calculate an overarching Restoration Priority Level (RPL) score for each visited subwatershed, as broken down below. A description of the considerations for each of the *Conditions* and *Criteria* are described here:

### Conditions

1. Impaired Forest Condition Class (IFCC) – IFCC is a qualitative indicator developed by Save the Redwood League, foresters, and other scientists that broadly defines an impaired forest condition. The IFCC's are not a part of the weighted calculation to determine the RPL but are used to identify key conditions that appear impaired by prolonged and extensive drought, intensive land use and development, wildfire suppression, forest pathogens, and climate change.

2. Fire Resiliency (FR) – Considers what will be the condition of a subwatershed’s resiliency to wildfire in the next 15 years based on a combination of current and expected factors, including but not limited to trees per acre, fuel load, tree mortality, and slopes. A number 1 – 5 is assigned to represent each subwatershed, with 1 being the highest priority for treatments to increase fire resiliency in the subwatershed. A 5 would represent a subwatershed where the combination of trees per acre, fuel load, and other forest factors would most likely NOT exacerbate wildfire conditions resulting in abnormally increased burn severity and tree mortality, indicating that vegetative treatments are not a priority within the subwatershed.
3. Sediment Input Potential (SIP) – Considers what is the potential for sediment input from a subwatershed into Class I or Class II watercourse(s) within the next 15 years due to exacerbated conditions resulting from historic activities, current conditions such as wildfire, roads, or other natural or unnatural disturbances. A number 1 – 5 is assigned to represent each subwatershed, with 1 representing a subwatershed that has a high potential for sediment input into a higher order watercourse resulting from historic activities, current conditions such as wildfire, roads, or other natural or unnatural disturbances. A 5 would be a watershed that does NOT exhibit exacerbated sediment input potential.
4. Sudden Oak Death (SOD) – Considers what is the condition of the forest as it relates to sudden oak death? A number 1 - 5 is assigned to subwatershed to indicate the presence or impact of SOD in a subwatershed, with 1 being the highest priority for treatments that can improve forest health as it relates to SOD infection. A five would be a subwatershed with VERY LITTLE or NO indication of SOD.
5. Marbled Murrelet Habitat Suitability (MMHS) – Considers what is the potential of developing additional suitable habitat for marbled murrelets in each subwatershed in the next 50 years. A number 1 – 5 is assigned to each subwatershed, with 1 being the highest priority for treatments that would promote old-growth characteristics and increase the development of marbled murrelet habitat in the next 50 years. A 5 would be a subwatershed with VERY LITTLE potential to develop additional forest stand structure, such as a subwatershed that burned at a high severity that leads to the loss of limbs and existing structure.
6. Invasive Species (IS) – Considers what is the level of invasive species occupation in each subwatershed from more prevalent exotics such as French broom or pampas grass. A number 1 - 5 is assigned to each subwatershed, with 1 being the highest

priority for treatments to reduce the abundance of invasive species. A 5 would be a subwatershed with VERY LITTLE or NO indication of invasive species occupation.

Items two through five are totaled, and an average is generated for *Condition*. Item one acts as an additional factor of consideration for what types of treatments should be considered for a treatment unit.

### Criteria

1. Treatment Access for Restoration (A) – Considers if there is reasonable and permittable existing infrastructure providing access into the subwatershed to conduct restorative treatments and evaluates the feasibility for varying types of treatments, such as mechanical, manual, or prescribed burning. A number 1 – 5 is assigned to each subwatershed, with 1 indicating a subwatershed has the best access and feasibility to conduct restorative treatments. A 5 would represent a subwatershed that does not have existing infrastructure within or adjacent to it.
2. Value (V) – Considers what the value of conducting restorative practices in each subwatershed by treating the conditions above. This category should consider the scale of benefit as it relates to inputs to achieve condition restoration; including but not limited to habitat restoration value and resiliency, regional resource related goals, time, money, permitting, research, and potential collaborations. A number 1 - 5 is assigned to each subwatershed, with 1 indicating high value to conduct restoration treatments in a subwatershed.
3. Public Access (PA) – Considers the presence and absence of trails, roads, or camps in each subwatershed providing ease of access for the public to interact with restorative treatments conducted in the subwatershed. A number 1 – 5 is assigned to each subwatershed, with 1 representing a subwatershed that has high public interactions and would provide direct access for viewing from trails, roads, or a camp to restorative treatments. A 5 would represent a subwatershed that has little to no public access.

Items 1 through 3 are totaled, and an average is generated for *Criteria*.

A final average between *Conditions* and *Criteria* is generated providing guidance on treatment prioritization.

## Forest Stand Structure

### *Subwatershed Stand Examination Results*

38 Forest Trend Plots (FTPs) were installed per the Subwatershed Stand Examination section. Recognizing this is a low sample size, it is important to understand that the purpose of trend monitoring is predominantly for comparison with future measurements and less so related to forest wide predictions. It is possible that where a high degree of homogeneity exists among stratified forest types that some indication of greater trends may have statistical significance.

Although there are several things that can be considered with the resulting data, the results and discussion section will focus on current trends in forest stand structure, tree mortality from the 2020 CZU Fire, a comparison of burned and unburned small diameter tree mortality, understory vegetative response and tree sprouting from the CZU Fire, conifer increment coring, and potential future fire patterns.

### Current Trends in Forest Stand Structure

The difference in forest stand structure i.e., the number of trees and their sizes, play an important role in considering restorative treatments to improve habitat quality. Figure 14 shows PCCP's four major forest types CHRW, OGRW, RWII, and RWIII (refer to Table 4) and their respective live trees per acre (TPA) by diameter class and representative species. The species codes are as follows: LIDE3 represents tanoak, PSME represents Douglas-fir, QUAG represents live oak, and SESE3 represents redwood.

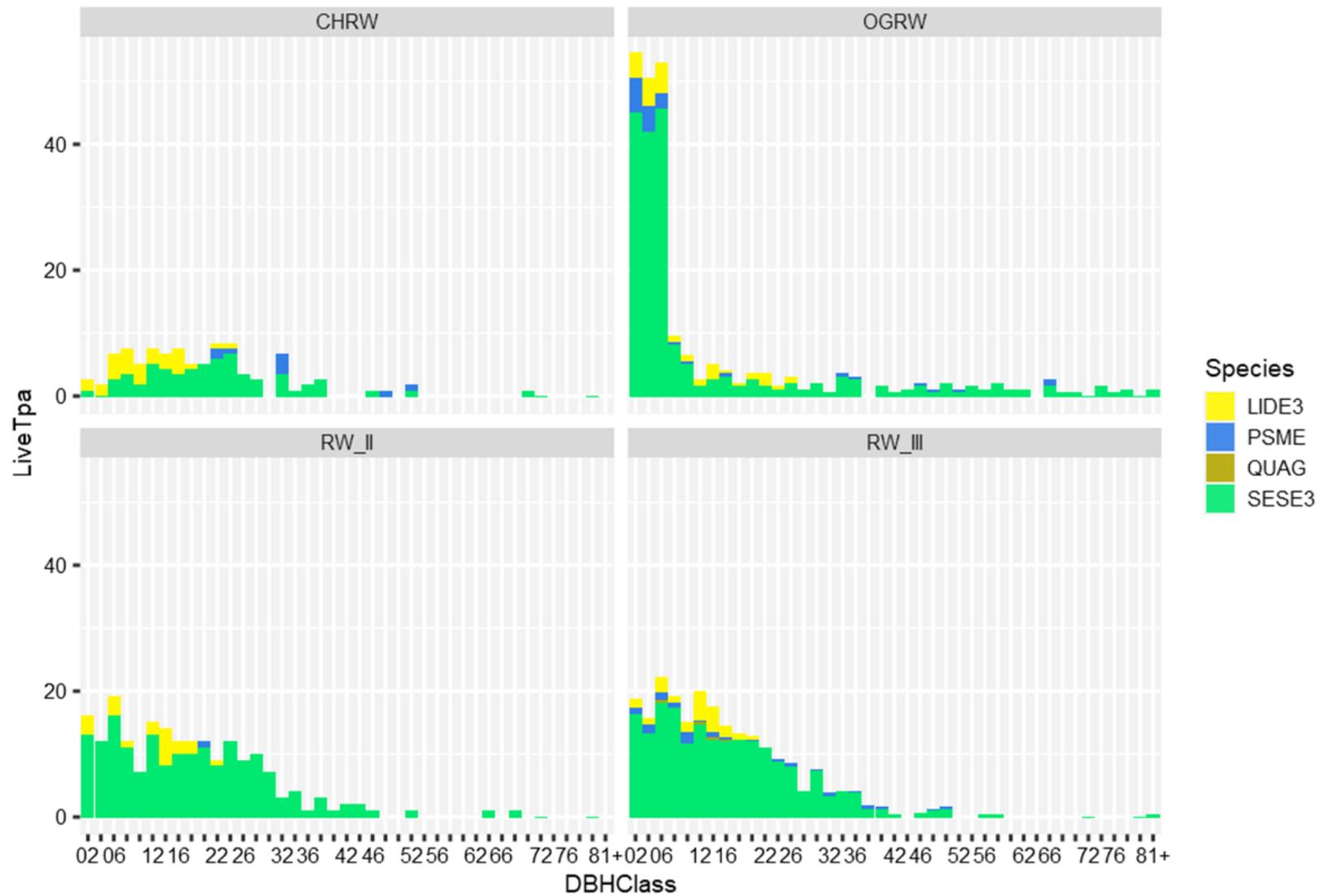


Figure 15 Live Trees per Acre (TPA) by Diameter (DBH) Class within each forest type

Figure 14 shows that that there are greater components of smaller and larger diameter trees per acre in the Old Growth Redwood (OGRW) forest type than in Redwood Site II (RWII) and Redwood Site III (RWIII) stands. RWII and RWIII are dense redwood regrowth forest types regenerating from historic clear-cut activities.

The OGRW stand is much older and most likely experienced more frequent fire at varying levels of burn severity. This stand retained the largest and healthiest trees, growing their crowns taller, creating a separation from significant burn severity impacts from more frequent low intensity understory wildfires. It appears likely that the high amount of regeneration in the understory is the result of additional sunlight hitting the forest floor with significant crown separation between the two classes of trees in OGRW (small diameter vs. large diameter trees).

Sprouting stands of RWII and RWIII show high frequencies of redwood low and mid-range diameters that have not been impacted by significant fire severity or other disturbances since clear-cut activities. The result is a very dense forested stand with high levels of competition for nutrients and water. This forest stand, without naturally occurring structural changes from wildfire or other disturbances, will take an extensive amount of time to generate stand characteristics similar to OGRW.

Figure 15 shows that these same forest stands represented by live basal area<sup>46</sup> indicate a difference between annual forest growth concentrated on a dense stand of second growth redwood (RWII and RWIII) for many years without disturbance vs. a stand of old growth redwood (OGRW) with a history of disturbance where forest growth has been concentrated on the larger trees over time.

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<sup>46</sup> Basal Area is the cross-sectional area of trees at breast height (1.3m or 4.5 ft above ground). It is a common way to describe stand density. [https://en.wikipedia.org/wiki/Basal\\_area](https://en.wikipedia.org/wiki/Basal_area)

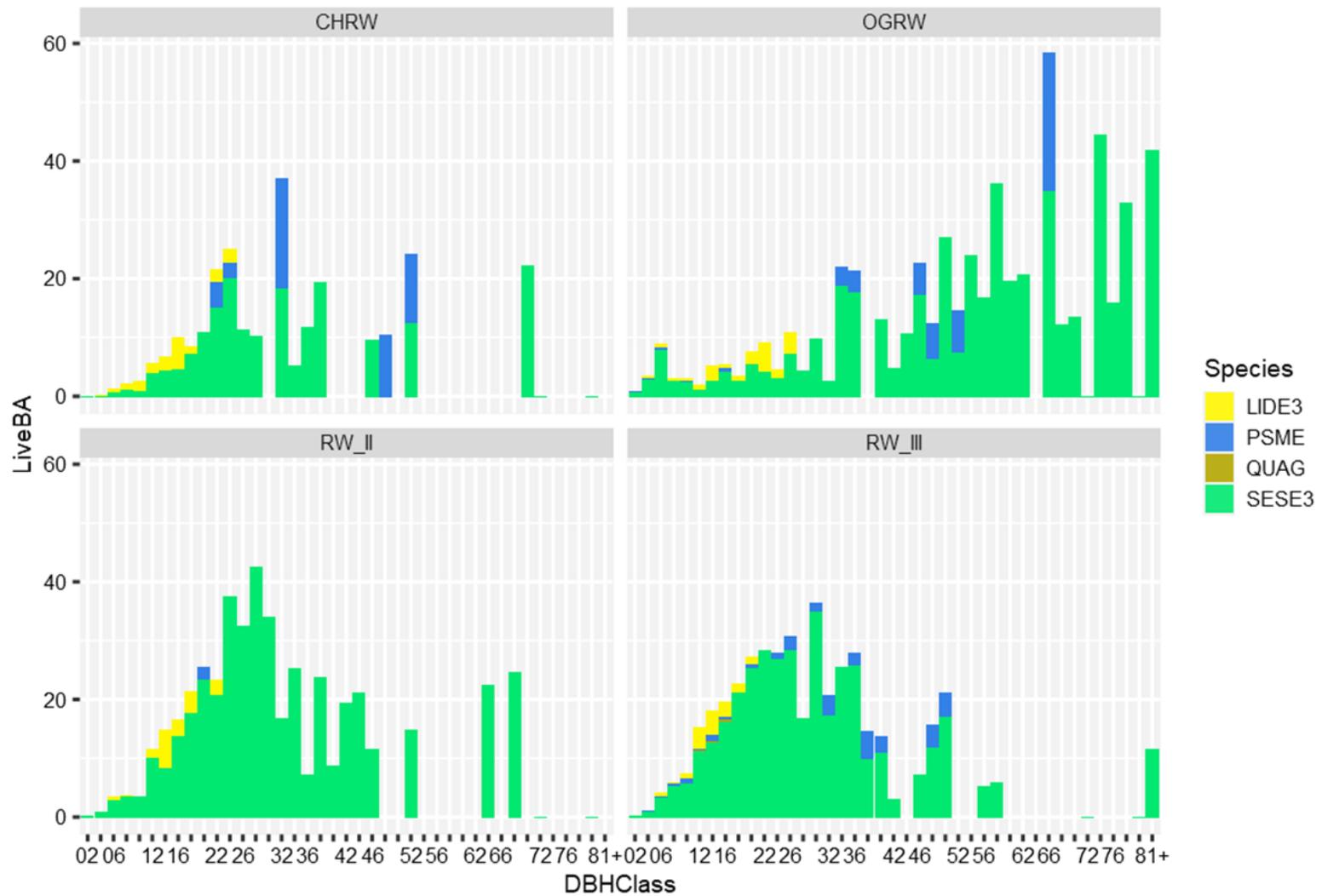


Figure 16 Live Basal Area (BA) by Diameter (DBH) Class within each forest type

These forest structures are completely different and restorative treatments could be applied to reduce redwood density and allow for growth to be applied to larger trees as a first step toward reversing the actions from clear-cut harvesting and restricting fire to improve habitat quality.

### Tree Mortality from the CZU Wildfire

Forest trend data indicates a possible correlation between severity and tree mortality. See Figures 16, 17, and 18.

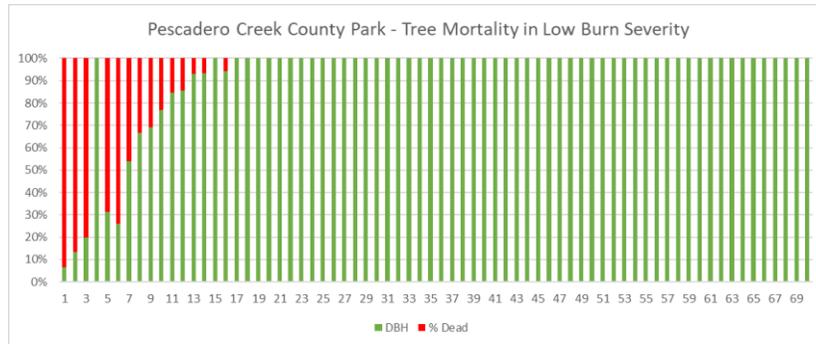


Figure 17 Tree Mortality in Low Burn Severity Forest Trend Plots

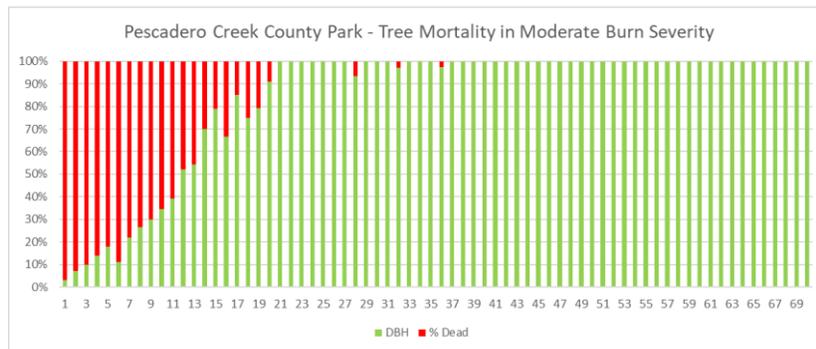


Figure 18 Tree Mortality in Moderate Burn Severity Forest Trend Plots

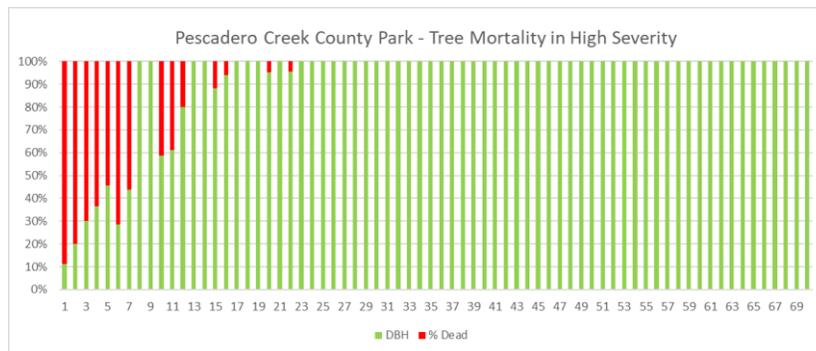


Figure 19 Tree Mortality in High Burn Severity Forest Trend Plots

Figures 16, 17, and 18 show all FTP plots in the burn area stratified by burn severity without consideration of forest type. Field observations and trend data correspond well to an increase in tree mortality based on increased severity regardless of forest type, albeit there is a greater level of survival in mid-range and large diameter redwoods. Figure 18 as not representative of field observations on PCCP or other areas of the 2020 CZU Fire area that indicated a greater level of tree mortality in high burn severity. This difference in PCCP data and field observations is likely due to the relatively limited land area within PCCP classified as high burn severity.

### Comparison of Burned and Unburned Small Diameter Tree Mortality

Considering forest stand structure and tree mortality, another interesting trend seen in the FTP data set was a similar level of percent mortality in trees less than 6 inches in diameter whether they expired from conditions related to 2020 CZU Fire severity or no fire at all. See Table 6 for the results.

*Table 6 Tree Mortality in Trees Less than 6 Inches in Diameter*

Forest Type	In Burn % Mortality Averages		Out of Burn % Mortality Averages	
	DBH<6		DBH<6	
	Totals Trees Per Acre	% Avg	Totals Trees Per Acre	% Avg
RWIII	17.3	0.54	23.4	0.55

In RWIII there were seven plots in the CZU Fire burn area and nine plots out of the burn area. Although more data is needed to evaluate the validity of these findings, it appears that whether the stand was burned or not, that there may be a correlation indicating that mortality related to wildfire and mortality related to suppression in a dense forest stand appear to exhibit similar percentages of mortality. It is noted that in some cases trees less than 6 inches in diameter may have already been dead at the time of the CZU Fire. A more critical evaluation of these trees occurred to determine whether outside indicators for tree mortality resulting from wildfire i.e., cambial death, crown scorch, root damage, and percent crown sprouting, were the cause of death<sup>47</sup>.

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<sup>47</sup> Auten, (2011). Damage and Mortality Assessment of Redwood and Mixed Conifer Forest Types in Santa Cruz County Following Wildfire. 2011 Redwood Symposium. [https://www.fs.fed.us/psw/publications/documents/psw\\_gtr238/psw\\_gtr238\\_347.pdf](https://www.fs.fed.us/psw/publications/documents/psw_gtr238/psw_gtr238_347.pdf)

## Final Points – Forest Stand Structure (FSS)

Evaluating the current conditions of the stand through gathering trend data and field observations indicate that stands that were clearcut (RWII, RWIII) are very different from the predominantly uncut Old Growth stand (OGRW). The following sub-points are not only to indicate what appear to be trends in the FTP data but also pose possible research questions where more data and analysis could be conducted.

### *Sub-Point One - FSS*

It appears that there is a trend indicating a much higher frequency of smaller trees in OGRW based on Table 6. It is likely that the large gaps between the crowns and a reduced amount of mid-range diameter trees allow more sunlight to reach the forest floor generating small cohorts of trees. A low to moderate intensity fire would have a reduced chance to reach the crowns of old growth trees in this kind of stand structure and likely a greater chance of reaching tree crowns in the second growth stands that show more vertical connectivity among diameter classes (RWII, RWIII).

### *Sub-Point Two - FSS*

Increased levels of tree mortality are seen as fire severity increases in Figures 16 & 17. Additional trend monitoring data taken from other portions of the 2020 CZU Fire burn area indicate that mortality spikes higher in larger trees than trend monitoring shows in Table 6. In addition, it appears that there is a correlation in percent tree mortality for smaller diameter trees that were suppressed and died due to forest densities and smaller trees that died as a result of burn severity in the CZU Fire, see Table 6.

## Fire History

### *Post-Disturbance Assessment*

Evaluating areas following recent disturbance provides critical insight into the conditions and factors responsible for the scale, severity, and ecological implications of the event.

The 2020 CZU Fire across PCCP and the Santa Cruz Mountains produced a highly variable array of severities and mortalities in forested areas. PCCP, being at the northern extent of the burn scar, offers a unique perspective on the fire's behavior and residual effect it had on the landscape in this region.

### *Radial Growth Measurements*

An 18" *Haglof* increment corer was used to core approximately 70 redwood trees across the 38 FTPs. Redwood radial tree cores confirmed previous harvest history dates across the landscape and predominantly correspond with the 1982 San Mateo County Parks Forest Management Plan.

In many areas of southern San Mateo County that experienced clear-cut harvesting, numerous small to mid-range diameter trees were left behind and were historically

outcompeted by their larger old growth cohabitants. Although many of these mid-range diameter trees were of similar ages as their relatives, they were suddenly left without competition and *released* adding copious amounts of tree volume to remaining trees. See Figure 19 for a photo of a tree in Upper Keyston from FTP #3 representing one of these *release* trees, further described below in the Evidence of Fire Patterns section, and Figure 20 for the increment core from the same *release* tree.



*Figure 20 "Released" Redwood Tree at Upper Keyston Creek*



*Figure 21 Radial Core Sample Depicting Growth Release in Redwood at Upper Keyston Creek*

Figure 20 shows significantly increased tree growth. Counting tree rings from where the sapwood begins (white wood at the bottom of the picture, arrow A) to the first dark line where the wood looks a bit brown and deteriorated (arrow B) constitutes approximately 78 years and represents a significant portion of the tree core and explosive volume growth

(~11-12 inches in length). The beginning of this explosive growth approximately coincides with the completion of the clear-cut harvest in Upper Keyston watershed in ~1943. The next ~69 years of this tree core, beginning from the deteriorated brown wood through a series of blackened tree rings (arrow C), ends at the approximate date of 1874 and represents a much slower growth period. Of additional note, the blackened portion of tree rings indicate a historic wildfire that may have occurred in both East Parke Gulch and Upper Keyston areas in approximately 1874 and may be a date seen in other scientific literature indicating that this fire could have been more expansive.<sup>48 49</sup>

The next step in understanding the exponential amount of forest growth on the *release* tree is recognizing that each acre of forestland only grows so much wood volume each year; similar to thinking about how many cows one acre of grassland might support or how much broccoli can be produced from one acre of cropland in one year. There is only so much resource availability that each system must compete for. This premise is no different in the forest system, a kind of cubic volume of wood growth is essentially sliced up and placed on the stand of trees that occupies this acre each year. Forestland with many trees per acre competes for this cubic volume per acre growth having to share among many more individuals making it less vigorous and resilient. Forestland with less trees per acre does not have to compete as much for this cubic volume applying this volume of growth to fewer individuals per acre, resulting in a more vigorous growth and a healthier forest stand with increased volume per tree. Spreading this growth to fewer large trees per acre can promote expedited growth of the larger trees and, with appropriate disturbance such as low severity wildfire, assist in their development towards old growth characteristics and additional suitable habitat for the marbled murrelet.

### Evidence of Fire Patterns

Refer again to Figure 19 showing a picture of the *release* tree. Towards the top of the *release* tree there is one large limb, indicated with an arrow, which is most likely older than the rest. This remnant limb likely survived a wildfire event where the cambium surrounding the limb was not killed and it was able to resprout needles and continue photosynthetic processes. The rest of the limbs in the tree crown most likely burned at a severity level where the cambial layers of the limbs did not survive and could not reproduce needles, limbs died and self-pruned detaching themselves from the tree, and a new tree crown developed from bole sprouting off the main cylinder of the tree into new tree limbs.

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<sup>48</sup> Stephens, S. L., & Fry, D. L. (2005). Fire history in Coast Redwood stands in the northeastern Santa Cruz Mountains, California. *Fire Ecology*, 1(1), 2–19. <https://doi.org/10.4996/fireecology.0101002>

<sup>49</sup> Jones, Gregory (2014). Master's Thesis, San Jose State University. Coast Redwood Fire History and Land Use in the Santa Cruz Mountains, California. Page 30. [https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=8016&context=etd\\_theses](https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=8016&context=etd_theses)

Essentially, the tree reinvented its crown following a severe wildfire. Similarly, the smaller tree in the right of Figure 19, that looks like a pipe cleaner, is in a much earlier stage of reinventing its tree crown following the more severe impacts to its tree crown in the 2020 CZU Fire.

The old, large limb and an entirely new younger tree crown on the *release* tree indicates that a previous historic fire likely had greater burn severity in this location than the CZU Fire. Other trees were seen in the upper portions of several other watersheds toward Butano Ridge with similar historic characteristics indicating the possibility of higher burn severities from a historic fire. The Santa Cruz Mountains are known for east winds at particular times of the year which may have fueled a more severe historic fire versus the backing fire predominantly seen in PCCP with prevailing winds blowing from the northwest during the CZU Fire. The message is that the forest has most likely burned with greater severity than the 2020 CZU Fire; an important factor when considering appropriate treatments for habitat resiliency at PCCP.

#### Understory Vegetative Response and Tree Sprouting from the CZU

Recent wildfire trends indicate that the vegetative response from the forest floor increases as severity increases. It should also be noted that the time frame in which this information was gathered was approximately 5-6 months following the 2020 CZU Fire. Based on other properties that are currently being evaluated by ARC following the CZU Fire, it can be expected that the vegetative responses are on the increase. In that, areas occupied by *Ceanothus thyrsiflorus* (blue blossom), along with many other basal sprouting species will increase in the understory with each year that passes in the recovering burn area until a tree crown reestablishes over them. See Figure 21 for trend monitoring results for PCCP CZU Fire vegetative response by burn severity.

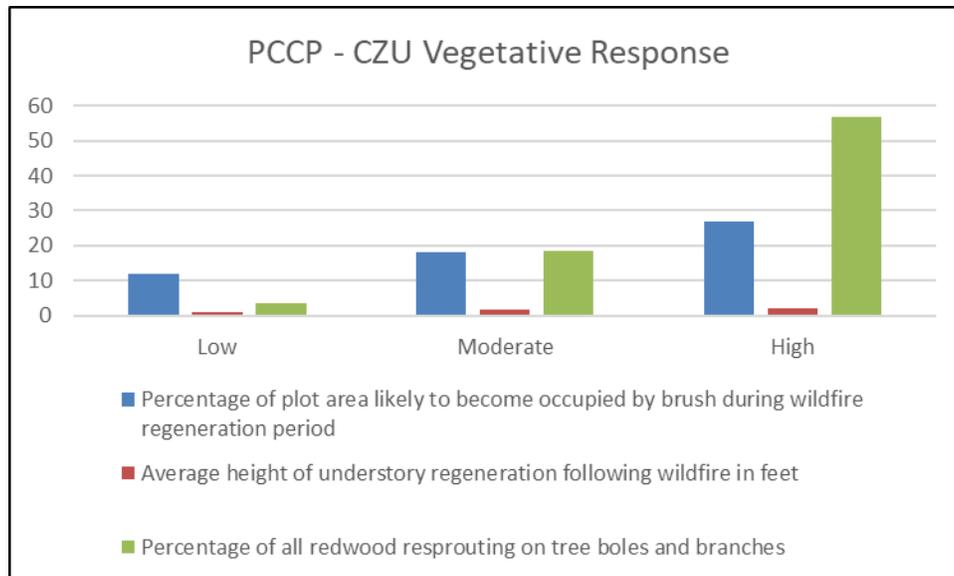


Figure 22 Vegetative Response at PCCP post-CZU Fire

Notably, with the vegetative response in the burn area, time is of the essence to select prioritized areas to treat. Some areas in the upper watershed with the highest severities will become extremely difficult to prepare or conduct treatments in with *Ceanothus* overtaking the understory and dead hardwood and Douglas-fir trees falling into the *Ceanothus*. These areas, predominantly moderate to high severities, will most likely become somewhat impenetrable to ground based analysis in 7-10 years. This will especially occur where leaves and needles on trees were completely consumed, and tree mortality was high allowing the maximum amount of sunlight to contact the forest floor for regeneration.

#### Lockheed Wildfire vs. CZU Complex Wildfire

See Figure 22 illustrating the burn area perimeter from the 2009 Lockheed Fire and then immediately next to it, the 2009 Lockheed Fire burn footprint is outlined in red within the 2020 CZU Fire footprint. Burn severity levels from within the Lockheed Fire were noted to be very high during the CZU Fire due to the increased regenerative vegetative response that occurred over ~12 years following the Lockheed Fire. The CZU Fire burned through this area very fast and very hot, leaving significant amounts of white ash that could be seen in some of the first infrared analyses completed by CAL FIRE following the CZU Fire. The condition of the Lockheed Fire burn area, other than deep in the drainages, were predominantly comprised of many dead trees and significant amounts of *Ceanothus* and other various understory species that had resprouted following the 2009 Lockheed Fire event. Many areas outside the Lockheed Fire footprint in high severity areas of the CZU Fire are on track for a similar regeneration, priming these areas for a potentially fast-moving intense fire in the next few decades. This is a key consideration in prioritizing and prescribing treatments as part of the PCCP Climate and Habitat Resiliency Plan.

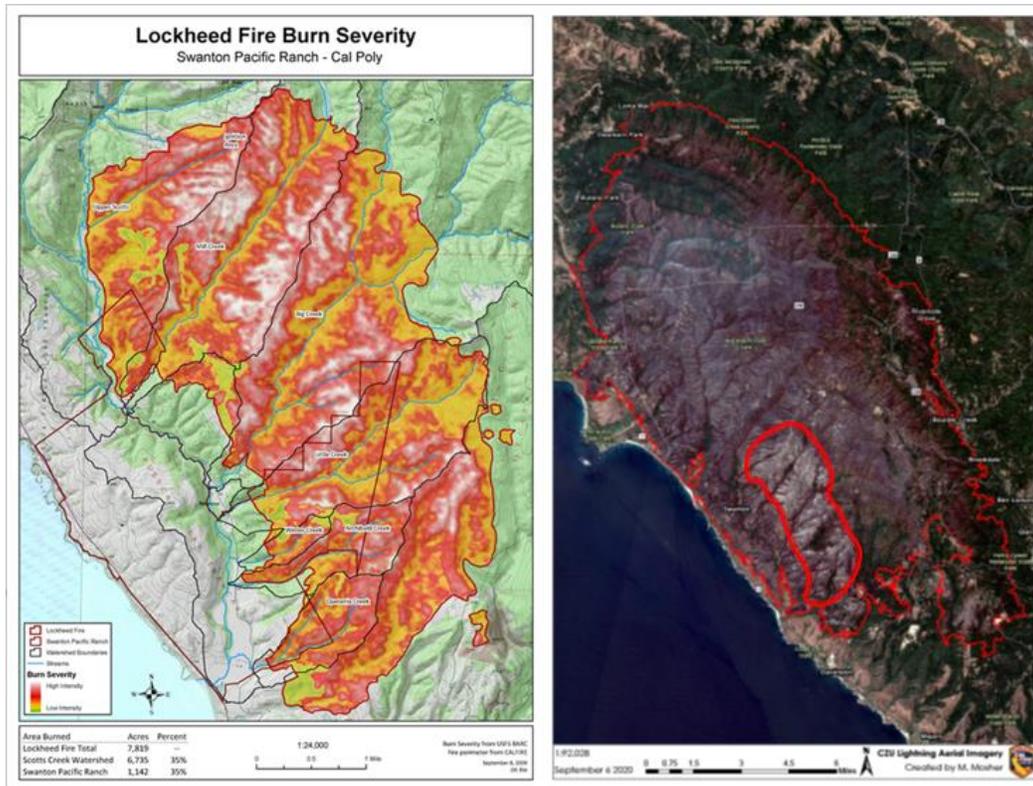


Figure 23 Comparison of 2009 Lockheed Fire Location (left) and the Footprint of the Lockheed Fire in the 2020 CZU Fire (right)

### Final Points – Fire History (FH)

Significant growth potential, evidence of past disturbance, varying fire history and burn severity appear across the landscape.

#### Sub-Point One - FH

Release trees indicate that the forest can generate significant amounts of growth on remaining trees in areas where competition is reduced. Stand structure and the number of trees per acre dictate how release growth is shared among the forest.

#### Sub-Point Two – FH

Evidence of different limb structures pre and post fire appear to indicate higher severity fires occurred in Pescadero Creek County Park historically other than the 2020 CZU Fire.

#### Sub-Point Three – FH

Increased burn severity appears to correlate with increased vegetative and tree sprouting response. The pattern that it may create is a system more susceptible to severe fast-moving fires and potentially vegetative alliance changes.

## **Conclusion – Forest Stand Structure and Fire History**

Disturbances such as wildfire and young tree suppression may play a corresponding role in the development of old growth trees. The stand structure of OGRW is more conducive to low to moderate fire severities with the significant separation of tree crowns. Whereas dense forest stands (RWII, RWIII) are likely to burn with higher degrees of severity due to their close proximity to each other, competition for resources, and shading out of smaller trees to ultimately create a structure of well-linked dead fuels that are especially susceptible to high severity fires. The result of these high severity fires may be that stands reach a late successional stage such as OGRW or undergo potential vegetative alliance changes if the climate is unable to support the previous vegetative composition.

Pairing this information with other observations in the CZU Fire zone, in OGRW stands where the lack of disturbance from wildfire has been restricted for 100 years, the smaller trees have developed into mid-range and larger diameters relative to the stand with greater density and connectivity to OGRW tree crowns. The resulting impact from increased wildfire severity in OGRW stands due to this connectivity was likely more significant than frequent fires set by indigenous peoples. The result was many large Douglas-fir trees that should have survived did not and OGRW redwoods, where survival is expected, were significantly more damaged.

PCCP has likely experienced high fire severity in the upper watersheds previously, but the CZU Fire was predominantly a low to moderate severity backing fire that generated some positive results. In some cases, increased areas of moderate fire severity could have completed the consumption of many dead smaller trees and understory that continue to remain. It can be expected that the dense forest structure in areas that were historically clearcut, with added dead understory following the CZU Fire, and the frequency of *Ceanothus* returning to the burn areas may experience vegetative alliance changes in the changing climate and increased wildfire severity. This factor plays an important role in PCCP when prioritizing restorative treatments on a landscape level.

## **Subwatershed Restoration Priority Results and Discussion**

The subwatershed restoration priority analysis was conducted across 33 subwatersheds. Although not all 64 subwatersheds were analyzed, the goal was to obtain enough samples across different forest types and topography to consider applying this initial assessment on other similar forest types and topography. The goal being to establish areas where restorative treatments should be considered for permit that achieve SMCP goals.

## Conditions

### Impaired Forest Condition Class (IFCCs)

Impaired Forest Condition Classes are a subset of specific vegetation circumstances developed to classify, describe, and ultimately treat factors responsible for compromised forest stands, see Table 7.

*Table 7 IFCC Types and Brief Descriptions*

Impaired Forest Condition Classes (IFCC)	
IFCC-1	Dense Redwood Regrowth Stands
IFCC-2	Advanced Redwood Regrowth Engulfed By Tanoak Regrowth (Redwood Isolates)
IFCC-3	Dense Upland Hardwoods; Displaced Douglas-Fir
IFCC-4	Conifer and Brush Encroachment into Mature Hardwood / Conifer Stands
IFCC-5	Dense post-wildfire redwood stump sprout regeneration

The IFCC type most commonly observed at PCCP was “IFCC-1: Dense Redwood Regrowth Stands”, predominantly in sites classified as RWII and RWIII. These conditions are the product of historic land use and intensive logging practices that took place across the Santa Cruz Mountains between the late 1800s to the mid-1900s on the south side of Pescadero Creek. Additionally, the absence of consistent, low intensity burns in this area that may have helped clear understory and dense regeneration has resulted in increased competition among existing vegetation. Many of the small-diameter, young trees within these impaired stands are experiencing widespread suppression, needle drop, and die off, ultimately adding fuel load to the forest floor exacerbating a system already built to burn.

### Grasslands

IGCC-1 – Impaired Grassland Condition Class - grasslands on the north side of PCCP and on Sam McDonald County Park are being severely encroached by shrubs and Douglas-fir and should be considered for prioritized treatment. This is not unlike many grasslands in the Santa Cruz Mountains that are slowly being taken over by the effects of fire suppression. In their current state, there are significant areas that are still manageable but left too long, will become very expensive to restore. Regional native grasslands have historically hosted an incredibly diverse array of allied flora but are in drastic decline primarily as a result of historic overgrazing and land use. As a result, wildlife and insect species that depend on these systems for food, refugia, reproduction, and migration are consequently affected. In addition, these areas play a key role for managing fire and act as potential escape routes for park visitors, nearby communities, SMCP employees, incident personnel in the event of an emergency, and potentially as temporary refuge areas in an emergency.

### Fire Resiliency (FR)

Resiliency to future fires was predominantly rated from 1-5 based on the amount of understory occupation, the potential increase of understory occupation from vegetative

response following fire, and the mortality of trees. A score of 1 represents the highest priority subwatershed to consider treatment. In unburned areas, the ratings were correlated with the amount of understory, tree mortality, and connectivity of ladder fuels.

In the burned areas, fire resiliency treatment priority was easily correlated with high burn severity. Priority treatment numbers assigned (1-2) from the rating system were predominantly based on vegetative response from the CZU Fire. In the unburned areas, the OGRW stands displayed some of the highest tree per acre counts in seedlings and saplings less than 12 inches DBH but lacked significant connectivity to tree crowns due to the separation between old growth tree crowns and tree crowns less than 12 inches in diameter resulting in lower priority FR (3-5). See Figure 14 – OGRW to visualize the gap in mid-range diameter trees between 12 – 26 inches DBH demonstrating the lack of connectivity between crowns.

In RWII and RWIII, vegetative response from the CZU Fire will increase and create additional connectivity in areas burned more severely. In low to moderate areas, the vegetative response from the CZU Fire is less, but still much easier for fire to travel through the crowns in these settings with dense redwood regrowth.

### Sediment Input Potential (SIP)

The rating system for SIP is added to the overall restoration priority to assign a 1-5 value indicating watersheds with a greater possibility of depositing significant sediment amounts into Pescadero Creek with one being the highest condition concern.

Subwatersheds predominantly south of Pescadero Creek showed higher priority SIP values. ARC staff field evaluated the majority of these watersheds from top to bottom which already appeared to have significant background rates of sediment movement most likely related to its highly erodible sandy loam soil type in the upper watersheds<sup>50</sup>. Intensive forest harvesting activities in these areas intensified these movements. Most of the watersheds still have significant amounts of soil filling their channels with a relatively incised channel mobilizing material over time. Much of the forest in these areas are growing back densely, metering out the amount of soil still loaded for transport in these watersheds.

The north side of PCCP is occupied by loams and appears more stable in configuration than the southern side resulting in lower priority SIP values between 3-5

Low priority SIP values were also predominantly identified on ridgeline slopes approaching from the south to Pescadero Creek that have most likely been cut by the meandering of

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<sup>50</sup> CA Soil Maps: <https://casoilresource.lawr.ucdavis.edu/gmap/>

Pescadero Creek on a geologic timescale. These *relict*<sup>51</sup> areas above and below the Old Haul Road were rated with low priority SIPs and are predominantly very dense second growth redwood forest.

### Sudden Oak Death (SOD)

Sudden oak death is prevalent throughout PCCP at varying levels and should be considered for treatment where feasible. Interestingly, in the upper watersheds on the southside of Pescadero Creek where fire severities were higher, there were many dead standing tanoaks prior to the CZU Fire that remain standing and relatively unburned. It can be expected that these SOD trees will continue to deteriorate and fall into the CZU Fire vegetative response, possibly exacerbating a more intensive fire scenario similar to creating the Lockheed effect discussed in the Lockheed Wildfire vs. CZU Complex Wildfire section.

### Marbled Murrelet Habitat Suitability (MMHS)

Marbled murrelets (*Brachyramphus marmoratus*) actively inhabit the park, predominantly on the north side of Pescadero Creek and to the east into Portola State Park, where rich groves of old growth redwood provide exceptional breeding habitat<sup>52</sup>. The south side of Pescadero Creek supports a lower quality suitable habitat for the marbled murrelet, but the creek is clearly a flyway that marbled murrelets frequent during the breeding season.

The field analysis considered restorative practices that could be developed to increase habitat for the marbled murrelet. The highest rating for MMHS was in proximity to Old Haul Road and Pescadero Creek. With some remnant old growth in these areas and the potential to reduce forest densities through forest health actions, it is possible that a long-term strategy could be developed to expedite habitat development in these areas.

It is also important to note that there are remnant old growth specimens in and among the southern side of Pescadero Creek reaching to Butano Ridge that should be evaluated to determine habitat viability for the marbled murrelet.

### Invasive Species (IS)

The frequency of significant invasive species across the park was low and most subwatersheds received a lower priority rating between 4 and 5. It is possible that the early evaluation of these areas did not entirely capture the vegetative response from the CZU Fire. French broom was observed along road systems and there are a few eucalyptus and blackwood acacia stands on the northside of PCCP and along the creek corridor.

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<sup>51</sup> Definition of Relict: [https://doi.org/10.1007/3-540-31060-6\\_308](https://doi.org/10.1007/3-540-31060-6_308)

<sup>52</sup> Marbled Murrelet CWHRS: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1827&inline=1>

## **Criteria**

### **Treatment Access (A)**

Treatment access to conduct restorative practices related to climate and habitat resiliency are paramount. This area is a driving force for the restoration priority directly related to useable existing infrastructure or historic existing infrastructure that could be reopened with a high degree of consideration to sensitive resources.

*Relict* areas along Old Haul Road were rated very high with 1 and 2's. In addition, areas for future consideration around the Honor Camp and dense forest, clear-cut in the 1800s or partially clear-cut, could be future considerations for CHRP actions.

### **Value (V)**

Value is another very important criteria to consider in project development considering habitat restoration value and resiliency, regional resource related goals, time, money, permitting, research, and potential collaborations. Considering these factors, the south side of Pescadero Creek and the *relicts* received high marks in criteria prioritization strongly correlated to their proximity to the main flyway for marbled murrelets. In addition, existing infrastructure is reasonable, permissible, and sensitive to resource related issues relative to slopes (see Map 8 Slope Analysis in *APPENDIX A*).

### **Public Access (PA)**

Public Access criteria from 1 – 5 indicates the access and visibility of subwatershed treatments. Areas that were rated as 1 are prioritized higher for treatment action. As a sensitive visual resource, this criterion was meant to offer insight, in that, the public can observe treatment action and be educated by it. With access ease from Old Haul Road, areas along this stretch near Pescadero Creek received the highest ratings. Public Access ratings were lower from Butano Ridge and from the northside of PCCP where driving is limited to Pescadero Creek from the North.

### **Subwatershed Restoration Priority**

See Table 8 below showing initial results for the locations of subwatersheds where treatment areas, and their representative forest types and topography, should receive a higher priority of consideration to implement habitat and resiliency treatments. See the Map 3 in *APPENDIX A* to compare with Table 8 for the location of these subwatersheds.

Table 8 Subwatershed Restoration Priority Results

RP AVERAGES			LOCATION	CRITERIA			CONDITION				
RESTORATION PRIORITY	CRITERIA Prioritization Average	CONDITION Prioritization Average	Subwatershed	Treatment Access (A)	Value (V)	Public Access (PA)	Fire Resiliency (FR)	Sediment Input Potential (SIP)	Sudden Oak Death (SOD)	Marbled Murrelet Habitat Suitability (MMHS)	Invasive Species (IS)
1.5	1.0	2.0	South Pescadero Creek West 1	1	1	1	1	2	2	1	4
2.0	1.0	3.0	West Keyston Relict	1	1	1	1	4	2	4	4
2.1	1.0	3.2	West Hooker Relict	1	1	1	2	4	2	4	4
2.2	2.0	2.4	South Pescadero Creek West 2	2	1	3	2	2	2	2	4
2.2	1.7	2.8	Lower Towne Creek	2	2	1	2	2	2	4	4
2.4	1.0	3.8	West Harwood Relict	1	1	1	3	5	3	3	5
2.5	1.3	3.6	Shingle Mill Creek	1	1	2	2	4	4	4	4
2.6	2.3	2.8	Lower Dark Gulch	2	3	2	3	2	3	2	4
2.6	1.3	3.8	West Rhododendron Relict	1	2	1	3	4	4	4	4
2.6	2.7	2.6	Lower Carriger Creek	2	3	3	3	2	3	2	3
2.7	2.3	3.0	East Jones Gulch	2	4	1	3	4	2	2	4
2.7	2.3	3.0	Wally's Creek	2	4	1	2	4	3	2	4
2.8	2.3	3.2	Mid East Tarwater Creek	2	3	2	3	4	2	3	4
2.8	2.3	3.2	West Schenly Relict	2	2	3	1	4	3	4	4
2.8	2.7	3.0	Upper Keyston Creek	2	2	4	2	4	1	4	4
2.9	2.3	3.4	Upper Carriger Creek	2	3	2	3	2	4	4	4
2.9	3.0	2.8	Lower Rhododendron Creek	3	3	3	2	1	4	3	4
2.9	3.0	2.8	Upper West Towne Creek	4	3	2	1	2	4	3	4
2.9	2.7	3.2	Lower Tarwater Creek	2	5	1	2	4	3	2	5
3.0	2.3	3.6	West Dark Gulch Relict	2	2	3	3	3	4	4	4
3.0	3.0	3.0	Upper East Towne Creek	4	3	2	2	3	2	4	4
3.1	2.7	3.6	West Carriger Relict	3	3	2	2	2	5	4	5
3.2	3.7	2.8	Lower Schenly Creek	5	3	3	2	1	3	4	4
3.2	3.7	2.8	Upper East Hooker Creek	3	4	4	2	2	2	4	4
3.2	2.7	3.8	Worley Flat	3	2	3	3	4	4	4	4
3.3	3.0	3.6	West Jones Gulch	3	5	1	3	4	4	2	5
3.4	4.0	2.8	Lower Hooker Creek	4	4	4	3	2	3	2	4
3.5	3.7	3.4	Upper Schenly Creek	4	4	3	3	2	4	4	4
3.6	4.3	2.8	Lower Keyston Creek	5	4	4	2	2	2	4	4
3.7	4.7	2.8	Upper Middle Rhododendron Creek	5	4	5	2	2	4	2	4
3.9	4.7	3.2	Upper Dark Gulch	5	4	5	3	2	3	4	4
4.2	4.3	4.0	East Parke Gulch	4	5	4	4	4	3	5	4
4.2	4.7	3.8	West Parke Gulch	5	5	4	4	4	3	4	4

The restoration priority system weights the *Criteria* more heavily than the *Conditions*. This is due to the simple fact that if you cannot reasonably get to a treatment area, obtain a permit, and pay for that treatment, the treatment cannot be implemented. Just as important is the idea of being able to treat specific *Conditions* to meet goals that are set for a property or entity. Table 9 is provided to show what subwatershed locations would be prioritized for treatment based on four different subwatershed prioritization sorting strategies:

1. Restoration Priority average (same as Table 8).
2. Sorting only by *Criteria*
3. Sorting only by *Condition*
4. Sorting by Restoration Priority average excluding Public Access (PA), Sudden Oak Death (SOD), and Invasive Species (IS) from the equation. A scenario considered recognizing that PA, SOD, and IS could be considered less of a priority than Access (A), Value (V), Fire Resiliency (FR), Sediment Input Potential (SIP), and Marbled Murrelet Habitat Suitability (MMHS).

The top 10 subwatersheds for Restoration Priority acts as the basis for colors carried through Table 9 showing where the top 10 lie through sorting columns for Restoration Priority, *Criteria*, *Condition*, Restoration Priority plus the column excluding PA, SOD, and IS.

Table 9 Subwatershed Treatment Prioritization Evaluation

TREATMENT PRIORITIZATION EVALUATION			
RESTORATION PRIORITY	CRITERIA	CONDITION	EXCLUDE PA, SOD, IS
1	South Pescadero Creek West 1	South Pescadero Creek West 1	South Pescadero Creek West 1
2	West Keyston Relict	West Keyston Relict	South Pescadero Creek West 2
3	West Hooker Relict	West Hooker Relict	Lower Carriger Creek
4	South Pescadero Creek West 2	West Harwood Relict	Lower Towne Creek
5	Lower Towne Creek	Shingle Mill Creek	Lower Dark Gulch
6	West Harwood Relict	West Rhododendron Relict	Lower Rhododendron Creek
7	Shingle Mill Creek	Lower Towne Creek	Upper West Towne Creek
8	Lower Dark Gulch	South Pescadero Creek West 2	Lower Schenly Creek
9	West Rhododendron Relict	Lower Dark Gulch	Upper East Hooker Creek
10	Lower Carriger Creek	East Jones Gulch	Lower Hooker Creek
11	East Jones Gulch	Wally's Creek	Lower Keyston Creek
12	Wally's Creek	Mid East Tarwater Creek	Upper Middle Rhododendron Creek
13	Mid East Tarwater Creek	West Schenly Relict	West Keyston Relict
14	West Schenly Relict	Upper Carriger Creek	East Jones Gulch
15	Upper Keyston Creek	West Dark Gulch Relict	Wally's Creek
16	Upper Carriger Creek	Lower Carriger Creek	Upper Keyston Creek
17	Lower Rhododendron Creek	Upper Keyston Creek	Upper East Towne Creek
18	Upper West Towne Creek	Lower Tarwater Creek	West Hooker Relict
19	Lower Tarwater Creek	West Carriger Relict	Mid East Tarwater Creek
20	West Dark Gulch Relict	Worley Flat	West Schenly Relict
21	Upper East Towne Creek	Lower Rhododendron Creek	Lower Tarwater Creek
22	West Carriger Relict	Upper West Towne Creek	Upper Dark Gulch
23	Lower Schenly Creek	Upper East Towne Creek	Upper Carriger Creek
24	Upper East Hooker Creek	West Jones Gulch	Upper Schenly Creek
25	Worley Flat	Lower Schenly Creek	Shingle Mill Creek
26	West Jones Gulch	Upper East Hooker Creek	West Dark Gulch Relict
27	Lower Hooker Creek	Upper Schenly Creek	West Carriger Relict
28	Upper Schenly Creek	Lower Hooker Creek	West Jones Gulch
29	Lower Keyston Creek	Lower Keyston Creek	West Harwood Relict
30	Upper Middle Rhododendron Creek	East Parke Gulch	West Rhododendron Relict
31	Upper Dark Gulch	Upper Middle Rhododendron Creek	Worley Flat
32	East Parke Gulch	Upper Dark Gulch	West Parke Gulch
33	West Parke Gulch	West Parke Gulch	East Parke Gulch

Table 9 indicates that the variety of different sorting strategies showed fairly reasonable consistency among the top 10 while predominantly controlled by *Criteria* and vary the most where priority was sorted by *Condition*. It is not inconceivable for all of the top 10 priority areas for *Conditions* to receive restorative treatments, but these areas will most likely be more difficult to access, harder to obtain a permit for, and more challenging to budget for. Therefore, prioritizing by *Condition* will not support expeditious achievement of the long-term goals of SMCP as part of this CHRP.

### Conclusion - Subwatershed Restoration Priority Results and Discussion

The subwatershed restoration priority analysis indicated regions of Pescadero Creek County Park where restorative treatments could be considered to support the goals of SMCP and the CHRP. The following points are a summary of desirable areas of PCCP to conduct restorative treatments:

1. The southside of Pescadero Creek where the clearcut harvesting had the most impact on the old growth stand. In addition, and in the same vicinity, Old Haul Road played a major role in stopping the CZU Fire on its northern flank. Key *conditions* and *criteria* here were both met at the highest levels including Impaired Forest Class Conditions indicating density reductions treatments would benefit these areas.
2. *Relict* areas on the southside of Pescadero Creek that slope more gently to Old Haul Road in between tributary drainages to Pescadero Creek. Key *conditions* and *criteria* here were both met at high levels including Impaired Forest Class Conditions indicating density reduction treatments would benefit these areas.
3. Paved, winterized, and seasonal roads that access PCCP assets (camps and parking areas) and traverse multiple subwatersheds with sensitive resources in them such as remaining old growth stands. Compartmentalizing these areas through forest health fuels reduction treatments and extending these treatments from the roads to areas where the slope begins to steepen. Key *conditions* and *criteria* here were both met at high levels including Impaired Forest Class Conditions indicating density reduction treatments would benefit these areas.
4. Areas on the northside of PCCP that were historically clearcut and act as gaps between existing old growth habitat with high forest densities. *Conditions* and *criteria* here were both met at moderate-high levels including Impaired Forest Class Conditions indicating density reduction treatments would benefit these areas.

### **Future Forest Monitoring and Research Opportunities**

The monitoring program described above creates an opportunity for additional forest trend monitoring and research to be conducted under established standards and protocols within the park.

Increasing the current database sample size may improve the statistics and provide clearer trends following stratification. The implementation of further forest trend monitoring should be prioritized within recommended treatment areas by installing additional FTPs prior to and following treatments. A 3% sampling percentage per treatment type would be appropriate for the fixed-radius FTPs, utilizing the same 500' x 500' systematic random sampling grid as used in initial forest trend monitoring data collection at PCCP. The establishment of fixed plots within treatment areas provides an opportunity for plots to be remeasured following events, such as prescribed management or wildfire, to draw comparisons of how forest health responds to changes in vegetation.

Other monitoring and research opportunities within PCCP include monitoring stream flow and winter period monitoring. Stream flow rates and depths can be monitored through the use of a staff gauge, as described in the Hydrology section above, to observe trends and responses to treatment activities or changing environmental conditions. During the winter period, it is important to monitor roads and treated areas to ensure maintenance of key infrastructure for emergency ingress and egress.

## Species/Wildlife Monitoring

### *MAMU surveys*

Historical surveys for Marbled Murrelet within PCCP and the greater Pescadero Creek Park Complex (including Sam McDonald and Memorial Parks) focused on identifying absence or presence of MAMU within specific locations through Audio-Visual (AV) surveys. AV surveys are conducted for a 2-hour period in the morning beginning 45 minutes before sunrise. Surveyors record observations verbally into an audio recording device to document MAMU flight activity in vicinity of the survey station. While presence of MAMU is assumed in PCCP, the value of conducting AV surveys is to record observations of occupied behavior in forest stands. Occupied behaviors include but are not limited to extended circling flights above forest canopy, circling or straight-line flights below lower than forest canopy, audio observation of wing sounds or Keer calls made from a stationary position.

Initial surveying efforts within PCCP were focused around areas adjacent planned development or creek crossing restoration where use of machinery was required to implement the projects within MAMU breeding season.

Survey methods used by SMCP staff follow guidelines developed by the Pacific Seabird Group "Method for Surveying Marbled Murrelet in Forests: A Revised Protocol for Land Management and Research; 2003."<sup>53</sup>

SMCP and other land managers within the Santa Cruz Mountains, including State Parks, Mid-Peninsula Open Space District, Peninsula Open Space Trust, and San Francisco Public Utilities Commission, make up the MAMU Zone 6 Management Area. Zone 6 members coordinate annually to conduct synchronized surveys within the region to collect date specific flight information of MAMU. Annually 5 dates are selected within the month of July, which corresponds with peak flight of MAMU for the area. SMCP also conducts surveys independently of the coordinated Zone 6 surveys during the months of May and June. Timing or frequency of independent surveys are variable from year to year.

Beginning 2021 SMCP began deploying Automatic Recording Devices (ARU's) in strategic locations across PCCP. ARU's are set to record in two-hour intervals surrounding dawn and

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<sup>53</sup> [https://www.pacificseabirdgroup.org/publications/PSG\\_TechPub2\\_MAMU\\_ISP.pdf](https://www.pacificseabirdgroup.org/publications/PSG_TechPub2_MAMU_ISP.pdf)

dusk. Audio recordings are sent to a third-party company who scan the recordings for MAMU calls and report on the timing, frequency, and volume of MAMU calls across the breeding season window. Information collected from ARU's should help the Department better understand when MAMU typically start and stop utilizing PCCP for nesting purposes.

### *Wildlife Cameras*

The installation of wildlife cameras throughout varying landscape conditions within a given property creates an opportunity to observe wildlife behaviors and responses to changing conditions in a cost-effective manner that replaces the need for human observers. Remote cameras are beneficial in identifying the presence of elusive or nocturnal animals. Through the use of wildlife cameras, information can be collected to monitor and observe wildlife behaviors, such as nesting and predation behaviors, the presence or absence of species, population estimates and demographics, activity patterns, feeding ecology, and the prevalence of disease. In PCCP, the use of wildlife cameras in strategic places (i.e., in proximity to treatment areas, in varying burn severities, or in highly trafficked areas and/or in remote areas) creates a way to monitor the effectiveness of varying land management strategies and monitor wildlife responses to changes in environmental conditions. Consideration should be given to monitoring objectives when selecting from the wide array of camera and accessory technologies that utilize different methods for wildlife detection.<sup>54</sup>

### *Legacy Tree Program*

A Legacy Tree Program can be developed within a given area or property to identify, document, and protect trees that meet specific criteria. The establishment of a Legacy Tree Program at PCCP would promote the protection of extraordinary trees, including their genetics, the preservation of natural history, such as the storage of information regarding natural disturbances and land management activities, and create a unique recreational experience for park visitors. Under this program, trees identified as a Legacy Tree would be protected for the entirety of their natural existence and should not ever be cut, unless the tree becomes a threat to workplace or public safety.

The Legacy Tree Program involves the establishment of a set of criteria that considers landowner values and objectives to protect trees that exhibit old-growth characteristics or provide unique ecosystem services. Criteria may include standards for minimum diameter at breast height (DBH) (i.e., 60 inches at DBH), large, complex limb and branching structure that may provide nesting or platform habitat opportunities (i.e., 8-10 inches in diameter), the presence of basal hollows or flat tops, the presence of platy bark with deep fissures, or other aesthetic values. Once trees are identified as meeting or exceeding the established criteria, the Legacy Trees should be recorded, including a record of data such as species,

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<sup>54</sup> <https://woodlandstewards.osu.edu/sites/woodlands/files/d6/files/pubfiles/Remote%20Cameras.pdf>

DBH, height, height to crown base, description, location, photograph, etc., and included in a report to finalize the protection of the identified Legacy Trees. Installing signage for the Legacy Trees can create an educational opportunity for park visitors. A similar Legacy Tree Program exists at Cal Poly's Swanton Pacific Ranch<sup>55</sup>.

### *Instream habitat enhancement*

Instream habitat enhancement projects work to preserve the integrity of stream ecosystem services, improve habitat for target species, and promote biodiversity in the aquatic and riparian ecosystems. Instream habitat enhancement projects often involve the reintroduction of boulders or the recruitment of large woody debris (LWD) into streams, which results in altered channel conditions, such as channel widths, water depths, flow velocities, and availability of spawning gravel for salmonid habitat. Strategic placement of anchored boulders or LWD within the stream channel is important for ensuring long-term success in high flow events and plays a crucial role in the movement of spawning gravel. In PCCP, restoration and improvements within Pescadero Creek create monitoring opportunities for target aquatic species, such as steelhead trout or coho salmon. To monitor the success of instream habitat enhancement activities, annual surveys could be conducted to estimate the population size of adult and juvenile fish of target species and record changes to instream habitat suitability.

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<sup>55</sup> [https://content-calpoly-edu.s3.amazonaws.com/spranch/1/documents/fsc/2016\\_LegacyTreeReport.pdf](https://content-calpoly-edu.s3.amazonaws.com/spranch/1/documents/fsc/2016_LegacyTreeReport.pdf)

## CONSIDERATION OF PERMIT FRAMEWORK

### FOREST HEALTH FUELS REDUCTION TREATMENT STANDARDS

The following Forest Health Fuels Reduction Treatment Standards (FHFRs) are a set of standardized guidelines that apply to forest health fuels reduction treatment operations implemented under a CalVTP permit within the bounds of PCCP. These standards were developed in accordance with local, county, and state regulations regarding applicable vegetation management and forest health treatments within the locale of Pescadero Creek County Park. FHFRs are intended to avoid and minimize environmental impacts and comply with applicable laws and regulations. Some FHFRs may not apply to fuel treatment projects implemented under the existing San Mateo County Routine Maintenance Program.

#### *Administrative Standards*

- ▶ **FHFR AD-1 San Mateo County Parks (SMCP) Coordination:** For treatments coordinated with CAL FIRE (burning or density reduction treatments where commercialization could occur), CAL FIRE will meet with SMCP to discuss all natural and environmental resources that must be protected using FHFRs and any applicable mitigation measures; identify any sensitive resources onsite; and discuss resource protection measures. For any prescribed burn treatments, CAL FIRE will also discuss the details of the burn plan in the incident action plan (IAP).
- ▶ **FHFR AD-2 Delineate Protected Resources:** SMCP or a qualified designee will clearly define the boundaries of the treatment area and protected resources on maps for the treatment area and with highly visible flagging or clear, existing landscape demarcations (e.g., edge of a roadway) prior to beginning any treatment to avoid disturbing the resource. "Protected Resources" refers to environmentally sensitive places within or adjacent to the treatment areas that would be avoided or protected to the extent feasible during planned treatment activities to sustain their natural qualities and processes. This work will be performed by a qualified person, as defined for the specific resource (e.g., qualified Registered Professional Forester or biologist).
- ▶ **FHFR AD-3 Consistency with Local Plans, Policies, and Ordinances:** SMCP will design and implement the treatment in a manner that is consistent with applicable local plans (e.g., general plans, considers Community Wildfire Protection Plans and CAL FIRE Unit Fire Plans), policies, and ordinances to the extent the project is subject to them. Applicable local plans, policies, and ordinances may include, but are not limited to:
  - Santa Cruz County – San Mateo County Community Wildfire Protection Plan
  - CAL FIRE San Mateo – Santa Cruz Unit 2021 Strategic Fire Plan
  - Bay Area Air Quality Management District: Procedures for Conducting Wildland Vegetation Management Fires (Prescribed Burning) in the Bay Area
  - Decision-Making Guidelines for Vegetation Management, San Mateo County Parks
  - County of San Mateo Routine Maintenance Program Manual

- ▶ **FHFR AD-4 Public Notifications for Prescribed Burning:** At least three calendar days prior to the commencement of prescribed burning operations, SMCP, in coordination with CAL FIRE, will: 1) post signs along the closest public roadway to the treatment area describing the activity and timing, and requesting persons in the area to contact a designated representative of SMCP (contact information will be provided with the notice) if they have questions or smoke concerns; 2) publish a public interest notification in a local newspapers or other widely distributed media source describing the activity, timing, and contact information; 3) send the San Mateo County supervisor and county administrative officer (or equivalent official responsible for distribution of public information) a notification letter describing the activity, its necessity, timing, and measures being taken to protect the environment and prevent prescribed burn escape.
- ▶ **FHFR AD-5 Maintain Site Cleanliness:** If trash receptacles are used on-site, the project proponent will use fully covered trash receptacles with secure lids (wildlife proof) to contain all food, food scraps, food wrappers, beverages, and other worker generated miscellaneous trash. Remove all temporary non-biodegradable flagging, trash, debris, and barriers from the project site upon completion of project activities.

Contractors, treatment crews, personnel, and all others affiliated with treatment scoping, implementation, and close-out shall adhere to the “Crumb-Clean” program philosophy to reduce predatory corvid activity within park bounds<sup>56</sup>.

- ▶ **FHFR AD-6 Public Notifications for Treatment Projects.** One to three calendar days prior to the commencement of a treatment activity, SMCP or a designee will post signs in a conspicuous location near the treatment area describing the activity and timing and requesting persons in the area to contact a designated representative of SMCP (contact information will be provided with the notice) if they have questions or concerns.
- ▶ **FHFR AD-7 Provide Information on Proposed, Approved, and Completed Treatment Projects.** For any vegetation treatment project using the CalVTP PEIR for CEQA compliance, the project proponent will provide the information listed below to the Board or CAL FIRE during the proposed, approved, and completed stages of the project. The Board or CAL FIRE will make this information available to the public via an online database or other mechanism.

Information on proposed projects (PSA in progress):

- GIS data that include project location (as a point);
- project size (typically acres);
- treatment types and activities; and

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<sup>56</sup> [https://www.parks.ca.gov/?page\\_id=29905](https://www.parks.ca.gov/?page_id=29905)

- contact information for a representative of the project proponent.

Information on approved projects (PSA complete):

- A completed PSA Environmental Checklist;
- A completed Mitigation Monitoring and Reporting Program (using Attachment A to the Environmental Checklist);
- GIS data that include a polygon(s) of the project area, showing the extent of each treatment type included in the project (ecological restoration, fuel break, WUI fuel reduction)

Information on completed projects:

- GIS data that include a polygon(s) of the treated area, showing the extent of each treatment type implemented (ecological restoration, fuel break, WUI fuel reduction)
- A post-project implementation report (referred to by CAL FIRE as a Completion Report) that includes
  - Size of treated area (typically acres);
  - Treatment types and activities;
  - Dates of work;
  - A list of the FHFRs and mitigation measures that were implemented
  - Any explanations regarding implementation if required by FHFRs and mitigation measures (e.g., explanation for feasibility determination required by SPR BIO-12; explanation for reduction of a no-disturbance buffer below the general minimum size described in Mitigation Measures BIO-1a and BIO-2b).
- ▶ **FHFR AD-8 Request Access for Post-Treatment Assessment.** For CAL FIRE projects, during contract development, CAL FIRE will include access to the treated area over a prescribed period (usually up to three years) to assess treatment effectiveness in achieving desired fuel conditions and other CalVTP objectives as well as any necessary maintenance, as a contract term for consideration by the landowner. For public landowners, access to the treated area over a prescribed period will be a requirement of the executed contract.

### ***Aesthetics and Visual Resources***

- ▶ **FHFR AES-1 Vegetation Thinning and Edge Feathering:** SMCP will thin and feather adjacent vegetation to break up or screen linear edges of the clearing and mimic forms of natural clearings as reasonable or appropriate for vegetation conditions.

In general, thinning and feathering in irregular patches of varying densities, as well as a gradation of tall to short vegetation at the clearing edge, will achieve a natural transitional appearance. The contrast of a distinct clearing edge will be faded into this transitional band. Pre-field work to determine treatment types and boundaries will take

into consideration topographical features with the intent to create irregular vegetation densities and treatment area size.

- ▶ **FHFR AES-2 Avoid Staging within Viewsheds:** SMCP will store all treatment-related materials, including vehicles, vegetation treatment debris, and equipment, outside of the viewshed of public trails, parks, recreation areas, and roadways to the extent feasible if there is potential for the public to interact with treatment areas. The project proponent will also locate materials staging and storage areas outside of the viewshed of public trails, parks, recreation areas, and roadways to the extent feasible.
- ▶ **FHFR AES-3 Provide Vegetation Screening:** SMCP will preserve sufficient vegetation within, at the edge of, or adjacent to treatment areas, where applicable, to screen views from public trails, recreation areas, and roadways as reasonable or appropriate for vegetation conditions.

Treatment demonstration areas or areas where shaded fuel break treatments are proposed will inherently be visible to park visitors. Although initial disturbances are expected to generate some less than pleasing aesthetics immediately after, these views will regenerate quickly with new growth and be short lived. Treatment activities will be designed to minimize or avoid substantial impacts to aesthetic resources and/or promote more visually pleasing vegetative conditions following treatments, particularly in areas affected by the CZU Fire.

### *Air Quality*

- ▶ **FHFR AQ-1 Comply with Air Quality Regulations:** SMCP will comply with the applicable air quality requirements of air districts within whose jurisdiction the project is located.
- ▶ **FHFR AQ-2 Submit Smoke Management Plan:** SMCP will submit a smoke management plan for all prescribed burns to the Bay Area Air Quality Management District (BAAQMD) through the Prescribed Fire Information Reporting System (PFIRS), in accordance with 17 CCR Section 80160. Pursuant to this regulation, a smoke management plan will not be required for burns less than 10 acres that also will not be conducted near smoke sensitive areas, unless otherwise directed by the air district.
- ▶ **FHFR AQ-3 Create Burn Plan:** SMCP will create a burn plan using the CAL FIRE burn plan template for all prescribed burns. The burn plan will include a fire behavior model output of First Order Fire Effects Model and BEHAVE or other fire behavior modeling simulation and that is performed by a qualified fire behavior technical specialist that predicts fire behavior, calculates consumption of fuels, tree mortality, predicted emissions, greenhouse gas emissions, and soil heating. The project proponent will minimize soil burn severity from broadcast burning to reduce the potential for runoff and soil erosion. The burn plan will be created with input from a qualified technician or certified State burn boss.
- ▶ **FHFR AQ-4 Minimize Dust:** To minimize dust during treatment activities, the SMCP will implement the following measures:

- Limit the speed of vehicles and equipment traveling on Old Haul Road and unpaved areas to 15 miles per hour to reduce fugitive dust emissions, in accordance with the California Air Resources Board (CARB) Fugitive Dust protocol.
  - If road use creates excessive dust, the SMCP will wet appurtenant, unpaved, dirt roads using water trucks or treat roads with a non-toxic chemical dust suppressant (e.g., emulsion polymers, organic material) during dry, dusty conditions. Any dust suppressant product used will be environmentally benign (i.e., non-toxic to plants and will not negatively impact water quality) and its use will not be prohibited by ARB, EPA, or the State Water Resources Control Board (SWRCB). The SMCP will not over-water exposed areas such that the water results in runoff. The type of dust suppression method will be selected by SMCP based on soil, traffic, site-specific conditions, and air quality regulations.
  - Remove visible dust, silt, or mud tracked-out on to public paved roadways where sufficient water supplies and access to water is available. The SMCP will remove dust, silt, and mud from vehicles at the conclusion of each workday, or at a minimum of every 24 hours for continuous treatment activities, in accordance with Vehicle Code Section 23113.
  - Suspend ground-disturbing treatment activities, including land clearing and bulldozer lines, when there is visible dust transport (particulate pollution) outside the treatment boundary, if the particulate emissions may “cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property,” per Health and Safety Code Section 41700.
- ▶ **FHFR AQ-5 Avoid Naturally Occurring Asbestos:** SMCP will avoid ground-disturbing treatment activities in areas identified as likely to contain naturally occurring asbestos (NOA) per maps and guidance published by the California Geological Survey, unless an Asbestos Dust Control Plan (17 CCR Section 93105) is prepared and approved by the BAAQMD. Any NOA-related guidance provided by the BAAQMD will be followed.
- Two ultramafic rock outcrops that may contain naturally occurring asbestos have been identified in San Mateo County; however, they are not located in proximity to PCCP<sup>57</sup>. No additional known or reported locations of historic asbestos mines, asbestos prospects, or other natural occurrences of asbestos are documented within San Mateo County.
- ▶ **FHFR AQ-6 Prescribed Burn Safety Procedures.** Prescribed burns planned and managed by non-CAL FIRE crews will follow all safety procedures required of CAL FIRE crew, including the implementation of an approved Incident Action Plan (IAP). The IAP

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<sup>57</sup> <https://pubs.usgs.gov/of/2011/1188/pdf/Pamphlet.pdf>

will include the burn dates; burn hours; weather limitations; the specific burn prescription; a communications plan; a medical plan; a traffic plan; and special instructions such as minimizing smoke impacts to specific local roadways. The IAP will also assign responsibilities for coordination with the BAAQMD, such as conducting onsite briefings, posting notifications, weather monitoring during burning, and other burn related preparations.

This FHFR applies only to prescribed burning treatment activities and all treatment types, including treatment maintenance.

### *Archaeological, Historical, and Cultural Resources*

- ▶ **FHFR CUL-1 Conduct Record Search:** An archaeological and historical resource record search will be conducted per the “Archaeological Review Procedures for CAL FIRE Projects”<sup>58</sup> and applicable procedures determined by the County of San Mateo Planning and Building Division<sup>59</sup>. Instead of conducting a new search, SMCP may use recent record searches completed within 5 years prior to project development.
- ▶ **FHFR CUL-2 Contact Geographically Affiliated Native American Tribes:** SMCP will obtain the latest Native American Heritage Commission (NAHC) provided Native Americans Contact List to notify the California Native American Tribes within San Mateo County.

The notification will contain the following:

- A written description of the treatment location and boundaries.
  - Brief narrative of the treatment objectives.
  - A description of the activities used (e.g., prescribed burning, mastication) and associated acreages.
  - A map of the treatment area at a sufficient scale to indicate the spatial extent of activities.
  - A request for information regarding potential impacts to cultural resources from the proposed treatment.
  - A detailed description of the depth of excavation, if ground disturbance is expected.
  - In addition, SMCP will contact the NAHC for a review of their sacred lands file.
- ▶ **FHFR CUL-3 Pre-field Research:** SMCP will conduct research prior to implementing treatments as part of the cultural resource investigation. The purpose of this research is to properly inform survey design, based on the types of resources likely to be encountered within the treatment area, and to be prepared to interpret, record, and evaluate these findings within the context of local history and prehistory. The qualified

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<sup>58</sup> <https://www.fire.ca.gov/media/11188/cultural-resources-review-procedures-for-cal-fire-projects-4-3-2020.pdf>

<sup>59</sup> <https://planning.smcgov.org/documents/historic-resources-ordinance>

archaeologist and/or archaeologically trained resource professional will review records, study maps, read pertinent ethnographic, archaeological, and historical literature specific to the area being studied, and conduct other tasks to maximize the effectiveness of the survey.

- ▶ **FHFR CUL-4 Archaeological Surveys:** SMCP will coordinate with an archaeologically trained resource professional and/or qualified archaeologist to conduct a site-specific survey of the treatment area. The survey methodology (e.g., pedestrian survey, subsurface investigation) depends on whether the area has a low, moderate, or high sensitivity for resources, which is based on whether the records search, pre-field research, and/or Native American consultation identifies archaeological or historical resources near or within the treatment area. A survey report will be completed for every cultural resource survey completed. The specific requirements will comply with the “Archaeological Review Procedures for CAL FIRE Projects” and applicable procedures determined by the County of San Mateo Planning and Building Division as needed.
- ▶ **FHFR CUL-5 Treatment of Archaeological Resources:** If cultural resources are identified within a treatment area, and cannot be avoided, a qualified archaeologist or archaeologically-trained resource professional will notify the culturally affiliated tribe(s) based on information provided by NAHC and assess whether an archaeological find qualifies as a unique archaeological resource, a historical resource, or in coordination with said tribe(s), a tribal cultural resource. SMCP, in consultation with culturally affiliated tribe(s), will develop effective protection measures for important cultural resources located within treatment areas. These measures may include adjusting the treatment location or design to entirely avoid cultural resource locations or changing treatment activities so that damaging effects to cultural resources will not occur. SMCP will defer implementing the treatment until the tribe approves protection measures, or if agreement cannot be reached after a good-faith effort, SMCP determines that any or all feasible measures have been implemented, where feasible, and the resource is either avoided or protected.

These protection measures will be written in clear, enforceable language, and will be included in the survey report in accordance with “Archaeological Review Procedures for CAL FIRE Projects” and/or applicable procedures determined by the County of San Mateo Planning and Building Division as needed.

- ▶ **FHFR CUL-6 Treatment of Tribal Cultural Resources:** The SMCP, in consultation with the culturally affiliated tribe(s), will develop effective protection measures for important tribal cultural resources located within treatment areas. These measures may include adjusting the treatment location or design to entirely avoid cultural resource locations or changing treatment activities so that damaging effects to cultural resources will not occur. SMCP will provide the tribe(s) the opportunity to submit comments and participate in consultation to resolve issues of concern. SMCP will defer implementing the treatment until the tribe approves protection measures, or if agreement cannot be reached after a good-faith effort, the proponent determines that any or all feasible

measures have been implemented, where feasible, and the resource is either avoided or protected. This SPR applies to all treatment activities and treatment types, including treatment maintenance.

- ▶ **FHFR CUL-7 Avoid Built Historical Resources:** If the records search or field investigation identifies built historical resources, as defined in Section 15064.5 of the State CEQA Guidelines, SMCP will avoid these resources. Within a buffer of 100 feet of the built historical resource, there will be no prescribed burning or mechanical treatment activities. Buffers less than 100 feet for built historical resources will only be used after consultation with and receipt of written approval from a qualified archaeologist. If the records search does not identify known historical resources in the treatment area, but structures (i.e., buildings, bridges, roadways) over 50 years old that have not been evaluated for historic significance are present in the treatment area, they will similarly be avoided.
- ▶ **FHFR CUL-8 Cultural Resource Training:** SMCP will train all crew members and contractors implementing treatment activities on the protection of sensitive archaeological, historical, or tribal cultural resources. Workers will be trained to halt work if archaeological resources are encountered on a treatment site and the treatment method consists of physical disturbance of land surfaces (e.g., soil disturbance).

### **Biological Resources**

- ▶ **FHFR BIO-QUAL- Qualified Registered Professional Forester (RPF) or Biologist:** To be qualified, an RPF or biologist would hold a wildlife biology, botany, ecology, forestry, or other relevant degree from an accredited university and: 1) be knowledgeable in relevant species life histories and ecology, 2) be able to correctly identify relevant species and habitats, 3) have experience conducting field surveys of relevant species or resources, 4) be knowledgeable about survey protocols, 5) be knowledgeable about state and federal laws regarding the protection of special-status species, and 6) have experience with CDFW's California Natural Diversity Database (CNDDDB) and Biogeographic Information and Observation System (BIOS).

If species-specific protocol surveys are performed, surveys would be conducted by qualified RPFs or biologists with the minimum qualifications required by the appropriate protocols, including having CDFW or USFWS approval to conduct such surveys, if required by certain protocols.

**Qualified RPF or Botanist:** To be qualified, an RPF or botanist would 1) be knowledgeable about plant taxonomy, 2) be familiar with plants of the region, including special-status plants and sensitive natural communities, 3) have experience conducting floristic botanical field surveys as described in CDFW "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" (current version dated March 20, 2018), or experience conducting such botanical field surveys under the direction of an experienced botanical field surveyor, 4) be familiar with the *California Manual of Vegetation* (Sawyer et al. 2009 or current

version, including updated natural communities data at <http://vegetation.cnps.org/>), and 5) be familiar with federal, state, and local statutes and regulations related to plants and plant collecting.

**Qualified RPF or Biological Technician:** To be qualified, an RPF or biological technician would 1) be knowledgeable in relevant species life histories and ecology, 2) be able to correctly identify relevant species and habitats, 3) have experience conducting biological monitoring of relevant species or resources, and 4) be knowledgeable about state and federal laws regarding the protection of special-status species. SMCP will review the resume and approve the qualifications of RPFs or biological technicians.

- ▶ **FHFR BIO-1: Review and Survey Project-Specific Biological Resources.** San Mateo County Parks will require a qualified RPF or biologist to conduct a data review and reconnaissance-level survey prior to treatment, no more than one year prior to the submittal of the permit for each treatment project, and no more than one year between completion of the permit and implementation of the treatment project.

The data reviewed will include the biological resources setting, species and sensitive natural communities tables, and habitat information for the ecoregion(s) where the treatment will occur. It will also include review of the best available, current data for the area, including vegetation mapping data, species distribution/range information, CNDDDB, California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California, relevant BIOS queries, and relevant general and regional plans.

Reconnaissance-level biological surveys will be general surveys that include visual and auditory inspection for biological resources to help determine the environmental setting of a project site. The qualified surveyor will 1.) identify and document sensitive resources, such as riparian or other sensitive habitats, sensitive natural communities to an alliance level per the 2<sup>nd</sup> Manual of California Vegetation, wetlands, or wildlife nursery site or habitat (including bird nests), and 2.) assess the suitability of habitat for special-status plant and animal species. The surveyor will also record any incidental wildlife observations. For each treatment project, habitat assessments will be completed at a time of year that is appropriate for identifying habitat and no more than one year prior to the submittal of a CalVTP PSA, unless it can be demonstrated that habitat assessments older than one year remain valid (e.g., site\_conditions are unchanged, and no treatment activity has occurred since the assessment).

If more than one year passes between completion of the permit and initiation of the treatment project, SMCP will verify the continued accuracy of the permit prior to beginning the treatment project by reviewing for any data updates and/or visiting the site to verify conditions. Based on the results of the data review and reconnaissance-level survey, San Mateo County Parks, in consultation with a qualified RPF or biologist, will determine which one of the following best characterizes the treatment:

1. **Suitable Habitat Is Present but Adverse Effects Can Be Clearly Avoided.** If, based on the data review and reconnaissance-level survey, the qualified RPF or

biologist determines that suitable habitat for sensitive biological resources is present but adverse effects on the suitable habitat can clearly be avoided through one of the following methods, the avoidance mechanism will be implemented prior to initiating treatment and will remain in effect throughout the treatment:

- a. by physically avoiding the suitable habitat, or
- b. by conducting treatment outside of the season when a sensitive resource could be present within the suitable habitat or outside the season of sensitivity (e.g., outside of special-status bird nesting season, during dormant season of sensitive annual or geophytic plant species, or outside of maternity and rearing season at wildlife nursery sites).

Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat. For physical avoidance, a buffer may be implemented as determined necessary by the qualified RPF or biologist.

2. **Suitable Habitat is Present and Adverse Effects Cannot Be Clearly Avoided.**

Further review and surveys will be conducted to determine presence/absence of sensitive biological resources that may be affected, as described in the FHFRs below. Further review may include contacting USFWS, NOAA Fisheries, CDFW, CNPS, or local resource agencies as necessary to determine the potential for special-status species or other sensitive biological resources to be affected by the treatment activity. Focused or protocol-level surveys may be conducted as necessary to determine presence/absence. If protocol surveys are conducted, survey procedures will adhere to methodologies approved by resource agencies and the scientific community, such as those that are available on the CDFW webpage at:

<https://www.wildlife.ca.gov/Conservation/Survey-Protocols>.

- ▶ **FHFR BIO-2: Require Biological Resource Training for Workers.** San Mateo County Parks will require crew members and contractors to receive training from a qualified RPF or biologist prior to beginning a treatment project. The training will describe the appropriate work practices necessary to effectively implement the biological FHFRs and mitigation measures and to comply with the applicable environmental laws and regulations. The training will include the identification, relevant life history information, and avoidance of pertinent special-status species; identification and avoidance of sensitive natural communities and habitats with the potential to occur in the treatment area; impact minimization procedures; and reporting requirements. The training will instruct workers when it is appropriate to stop work and allow wildlife encountered during treatment activities to leave the area unharmed and when it is necessary to report encounters to a qualified RPF, biologist, or biological technician.

The qualified RPF, biologist, or biological technician will immediately contact CDFW or USFWS, as appropriate, if any wildlife protected by the California Endangered Species

Act (CESA) or Federal Endangered Species Act (ESA) is encountered and cannot leave the site on its own (without being handled).

### Sensitive Natural Communities and Other Sensitive Habitats

► **FHFR BIO-3: Survey Sensitive Natural Communities and Other Sensitive Habitats.**

If FHFR-BIO-1 determines that sensitive natural communities or sensitive habitats may be present and adverse effects cannot be avoided, SMCP will:

- Require a qualified RPF or biologist to perform a protocol-level survey following the CDFW “Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities” (current version dated March 20, 2018) of the treatment area prior to the start of treatment activities for sensitive natural communities and sensitive habitats. Sensitive natural communities will be identified using the best means possible, including keying them out using the most current edition of *A Manual of California Vegetation* (including updated natural communities data at <http://vegetation.cnps.org/>), or referring to relevant reports (e.g., reports found on the VegCAMP website).
- Map and digitally record, using a Global Positioning System (GPS), the limits of any potential sensitive habitat and sensitive natural community identified in the treatment area.

► **FHFR BIO-4: Design Treatment to Avoid Loss or Degradation of Riparian Habitat Function.** SMCP, in consultation with a qualified RPF or qualified biologist, will design treatments in riparian habitats to retain or improve habitat functions by implementing the following within riparian habitats:

- Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat identified and mapped during surveys conducted pursuant to FHFR-BIO-3. Native riparian vegetation will be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities.
- Treatments will be limited to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are characteristic of healthy stands of the riparian vegetation types characteristic of the region. This includes hand removal (or mechanized removal where topography allows) of dead or dying riparian trees and shrubs, invasive plant removal, selective thinning, and removal of encroaching upland species.
- Removed trees will be felled away from adjacent streams or waterbodies and piled outside of the riparian vegetation zone (unless there is an ecological reason to do otherwise that is approved by applicable regulatory agencies, such as adding large woody material to a stream to enhance fish habitat, e.g., see *Accelerated Wood Recruitment and Timber Operations: Process Guidance from the California Timber Harvest Review Team Agencies and National Marine Fisheries Service*).

- Vegetation removal that could reduce stream shading and increase stream temperatures will be avoided.
  - Ground disturbance within riparian habitats will be limited to the minimum necessary to implement effective treatments. This will consist of the minimum disturbance area necessary to reduce hazardous fuels and return the riparian community to a natural fire regime (i.e., Condition Class 1) considering historic fire return intervals, climate change, and land use constraints.
  - San Mateo County Parks will notify CDFW pursuant to California Fish and Game Code Section 1602 prior to implementing any treatment activities in riparian habitats. Notification, which could come in the form of a CalVTP PSA per SPR-BIO 2, will identify the treatment activities, map the vegetation to be removed, identify the impact avoidance identification methods to be used (e.g., flagging), and appropriate protections for the retention of shaded riverine habitat, including buffers and other applicable measures to prevent erosion into the waterway.
- ▶ **FHFR BIO-5: Avoid Environmental Effects of Type Conversion and Maintain Habitat Function in Chaparral and Coastal Sage Scrub.** SMCP will design treatment activities to avoid type conversion where native coastal sage scrub and chaparral are present. An ecological definition of type conversion for assessment of environmental effects: a change from a vegetation type dominated by native shrub species that are characteristic of chaparral and coastal sage scrub vegetation alliances to a vegetation type characterized predominantly by weedy herbaceous cover or annual grasslands. Type conversion is considered in terms of habitat function, which is defined here as the arrangement and capability of habitat features to provide refuge, food source, and reproduction habitat to plants and animals, and thereby contribute to the conservation of biological and genetic diversity and evolutionary processes.<sup>60</sup> Some modification of habitat characteristics may occur provided habitat function is maintained (i.e., the location, essential habitat features, and species supported are not substantially changed).

During the reconnaissance-level survey required in FHFR-BIO-1, a qualified RPF or biologist will identify chaparral and coastal sage scrub vegetation to the alliance level and determine the condition class and fire return interval departure of the chaparral and/or coastal sage scrub present in each treatment area.

For all treatment types in chaparral and coastal sage scrub, SMCP, in consultation with a qualified RPF or qualified biologist will:

- Develop a treatment design that avoids environmental effects of type conversion in chaparral and coastal sage scrub vegetation alliances, which will include evaluating and determining the appropriate spatial scale at which the proponent would

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<sup>60</sup> [https://doi.org/10.1016/S0921-8009\(02\)00089-7](https://doi.org/10.1016/S0921-8009(02)00089-7)

consider type conversion and substantiating its appropriateness. SMCP will demonstrate with substantial evidence that the habitat function of chaparral and coastal sage scrub would be at least maintained within the identified spatial scale at which type conversion is evaluated for the specific treatment project. Consideration of factors such as site hydrology, erosion potential, suitability of wildlife habitat, spatial needs of sensitive species, presence of sufficient seed plants and nurse plants, light availability, and edge effects may inform the determination of an appropriate spatial scale.

- The treatment design will maintain a minimum percent cover of mature native shrubs within the treatment area to maintain habitat function; the appropriate percent cover will be identified by SMCP in the development of treatment design and be specific to the vegetation alliances that are present in the identified spatial scale used to evaluate type conversion. Mature native shrubs that are retained will be distributed contiguously or in patches within the stand. If the stand consists of multiple age classes, patches representing a range of middle to old age classes will be retained to maintain and improve heterogeneity, to the extent needed to avoid type conversion.

Additional measures will be applied to ecological restoration treatment types:

- For ecological restoration treatment types, complete removal of the mature shrub layer will not occur in native chaparral and coastal sage scrub vegetation types.
- A minimum of 35 percent relative cover of existing shrubs and associated native vegetation will be retained at existing densities in patches distributed in a mosaic pattern within the treated area or the shrub canopy will be thinned by no more than 20 percent from baseline density (i.e., if baseline shrub canopy density is 60 percent, post treatment shrub canopy density will be no less than 40 percent). A different percent relative cover can be retained if SMCP demonstrates with substantial evidence that alternative treatment design measures would result in effects on the habitat function of chaparral and coastal sage scrub that are equal or more favorable than those expected to result from application of the above measures. Biological considerations that may inform a deviation from the minimum 35 percent relative cover retention include but are not limited to soil moisture requirements, increased soil temperatures, changes in light/shading, presence of sufficient seed plants and nurse plants, erosion potential, and site hydrology.
- If the stand within the treatment area consists of multiple age classes, patches representing a range of middle to old age classes will be retained to maintain and improve heterogeneity.

A determination of compliance with the SB 1260 prohibition of type conversion in chaparral and coastal sage scrub is a statutory issue separate from CEQA compliance that may involve factors additional to the ecological definition and habitat functions presented in the CalVTP PEIR, such as geographic context. It is beyond the legal scope

of the CalVTP PEIR to define SB 1260 type conversion and statutory compliance. SMCP, acting as lead agency for the proposed later treatment project, will be responsible for defining type conversion in the context of the project and making the finding that type conversion would not occur, as required by SB 1260.

- ▶ **FHFR BIO-6: Prevent Spread of Plant Pathogens.** When working in sensitive natural communities, riparian habitats, or oak woodlands that are at risk from plant pathogens, SMCP will implement the following best management practices to prevent the spread of *Phytophthora* (sudden oak death, madrone cankers) and other plant pests and pathogens (e.g., California oakworm, Annosus root disease):
  - clean and sanitize vehicles, equipment, tools, footwear, and clothes before arriving at a treatment site and when leaving a contaminated site, or a site in a county where contamination is a risk;
  - include training on *Phytophthora* diseases and other plant pests and pathogens in the worker awareness training;
  - minimize soil disturbance as much as possible by limiting the number of vehicles, avoiding off-road travel as much as possible, and limiting use of mechanized equipment;
  - minimize movement of soil and plant material within the site, especially between areas with high and low risk of contamination;
  - clean soil and debris from equipment and sanitize hand tools, buckets, gloves, and footwear when moving from high-risk to low-risk areas or between widely separated portions of a treatment area; and
- ▶ **FHFR BIO-7: Survey for Special-Status Plants.** If FHFR-BIO-1 determines that suitable habitat for special-status plant species is present and cannot be avoided, SMCP will require a qualified RPF or botanist to conduct protocol-level surveys for special-status plant species with the potential to be affected by a treatment prior to initiation of the treatment. The survey will follow the methods in the current version of CDFW's "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities."

Surveys to determine the presence or absence of special-status plant species will be conducted in suitable habitat that could be affected by the treatment and timed to coincide with the blooming or other appropriate phenological period of the target species (as determined by a qualified RPF or botanist), or all species in the same genus as the target species will be assumed to be special-status.

If potentially occurring special-status plants are listed under CESA or ESA, protocol-level surveys to determine presence/absence of the listed species will be conducted in all circumstances, unless determined otherwise by CDFW or USFWS.

For other special-status plants not listed under CESA or ESA, as defined in Section 3.6.1 of the CalVTP PEIR, surveys will not be required under the following circumstances:

- If protocol-level surveys, consisting of at least two survey visits (e.g., early blooming season and later blooming season) during a normal weather year, have been completed in the 5 years before implementation of the treatment project and no special-status plants were found, and no treatment activity has occurred following the protocol-level survey, treatment may proceed without additional plant surveys.
- If the target special-status plant species is an herbaceous annual, stump-sprouting, or geophyte species, the treatment may be carried out during the dormant season for that species or when the species has completed its annual lifecycle without conducting presence/absence surveys provided the treatment will not alter habitat or destroy seeds, stumps, or roots, rhizomes, bulbs and other underground parts in a way that would make it unsuitable for the target species to reestablish following treatment.

### Invasive Plants and Wildlife

- ▶ **FHFR BIO-9: Prevent Spread of Invasive Plants, Noxious Weeds, and Invasive Wildlife.** SMCP will take the following actions to prevent the spread of invasive plants, noxious weeds, and invasive wildlife (e.g., New Zealand mudsnail):
  - clean clothing, footwear, and equipment used during treatments of soil, seeds, vegetative matter, other debris or seed-bearing material, or water (e.g., rivers, streams, creeks, lakes) before entering the treatment area or when leaving an area with infestations of invasive plants, noxious weeds, or invasive wildlife;
  - for all heavy equipment and vehicles traveling off road, pressure wash, if feasible, or otherwise appropriately decontaminate equipment at a designated weed-cleaning station prior to entering the treatment area from an area with infestations of invasive plants, noxious weeds, or invasive wildlife. Anti-fungal wash agents will be specified if the equipment has been exposed to any pathogen that could affect native species;
  - inspect all heavy equipment, vehicles, tools, or other treatment-related materials for sand, mud, or other signs that weed seeds or propagules could be present prior to use in the treatment area. If the equipment is not clean, the qualified RPF or biological technician will deny entry to the work areas;
  - stage equipment in areas free of invasive plant infestations unless there are no uninfested areas present within a reasonable proximity to the treatment area;
  - identify significant infestations of invasive plant species (i.e., those rated as invasive by Cal-IPC or designated as noxious weeds by California Department of Food and Agriculture) during reconnaissance-level surveys and target them for removal during treatment activities. Treatment methods will be selected based on the invasive species present and may include herbicide application, manual or mechanical treatments, prescribed burning, and/or herbivory, and will be designed to maximize success in killing or removing the invasive plants and preventing reestablishment based on the life history characteristics of the invasive plant

species present. Treatments will be focused on removing invasive plant species that cause ecological harm to native vegetation types, especially those that can alter fire cycles;

- treat invasive plant biomass onsite to eliminate seeds and propagules and prevent reestablishment or dispose of invasive plant biomass offsite at an appropriate waste collection facility (if not kept on site); transport invasive plant materials in a closed container or bag to prevent the spread of propagules during transport; and
- implement Fire and Fuel Management BMPs outlined in the “Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers” (Cal-IPC 2012, or current version).<sup>61</sup>

### Wildlife

- ▶ **FHFR BIO-10: Survey for Special-Status Wildlife and Nursery Sites.** If SPR BIO-1 determines that suitable habitat for special-status wildlife species or nurseries of any wildlife species is present and cannot be avoided, SMCP will require a qualified RPF or biologist to conduct focused or protocol-level surveys for special-status wildlife species or nursery sites (e.g., marbled murrelet nesting sites, bat maternity roosts, deer fawning areas) with potential to be directly or indirectly affected by a treatment activity. The survey area will be determined by a qualified RPF or biologist based on the species and habitats and any recommended buffer distances in agency protocols.

The qualified RPF or biologist will determine if following an established protocol is required, and SMCP may consult with CDFW and/or USFWS for technical information regarding appropriate survey protocols. Unless otherwise specified in a protocol, the survey will be conducted no more than 14 days prior to the beginning of treatment activities. Focused or protocol surveys for a special-status species with potential to occur in the treatment area may not be required if presence of the species is assumed.

- ▶ **FHFR BIO-11. Install Wildlife-Friendly Fencing (Prescribed Herbivory).** If temporary fencing is required for prescribed herbivory treatment, a wildlife-friendly fencing design will be used. SMCP will require a qualified RPF or biologist to review and approve the design before installation minimize the risk of wildlife entanglement. The fencing design will meet the following standards:
  - Minimize the chance of wildlife entanglement by avoiding barbed wire, loose or broken wires, or any material that could impale or snag a leaping animal; and, if feasible, keeping electric netting-type fencing electrified at all times or laid down while not in use.
  - Charge temporary electric fencing with intermittent pulse energizers; continuous output fence chargers will not be permitted.

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<sup>61</sup> <https://www.cal-ipc.org/resources/library/publications/landmanagers/>

- Allow wildlife to jump over easily without injury by installing fencing that can flex as animals pass over it and installing the top wire low enough (no more than approximately 40 inches high on flat ground) to allow adult ungulates to jump over it. The determination of appropriate fence height will consider slope, as steep slopes are more difficult for wildlife to pass.
  - Be highly visible to birds and mammals by using high-visibility tape or wire, flagging, or other markers.
- **FHFR BIO-12. Protect Common Nesting Birds, Including Raptors.** SMCP will schedule treatment activities to avoid the active nesting season of common native bird species, including raptors, that could be present within or adjacent to the treatment site, if feasible. Common native birds are species not otherwise treated as special-status. The active nesting season will be defined by the qualified RPF or biologist.

If active nesting season avoidance is not feasible, a qualified RPF or biologist will conduct a survey for common nesting birds, including raptors. Existing records (e.g., CNDDDB, eBird database, State Wildlife Action Plan) should be reviewed in advance of the survey to identify the common nesting birds, including raptors, which are known to occur in the vicinity of the treatment site. The survey area will encompass reasonably accessible areas of the treatment site and the immediately surrounding vicinity viewable from the treatment site. The survey area will be determined by a qualified RPF or biologist, based on the potential species in the area, location of suitable nesting habitat, and type of treatment. For vegetation removal or project activities that would occur during the nesting season, the survey will be conducted at a time that balances the effectiveness of detecting nests and the reasonable consideration of potential avoidance strategies. Typically, this timeframe would be up to 3 weeks before treatment. The survey will occur in a single survey period of sufficient duration to reasonably detect nesting birds, including raptors, typically one day for most treatment projects (depending on the size, configuration, and vegetation density in the treatment site), and conducted during the active time of day for target species, typically close to dawn and/or dusk. The survey may be conducted concurrently with other biological surveys, if they are required by other FHFRs. Survey methods will be tailored by the qualified RPF or biologist to site and habitat conditions, typically involving walking throughout the survey area, visually searching for nests and birds exhibiting behavior that is typical of breeding (e.g., delivering food).

If an active nest is observed (i.e., presence of eggs and/or chicks) or determined to likely be present based on nesting bird behavior, SMCP will implement a feasible strategy to avoid disturbance of active nests, which may include, but is not limited to, one or more of the following measures:

- **Establish Buffer.** SMCP will establish a temporary, species-appropriate buffer around the nest sufficient to reasonably expect that breeding would not be disrupted. Treatment activities will be implemented outside of the buffer. The buffer location will be determined by a qualified RPF or biologist. Factors to be considered

for determining buffer location will include: presence of natural buffers provided by vegetation or topography, nest height above ground, baseline levels of noise and human activity, species sensitivity, and expected treatment activities. Nests of common birds within the buffer need not be monitored during treatment. However, buffers will be maintained until young fledge or the nest becomes inactive, as determined by the qualified RPF, biologist, or biological technician.

- **Modify Treatment.** SMCP will modify the treatment in the vicinity of an active nest to avoid disturbance of active nests (e.g., by implementing manual treatment methods, rather than mechanical treatment methods). Treatment modifications will be determined by SMCP in coordination with the qualified RPF or biologist.
- **Defer Treatment.** SMCP will defer the timing of treatment in the portion(s) of the treatment site that could disturb the active nest. If this avoidance strategy is implemented, treatment activity will not commence until young fledge or the nest becomes inactive, as determined by the qualified RPF, biologist, or biological technician.

Feasible actions will be taken by SMCP to avoid loss of common native bird nests. The feasibility of implementing the avoidance strategies will be determined by SMCP based on whether implementation of this FHFR will preclude completing the treatment project within the reasonable period of time necessary to meet CHRP objectives, including, but not limited to, protection of vulnerable communities. Considerations may include limitations on the presence of environmental and atmospheric conditions necessary to execute treatment prescriptions (e.g., the limited seasonal windows during which prescribed burning can occur when vegetation moisture, weather, wind, and other physical conditions are suitable). If it is infeasible to avoid loss of common bird nests (not including raptor nests), SMCP will document the reasons implementation of the avoidance strategies is infeasible. After completion of the treatment permit and prior to or during treatment implementation, if there is any change in the feasibility of avoidance strategies from those explained in the treatment permit, this will be documented in the post-project implementation report (referred to by CAL FIRE as a Completion Report), when applicable.

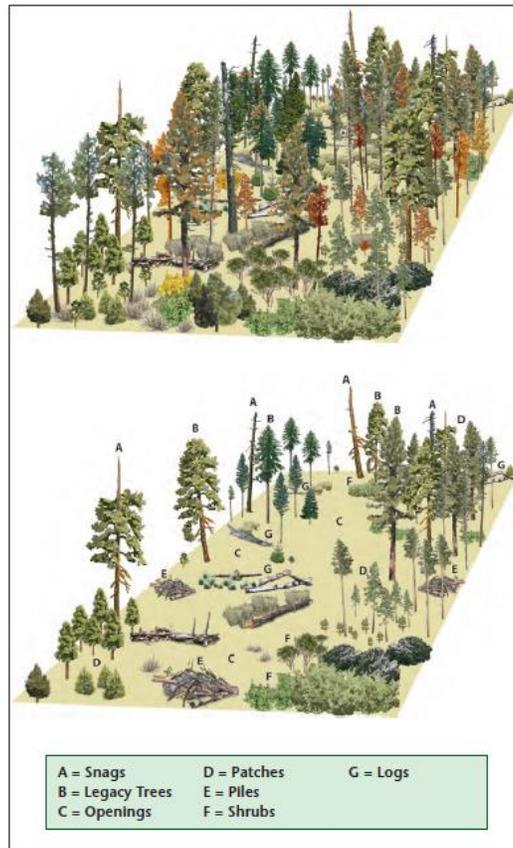
The following avoidance strategies may also be considered together with or in lieu of other actions for implementation by SMCP to avoid disturbance to raptor nests:

- **Monitor Active Raptor Nest During Treatment.** A qualified RPF, biologist, or biological technician will monitor an active raptor nest during treatment activities to identify signs of agitation, nest defense, or other behaviors that signal disturbance of the active nest is likely (e.g., standing up from a brooding position, flying off the nest). If breeding raptors are showing signs of nest disturbance, one of the other avoidance strategies (establish buffer, modify treatment or defer treatment) will be implemented or a pause in the treatment activity will occur until the disturbance behavior ceases.

- **Retention of Raptor Nest Trees.** Trees with visible raptor nests, whether occupied or not, will be retained.

**FHFR BIO-13 California Red-Legged Frog (*Rana draytonii*) and foothill yellow-legged frog (*Rana Boylii*):** The project area occurs within the historic range of California red-legged frog, so presence is assumed unless protocol-level surveys demonstrate absence.

Avoidance and retention measures required by the Standard Project Requirements (SPR) and Mitigation Measures (MM) in the California Vegetation Treatment Program (CalVTP) Program Environmental Impact Report (PEIR) will be included in the project-specific analysis (PSA) for any Forest Health Fuels Reduction (FHFR) treatments under the Climate and Habitat Resiliency Plan. In some cases, SPRs and MMs from the PEIR are refined for the project to reflect site-specific conditions. Project-specific avoidance and retention measures shall be provided in the Project Description and the Mitigation Monitoring and Reporting Program (MMRP) of future CalVTP PSAs. Retention measures were informed in part by the recommendations in *Wildfire-Friendly Fuels Reduction in Dry Forests in the Pacific Northwest* (Strong and Bevis 2016). Figures 4 and 5 from this article are provided below to show planned treatment outcomes proposed by implementing FHFRs under the Climate and Habitat Resiliency Plan.



**Figure 4 and Figure 5.** Top, a forest from which fire has been removed for many years and is in need of restoration. Bottom, a forest treated to reduce fire risk, be more resilient to insects and disease, and enhance wildlife habitat. Components retained in the treated stand include snags, legacy trees, openings and patches.

- **Shut Down Periods:** (MM BIO-2a) Mechanized operations will be shut down for the following periods after the end of a precipitation event.

California Red-legged Frog Precipitation Shut Down Periods for Mechanized Operations	
Precipitation Amount	Shut down period
≥ .20 inch - 1 inch	24 hours
1 inch - 2 inches	48 hours
≥ 2 inches	72 Hours

\* Handwork W/O track chippers may continue

- **Habitat Retention Standards to Create a Mosaic of Vegetation Following Treatments:**

- Retain a mosaic of remaining trees comprised of approximately 100–200 healthy trees per acre generally, removing dead, dying, and diseased trees first and select live trees less than or equal ( $\leq$ ) to 16 inches DBH.
- Where there are only stands made up of trees less than 16 inches DBH, these stands of smaller trees will be spaced approximately 10–20 feet apart. Healthy trees less  $\leq$ 16 inches DBH will be favored for retention over diseased trees  $\leq$ 16 inches DBH to meet the spacing goal.
- Retain snags greater than 12 inches DBH that are at least 100 feet from key infrastructure and recreation assets; target retention per acre is 1–2 snags per acre prioritizing snags with cavities for habitat.
- Retention of woody debris in strategic locations to maintain forest floor complexity while reducing fuel connectivity. When masticating, operators will minimize disturbance to down wood greater than 12 inches in diameter where feasible, only moving large pieces of woody debris when necessary to reduce fire behavior or gain access to larger portions of treatment areas, with a per acre retention target of 1–4 downed logs 15 feet in length and greater than or equal to 12 inches in diameter per acre.
- The following understory retention will be implemented to create a mosaic of vegetation to maintain suitable non-aquatic habitat for California red-legged frog:
  - Hydrophytic riparian species such as (e.g., sedges [*Carex* spp.], rushes [*Juncus* spp.], western azalea [*Rhododendron occidentale*], red elderberry [*Sambucus racemosa*] and blue elderberry [*Sambucus cerulea*], and ferns [*Pteridophyta*]) will be retained unless there is a safety issue, and that species needs to be removed.
  - California hazelnut (*Corylus cornuta*), where it occurs, shall be maintained at a spacing between 25–100 feet depending on

frequency per acre, steepness of slope related to exacerbation of fire behavior, or proximity to key infrastructure and assets.

- Outside of the drip line of retained trees, shrubs (not subject to other retention standards) shall be retained to achieve a horizontal crown separation of approximately 50–75 feet. Spacing may be closer to 50 feet on flatter ground and 75 feet on steeper ground or completely removed to provide defensible space when in proximity to infrastructure or near homes within treatment areas. Remaining clumps of brush and shrubs should not exceed approximately 15–25 feet in diameter and will consist of healthy appearing specimens where feasible. At no time shall more than 66% of any contiguous stand of shrubs be removed that is mapped in a single treatment polygon unless the treatment activity is Fuel Break. Consideration shall be given to maintaining a diversity of understory vegetation, brush, and shrub species in these areas.
  - In areas specified for retention of vegetation outside of riparian habitat, maintain associated herbaceous vegetative understory components with an overall goal of maintaining a typical minimum of approximately 5-10% herbaceous understory vegetation per acre unless removal is warranted with respect to recreation, community protection, or other key infrastructure or assets including roads and staging areas.
- No cutting of California buckeye (*Aesculus californica*), California nutmeg (*Torreya californica*), California Big leaf-maple (*Acer macrophyllum*), western sycamore (*Platanus racemose*), and box elder (*Acer negundo* var. *californicum*), unless their removal is warranted for crew safety or proximity with respect to recreation or other infrastructure assets including roads and staging areas.
  - Micro stands of untreated oak trees with a cluster radius of approximately 25 feet (50-foot diameter) shall be periodically maintained throughout the project area where feasible; and should be spaced approximately 75–150 feet apart depending on the steepness of slope related to exacerbation of fire behavior or proximity to key infrastructure and assets.
  - The residual masticated material shall remain uniformly spread to the extent feasible within the project area, shall not exceed a depth of approximately 6 inches and should average 3 inches. Tracked chippers will be restricted to manual treatment units where slopes do not exceed 35 percent.

- ▶ **FHFR BIO-14 Marbled Murrelets (*Brachyramphus marmoratus*):** The following recommended Best Management Practices consider the recorded localized marbled murrelet behaviors analyzed SMCP, the scale and impact of the CZU Fire to marbled murrelet habitat, and the urgency to minimize the threat of further loss of murrelet habitat as a result of extreme wildfires and climate change through proactive forest management:
  - **Operational Window:** High decibel work (See *APPENDIX H*) in proximity or within areas identified as murrelet habitat, occupied or important habitat areas in Pescadero Creek County Park may begin on August 15th and continue to March 24th, except for the following conditions:
    - New Audio-Visual (AV) or Acoustic Recording Unit (ARU) data suggests different dates when murrelets nest in these areas.
    - High decibel work may occur year around in areas of the CZU Fire that burned at moderate-high and high severities (<https://sig-gis.com/czu-lightning-complex-map/>) within the CZU Fire where murrelet habitat was significantly compromised or destroyed.
  - **Working Hours:** Do not work during the dawn and dusk period in areas identified as murrelet habitat, occupied or important habitat areas that experienced low or moderate burn severity. Work from 1.5 hours after sunrise to 1 hour before sunset between March 24<sup>th</sup> – August 15<sup>th</sup> in marbled murrelet important areas within Pescadero Creek County Park.
  - **Noise Restrictions:** Noise restrictions should be in place that address any chronic noise production or new noise that is 30-35 dB above background (See *APPENDIX H*). These noises should be carefully evaluated and minimized to the extent possible.
    - **Habitat Buffer:** Sound analysis work and data indicates that in areas of low to moderate fire severity identified as murrelet habitat, where occupied or important habitat areas in the Santa Cruz Mountains still exist, disturbance buffers can be reduced to 330 feet to allow larger handwork crews and mastication equipment to conduct forest restoration and resiliency treatments greater than normal routine maintenance actions and park use, from March 24th to August 15<sup>th</sup> in Pescadero Creek County Park.
  - **Strategic Planning:** Time forestry work to occur as far from murrelet habitat in the July timeframe and gradually work towards murrelet habitat as the season tapers off.
  - **Continued Monitoring:** AV and ARU monitoring will continue in areas where these recommendations are being followed to monitor changes in murrelet behavior supporting adaptive management strategies as needed to protect the species. Survey data will be shared with Agencies as it is available post-season to adjust work windows based on new information.

- **Routine Maintenance:** General, routine work within the scope of the *County of San Mateo Routine Maintenance Program* may be conducted at any time, year-round within Pescadero Creek County Park.<sup>62</sup>

### **Energy and Climate**

- ▶ **FHFR-ENC-1 Contribute to the AB 1504 Carbon Inventory Process:** SMCP treatment projects subject to the AB 1504 process will provide all necessary data about the treatment that is needed by the U.S. Forest Service and FRAP to fulfill requirements of the AB 1504 carbon inventory, and to aid in the ongoing research about the long-term net change in carbon sequestration resulting from treatment activity.

### **Geology, Soils, and Mineral Resources**

- ▶ **FHFR GEO-1 Suspend Disturbance during Heavy Precipitation:** SMCP will suspend mechanical and herbicide treatments if the National Weather Service forecast is a “chance” (30 percent or more) of rain within the next 12 hours from 6:00 am to 6:00 pm. Activities that cause mechanical soil disturbance may resume when precipitation stops and soils are no longer saturated (i.e., when soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur). Indicators of saturated soil conditions may include, but are not limited to: (1) areas of ponded water, (2) pumping of fines from the soil or road surfacing, (3) loss of bearing strength resulting in the deflection of soil or road surfaces under a load, such as the creation of wheel ruts, (4) spinning or churning of wheels or tracks that produces a wet slurry, or (5) inadequate traction without blading wet soil or surfacing materials.
- ▶ **FHFR GEO-2 Limit High Ground Pressure Vehicles:** SMCP will limit heavy equipment that could cause soil disturbance or compaction to be driven through treatment areas when soils are wet and saturated to avoid compaction and/or damage to soil structure. Saturated soil means that soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur. If use of heavy equipment is required in saturated areas, other measures such as operating on organic debris or using low ground pressure vehicles will be implemented to minimize soil compaction. Existing compacted road surfaces are exempted as they are already compacted from use.
- ▶ **FHFR GEO-3 Stabilize Disturbed Soil Areas:** SMCP will stabilize soil disturbed during mechanical treatment that results in exposure of bare soil over 50 percent or more of the treatment area with mulch or its equivalent immediately after treatment activities, to the maximum extent practicable, to minimize the potential for substantial sediment discharge. If mechanical, treatment activities could result in substantial sediment discharge from soil disturbed by machinery, organic material from mastication or mulch will be incorporated onto at least 75 percent of the disturbed soil surface where the soil erosion hazard is moderate or high, and 50 percent of the disturbed soil surface

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<sup>62</sup> <https://www.smcgov.org/publicworks/county-san-mateo-routine-maintenance-program>

where soil erosion hazard is low to help prevent erosion. Where slash mulch is used, it will be packed into the ground surface with heavy equipment so that it is sufficiently in contact with the soil surface.

- ▶ **FHFR GEO-4 Erosion Monitoring:** SMCP will inspect treatment areas for the proper implementation of erosion control standards and mitigations prior to the rainy season. If erosion control measures are not properly implemented, they will be remediated prior to the first rainfall event per FHFR-GEO-3 and GEO-8. Additionally, the project proponent will inspect for evidence of erosion after the first large storm or rainfall event (i.e.,  $\geq 1.5$  inches in 24 hours) as soon as is feasible after the event. Any area of erosion that will result in substantial sediment discharge will be remediated within 48 hours per the methods stated in FHFR-GEO-3 and GEO-8.
- ▶ **FHFR GEO-5 Drain Stormwater via Water Breaks:** SMCP will drain compacted and/or bare linear treatment areas capable of generating storm runoff via water breaks using the spacing and erosion control guidelines contained in Sections 914.6, 934.6, and 954.6(c) of the 2021 California Forest Practice Rules. Where waterbreaks cannot effectively disperse surface runoff, including where waterbreaks cause surface run-off to be concentrated on downslopes, other erosion controls will be installed as needed to maintain site productivity by minimizing soil loss.
- ▶ **FHFR GEO-6 Minimize Burn Pile Size:** SMCP will not create burn piles that exceed 20 feet in length, width, or diameter, except when on landings, road surfaces, or on contour to minimize the spatial extent of soil damage. In addition, burn piles will not occupy more than 15 percent of the total treatment area (Busse et al. 2014). SMCP will not locate burn piles in a Watercourse and Lake Protection Zone as defined in 14 CCR Section 916.5 of the 2021 California Forest Practice Rules.
- ▶ **FHFR GEO-7 Minimize Erosion:** To minimize erosion, SMCP will:
  - (1) Prohibit use of heavy equipment where any of the following conditions are present:
    - (i) Slopes steeper than 65 percent.
    - (ii) Slopes steeper than 50 percent where the erosion hazard rating is high or extreme based on calculations obtained pursuant to 14 CCR Section 912.5.
    - (iii) Slopes steeper than 50 percent that lead without flattening to sufficiently dissipate water flow and trap sediment before it reaches a watercourse or lake.
  - On slopes between 50 percent and 65 percent where the erosion hazard rating is moderate, and all slope percentages are for average slope steepness based on sample areas that are 20 acres, or less, heavy equipment will be limited to:
    - (i) Existing tractor roads that do not require reconstruction, or
    - (ii) New tractor roads flagged by SMCP prior to the treatment activity.
  - Prescribed herbivory treatments will not be used in areas with over 50 percent slope.

- ▶ **FHFR GEO-8 Steep Slopes:** SMCP will require a Registered Professional Forester (RPF) or licensed geologist to evaluate treatment areas with slopes greater than 50 percent for unstable areas (areas with potential for landslide) and unstable soils (soil with moderate to high erosion hazard). If unstable areas or soils are identified within the treatment area, are unavoidable, and will be potentially directly or indirectly affected by the treatment, a licensed geologist (P.G. or C.E.G.) will determine the potential for landslide, erosion, of other issue related to unstable soils and identify measures (e.g., those in FHFR-GEO-7) that will be implemented by SMCP such that substantial erosion or loss of topsoil would not occur to avoid adverse impacts to TMDL requirements.

### *Hazardous Materials, Public Health, and Safety*

- ▶ **FHFR HAZ-1 Maintain All Equipment:** SMCP and/or their contractor will maintain all diesel- and gasoline-powered equipment per manufacturer's specifications, and in compliance with all state emissions requirements defined by the California Air Resources Board. Maintenance records will be made available for verification. Prior to the start of treatment activities, SMCP will inspect all equipment for leaks and inspect everyday thereafter until equipment is removed from the site. Any equipment found leaking will be promptly removed from the treatment area.
- ▶ **FHFR HAZ-2 Require Spark Arrestors:** SMCP will require mechanized hand tools to have federal- or state-approved spark arrestors.
- ▶ **FHFR HAZ-3 Require Fire Extinguishers:** SMCP will require tree cutting crews to carry one fire extinguisher per chainsaw. Each vehicle would be equipped with one long-handled shovel and one axe or Pulaski consistent with PRC Section 4428.
- ▶ **FHFR HAZ-4 Prohibit Smoking in County Parks:** SMCP prohibits smoking within all San Mateo County parks and is not permitted under any circumstance.
- ▶ **FHFR HAZ-5 Spill Prevention and Response Plan:** SMCP or licensed Pest Control Advisor (PCA) will prepare a Spill Prevention and Response Plan (SPRP) prior to beginning any herbicide treatment activities to provide protection to onsite workers, the public, and the environment from accidental leaks or spills of herbicides, adjuvants, or other potential contaminants. The SPRP will include (but not be limited to):
  - a map that delineates staging areas, and storage, loading, and mixing areas for herbicides;
  - a list of items required in an onsite spill kit that will be maintained throughout the life of the activity;
  - procedures for the proper storage, use, and disposal of any herbicides, adjuvants, or other chemicals used in vegetation treatment.
- ▶ **FHFR HAZ-6 Comply with Herbicide Application Regulations:** SMCP will coordinate pesticide use with the applicable County Agricultural Commissioner(s), and all required licenses and permits will be obtained prior to herbicide application. The SMCP will prepare all herbicide applications to do the following:

- Be implemented consistent with recommendations prepared annually by a licensed PCA.
  - Comply with all appropriate laws and regulations pertaining to the use of pesticides and safety standards for employees and the public, as governed by the EPA, DPR, and applicable local jurisdictions.
  - Adhere to label directions for application rates and methods, storage, transportation, mixing, container disposal, and weather limitations to application such as wind speed, humidity, temperature, and precipitation.
  - Be applied by an applicator appropriately licensed by the State.
- ▶ **FHFR HAZ-7 Triple Rinse Herbicide Containers:** SMCP will triple rinse all herbicide and adjuvant containers with clean water at an approved site and dispose of rinsate by placing it in the batch tank for application per 3 CCR Section 6684. The SMCP will puncture used containers on the top and bottom to render them unusable, unless said containers are part of a manufacturer's container recycling program, in which case the manufacturer's instructions will be followed. Disposal of non-recyclable containers will be at legal dumpsites. Equipment will not be cleaned, and personnel will not be washed in a manner that would allow contaminated water to directly enter any body of water within the treatment area or adjacent watersheds. Disposal of all herbicides will follow label requirements and waste disposal regulations.
- ▶ **FHFR HAZ-8 Minimize Herbicide Drift to Public Areas:** SMCP will employ the following herbicide application parameters during herbicide application to minimize drift into public areas:
- application will cease when weather parameters exceed label specifications or when sustained winds at the site of application exceeds 7 miles per hour (whichever is more conservative);
  - spray nozzles will be configured to produce the largest appropriate droplet size to minimize drift;
  - low nozzle pressures (30-70 pounds per square inch) will be utilized to minimize drift; and
  - spray nozzles will be kept within 24 inches of vegetation during spraying.
- ▶ **FHFR HAZ-9 Notification of Herbicide Use in the Vicinity of Public Areas:** For herbicide applications occurring within or adjacent to public recreation areas, residential areas, schools, or any other public areas within 500 feet, SMCP will post signs at each end of herbicide treatment areas and any intersecting trails notifying the public of the use of herbicides. The signs will include the signal word (i.e., Danger, Warning or Caution), product name, and manufacturer; active ingredient; EPA registration number; target pest; treatment location; date and time of application; restricted entry interval, if applicable per the label requirements; date which notification sign may be removed; and a contact person with a telephone number. Signs will be

posted prior to the start of treatment and notification will remain in place for at least 72 hours after treatment ceases.

### **Hydrology and Water Quality**

- ▶ **FHFR HYD-1 Comply with Existing Lake and Streambed Alteration Agreement:** An existing Lake and Streambed Alteration Agreement (Notification No. 1600-2019-0144-R3) between the California Department of Fish and Wildlife (CDFW) and the County of San Mateo Public Works Department (Permittee) provides terms and conditions, agreed upon pursuant to Fish and Game Code, to allow for routine maintenance activities to be conducted within San Mateo County pursuant to the Routine Maintenance Manual.

SMCP will comply with all applicable routine maintenance requirements and allowable activities authorized by CDFW under the agreement in areas where sensitive species have the potential to occur, in order to prevent take of state listed or fully protected species.

- ▶ **FHFR HYD-2 Comply with Regional Water Quality Regulations:** SMCP must also conduct proposed vegetation treatments in conformance with the San Francisco Bay Regional Water Quality Control Board timber, vegetation, and land disturbance related Waste Discharge Requirements (WDRs) and/or related Conditional Waivers of Waste Discharge Requirements (Waivers), and Basin Plan prohibitions. Where these regulatory requirements differ, the most restrictive will apply

SMCP will comply with all applicable water quality requirements adopted by the San Francisco Bay RWQCB Basin Plan<sup>63</sup>, which includes the Pescadero-Butano Watershed Sediment TMDL and Habitat Enhancement Plan (Section 7.4.2), in order to prevent degradation of the quality and Beneficial Uses of water consistent with 14 CCR § 916.2[936.2,956.2].

- ▶ **FHFR HYD-3 Water Quality Protections for Prescribed Herbivory:** SMCP will include the following water quality protections for all prescribed herbivory treatments:
  - Environmentally sensitive areas such as waterbodies, wetlands, or riparian areas will be identified in the treatment prescription and excluded from prescribed herbivory project areas using temporary fencing or active herding. A buffer of approximately 50 feet will be maintained between sensitive and actively grazed areas.
  - Water will be provided for grazing animals in the form of a portable water source located outside of environmentally sensitive areas.
  - Treatment prescriptions will be designed to protect soil stability. Grazing animals will be herded out of an area if accelerated soil erosion is observed.
- ▶ **FHFR HYD-4 Identify and Protect Watercourse and Lake Protection Zones:** SMCP will establish Watercourse and Lake Protection Zones (WLPZs) on either side of

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<sup>63</sup> [https://www.waterboards.ca.gov/sanfranciscobay/basin\\_planning.html](https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html)

watercourses as defined in Figure 23 below, which is taken from 14 CCR Section 916.5 of the 2021 California Forest Practice Rules. WLPZ's are classified based on the uses of the stream and the presence of aquatic life. Wider WLPZs are required for steep slopes.

<b>Procedures for Determining Watercourse and Lake Protection Zone Widths and Protective Measures<sup>1</sup></b>								
Water Class Characteristics or Key Indicator Beneficial Use	1) Domestic supplies, including springs, on site and/or within 100 feet downstream of the operations area and/or  2) Fish always or seasonally present onsite, includes habitat to sustain fish migration and spawning.		1) Fish always or seasonally present offsite within 1000 feet downstream and/or  2) Aquatic habitat for nonfish aquatic species.  3) Excludes Class III waters that are tributary to Class I waters.		No aquatic life present, Watercourse showing evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of Timber Operations.		Man-made Watercourses, usually downstream, established domestic, agricultural, hydroelectric supply or other beneficial use.	
Water Class	Class I		Class II		Class III		Class IV	
Slope Class (%)	Width Feet	Protection Measure	Width Feet	Protection Measure	Width Feet	Protection Measure	Width Feet	Protection Measure
					[see 916.4(c)] [see 936.4(c)] [see 956.4(c)]		[see 916.4(c)] [see 936.4(c)] [see 956.4(c)]	
<30	75	BDG	50	BEI	See CFH		See CFI	
30-50	100	BDG	75	BEI	See CFH		See CFI	
>50	150 <sup>2</sup>	ADG	100 <sup>3</sup>	BEI	See CFH		See CFI	
<p>1 - See Section 916.5(e) for letter designations application to this table.                  2 - Subtract 50 feet width for cable Yarding operations.                  3 - Subtract 25 feet width for cable Yarding operations.</p>								

Figure 24 Procedures for Determining Watercourse and Lake Protection Zone (WLPZ) Widths and Protection Measures, 14 CCR 916.5

The following WLPZ protections will be applied for all treatments:

- Treatment activities with WLPZs will retain at least 75 percent canopy cover and 50 percent surface cover and undisturbed area to act as a filter strip for raindrop energy dissipation and for wildlife habitat. If this percentage is reduced, a qualified RPF will provide SMCP with a site- and/or treatment activity-specific explanation for the percent surface cover reduction. This requirement is based on 14 CCR Section 916.4 [936.4, 956.4] Subsection (b)(6) and 14 CCR Section 916.5.

- Equipment, including tractors and vehicles, must not be driven in wet areas or WLPZs, except over existing roads or watercourse crossings where vehicle tires or tracks remain dry.
- Equipment used in vegetation removal operations will not be fueled or serviced within 65 feet of a watercourse, within wet meadows or other wet areas, or in locations that would allow grease, oil, or fuel to pass into lakes, watercourses, or wet areas.
- WLPZs will be kept free of slash, debris, and other material that harm the beneficial uses of water. Accidental deposits will be removed immediately.
- Burn piles will be located outside of WLPZs.
- No fire ignition (nor use of associated accelerants) will occur within WLPZs; however, low intensity backing fires may be allowed to enter or spread into WLPZs.
- Pursuant to 14 CCR 916.7, within Class I and Class II WLPZs, locations where project operations expose a continuous area of mineral soil 800 square feet or larger shall be treated for reduction of soil loss. Treatment shall occur prior to October 15<sup>th</sup> and disturbances that are created after October 15<sup>th</sup> shall be treated within 10 days. Stabilization measures shall be selected that will prevent significant movement of soil into water bodies and may include but are not limited to mulching, rip-rap, grass seeding, or chemical soil stabilizers.

Where mineral soil has been exposed by project operations on approaches to watercourse crossings of Class I, II, or III within a WLPZ, the disturbed area shall be stabilized to the extent necessary to prevent the discharge of soil into watercourses or lakes in amounts that would adversely affect the quality and beneficial uses of the watercourse.

Where necessary to protect beneficial uses of water from project operations, protection measures such as seeding, mulching, or replanting shall be used to retain and improve the natural ability of the ground cover within the WLPZ to filter sediment, minimize soil erosion, and stabilize banks of watercourses and lakes.

- Equipment limitation zones (ELZs) will be designated adjacent to Class III watercourses with minimum widths of 30 feet where side-slope is less than 30 percent and 50 feet where side-slope is 30 percent or greater. An RPF will describe the limitations of heavy equipment within the ELZ and, where appropriate, will include additional measures to protect the beneficial uses of water.
- ▶ **FHFR HYD-5 Protect Non-Target Vegetation and Special-status Species from Herbicides:** SMCP will implement the following measures when applying herbicides:
- Locate herbicide mixing sites in areas devoid of vegetation and where there is no potential of a spill reaching non-target vegetation or a waterway.

- Use only herbicides labeled for use in aquatic environments when working in riparian habitats or other areas where there is a possibility the herbicide could come into direct contact with water. Only hand application of herbicides will be allowed in riparian habitats and only during low-flow periods or when seasonal streams are dry.
- No terrestrial or aquatic herbicides will be applied within WLPZs of Class I and II watercourses, if feasible. If this is not feasible, hand application of herbicides labeled for use in aquatic environments may be used within the WLPZ provided that SMCP notifies San Francisco Bay Regional Water Quality Control Board no fewer than 15 days prior to herbicide application. The feasibility of avoiding herbicide application within WLPZ of Class I and II watercourses will be determined by SMCP and may be based on whether doing so will preclude achieving program objectives, including, but not limited to, protection of vulnerable communities and health of the Pescadero-Butano . The reasons for infeasibility will be documented in the permit.
- No herbicides will be applied within a 50-foot buffer of ESA or CESA listed plant species or within 50 feet of dry vernal pools.
- For spray applications in and adjacent to habitats suitable for special-status species, use herbicides containing dye (registered for aquatic use by DPR, if warranted) to prevent overspray.
- Application will cease when weather parameters exceed label specifications or when sustained winds at the site of application exceeds 7 miles per hour (whichever is more conservative)
- No herbicide will be applied during precipitation events or if precipitation is forecast 24 hours before or after project activities.

This FHFR applies to herbicide treatment activities and all treatment types, including treatment maintenance.

### Noise

- ▶ **FHFR NOI-1 Limit Heavy Equipment Use to Daytime Hours:** SMCP will require that operation of heavy equipment associated with treatment activities (heavy off-road equipment, tools, and delivery of equipment and materials) will occur during daytime hours if such noise would be audible to receptors (e.g., residential land uses, schools, hospitals, places of worship). Per San Mateo County Code of Ordinances Title 4, Chapter 4.88, activities associated with noise-generating vegetation treatment will be limited to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, and on Saturdays per an as-needed basis. Noise-generating treatment activities are not permitted to take place on Sundays or federally recognized holidays.

If SMCP is not subject to local ordinances (e.g., CAL FIRE), it will adhere to the restrictions stated above or may elect to adhere to the restrictions identified by the local ordinance encompassing the treatment area.

- ▶ **FHFR NOI-2 Equipment Maintenance:** SMCP will require that all powered treatment equipment and power tools will be used and maintained according to manufacturer

specifications. All diesel- and gasoline-powered treatment equipment will be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations.

- ▶ **FHFR NOI-3 Engine Shroud Closure:** SMCP will require that engine shrouds be closed during equipment operation.
- ▶ **FHFR NOI-4 Locate Staging Areas Away from Noise-Sensitive Land Uses:** SMCP will locate treatment activities, equipment, and equipment staging areas away from nearby noise-sensitive land uses (e.g., residential land uses, schools, hospitals, places of worship), to the extent feasible, to minimize noise exposure.
- ▶ **FHFR NOI-5 Restrict Equipment Idle Time:** SMCP will require that all motorized equipment be shut down when not in use. Idling of equipment and haul trucks will be limited to 5 minutes.
- ▶ **FHFR NOI-6 Notify Nearby Off-Site Noise-Sensitive Receptors:** For treatment activities utilizing heavy equipment, SMCP will notify noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship) located within 1,500 feet of the treatment activity. Notification will include anticipated dates and hours during which treatment activities are anticipated to occur and contact information, including a daytime telephone number, of the project representative. Recommendations to assist noise-sensitive land uses in reducing interior noise levels (e.g., closing windows and doors) will also be included in the notification.

### **Recreation**

- ▶ **FHFR REC-1 Notify Recreational Users of Temporary Closures.** If a treatment activity would require temporary closure of a public recreation area or facility, SMCP reserves the right to implement necessary closures along trails and park roads to preserve public safety. If temporary closure of a recreation area or facility is required, San Mateo County Parks will post notifications of the closure at least 3 days prior to the commencement of the treatment activities.

### **Transportation**

- ▶ **FHFR TRAN-1 Implement Traffic and Pedestrian Control during Treatments:** Prior to initiating vegetation treatment activities, SMCP will implement necessary traffic and pedestrian control over affected roadways and public trails during treatment activities. A Traffic Management Plan (TMP) will be developed if traffic generated by the project would result in obstructions, hazards, or delays exceeding applicable San Mateo County Department of Public Works standards along access routes for individual vegetation treatments. If needed, a TMP will be prepared to provide measures to reduce potential traffic obstructions, hazards, and service level degradation along affected roadway facilities. The scope of the TMP will depend on the type, intensity, and duration of the specific treatment activities.

Measures could include, but are not limited to, construction signage to provide motorists and pedestrians with notification and information when approaching or traveling along the affected roadway facilities, trail or park closures, flaggers for lane closures to provide temporary traffic control along affected roadway facilities,

treatment schedule restrictions to avoid seasons or time periods of peak vehicle traffic, haul-trip, delivery, and/or commute time restrictions that would be implemented to avoid peak traffic days and times along affected roadway facilities.

- ▶ **FHFR TRAN-2 Smoke Management Specific to Traffic Operations** Smoke generated during prescribed burn operations could potentially affect driver visibility and traffic operations along nearby county-maintained roadways that may include, but are not limited to, Pescadero Road, Alpine Road, and Wurr Road. Direct smoke impacts to roadway visibility and indirect impacts related to driver distraction will be considered during the planning phase of burning operations. Smoke impacts and smoke management practices specific to traffic operations during prescribed fire operations will be identified and addressed within the TMP. The TMP will include measures to monitor smoke dispersion onto public roadways, and traffic control operations will be initiated in the event burning operations could affect traffic safety along any roadways.

### **Public Services and Utilities**

- ▶ **FHFR UTIL-1 Solid Organic Waste Disposition Plan.** For projects requiring the disposal of material outside of the treatment area, SMCP will prepare an Organic Waste Disposition Plan prior to initiating treatment activities. The Solid Organic Waste Disposition Plan will include the amount (e.g., tons) of solid organic waste to be managed onsite (i.e., scattering of wood materials, generating unburned piles, and pile burning) and transported offsite for processing (i.e., biomass power plant, wood product processing facility, composting). If SMCP intends to transport solid organic waste offsite, the Solid Organic Waste Disposition Plan will clearly identify the location and capacity of the intended processing facility, consistent with local and state regulations to demonstrate that adequate capacity exists to accept the treated materials.

### **FOREST DENSITY REDUCTION TREATMENT STANDARDS**

The following Forest Density Reduction Treatment Standards (FDRs) are a set of standardized guidelines that apply to non-exempt density reduction treatment operations within the bounds of PCCP property pursuant to requirements of the California Forest Practice Rules. These guidelines were developed in accordance with local, county, and state regulations regarding timber operations within the locale of Pescadero Creek County Park and modified from the California Forest Practice Rules to attain site-specific standards. FDRs are intended to avoid and minimize environmental impacts and comply with applicable laws and regulations. Projects of this type would likely utilize a Timber Harvesting Plan (THP), Modified THP, or CAL FIRE Exemption. Requirements and standards for projects implemented under a CAL FIRE Exemption vary on a permit-by-permit basis; therefore, some of the following FDRs may not apply.

## **Silviculture**

In an effort to maintain treatment mobility and achieve the ecological goals and objectives for Pescadero Creek County Park, the following silvicultural standards are designed to allow for professional management discretion while implementing site-specific treatments pursuant to the California Forest Practice Rules.

The long-term intent of the silvicultural stewardship is to develop a large, well-spaced, and vigorous forest of redwood trees and their allied species from the existing, overstocked second growth stands PCCP currently comprises. The intent is also that these large trees will develop into old growth trees but may take hundreds of years to develop key old growth characteristics such as goose pens, reiterated tops, thick bark, large limbs, epicormic branching, and other characteristics before we can call these trees old growth again. To be able to operate well within permit bounds, minimize resource competition, promote stand complexity and growing space, reduce hazardous fuel continuities, and develop resilient stand structure, the project proponent shall consider the following silvicultural standards as maximum treatment prescription boundaries. It is likely that treatments designed to achieve the goals described above can be predominantly implemented without approaching these maximums; ultimately conserving project resources and allowing more treatments to be conducted over larger geographic scales.

- ▶ **FDR SILV-1:** Only uneven-aged silvicultural methods shall be applied that meet the following standards:
  - a 10-year re-entry period shall apply to plans that propose to remove ≤50 percent of trees >18" DBH.
  - Density reduction treatments will retain 50% or more of trees >18" DBH.
  - For second growth trees >38" DBH, a minimum retention average of 10-15 trees per acre shall be maintained across a treatment area when existing stand conditions allow for it.
    - During any 10-year re-entry period, no more than 33% of second growth trees >38" DBH may be removed within any treatment area.
    - Within treatment areas, an average of 10-15 trees >38" DBH per acre at a minimum shall be marked with a "W" on the bole to be retained as a "development tree". Development Trees are those selected for long-term resiliency in a stand as individuals with potential for becoming future old growth trees. "W"s marked on trees shall face away from roads, trails, and the public viewshed to the extent feasible.
      - It is possible these trees may need to be substituted or replaced for various issues over time including, but not limited to, becoming a hazard, death or dying, damage by fire, or its position in the grove is compromised with respect to another tree that is healthier, more

vigorous and has taken the appropriate dominant position in the grove to become the new "W" tree.

- Leave trees shall be thrifty coniferous trees, which are dominant or co-dominant in crown class prior to timber harvesting or which have crowns typical of such dominant or co-dominant trees. They shall be free from significant damage caused by timber operations. No conifer shall be cut which is more than 22.9 m (75 feet) from a leave tree 30.5 cm (12 in.) DBH or larger located within the logging area.
- ▶ **FDR SILV-2:** Any density reduction treatments shall maintain minimum basal area standards based on the Site Class of the treatment area.
  - A minimum basal area of 180 sq. ft. per acre shall be retained on Site Class II lands.
  - A minimum basal area of 150 sq. ft. per acre shall be retained on Site Class III lands.

### *Wildlife Retention Trees and Snags*

- ▶ **FDR WRTS-1:** Tree marking shall be conducted with consideration for wildlife tree retention and snags using the following characteristics as a guide:
  - Redwoods with boles having at least 75% defect;
  - Trees with "goose-pens" boles (basal cavities) extending four feet or more above the ground level and hollowing out more than 50% of the stem basal area
  - Standalone granary trees (granary trees are redwood or Douglas-fir trees with numerous holes in the bark that are used by woodpeckers to store acorns);
  - Standalone Douglas-firs with "wolfy" branching structure, including large, spreading limbs and/or large crown;
  - Douglas-fir trees significantly infected (50% or more of the tree visibly affected) with *Fomes pini*;
  - Hardwoods  $\leq 24$  inches DBH, where present on site not directly inhibiting growth of conifers. If 24-inch DBH trees are not available, next largest diameters on site can be utilized.
  - Deformed stems including dead, reiterated, or flat tops, epicormic branching or platforms.
  - Isolated or unique trees exhibiting multiple characteristics are preferred wildlife trees and shall be retained unless removal is specifically needed to address unavoidable safety hazards, forest health fuels reduction, grassland encroachment, or pertaining to infrastructure utilization. These trees shall not be painted and will therefore be retained. The RPF shall complete a sample mark of the harvest trees prior to the Pre-Harvest Inspection (PHI) for review.

- Contractor shall consider maintaining an appropriate number of snags within the harvest area; at least 1-2 per acre. The only instance in which snags shall be felled in excess of this number is in the case of crew safety.

### Old Growth

- ▶ **FDR OG-1:** No old growth trees, live or dead, will be cut. Old growth characteristic redwood and Douglas-fir trees can be described as being approximately 60 inches at DBH and were present in the dominant overstory during the late successional stages of forest development of the first-growth stands (pre 1800's). These trees have outward indicators such as platy bark with deep fissures, basal hollows with fire scars of multiple ages, large complex branching structures, flat tops, and limbs at least 8-10 inches in diameter that provide an opportunity for platforms/nesting. In very rare instances, a downed log may be milled for park infrastructure, or an old growth tree might have to be cut for workplace or a public safety issue.

### Felling Instructions to Licensed Timber Operator

- ▶ **FDR LTO-1:** Trees to be cut will be marked by the RPF or a supervised designee prior to felling operations with a horizontal stripe of blue paint on at least two sides as well as a painted stump mark. Marking will focus on removal of poorer growing trees, while providing for spacing, release potential, aesthetics, and retention of wildlife habitat. All operations will be conducted to minimize damage to residual conifer species.
  - The fallers shall consult with the RPF or a supervised designee on any and all questionable tree marking.
  - Falling of trees across Class III watercourses is allowed in the general logging season, unless water is present. If water is present, trees shall be felled away from Class III watercourses.

### Forest Pathogens

- ▶ **FDR FP-1:** Measures to mitigate adverse infestations or infections:
  - Pitch Canker: The plan area is located within the Coastal Pitch Canker Zone of Infestation. Pitch Canker is caused by the fungus *Fusarium subglutinans*, sp. *pini*. Several native conifer species known to exist in the general vicinity of the plan area (San Mateo County) are susceptible to the disease, including Monterey pine (*Pinus radiata*), knobcone pine (*Pinus attenuata*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*). No pitch canker symptoms have been observed at PCCP, although Douglas-fir is present. The disease is spread by a variety of insects that carry the pathogen and bore into the host species. Management for the disease is limited to controlling availability of vector breeding material, restricting planting of host species, and controlling presence of the inoculum. No trees known to be infected with pitch canker will be cut as part of the proposed harvest. Proposed operations should not increase the incidence of the disease in the harvest area, if observed.

- Sudden Oak Death: The THP is located within the Zone of Infestation for Sudden Oak Death. The California Oak Mortality Task Force monitors the distribution of sudden oak death at ([www.suddenoakdeath.org](http://www.suddenoakdeath.org)). Sudden Oak Death may be present in limited amounts within the project area, but it is not having an adverse impact on forest health. The RPF has seen scattered tanoaks in the harvest area with outward indicators of Sudden Oak Death and recognizes the disease is present in the general project area.
- The THP shall function as the compliance agreement to allow for the removal of hardwood from the project area for commercialization for the duration of the approved THP. If hardwood removal is to occur as a part of this THP and SOD regulations have been revised, the RPF shall amend the plan to conform to current regulations. To function as the compliance agreement, the following information and mitigation is contained in the THP:
- Counties regulated for Sudden Oak Death at the time of plan submittal include Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma and Trinity.
- Regulated Hosts:

*Acer macrophyllum*\* Bigleaf maple  
*Acer pseudoplatanus* Planetree maple  
*Adiantum aleuticum*\* Western maidenhair fern  
*Adiantum jordanii*\* California maidenhair fern  
*Aesculus californica*\* California buckeye  
*Aesculus hippocastanum* Horse chestnut  
*Arbutus menziesii*\* Madrone  
*Arctostaphylos manzanita*\* Manzanita  
*Calluna vulgaris*\* Scotch heather  
*Camellia* spp.\* Camellia - all species, hybrids and cultivars  
*Castanea sativa*\* Sweet chestnut  
*Cinnamomum camphora*\* Camphor tree  
*Fagus sylvatica* European beech  
*Frangula californica* California coffeeberry  
*Frangula purshiana* Cascara  
*Fraxinus excelsior* European ash  
*Gaultheria procumbens*\* Eastern teaberry  
*Griselinia littoralis*\* Griselinia  
*Hamamelis virginiana*\* Witch hazel  
*Heteromeles arbutifolia*\* Toyon  
*Kalmia* spp.\* Mountain laurel - all species, hybrids and cultivars  
*Laurus nobilis*\* Bay laurel

*Notholithocarpus densiflorus* Tanoak  
*Lonicera hispidula*\* California honeysuckle  
*Maianthemum racemosum* False Solomon's seal  
*Michelia doltsopa*\* (*Magnolia dolstopa*), *Michelia*  
*Parrotia persica*\* Persian ironwood  
*Photinia fraseri*\* Red tip photinia  
*Pieris* spp.\* Andromeda, *Pieris* - all species, hybrids and cultivars  
*Pseudotsuga menziesii* var. *Menziesii*, Douglas-fir  
*Quercus agrifolia* Coast live oak  
*Quercus cerris* European turkey oak  
*Quercus chrysolepis* Canyon live oak  
*Quercus falcata* Southern red oak *Quercus ilex*\* Holm oak  
*Quercus kelloggii* California black oak  
*Quercus parvula* var. *shrevei* Shreve's oak  
*Rhododendron* spp.\* Rhododendron (including azalea)  
*Rosa gymnocarpa*\* Wood rose  
*Salix caprea*\* Goat willow  
*Sequoia sempervirens*\* Coast redwood  
*Syringa vulgaris*\* Lilac  
*Taxus baccata*\* European yew  
*Lysimachia latifolia*\* Western starflower  
*Umbellularia californica*\* California bay laurel, pepperwood, Oregon myrtle  
*Vaccinium ovatum*\* Evergreen huckleberry  
*Viburnum* spp.\* Viburnum – all species, hybrids and cultivars

- Coast live oak, tanoak and madrone may be removed from the THP area either as logs stripped of branches, hardwood rounds, or split firewood. No host foliage will be removed from the project area.
- Host material will not be moved outside of the regulated area.
- The approved THP will function as the compliance agreement to allow for the movement of hardwood within the regulated area.
  - Hardwood removed from the THP area will go to a distributor located in San Mateo, Santa Cruz, or Santa Clara County.
  - No material from host plants less than four inches in diameter will be removed from the THP area.
  - The LTO will visually inspect all vehicles containing host material leaving the project area to ensure that the vehicles are free of host plant debris (leaves, twigs, and branches).

- Host material greater than 4 inches in diameter does not require a closed container for transportation.
- An amendment will be submitted if SOD information or mitigation measures change.
- Prior to entering the plan area and upon leaving the plan area, heavy equipment, saws and boots shall have accumulations of soil, mud, and organic debris removed or washed off and sanitized using a disinfectant solution (e.g., Lysol spray, bleach) not less than 100 feet from any watercourse with no solution reaching a watercourse.

### **Soil Stabilization**

- ▶ **FDR SS-1:** Unless noted elsewhere in the plan at a specific mitigation point, the following will apply for the treatment of roads, landings, temporary crossings, skid trails and bared areas:
  - All skid trails utilized (existing or proposed) in the operation shall be outsloped to the extent possible (except where stated otherwise) and waterbarred. Skid trail sections on steeper ground and sections near watercourses shall be surfaced with tractor-crushed slash or hand spread slash, where feasible, following completion of use, or as otherwise specified in the plan.
  - Landings shall be sloped or ditched to prevent water from accumulating on the landings. Discharge points shall be located and designed to reduce erosion. Landing surfaces shall be treated with effective erosion control measures upon completion of operations, prior to the winter period.
  - Effective Erosion Control Measures may include, but are not limited to, seed (not including annual rye), weed free straw mulch, tractor crushed slash, or hand placed slash.
  - Grass seeding for Effective Erosion Control purposes may include seeding at an application rate of 25 – 35 lbs. per acre at the discretion of the RPF or his supervised designee. Barley, wheat or other species known to effectively control surface erosion may be spread (not including annual rye). Other recommended seed species includes California brome and blue wild rye.
  - The RPF, or his supervised designee, shall flag the location of all waterbreaks on the truck roads prior to installation. Truck roads shall be outsloped where feasible. The LTO shall install waterbreaks on truck roads and skid trails at a moderate or high EHR spacing throughout the project area, unless extreme EHR spacing is specified at a specific mitigation point.

*Table 10 Maximum Distance Between Installed Waterbreaks, 14 CCR 914.6(c)*

<b>14CCR 914.6(c) Maximum Distance Between Waterbreaks (in feet)</b>				
<b>Erosion Hazard Rating (EHR)</b>	<b>Roads or Trails &lt;10%</b>	<b>Roads or Trails 11 - 25%</b>	<b>Roads or Trails 26 - 50%</b>	<b>Roads or Trails &gt;50%</b>
<b>Moderate</b>	<b>200'</b>	<b>150'</b>	<b>100'</b>	<b>75'</b>
<b>High</b>	<b>150'</b>	<b>100'</b>	<b>75'</b>	<b>50'</b>
<b>Extreme</b>	<b>100'</b>	<b>75'</b>	<b>50'</b>	<b>50'</b>

- Per 923.5(e) where waterbreaks are to be used to control surface runoff on logging roads, the waterbreaks shall be cut diagonally a minimum of six inches into the firm roadbed and shall have a continuous firm embankment of at least six inches in height immediately adjacent to the lower edge of the waterbreak cut. Per 923.5(g) Where outsloping and rolling dips are used to control surface runoff of logging roads, the dip in the logging road grade shall be sufficient to capture runoff from the logging road surface.
- Per 923.5(h) Drainage facilities and structures shall discharge into vegetation, woody debris, or rock wherever possible. Where erosion-resistant material is not present, slash, rock, or other energy dissipating material shall be installed below the drainage facility or drainage structure outlet as necessary to minimize soil erosion and sediment transport and to prevent significant sediment discharge.
- Per 916.9(m) all tractor roads shall have drainage and/or drainage collection and storage facilities installed as soon as practical following yarding and prior to either (1) start of any rain which causes overland flow across or along the disturbed surface within a WLPZ or within any ELZ or EEZ designated for watercourse or lake protection, or (2) any day with a National Weather Service forecast of a chance of rain of 30 percent or more, a flash flood warning, or a flash flood watch.
- Sidecast or fill material extending more than 20 ft. in slope distance from the outside edge of the roadbed which has access to a watercourse or lake which is protected by a WLPZ shall be seeded, slash packed, planted, mulched, removed or treated as specified in the THP to adequately reduce soil erosion.
- Sidecast or fill material extending more than 20 ft. in slope distance from the outside edge of the landing and which has access to a watercourse or lake shall be seeded, slash packed, planted, mulched, removed, or treated as specified in the THP to adequately reduce soil erosion.
- Sidecast treated in place will be laid back to a slope not to exceed 66% prior to treatment. If removed, sidecast will be incorporated into the roadbed or taken to a stable location outside of the WLPZ.

- Areas in the WLPZ exceeding 100 contiguous square feet where timber operations have exposed bare soil or any other area of disturbed soil that threatens to discharge sediment into waters in amounts deleterious to the quality and beneficial uses of water shall be treated with mulching.
- Slash Pack Guidelines for the LTO:
  - The slash should be small enough in diameter so that it can be crushed and embedded into the soil by track walking over it with a cat; generally 2 to 3 inch diameter and smaller.
  - Place slash on the bare soil surface, by hand or with equipment, so that at least 90% of the ground surface is covered with slash.
  - The slash should be placed no more than 1 foot thick, so that it can be effectively crushed and embedded in the soil by the cat.
  - After the slash is placed, the cat should walk over the slash until most of the pieces of slash are touching the ground, and most of the length of any individual piece of slash is in contact with the ground.
- Saturated Soil Conditions: Use of logging roads, tractor roads, or landings shall not take place at any location where saturated soil conditions exist, where a stable logging road or landing operating surface does not exist, or when visibly turbid water from the road, landing, or skid trail surface or inside ditch may reach a watercourse or lake. Grading to obtain a drier running surface more than one time before reincorporation of any resulting berms back into the road surface is prohibited.

#### ***Watercourse and Lake Protection Zone Soil Stabilization***

- ▶ **FDR WLPSS-1:** Within the WLPZ, and within any ELZ or EEZ designated for watercourse or lake protection, treatments to stabilize soils, minimize soil erosion, and prevent significant sediment discharge shall be described in the plan as follows.
  - Soil stabilization is required for the following areas:
    - Areas exceeding 100 contiguous square feet where timber operations have exposed bare soil. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.
    - Approaches to tractor road watercourse crossings between the drainage facilities closest to the crossing. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.
    - Any other area of disturbed soil that threatens to discharge sediment into waters in amounts that would result in a significant sediment discharge. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.

- Soil stabilization treatment measures may include, but need not be limited to, removal, armoring with rip-rap, replanting, mulching, seeding, installing commercial erosion control devices to manufacturer's specifications.
- Where straw or slash mulch is used, the minimum straw coverage shall be 90 percent, and any treated area that has been reused or has less than 90 percent surface cover shall be treated again by the end of timber operations.
- Where slash mulch is packed into the ground surface through the use of a tractor or equivalent piece of heavy equipment the minimum slash coverage shall be 75 percent.
- For areas disturbed from May 1 to October 15, treatment shall be completed prior to the start of any rain that causes overland flow across or along the disturbed surface that could deliver sediment into a watercourse or lake in quantities deleterious to the beneficial uses of water.
- Where the natural ability of ground cover is inadequate to protect beneficial uses of water by minimizing soil erosion or by filtering sediment, the plan shall specify protection measures to retain and improve the natural ability of the ground cover to filter sediment and minimize soil erosion.

### **Winter Operations**

- ▶ **FDR WO-1:** Winter period operations may occur from October 15 – November 30 (or the accumulation of >4 inches of precipitation after October 15. Ground based operations are proposed through this time period for the harvest area outside of the WLPZ. Log hauling, erosion control and road maintenance on the seasonal haul road are also allowed during this time period. Ground based operations within the WLPZ (except for log hauling, erosion control and road maintenance on the seasonal haul road) shall be completed by November 30 (or a trigger of a rainfall event with accumulation of >1/4" of precipitation after October 15, whichever comes first). No hauling or other ground-based operations may occur during periods of saturated soil conditions.

December 1 (or the accumulation of >4 inches of precipitation after Oct. 15, whichever comes first) – April 15: Operations allowed during this time period include timber falling outside of the WLPZ, lopping, tree planting, and erosion control. ATV's, foot traffic, and other light tracking vehicles will be allowed to access the property. No heavy equipment operations, including loading and log hauling, shall be permitted during this period.

- Erosion control structures shall be installed on landings and truck roads prior to the end of the day if the National Weather Service forecasts a 30% or more chance of rain before the next day or prior to any weekend or other shutdown period (as per 14 CCR 914.6(a)(2)).
- Erosion control structures for roads in use will consist of rolling dips or waterbars.

- All tractor roads shall have drainage facilities installed following completion of yarding and prior to either (1) the start of any rain which causes overland flow across or along the disturbed surface within a WLPZ or within any ELZ designated for watercourse or lake protection, or (2) any day with a National Weather Service forecast of a chance of rain of 30% or more, a flash flood warning, or a flash flood watch.
- Landings used in the winter period will be seeded with a sterile barley variety at 30 lbs. per acre and straw mulched to a depth of one-three inches or tractor packed with slash upon completion of the use of that landing within the winter period.
- Not more than two skid trails (refers only to trails > 300 feet in length) per piece of skidding equipment shall be open (i.e., not waterbarred) at any time.
- Operation of trucks and heavy equipment on roads and landings shall be limited to those with a stable operating surface.
- All road, skid trail, and landing construction shall occur prior to the onset of the wet season.
- During the wet season, hauling and loading of logs shall occur during daylight hours only.
- Trees shall be felled away from riparian habitat including springs, seeps, bogs, and other wet areas of saturated ground.
- Prior to operations during the winter period, all materials, including but not limited to straw mulch, seed, waddles, or slash accumulations, shall be prepositioned in locations to allow for rapid and timely treatment application of erosion control measures pursuant to this winter operating plan.
- Class III crossings may be used in the winter operating period. During this period, Class III crossings shall be dipped out and slashed (or straw mulched) for 25 feet in each direction prior to either (1) the start of any rain which causes overland flow within the Class III channel, or (2) any day with a National Weather Service forecast (Pescadero, CA) of a 30% chance of rain or more, a flash flood warning, or a flash flood watch. After October 15, mulching materials for the skid trail surface (straw bales, slash piles) shall be staged on site next to the crossings.

### ***Pescadero Creek Habitat Restoration Zone***

- ▶ **FDR PCHRZ-1:** Pescadero Creek Habitat Restoration Zone: Recognizing the sensitivity of Pescadero Creek's in-stream habitat within the coastal anadromy zone and its potential functionality as a flyway for special-status birds, a Habitat Restoration Zone (HRZ) will be implemented along the stream channel by using existing topography and geomorphic features as a guide. The top edge of the stream bank, where the incised watercourse corridor begins, predominantly forms the landward boundary of the HRZ and will act as the Watercourse Transition Line (WTL) per 14 CCR § 895.1. On average,

the HRZ boundary/WTL lies 100-300 feet from the active stream channel, which exceeds the zonal protection standards outlined in CCR § 916.9.

**Watercourse and Lake Protection Zones**

► **FDR WLPZ-1:** The following protection measures shall be afforded to the watercourses throughout the project area.

- CLASS I WATERCOURSE WITH A CONFINED CHANNEL PROTECTION MEASURES
- The Class I WLPZ shall be clearly identified on the ground by the RPF who prepared the plan, or a designee, with paint, flagging, or other suitable means. The WLPZ boundary shall be identified with blue/white striped flagging based on the following parameters per 14 CCR § 916.5:

<b>Slope:</b>	<b>&lt;30%</b>	<b>30-50%</b>	<b>&gt;50%</b>
<b>WLPZ Width:</b>	<b>50 Feet</b>	<b>75 Feet</b>	<b>100 Feet</b>

- To ensure retention of shade canopy, filter strip properties, and the maintenance of wildlife values described in 14 CCR 916.4(b), trees within the WLPZ shall be marked by the RPF or a supervised designee.
- Core Zone: Per 14 CCR § 916.9, the minimum width of the Core Zone shall be 30 feet measured from the Watercourse Transition Line/HRZ boundary. No timber operations will occur within this zone unless actions are proposed that are designed to improve salmonid habitat consistent with 14 CCR § 916.9 subsections (a) and (c).
- Inner Zone: The minimum width of the Inner zone shall be 70 feet measured from the landward edge of Core Zone. Timber operations are permitted in this zone when conducted to meet the goals of this section, objectives for the Inner Zone in 14 CCR § 916.9 subsection (c)(2).
  - Postharvest stand shall have a minimum 80% overstory canopy cover in the Coast and Southern Forest Districts of the coastal anadromy zone. The postharvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.
  - Postharvest stand shall retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the Core and Inner Zones.
  - Large trees retained to meet 14 CCR § 916.9 [936.9, 956.9], subsections (f)(2)(B)(1.) and (3.) above that are the most conducive to recruitment to provide for the beneficial functions of riparian zones (e.g., trees that lean towards the channel, have an unimpeded fall path toward the watercourse, are in an advanced state of decay, are located on unstable areas or downslope of such an unstable areas, or have undermined roots) are to be given priority to be retained as future recruitment trees.

- CLASS II WATERCOURSE AND CLASS II POND PROTECTION MEASURES

<b>Slope:</b>	<b>&lt;30%</b>	<b>30-50%</b>	<b>&gt;50%</b>
<b>WLPZ Width:</b>	<b>50 Feet</b>	<b>75 Feet</b>	<b>100 Feet</b>

- The Class II WLPZ shall be clearly identified on the ground by the RPF who prepared the plan, or a designee, with paint, flagging, or other suitable means.
- To ensure retention of shade canopy, filter strip properties, and the maintenance of wildlife values described in 14 CCR 916.4(b), trees within the WLPZ shall be marked by the RPF or a supervised designee.
- No equipment will be operated within the Class II WLPZ unless mapped and described elsewhere in the plan.
- Retain all trees within the Class II WLPZ that meet the following criteria:
  - all trees located within the channel zone;
  - all trees that have boles that overlap the edge of the channel zone; and
  - all trees with live roots permeating the bank or providing channel grade control, with the following exception:
    - 1/3 of the stems of redwoods with live roots permeating the bank or providing channel grade control may be harvested.
- Where sufficient spacing exists prior to harvesting, retained redwood trees greater than or equal to 12 inches DBH shall not be spaced more than 25 feet apart.
- A minimum of 80% overstory canopy shall be maintained within the channel zone. If 80% overstory canopy is not present within the channel zone, the existing overstory canopy within the channel shall not be reduced. Throughout the remainder of the Class II WLPZ, at least 50% of the total canopy covering the ground shall be left in a well-distributed, multistoried stand composed of a diversity of species similar to that found prior to the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.
- Recruitment of large woody debris for instream habitat shall be provided by retaining at least two living conifers per acre at least 16 inches DBH and 50 ft. tall within 50 ft. of all Class II watercourses.
- CLASS III WATERCOURSE PROTECTION MEASURES
- Establish a 30-foot wide ELZ on both sides of the watercourse for slopes less than 30% and an additional 20-foot wide ELZ where sideslopes are >30%. The following are the minimum requirements for timber operations in Class III watercourses, unless explained and justified in the plan and approved by the Director:
  - no new construction of tractor roads permitted;
  - no ground-based equipment on slopes >50%; and

- ground-based operations are limited to existing stable tractor roads that show no visible evidence of sediment deposition being transported into the adjacent watercourse
- Retain all pre-existing large wood on the ground within the ELZ that is stabilizing sediment and is necessary to prevent potential discharge into the watercourse.
- Retain all pre-existing down wood and debris in the channel zone.
- Retain hardwoods, where feasible, within the ELZ.
- Retain all snags (except as required for safety) within the ELZ.
- Retain all countable trees needed to achieve resource conservation standards in 14 CCR § 912.7 within the ELZ.
- Retain all trees in the ELZ and channel zone which show visible indicators of providing bank or bed stability, excluding sprouting conifers that do not have boles overlapping the channel zone. Visible indicators of stability include roots that permeate the bank or provide channel grade control.
- At least 50% of the understory vegetation present before operations shall be left living and well distributed adjoining Class III watercourses to maintain soil stability.
- Soil deposited during timber operations in a Class III watercourse other than at a temporary crossing shall be removed and debris deposited during timber operations shall be removed or stabilized before the conclusion of timber operations, or before October 15.

### **Biological Resources**

- ▶ **FDR BRT-1 Training:** Prior to commencing treatment activities and operations, all operating personnel will attend a worker environmental awareness training program. The training will include a brief review of special-status species, sensitive habitats, and other sensitive resources that may exist in the project area, including field identification, habitat requirements, and the legal status and protection of each relevant species, as well as locations of sensitive biological resources. The training will include materials concerning the following topics: sensitive resources, resource avoidance, permit conditions, and possible consequences for violations of State or Federal environmental laws. The training will cover the planned operation's conservation measures, environmental permits, and regulatory compliance requirements, as well as the roles and authority of the monitors and biologist(s). It will include printed material and an oral training session by a qualified biologist.
- ▶ **FDR BRS-2 Survey:** A reconnaissance level biological resources survey will be conducted by a qualified biologist, qualified RPF, or other qualified professional. prior to any operations to determine if any rare, threatened, or endangered (RTE) species as well as any species of special concern are present within or adjacent to treatment areas. If this survey determines that sensitive species are present in or around the

project area operations will cease until the appropriate regulatory agency is contacted and appropriate mitigation measures are implemented.

- ▶ **FDR BRNB-3 Nesting Birds:** There are multiple bird species listed as species of special concern (SSC) by the California Department of Fish and Wildlife (CDFW) that may be found within the Pescadero Creek County Park (PCCP) boundary. This includes the tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), Golden Eagle (*Aquila chrysaetos*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), Burring owl (*Athene cunicularia*), Barrow's goldeneye (*Bucephala islandica*), Vaux's swift (*Chaetura vauxi*), Northern harrier (*Circus hudsonius*), Olive-sided flycatcher (*Contopus cooperi*), Black Swift (*Cypseloides niger*), white-tailed kite (*Elanus leucurus*), Bald Eagle (*Haliaeetus leucocephalus*), Loggerhead shrike (*Lanius ludovicianus*), Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*), Purple martin (*Progne subis*), and the Yellow warbler (*Setophaga petechia*).
  - Should operations occur during the nesting period of February 1 through August 31, qualified biologist, qualified RPF, or other qualified professional. biologist will survey the project area for signs of active nests prior to operations. This includes nests, breeding behavior, whitewash, pellets, feathers, plucking posts, and other appropriate signs.
  - If nesting birds are found, a qualified RPF, qualified professional, or qualified biologist will identify an appropriate buffer based on a site-specific evaluation and will contact CDFW if appropriate.
  - The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately outside the buffer zone.
  - No trees or shrubs shall be disturbed that contain known active bird nests until all eggs have hatched, and young have fully fledged (are no longer being fed by the adults and have completely left the nest site).
    - Non-Listed Nesting Raptors: If active non-listed raptor nests are located prior to or during operations, activities shall cease within 300 feet of the nest and contact shall be made with the a qualified biologist, qualified RPF, or other qualified professional. to determine the appropriate buffer. Consultation shall be made with CDFW and CAL FIRE to confirm the appropriate protection measures prior to fledging.
- ▶ **FDR BRB-4 Bats:** Suitable habitat for this species will be assessed prior to operations by a qualified RPF, qualified professional, or qualified biologist during the pre-operational biological survey. If high-quality habitat for roosting bats (i.e., large trees with cavities of sufficient size to support roosting bats, or buildings providing suitable roost sites) is present within a planned work area, a qualified biologist, qualified RPF, or other qualified professional. will conduct a survey to look for evidence of bat use within prior to the onset of active operations. If evidence of bat occupancy is observed, or if high-quality roost sites are present in areas where evidence of bat use might not be

detectable (such as a tree cavity), an evening survey and/or nocturnal acoustic survey may be necessary to determine if a bat colony is present and to identify the specific location of the bat colony.

- If no active maternity colony or non-breeding bat roost is located, operations can continue as planned.
  - If an active maternity colony or non-breeding bat roost is located, the project work will be redesigned to avoid disturbance of the roosts.
  - If an active maternity colony is located, and the project cannot be redesigned to avoid removal or disturbance of the occupied tree or structure, disturbance will not take place during the maternity season (March 15 – July 31), and a disturbance-free buffer zone (determined by a qualified biologist) will be observed during this period.
  - If an active non-breeding bat roost is located, and the project cannot be redesigned to avoid removal or disturbance of the occupied tree or structure, the individuals will be safely evicted between August 1 and October 15 or between February 15 and March 15 (as determined by a Memorandum of Understanding with CDFW). Bats may be evicted through exclusion after notifying CDFW. Trees with roosts that need to be removed will first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape during the darker hours.
- ▶ **FDR BRWB-5 Western bumble bee (*Bombus occidentalis occidentalis*):** Any occupied habitat that may be found during the pre-operational biological survey shall have an appropriate buffer established around it if determined necessary by a qualified biologist, qualified RPF, or other qualified professional. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.
- ▶ **FDR BRSFDW-6 San Francisco Dusky-footed Woodrat (*Neotoma fuscipes annectens*):** Any nests or individuals located during the pre-operational reconnaissance survey will be flagged for avoidance with approximately a 10ft buffer. Operators shall avoid running heavy equipment near woodrat nests during treatment activities wherever feasible.
- ▶ **FDR BRML-7 Mountain Lion (*Felis concolor*):** Any lion sightings or detection of den/rendezvous sites from the pre-operational biological survey shall be immediately reported to the CDFW and an appropriate no-operations buffer shall be established, as determined by a qualified biologist, around the potential habitat. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.
- ▶ **FDR BRFROG-8 California red-legged frog (*Rana draytonii*) and Foothill yellow-legged frog (*Rana Boylii*):** The following protection measures were developed with assistance and input from CDFW and consulting biologists on previous land management plans in the Santa Cruz Mountains and have been successful in avoiding negative impacts to the California red-legged frog (CRLF) and foothill yellow-legged frog

caused by operations. The following mitigation is generally consistent with a hybrid of USFWS scenarios III and IV outlined in a March 25, 2008 guideline for THPs. The mitigation limits active operations within 300 feet of suitable breeding habitat during the wet season except for the use of vehicles/equipment on existing haul roads.

- Prior to the commencement of operations, a qualified biologist shall meet with the operating crew to provide information on the CRLF. The intent of the meeting shall be to educate the crew on CRLF life history in order to avoid harm to the species during operations. The meeting shall include:
  - A physical description of the CRLF with color photograph showing identifying features and a brief description of the life history of CRLF.
  - Information of suitable habitat during various life stages.
  - Directions to cease all operations within 50 feet, or other specified distances provided within below stated restrictions, of observed CRLF.
  - Direction to immediately contact the project lead or designated supervisor of any observed sighting of CRLF.
- Wet Season Restrictions (\*see below for the definition of the wet season):
  - No treatment operations within 300 feet of suitable breeding habitat (except for use of existing haul roads)
  - During the wet season, no operation activities will occur within the WLPZ of class I or II watercourses that have water present.
  - All crossing replacement or upgrading shall occur prior to the onset of the wet season.
  - Any sighting of CRLF reported to the project lead or designated supervisor by the crew foreman shall be disclosed to Cal-Fire and CDFW. The project supervisor shall also disclose any and all take avoidance measures being implemented to avoid take of the individual.
- Dry Season Restrictions
  - All suitable habitat must maintain a 30-foot no-cut buffer; no equipment within the no cut buffer; trees felled away from suitable habitat.
  - Trees shall be felled away from riparian features including springs, seeps, bogs, Class I and II watercourses and other wet areas of saturated ground.
  - Any sighting of CRLF reported to the project lead or designated supervisor by the crew foreman shall be disclosed to Cal-Fire and CDFW. The RPF shall also disclose any and all take avoidance measures being implemented to avoid take of the individual.
- \* Wet Season Definition: For purposes of protection of red-legged frogs, the wet season begins with the first frontal rain system depositing a minimum of 0.25 inches

of rain after October 15 and ending on April 15. Barring rain events that total 0.25 inches of rain as, wet season restrictions shall apply on November 30.

- ▶ **FDR BRSSP-9 Special-Status Plant Species:** If it is determined after the pre-operational biological survey that a special-status plant species is present within a planned operation area, then the identified species will be flagged for avoidance in coordination with a qualified biologist, qualified RPF, or other qualified professional in order to limit the amount of potential disturbance. Any findings of previously unrecorded sensitive plant species shall be reported to CDFW and CAL FIRE with a map and description of protection measures to be implemented. Measures shall ensure negative impacts to the individual plant or plants during operations are avoided and shall be developed in consultation with a qualified biologist.
- ▶ **FDR BBAMP-10:** California Giant Salamander, Santa Cruz Black Salamander, and Western Pond Turtle. In areas of documented California giant salamander, Santa Cruz black salamander, or western pond turtle occurrences, or where suitable habitat for one or more of these species is determined to exist in or around the planned operation area, SMCP will implement applicable protection measures as follows:
  - If no California giant Salamander, Santa Cruz black salamander, or western pond turtle is found during the pre-operational biological survey, the work may proceed, however, operators shall avoid moving large woody debris where feasible, particularly in riparian areas.
  - If eggs or larvae of the California giant salamander, Santa Cruz black salamander, are found, a qualified biologist, a qualified RPF, or other qualified professional will establish a buffer around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed, or the Permittee shall contact CDFW to develop site appropriate avoidance and minimization measures.
  - If an active western pond turtle nest is detected within the activity area, a 10-foot buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist, a qualified RPF, or another qualified professional.
  - If adult or non-larval juvenile California giant salamanders, Santa Cruz black salamanders, or western pond turtles are found, one of the following two procedures will be implemented:
    - If, in the opinion of the qualified biologist, qualified RPF, or other qualified professional, capture and removal of the individual to a safe place outside of the work area is less likely to result in adverse effects than leaving the individual in place and rescheduling the work (e.g., if the species could potentially hide and be missed during a follow-up survey), the individual will be captured and

- relocated by a qualified biologist to suitable habitat at least 100 meters away and work may proceed.
- b. If, in the opinion of the qualified biologist, qualified RPF, or other qualified professional the individual is likely to leave the work area on its own, and work can be feasibly rescheduled, a buffer will be established around the location of the individual(s) and work may proceed outside of the buffer zone. No work will occur within the buffer zone until the turtle has left the work area. Work within the buffer zone will be rescheduled if necessary.
- ▶ **FDR BRSFGS-11 San Francisco gartersnake (*Thamnophis sirtalis tetrataenia*):** should a San Francisco garter snake be found during operations in the project area, or during the pre-operational biological survey, operations that could potentially harm the individual will cease and the USFWS and CDFW will be contacted immediately. Operations in immediate vicinity to the siting shall not commence until appropriate buffers have been approved by a qualified biologist and CDFW.
  - ▶ **FDR BRAB-12 American Badger (*Taxidea taxus*):** Any occupied habitat that may be found during the pre-operational biological survey shall have an appropriate buffer established around it if determined necessary by a qualified biologist, qualified RPF, or other qualified professional. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.
  - ▶ **FDR BRMM-13 Marbled Murrelets (*Brachyramphus marmoratus*):** Forest Density Reduction Treatments conducted in Pescadero Creek County Park will adhere to protective measures outlined in 14 CCR Section 919.11 of the Forest Practice Rules which state:
 

*Where there is evidence of an active murrelet site in or adjacent to the THP area, or where there is evidence of a potential Impact to a murrelet, the Director shall consult with CDFW as to whether the proposed THP will result in a "take" or "jeopardy" (pursuant to the California Endangered Species Act) of the murrelet before the Director may approve or disapprove a THP. Biological Assessments submitted with the THP that are prepared according to the CDFW Guidelines for Consultation shall be provided to the CDFW during consultation. If CDFW determines jeopardy or a take will occur as a result of operations proposed in the THP, the Director shall disapprove the THP unless the THP is accompanied by authorization by a wildlife agency acting within its authority under state or federal endangered species acts.*

    - FDR treatment activities conducted under a THP may be able to adhere to recommendations in APPENDIX I and protection measures described in FHFR BIO-14 Marbled Murrelets (*Brachyramphus marmoratus*). Treatment activities that qualify will be evaluated on a project-by-project basis and CDFW will be contacted prior to developing treatment designs.

## TREATMENT UNITS

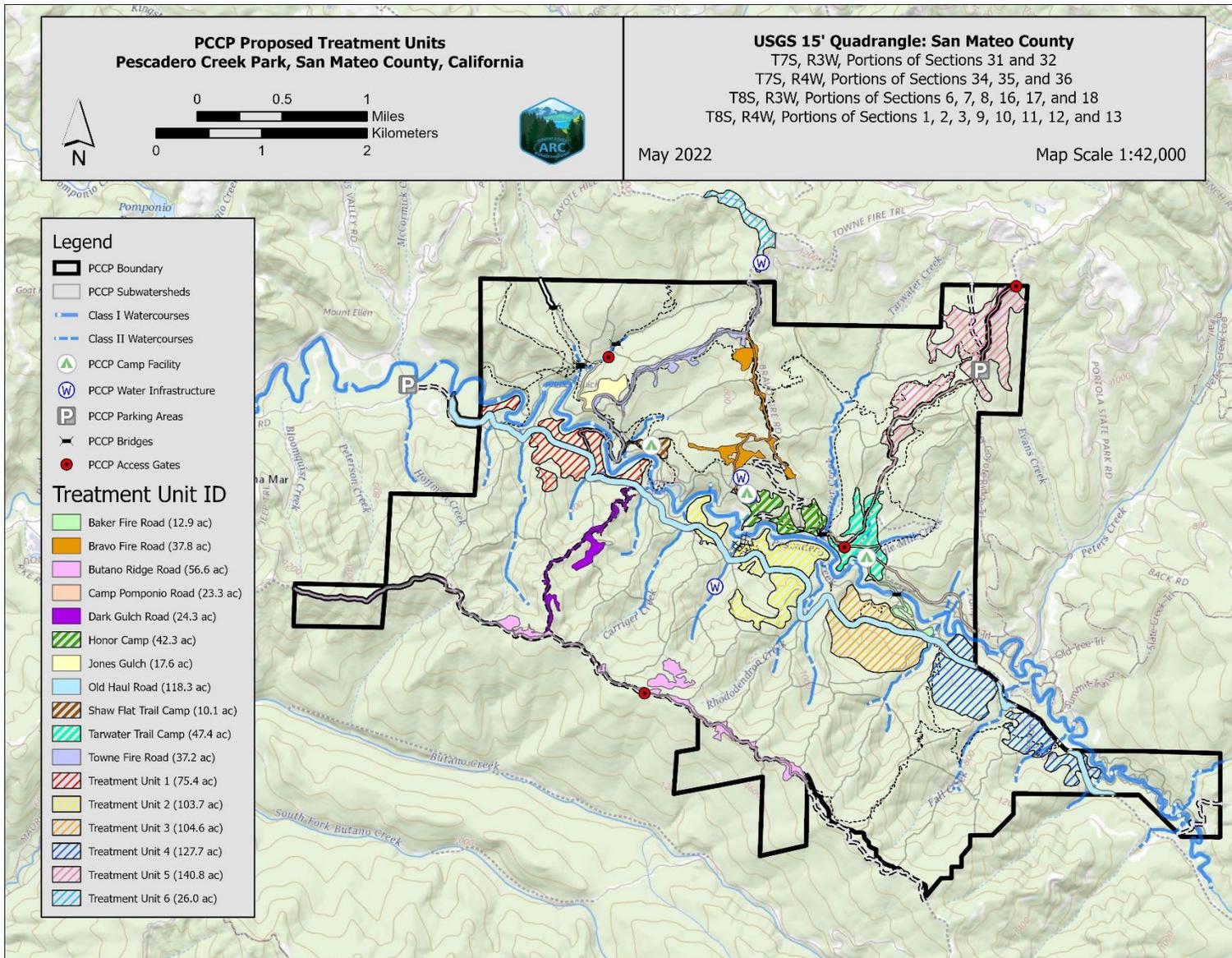
Field observations, Stand Examinations, and Restoration Priority analysis indicate the following areas as high priority treatment units, totaling approximately 1,006 acres of the 5,943 acres of Pescadero Creek County Park. Further detailed analysis of treatment units selected for permitting action will be necessary to confirm the Access, Value, and Objectives of any actions proposed as part of the CHRP.

Table 11 shows prioritized treatment units for PCCP, Map 2 shows a map of treatment areas in PCCP, followed by a summarized description of proposed treatments and treatment objectives.

*Table 11 Proposed Treatment Unit Acreages and IFCC/IGCC Designations*

TREATMENT UNIT ID	ACRES	CRITERIA	CONDITIONS
<b>Old Haul Road (100 Feet)</b>	118.3	A, V, PA	FR, SIP, MMHS, IFCC 1
<b>Shaw Flat Trail Camp</b>	10.1	A, V, PA	FR, MMHS
<b>Tarwater Trail Camp</b>	47.4	A, V, PA	FR, MMHS
<b>Treatment Unit 1</b>	75.4	A, V, PA	FR, SIP, MMHS, IFCC 1
<b>Camp Pomponio Road</b>	23.3	A, V, PA	FR
<b>Jones Gulch</b>	17.6	A, V, PA	FR
<b>Baker Fire Road</b>	12.9	A, V, PA	FR
<b>Bravo Fire Road</b>	37.8	A, V, PA	FR
<b>Towne Fire Road</b>	37.2	A, V, PA	FR
<b>Treatment Unit 2</b>	103.7	A, V, PA	FR, SIP, MMHS, IFCC 1
<b>Treatment Unit 3</b>	104.6	A, V, PA	FR, SIP, MMHS, IFCC 1
<b>Treatment Unit 4</b>	127.7	A, V, PA	FR, SIP, MMHS, IFCC 1
<b>Treatment Unit 5</b>	140.8	A, V, PA	FR, MMHS, IGCC 1
<b>Treatment Unit 6</b>	26	A, V, PA	FR, MMHS, IGCC 1
<b>Dark Gulch Road</b>	24.3	A, V	FR
<b>Butano Ridge Road</b>	56.6	A, V	FR
<b>Honor Camp</b>	42.3	A, V, PA	FR, SIP, MMHS, IFCC 1

**TOTAL PRIORITY  
TREATMENT ACRES                      1006**



Map 2 Proposed Treatment Units and Acreages at PCCP

## General Treatment Descriptions

General treatment descriptions provide a broad description of how treatments should be implemented with consideration to site-specific, prioritized objectives. Treatment units were developed based on information sourced from pre-field research, field verification, and areas with high restoration priority levels based on forest trend monitoring efforts.

### *Old Haul Road*

Approximately 5.5 miles of existing winterized and seasonal road running proximal to Pescadero Creek occupying 118.3 treatment area acres.

- Objective 1: Install a 200-foot-wide shaded fuel break removing dead, dying, and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees.

### *Shaw Flat Trail Camp*

A hike in trail camp in an old growth characteristic forest. A 10.1-acre treatment area is proposed with the following objectives:

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider density reduction treatments of hardwoods and young growth conifers to reduce the basal area on reasonable slopes within proximity to the camp.

### *Tarwater Trail Camp*

A hike in trail camp in an old growth characteristic forest. A 47.4-acre treatment area is proposed with the following objectives:

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider density reduction treatments of hardwoods and young growth conifers to reduce the basal area on reasonable slopes within proximity to the camp.

### ***Treatment Unit 1***

Approximately 75.4 acres of second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Camp Pomponio Road, Jones Gulch Road and Towne, Bravo, & Baker Fire Roads***

Approximately 7.5 miles of existing paved, winterized, and seasonal roads traversing multiple subwatersheds on the northside of Pescadero Creek occupying 111.2 treatment area acres. Extensive shaded fuel break work has been completed on many of these road sections and should be maintained and extended with respect to sensitive resources and slope as necessary, feasible, and when funds are available.

- Objective 1: Install and maintain 60-foot-wide shaded fuel breaks by removing dead, dying, and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider removing Douglas-fir encroaching into the shaded fuel break or other density reduction treatments to reduce the basal area of tree stems on reasonable slopes within proximity to the shaded fuel break.
- Objective 4: In other areas within proximity to the shaded fuel break on reasonable slopes and with respect to sensitive resources implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Treatment Unit 2***

Approximately 103.7 acres of second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Treatment Unit 3***

Approximately 104.6 acres of second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Treatment Unit 4***

Limited by access across Redtree Properties LP land on bridge installed as part of the CZU Fire. An approximately 127.7-acre treatment unit of second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Treatment Unit 5***

An approximately 140.8-acre treatment unit in Proximity to Pomponio Road made up of historic grassland encroached upon by Douglas-fir trees and other shrubland species.

- Objective 1: Remove Douglas-fir trees encroaching into historic grassland footprint.
- Objective 2: Remove shrubs encroaching into historic grassland footprint.
- Objective 3: Maintain habitat continuity through shrub retention providing enough space to reduce fire intensity within the main portion of each treatment area. Treatment area edges (~200 feet from the edges) should be treated more aggressively to reduce continuity between forest vegetation types.
- Objective 4: Remove all eucalyptus trees.

### ***Treatment Unit 6***

An approximately 26.0-acre treatment unit in Sam McDonald Park made up of historic grassland encroached upon by Douglas-fir trees and other shrubland species.

- Objective 1: Remove Douglas-fir trees encroaching into historic grassland footprint.
- Objective 2: Remove shrubs encroaching into historic grassland footprint.
- Objective 3: Maintain habitat continuity through shrub retention providing enough space to reduce fire intensity within the main portion of each treatment area.

Treatment area edges (~200 feet from the edges) should be treated more aggressively to reduce continuity between forest vegetation types.

### ***Dark Gulch Road***

Approximately 1.3 miles of existing seasonal road running from Old Haul Road to Butano Ridge Road occupying 24.3 treatment area acres. This area predominantly traverses through a second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Install and maintain 60-foot-wide shaded fuel breaks by removing dead, dying, and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider removing Douglas-fir encroaching into the shaded fuel break or other density reduction treatments to reduce the basal area of tree stems on reasonable slopes within proximity to the shaded fuel break.
- Objective 4: In other areas within proximity to the shaded fuel break on reasonable slopes and with respect to sensitive resources implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

### ***Butano Ridge Road***

Approximately 4.9 miles of existing seasonal road running along the ridge line on the southernmost portion of PCCP occupying 56.6 treatment area acres. This road predominantly traverses through a second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

- Objective 1: Install and maintain 60-foot-wide shaded fuel breaks by removing dead, dying, and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider removing Douglas-fir encroaching into the shaded fuel break or other density reduction treatments to reduce the basal area of tree stems on reasonable slopes within proximity to the shaded fuel break.
- Objective 4: In other areas within proximity to the shaded fuel break on reasonable slopes and with respect to sensitive resources implement density reduction treatments to promote understory biological diversity and the growth of fewer larger trees per acre.

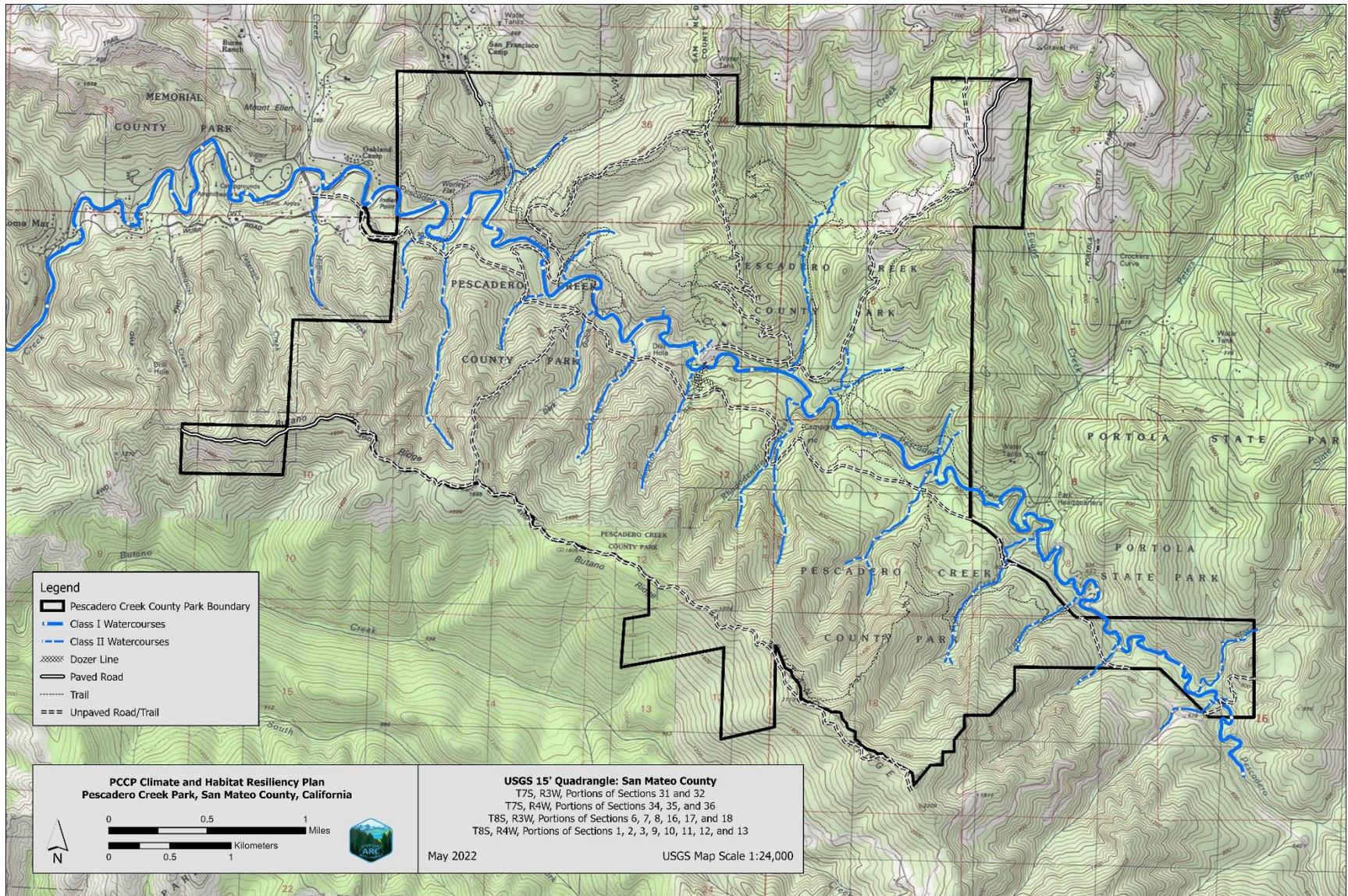
### *Honor Camp*

An approximately 42.3-acre treatment unit surrounding a former facility for inmates on an area of land still holding various aging infrastructure. This honor camp is in a second growth redwood and Douglas-fir forest with various tanoak, madrone, and live oak trees intermixed.

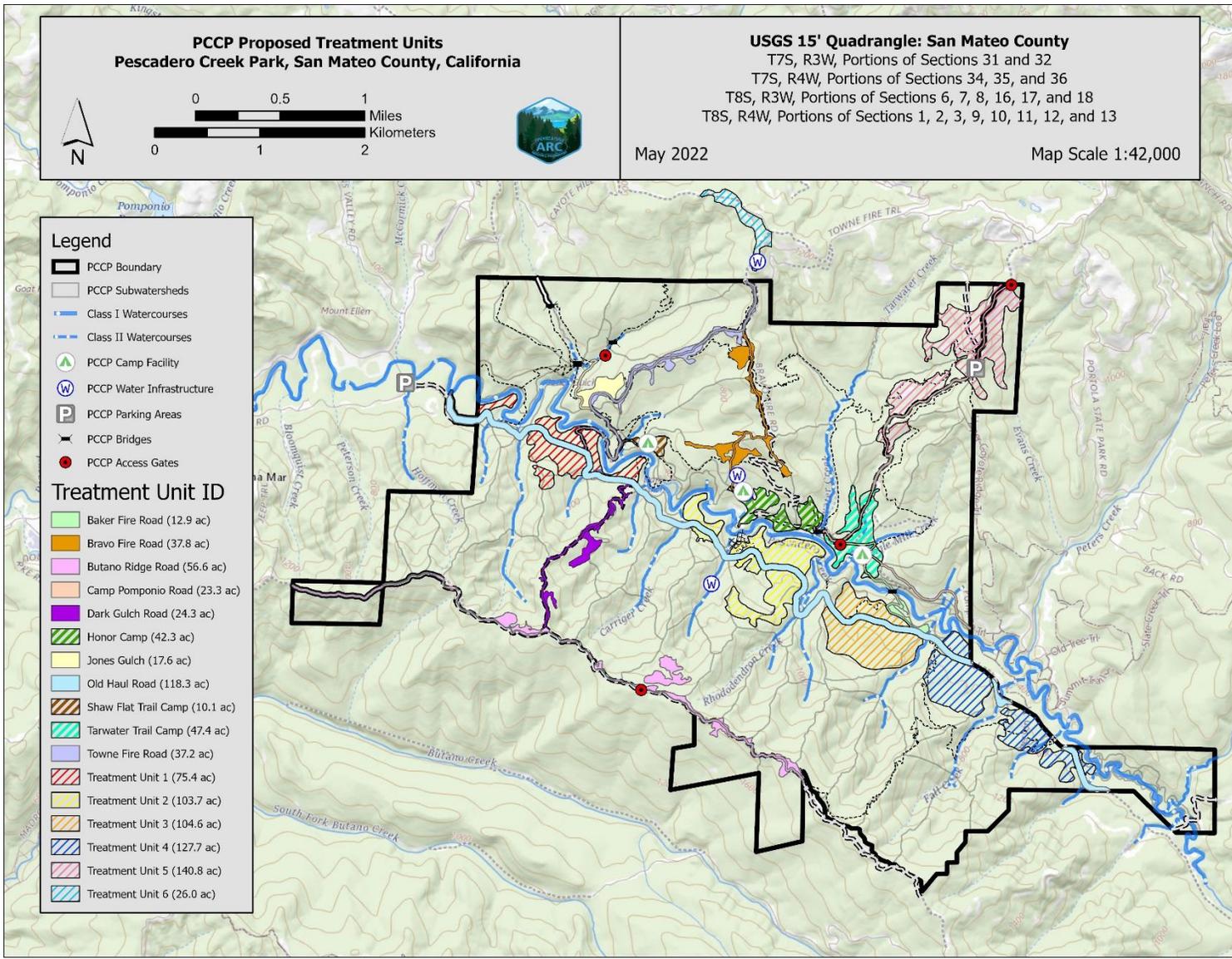
- Objective 1: Remove dead, dying and diseased understory and trees.
- Objective 2: Retain areas or single specimens of healthy understory vegetation, downed wood debris, and other sensitive resources to maintain habitat complexities.
- Objective 3: Consider density reduction treatments of hardwoods and young growth conifers to reduce the basal area on reasonable slopes within proximity to the camp.

## APPENDIX A: MAPS

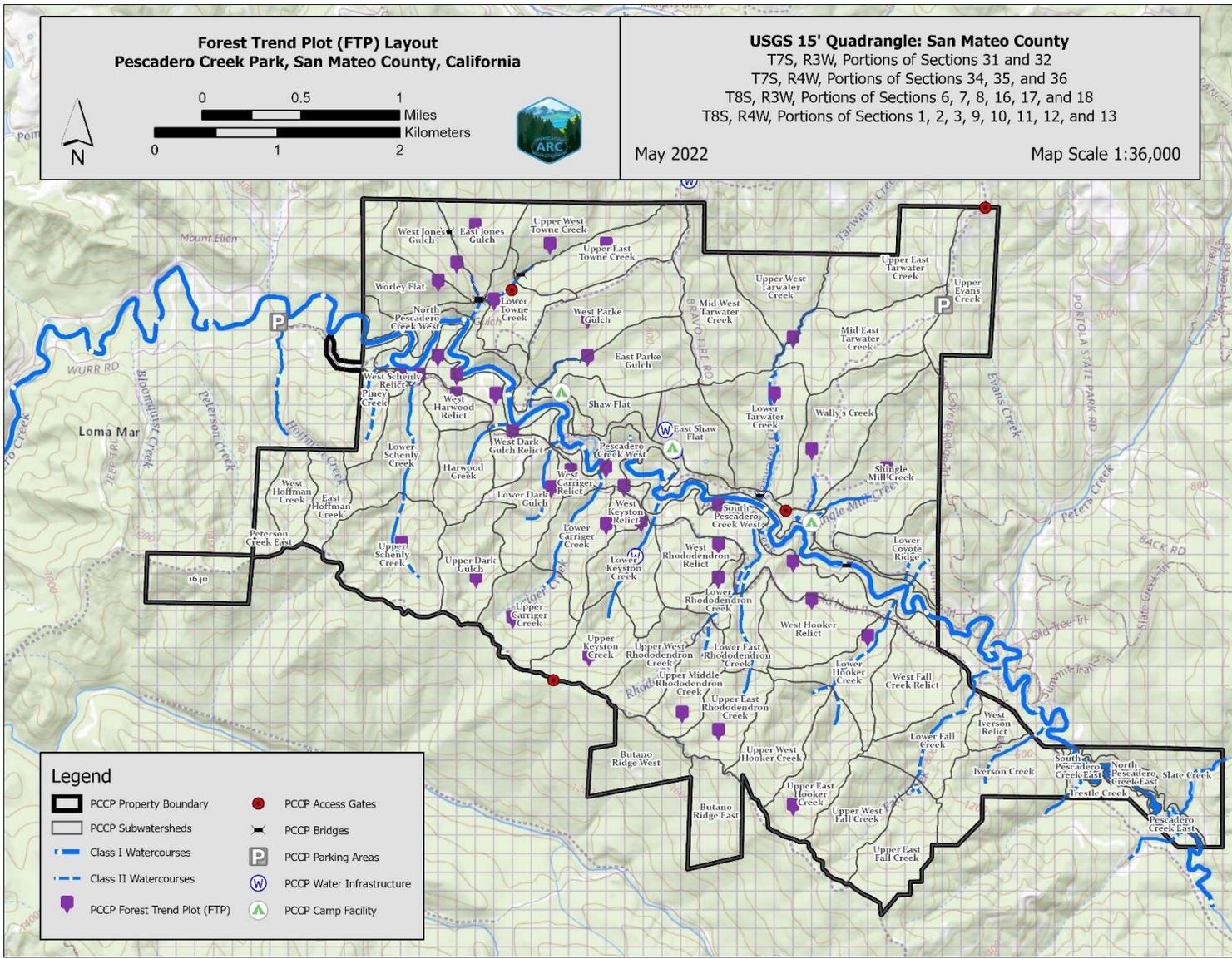
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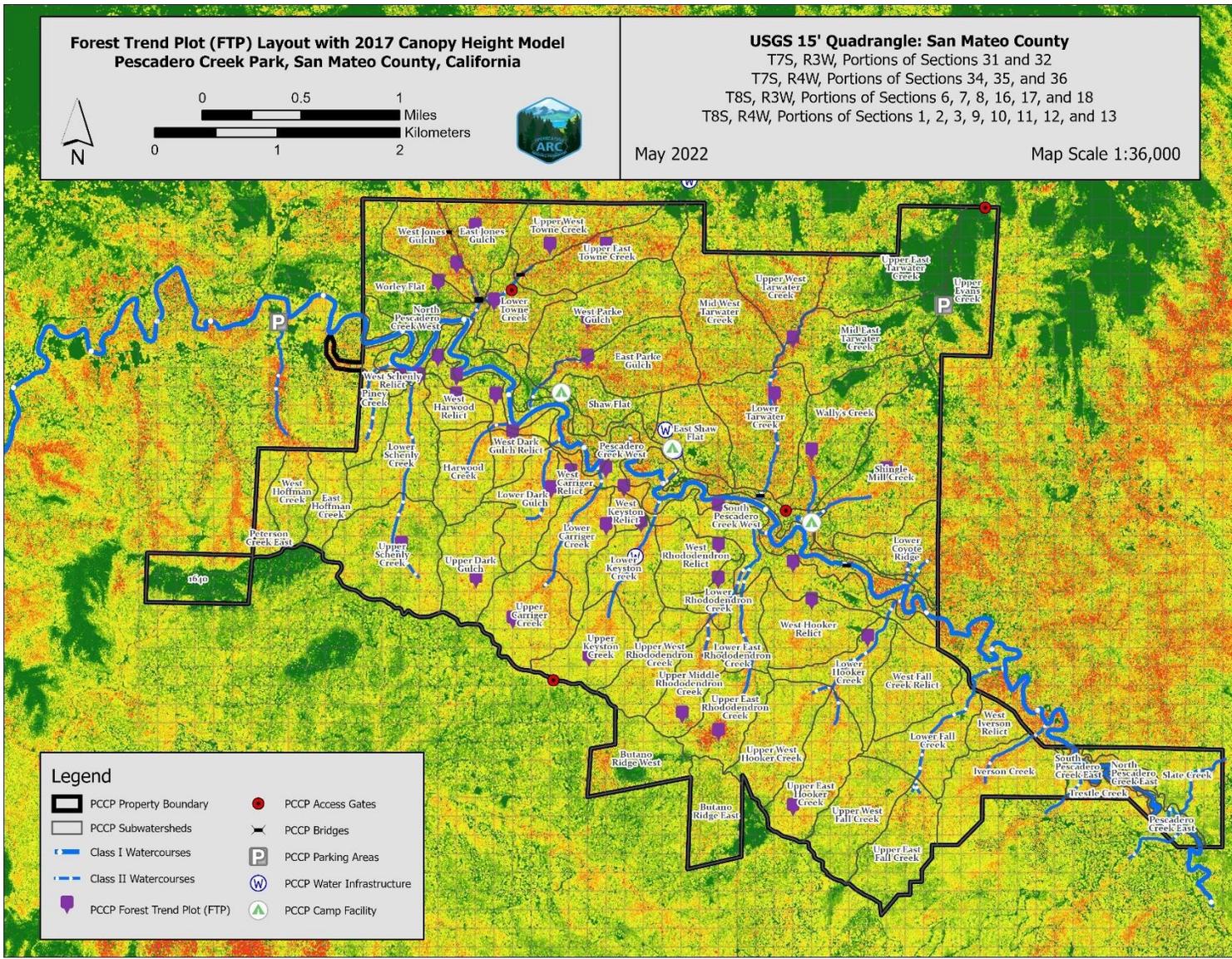
Map 1 Pescadero Creek County Park, San Mateo County



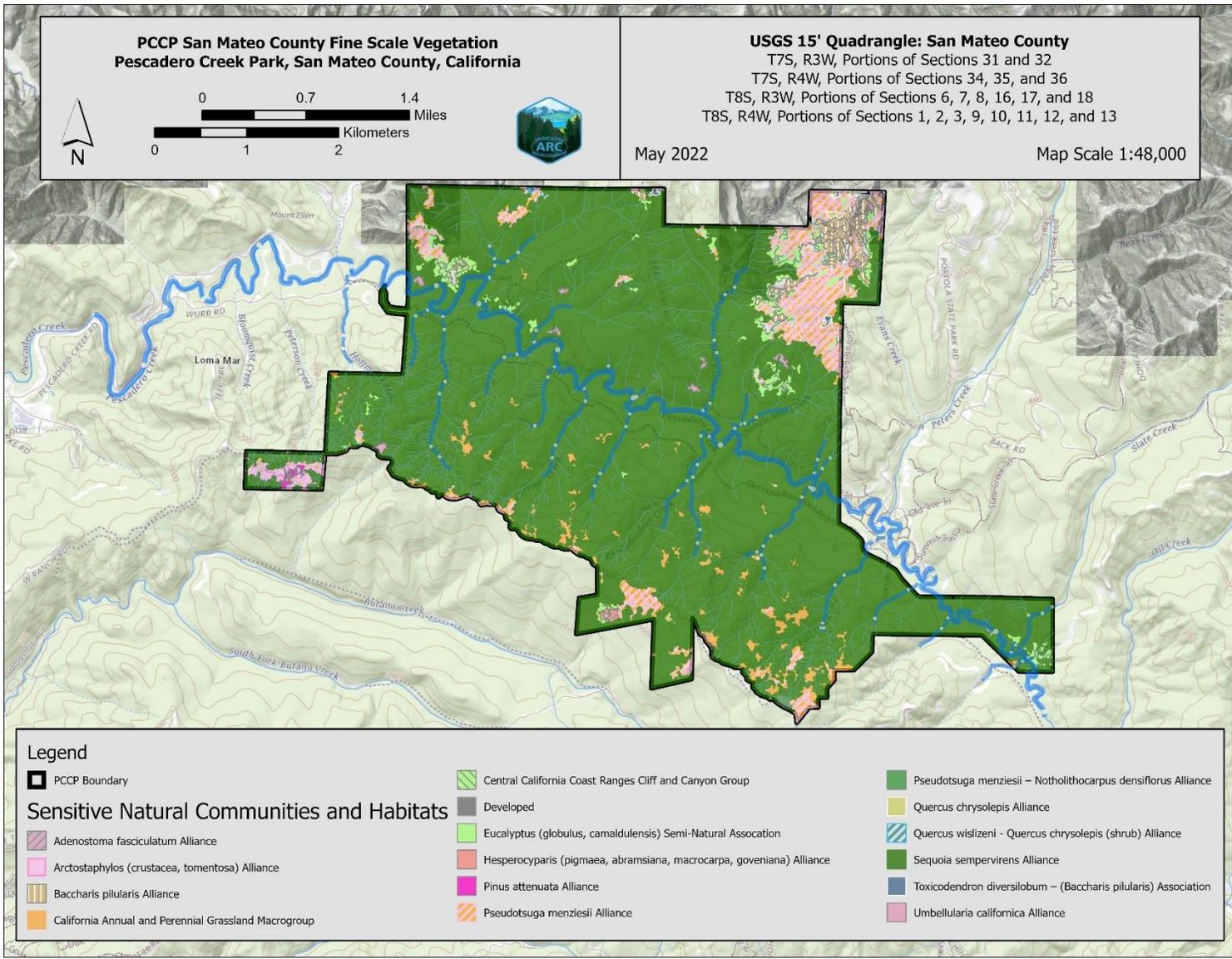
Map 2 Proposed Treatment Units and Acreages at PCCP



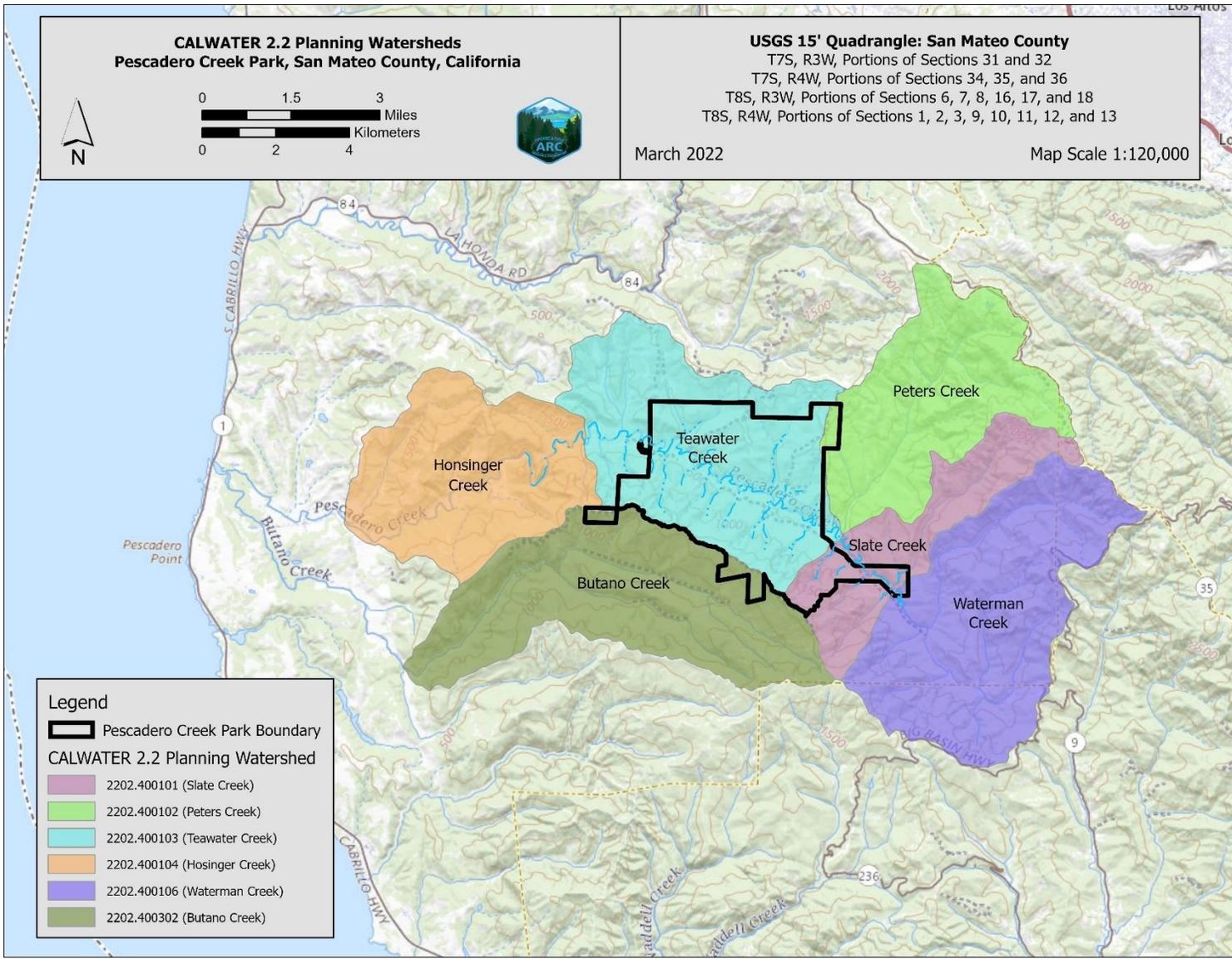
Map 3 Forest Trend Plot (FTP) Layout



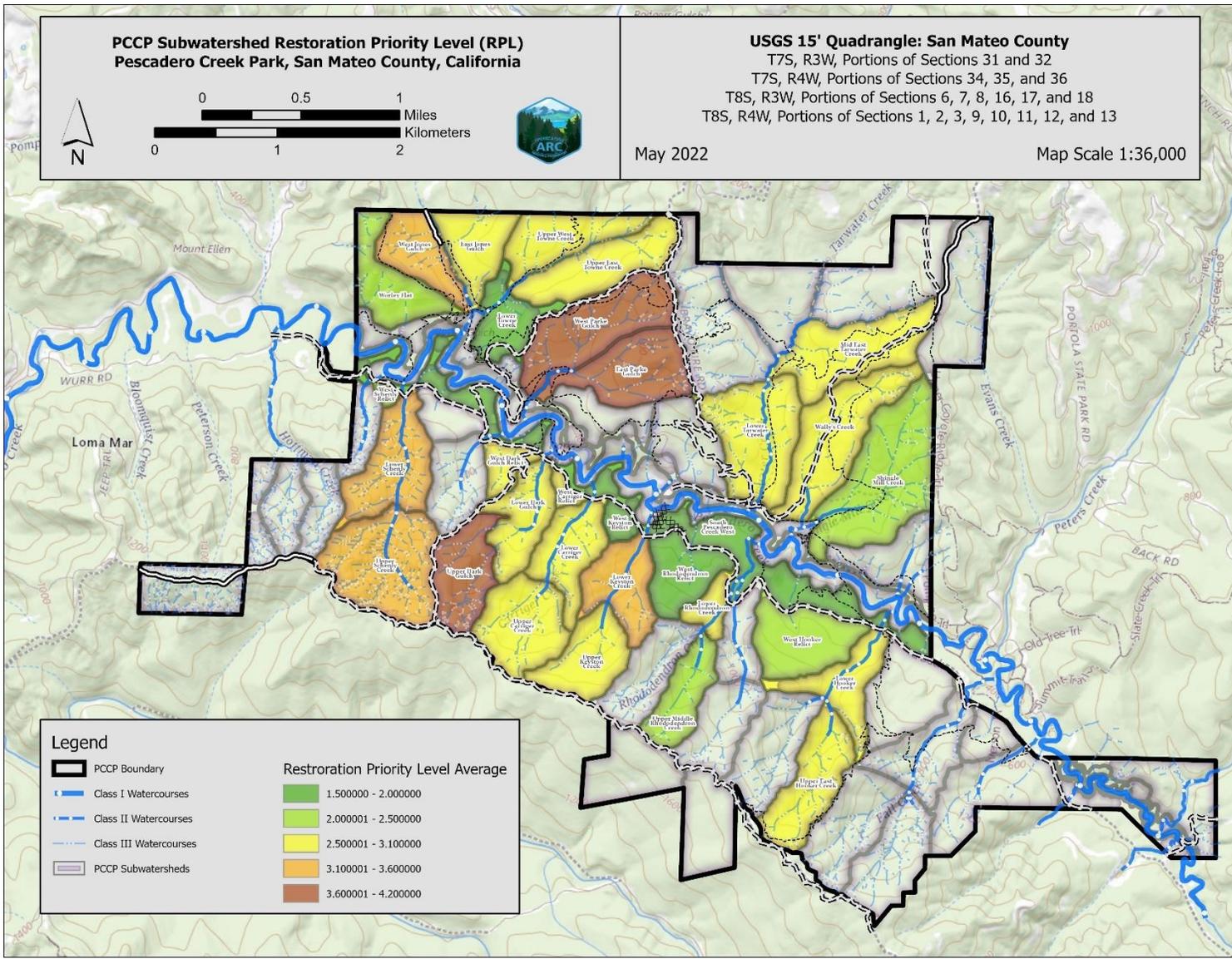
*Map 4 Forest Trend Plot (FTP) Layout with 2017 Canopy Height Model*



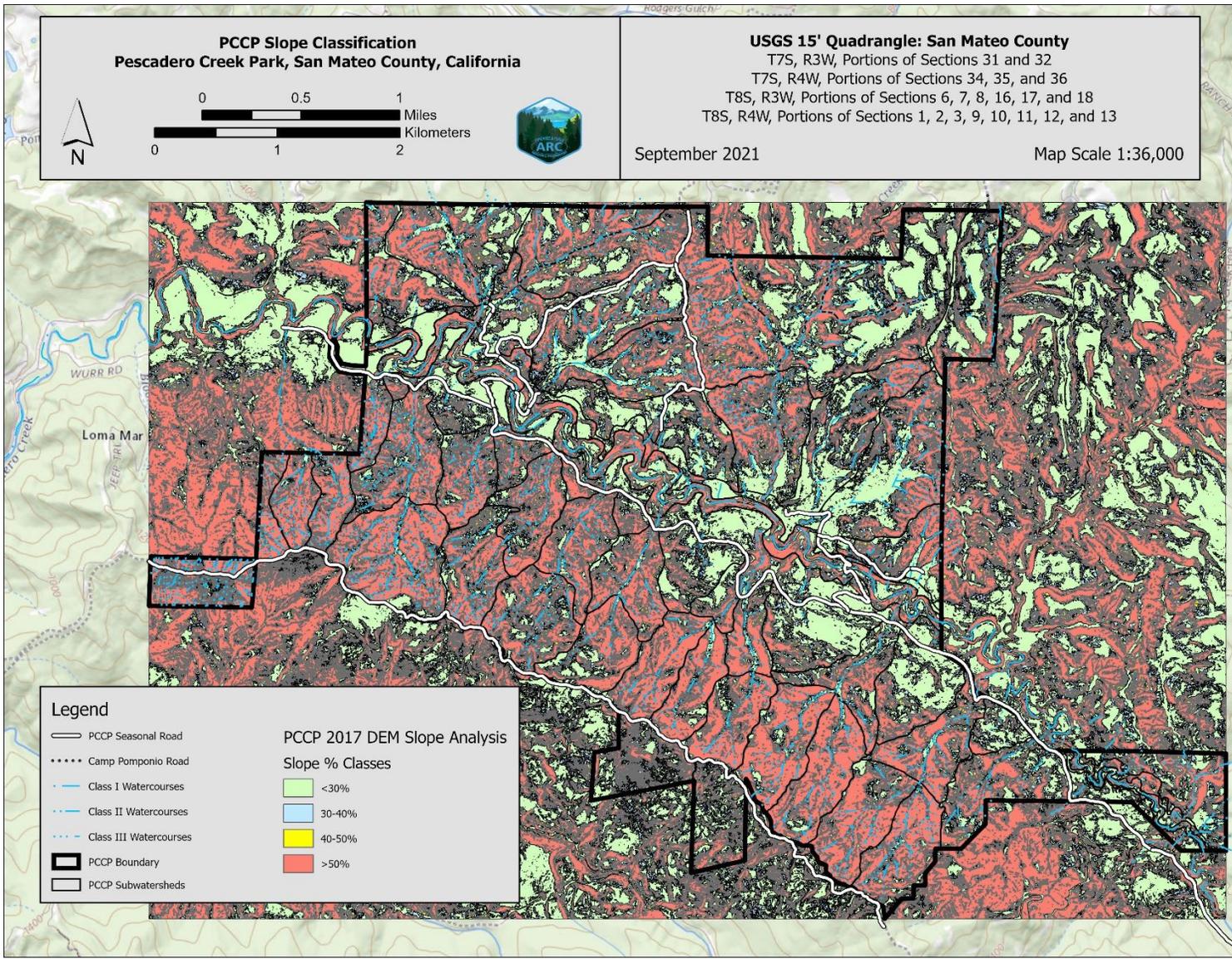
Map 5 PCCP San Mateo County Fine Scale Vegetation



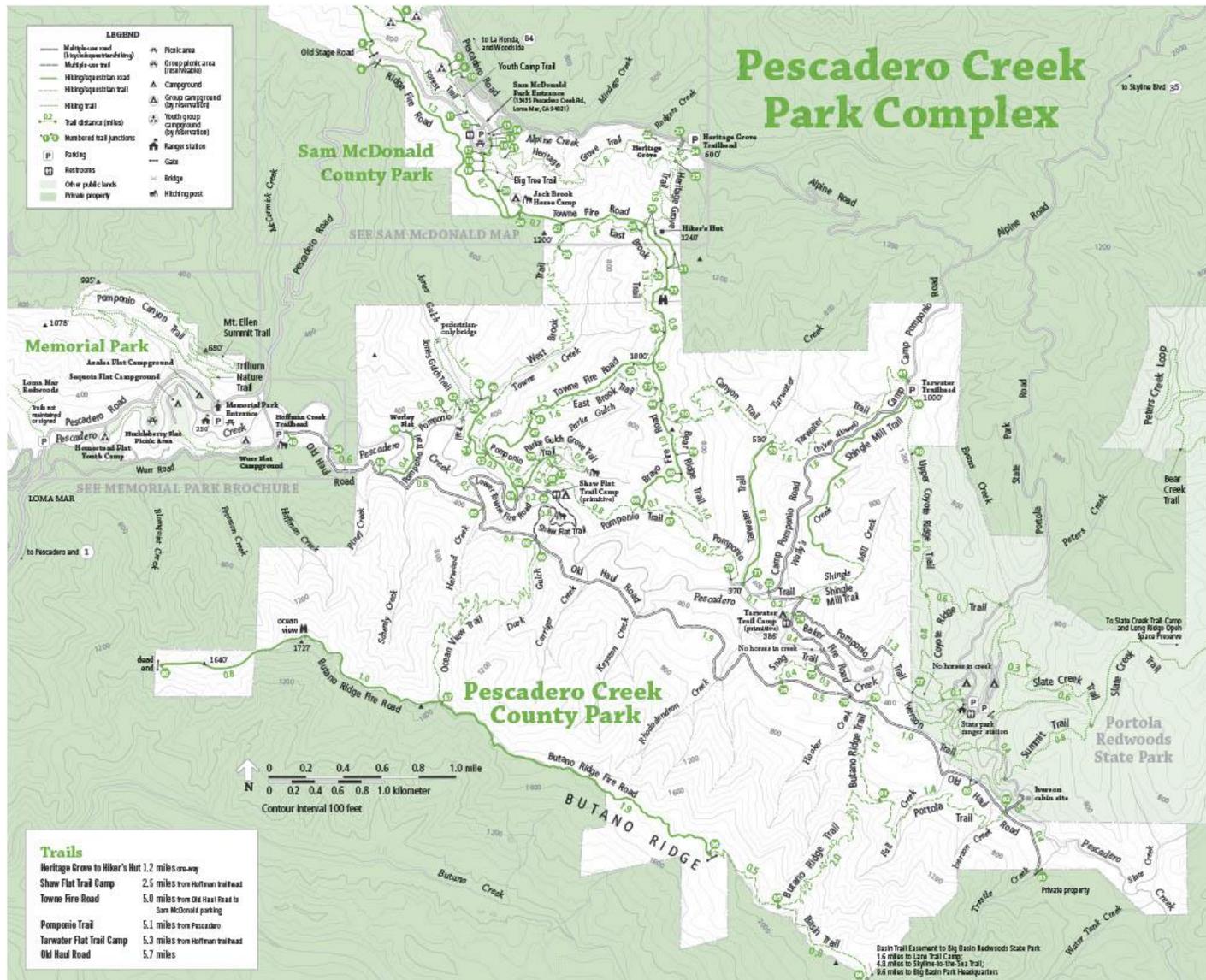
Map 6 CALWATER 2.2 Planning Watersheds



Map 7 PCCP Subwatershed Restoration Priority Level (RPL)



Map 8 Slope Analysis at PCCP



Map 9 Pescadero Creek Park Complex

## APPENDIX B: BIOLOGICAL RESOURCES

### Scoping Discussion

The California Natural Diversity Data Base (CNDDDB), RareFind 5, was used to identify the state and federally listed species that may be present within the park boundary as well as within five miles of the property boundary. The search yielded twenty-five (25) species with either a federal or state listing status of threatened, endangered, or candidate species, CDFW species of special concern or the California Native Plant Society's (CNPS) California Rare Plant Rank (CRPR) List 1 and 2. A detailed description of these species, their habitat type, potential for occurrence as well as photo can be found in the *Wildlife Resources* and *Botanical Resources* subsections.

### CNDDDB Botanical Occurrences

There are two (2) special-status plants that have documented known occurrences, as of May 2022, within the PCCP property boundary. The species are Butano Ridge cypress (*Hesperocyparis abramsiana* var. *butanoensis*) and Anderson's manzanita (*Arctostaphylos andersonii*) both of which are in close proximity to Butano Ridge Road.

There are fifteen (15) special-status plants that have potentially suitable habitat located within the park boundary but have no known occupancy. These include King's mountain manzanita (*Arctostaphylos regismontana*), Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), western leatherwood (*Dirca occidentalis*), San Mateo woolly sunflower (*Eriophyllum latilobum*), minute pocket moss (*Fissidens pauperculus*), Toren's grimmia (*Grimmia torenii*), legenere (*Legenere limosa*), Point Reyes meadowfoam (*Limnanthes douglasii* spp. *sulphurea*), arcuate bush-mallow (*Malacothamnus arcuatus*), woodland woollythreads (*Monolopia aracilens*), Kellman's bristle moss (*Orthotrichum kellmanii*), Dudley's lousewort (*Pedicularis dudleyi*), white-flowered rein orchid (*Piperia candida*), Choris' popcornflower (*Plagiobothrys chorisianus* var. *chorisianus*), and Santa Cruz clover (*Trifolium buckwestiorum*). See Table 12.

Table 12 Special-Status Botanical Species at PCCP

Plant Species Table				
Plant Species		Federal Threatened/ Endangered	State Rare/Threatened / Endangered	CRPR (1A, 1B, 2A, 2B)
Common Name	Scientific Name			
Anderson's manzanita	<i>Arctostaphylos andersonii</i>	-	-	1 B.2
King's mountain manzanita	<i>Arctostaphylos regismontana</i>	-	-	1 B.2
Ben Lomond spineflower	<i>Chorizanthe pungens var. hartwegiana</i>	E	-	1 B.1
western leatherwood	<i>Dirca occidentalis</i>	-	-	1 B.2
San Mateo woolly sunflower	<i>Eriophyllum latilobum</i>	E	E	1 B.1
minute pocket moss	<i>Fissidens pauperculus</i>	-	-	1 B.2
Toren's grimmia	<i>Grimmia torenii</i>	-	-	1 B.3
Butano Ridge cypress	<i>Hesperocyparis abramsiana var. butanoensis</i>	-	-	1 B.2
Legenere	<i>Legenere limosa</i>	-	-	1 B.1
Point Reyes meadowfoam	<i>Limnanthes douglasii spp. sulphurea</i>	-	-	1 B.2
arcuate bush-mallow	<i>Malacothamnus arcuatus</i>	-	-	1 B.2
woodland woollythreads	<i>Monolopia aracilens</i>	-	-	1 B.2
Kellman's bristle moss	<i>Orthotrichum kellmanii</i>	-	-	1 B.2
Dudley's lousewort	<i>Pedicularis dudleyi</i>	-	R	1 B.2
white-flowered rein orchid	<i>Piperia candida</i>	-	-	1 B.2
Choris' popcornflower	<i>Plagiobothrys chorisianus var. chorisianus</i>	-	-	1 B.2
Santa Cruz clover	<i>Trifolium buckwestiorum</i>	-	-	1 B.1

### CNDDDB Wildlife Occurrences

In addition to the CNDDDB RareFind query, a California Wildlife Habitat Relationships (CWHR) search was conducted to determine which additional special status wildlife species have potential habitat within the property boundary. The CWHR system was developed by CDFW and contains life history, geographic range, and management information for 712 species of amphibians, reptiles, birds, and mammals that occur within the state. It also contains detailed information on 59 habitat types and their spatial distribution.

There are four (4) special-status wildlife species that have documented known occurrences, as of May 2022, within the project property. The species are the marbled murrelet (*Brachyramphus marmoratur*), California giant salamander (*Dicamptodon ensatus*), mountain lion (*Puma concolor*), and the foothill yellow-legged frog (*Rana boylei*).

There are thirty (30) additional special-status wildlife species that have potentially suitable habitat within the PCCP boundary including the western pond turtle (*Acitenemys marmorata*), tricolored black bird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), Santa Cruz black salamander (*Aneides flavipunctatus niger*), pallid bat (*Antrozous pallidus*), golden eagle (*Aquila chrysaetos*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), burrowing owl (*Athene cunicularia*), western bumble bee (*Bombus occidentalis*), Barrow's goldeneye (*Bucephala islandica*), Vaux's swift (*Chaetura vauxi*), Northern harrier (*Circus hudsonius*), Olive-sided flycatcher (*Contopus cooperi*), Townsend's big eared bat (*Corynorhinus townsendii*), Black swift (*Cypseloides niger*), white-tailed kite (*Elanus leucurus*), Western Mastiff Bat (*Eumops perotis californicus*), bald eagle (*Haliaeetus leucocephalus*), Loggerhead shrike (*Lanius ludovicianus*), Western red bat (*Lasiurus blossevillii*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), Coho salmon- central California coast (*Oncorhynchus kisutch pop. 4*), steelhead- central California coast (*Oncorhynchus mykiss irideus pop. 8*), Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*), purple martin (*Progne subis*), California red-legged frog (*Rana draytonii*), Yellow warbler (*Setophaga petechia*), American badger (*Taxidea taxus*), and the San Francisco gartersnake (*Thamnophis sirtalis tetrataenia*). See Table 13.

Table 13 Special-Status Wildlife Species at PCCP

Animal Species Table					
Animal Species		Species Type	Federal	State	CDFW
		Mammal / bird / reptile / amphibian / fish / Invertebrate	Threatened/ Endangered	Threatened / Endangered / Candidate	Fully Protected / Species of Special Concern
Common Name	Scientific Name				
Western pond turtle	<i>Acitemys marmorata</i>	Reptile	-	-	SSC
Tricolored blackbird	<i>Agelaius tricolor</i>	Bird	-	-	SSC
Grasshopper sparrow	<i>Ammodramus savannarum</i>	Bird	-	-	SSC
Santa Cruz black salamander	<i>Aneides flavipunctatus niger</i>	Amphibian	-	-	SSC
Pallid bat	<i>Antrozous pallidus</i>	Mammal	-	-	SSC
Golden eagle	<i>Aquila chrysaetos</i>	Bird	-	-	FP
Short-eared owl	<i>Asio flammeus</i>	Bird	-	-	SSC
Long-eared owl	<i>Asio otus</i>	Bird	-	-	SSC
Burrowing owl	<i>Athene cucularia</i>	Bird	-	-	SSC
Western bumble bee	<i>Bombus occidentalis</i>	Insect	-	C	-
Marbled murrelet	<i>Brachyramphus marmoratur</i>	Bird	T	E	-
Barrow's goldeneye	<i>Bucephala islandica</i>	Bird	-	-	SSC
Vaux's swift	<i>Chaetura vauxi</i>	Bird	-	-	SSC
Northern harrier	<i>Circus hudsonius</i>	Bird	-	-	SSC
Olive-sided flycatcher	<i>Contopus cooperi</i>	Bird	-	-	SSC
Townsend's big eared bat	<i>Corynorhinus townsendii</i>	Mammal	-	-	SSC
Black swift	<i>Cypseloides niger</i>	Bird	-	-	SSC
California giant salamander	<i>Dicamptodon ensatus</i>	Amphibian	-	-	SSC
white-tailed kite	<i>Elanus leucurus</i>	Bird	-	-	FP
Western Mastiff bat	<i>Eumops perotis californicus</i>	Mammal	-	-	SSC
Bald eagle	<i>Haliaeetus leucocephalus</i>	Bird	-	E	FP
Loggerhead shrike	<i>Lanius ludovicianus</i>	Bird	-	-	SSC
Western red bat	<i>Lasiurus blossevillii</i>	Mammal	-	-	SSC
San Francisco dusky-footed woodrat	<i>Neotoma fuscipes annectens</i>	Mammal	-	-	SSC
Coho salmon	<i>Oncorhynchus kisutch pop. 4</i>	Fish	E	E	-
Steelhead	<i>Oncorhynchus mykiss irideus pop. 8</i>	Fish	T	-	-
Bryant's savannah sparrow	<i>Passerculus sandwichensis alaudinus</i>	Bird	-	-	SSC
Purple martin	<i>Progne subis</i>	Bird	-	-	SSC
Mountain lion	<i>Puma concolor</i>	Mammal	-	C	SSC
foothill yellow-legged frog	<i>Rana boylei</i>	Amphibian	-	E	SSC
California red-legged frog	<i>Rana draytonii</i>	Amphibian	E	-	SSC
Yellow warbler	<i>Setophaga petechia</i>	Bird	-	-	SSC
American badger	<i>Taxidea taxus</i>	Mammal	-	-	SSC
San Francisco gartersnake	<i>Thamnophis sirtalis tetrataenia</i>	Reptile	E	E	-

## Habitat Types

A list of sensitive natural communities with potential to occur within the park boundary was compiled by utilizing the most up to date detailed fine scale vegetation type data available as of May 2022 (Table 14). This fine scale vegetation data was developed by the Golden Gate National Parks Conservancy in coordination with Tukman Geospatial LLC, Aerial Information Systems, National Park Service, Midpeninsula Regional Open Space District, County of San Mateo, San Francisco Public Utilities Commission, Peninsula Open Space Trust, and San Mateo City/County Association of Governments.

Sensitive natural communities are identified according to the Survey of California Vegetation Classification and Mapping Standards (i.e., the standards used in the Manual of California Vegetation). Natural communities with ranks of S1-S3 are considered Sensitive Natural Communities to be addressed in the environmental review processes of CEQA and its equivalents. A question mark (?) denotes an inexact numeric rank because we know we have insufficient samples over the full expected range of the type, but existing information points to this rank; it is the equivalent of the NatureServe rank calculator's "range of rankings" option.

A complete list of California sensitive natural communities can be found at:

<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153609&inline>

Table 14 Sensitive Natural Communities at PCCP

Sensitive Natural Communities Table			
CA Code	Sensitive Habitat/ Sensitive Natural Community	Species Alliance	Rarity Rank
86.100.00	Redwood forest and woodland	<i>Sequoia sempervirens</i> Alliance	S3
82.500.00	Douglas fir forest and woodland	<i>Pseudotsuga menziesii</i> - <i>Notholithocarpus densiflorus</i> / <i>Vaccinium ovatum</i> Association	S3
73.100.00	Tanoak forest	<i>Notholithocarpus densiflorus</i> Alliance	S3
37.308.00	Brittle leaf - woolly leaf manzanita chaparral	<i>Arctostaphylos (crustacea, tomentosa)</i> Alliance	S3
37.340.00	Glossy leaf manzanita - Golden chinquapin chaparral	<i>Arctostaphylos (nummularia, sensitiva)</i> - <i>Chrysolepis chrysophylla</i> Alliance	S2
37.101.00	Chamise chaparral	<i>Adenostoma fasciculatum</i> Alliance	S5
81.606.00	Santa Cruz cypress groves	<i>Hesperocyparis abramsiana</i> / <i>Arctostaphylos (crustacea, silvicola)</i> Association	S1
71.060.00	Coast live oak woodland and forest	<i>Quercus agrifolia</i> Alliance	S4
71.080.00	Interior live oak - shreve oak woodland and forest	<i>Quercus wislizeni</i> - <i>Quercus parvula</i> (tree) Alliance	S4
87.100.00	Knobcone pine forest and woodland	<i>Pinus attenuata</i> Alliance	S4
32.060.00	Coyote brush scrub	<i>Baccharis pilularis</i> Alliance	S5
63.909.00	Salal - berry brambles	<i>Gaultheria shallon</i> - <i>Rubus (ursinus)</i> Alliance	S4
74.100.00	California bay forest and woodland	<i>Umbellularia californica</i>	S3
61.201.00	Arroyo willow thickets	<i>Salix lasiolepis</i> Alliance	S4
61.204.00	Shining willow groves	<i>Salix lucida ssp. lasiandra</i> Association	S3
61.450.00	Bigleaf maple forest and woodland	<i>Acer macrophyllum</i>	S3
80.100.06	Red osier thickets	<i>Cornus sericea</i> - <i>Salix (lasiolepis, exigua)</i> Association	S3
61.420.00	White alder groves	<i>Alnus rhombifolia</i> Alliance	S4

## Wildlife Resources

### western pond turtle (*Acitenemys (Emys) marmorata*)

#### Description/ Status:

*Emys marmorata*, or the western pond turtle, is a CDFW species of special concern. The western pond turtles are yellow-ish with dark blotches on the dark brown to olive, smooth shell with webbed toes. Adult males have a large head, pointy snout, thick tail base, and wide neck with white and yellow coloration. Adult females have blunt snouts, a thin tail base, and a dark throat and chin. Juveniles have long tails, soft shells, and are light brown.



#### Habitat:

The habitat for this species consists of aquatic and terrestrial environments, including lakes rivers, streams, ponds, wetlands, vernal pools, creeks, reservoirs, agricultural ditches, estuaries, and brackish waters. Adults favor deep waters while juveniles favor shallow waters, however, both prefer slow moving water. Terrestrial habitats consist of burrows in leaves or soil during the winter season. Nests are built away from water in flat areas with short vegetation and dry soils. The western pond turtle feeds on crustaceans, midges, fish, dragonflies, beetles, and other invertebrates and algae or plant material. Development is a threat to this species.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Tricolored blackbird (*Agelaius tricolor*)**

#### Description/Status:

*Agelaius tricolor* is listed as state threatened and CDFW species of special concern. It is a medium-sized (18-24cm total length), sexually dimorphic North American passerine. Adult males are typically larger than females and are black with bright red and white plumage on the wing shoulder. Adult females have sooty brown-black plumage with distinct grayish streaks, a relatively white chin and throat, and a smaller reddish shoulder-patch.



#### Habitat:

Tricolored blackbirds are found in areas near water, such as marshes, grasslands, and wetlands. They require some sort of substrate nearby to build nests. This substrate is often in the form of aquatic vegetation. They also need foraging areas, which can consist of grassland or agricultural pastures such as rice, grain, or alfalfa.<sup>64</sup>

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Grasshopper sparrow (*Ammodramus savannarum*)**

#### Description/Status:

*Ammodramus savannarum*, common name grasshopper sparrow, is listed by CDFW as a species of special concern. Grasshopper Sparrow is on the small side for a sparrow, with a distinctive compact shape. The head is large and flat-crowned, with a conspicuous bill. Tail is very short. Grasshopper Sparrow is a brown and tan bird with light streaking. The belly is white, but the entire breast is unstreaked and buffy. The back is mottled tan, black, and chestnut, and isn't as streaky as other sparrows. The face is relatively plain with a conspicuous white eye ring. They often show a yellow spot between the eye and bill (the lore), and on the bend of the wing.<sup>65</sup>



#### Habitat:

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<sup>64</sup> [https://animaldiversity.org/accounts/Agelaius\\_tricolor/#:~:text=Tricolored%20blackbirds%20\(Agelaius%20tricolor\)%20are,well%20as%20coastal%20areas.%20\(%22](https://animaldiversity.org/accounts/Agelaius_tricolor/#:~:text=Tricolored%20blackbirds%20(Agelaius%20tricolor)%20are,well%20as%20coastal%20areas.%20(%22)

<sup>65</sup> [https://www.allaboutbirds.org/guide/Grasshopper\\_Sparrow/id](https://www.allaboutbirds.org/guide/Grasshopper_Sparrow/id)

This species breeds in open grasslands, prairies, hayfields, and pastures, typically with some bare ground. Grasshopper Sparrows usually avoid breeding in grasslands with extensive shrub cover but are a bit more tolerant of shrubs in migration and during the winter.<sup>66</sup>

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

**Santa Cruz black salamander (*Aneides flavipunctatus niger*)**

Description/ Status:

*Aneides niger*, or the Santa Cruz black salamander, is endemic to California and is listed as a CDFW species of special concern. Males have snouts that range from 68.8-85.7 mm and a head width of 10.5-16.3 mm, whereas female snouts range from 58.3 mm-73.7 mm and head widths range from 8.9-10.9 mm. Adults have uniform shiny, black coloration without spots. Juveniles have small white spots that cover dorsal and ventral surfaces, that occasionally exhibit grey, green, or black coloration beneath the spotting.



Habitat:

This species occurs in mixed deciduous woodland, coniferous forests, and coastal grasslands in California. This species can be found in riparian areas near streams and under damp debris, but do not inhabit streams.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

**pallid bat (*Antrozous pallidus*)**

Description/Status:

The pallid bat, or *Antrozous pallidus*, is a CDFW species of special concern. Adults can reach approximately 60 to 85 mm in length including its tail and has a wingspan of approximately 90 to 120 mm wide. This species is dorsally cream-yellow to light brown in color and pale to white on its underside with woolly fur. The pallid bat has wart-like glands near the nose that secrete an odor as a defense mechanism and have a U-shaped ridge above their nostrils. The ears are large and pointed with serrated edges.



Habitat:

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<sup>66</sup> [https://www.allaboutbirds.org/guide/Grasshopper\\_Sparrow/id](https://www.allaboutbirds.org/guide/Grasshopper_Sparrow/id)

This species favors rocky outcrops in semi-arid climates within grasslands, chaparral, oak woodlands, and coniferous forests. The pallid bat diet consists of ground-dwelling prey like small mammals or reptiles and large flying or ground-dwelling insects.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **golden eagle (*Aquila chrysaetos*)**

Description/ Status:

*Aquila chrysaetos*, or the golden eagle, is federally protected under the Bald Eagle Protection Act of 1962, is a CDFW fully protected species and is on their watchlist. This species is a large bird with an adult wingspan of approximately 2 meters (6ft, 6 in) and height that ranges from 76-104 cm (30-40 in). The golden eagle is all dark with a golden nape and a dark, small bill compared to that of a bald eagle. Juvenile golden eagles have a white base at the tail with a black tip and have white patches on the underside of the wings.



Habitat:

Habitat is primarily open spaces that alternate with tall forests and oak woodland. This species is partially migrant and populations at lower elevations are mostly sedentary. During migration the golden eagle can be found in any habitat. Nesting occurs on rocky ledges or in tall trees and are made up of a large mass of sticks, where they will lay 1-4 white eggs. The golden eagle primarily preys on rabbits and other large rodents, but will occasionally prey on scavenger birds, or carrion.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Short-eared owl (*Asio flammeus*)**

Description/Status:

*Asio flammeus*, or the short-eared owl, is a CDFW species of special concern. Short-eared Owls are medium-sized owls with rounded heads. The "ears" mentioned in their name are difficult to see. The wings are broad and the tips are smoothly rounded. The tail is short. Short-eared Owls are medium brown spotted with buff and white on the upperparts. The face is pale with yellow eyes accentuated by black outlines. The breast is heavily streaked with brown; the chest and belly are pale or



buffy. The pale underwing has a dark comma-shaped mark near the wrist, and the upper wing shows a pale patch in the primaries.<sup>67</sup>

Habitat:

This species is widely distributed and can be found in grasslands and open areas where they perch in low trees or on the ground. These owls prefer to live in marshes and bogs; they inhabit open, treeless areas. Their hunting and nesting habits make them well suited to relatively flat land.<sup>68</sup>

### **long-eared owl (*Asio otus*)**

Description/ Status:

*Asio otus*, or the long-eared owl, is a CDFW species of special concern. This species has a square-shaped head with long ear tufts and can reach approximately 35-40 cm in length and have a wingspan that ranges approximately from 90-100 cm. Long-eared owls have buff, black, and brown patterns on the body, black, orange, and buff ear tufts, and faces with orange lines on the outside of the yellow eyes and white lines in between the eyes.



Habitat:

This species roosts in forests with dense vegetation near grasslands or shrublands for foraging. The long-eared owl uses abandoned stick nests in tree cavities or cliffs, where they lay 2-10 white eggs. This species preys on small mammals in open ground or sparse forests. The diet predominately consists of mice, kangaroo rats, shrews, voles, rabbits, and occasionally small birds.

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<sup>67</sup> [https://www.allaboutbirds.org/guide/Short-eared\\_Owl/id](https://www.allaboutbirds.org/guide/Short-eared_Owl/id)

<sup>68</sup> [https://animaldiversity.org/accounts/Asio\\_flammeus/#:~:text=One%20of%20the%20world's%20most%20widely%20distributed%20owls%2C%20Asio%20flammeus,suited%20to%20relatively%20flat%20land](https://animaldiversity.org/accounts/Asio_flammeus/#:~:text=One%20of%20the%20world's%20most%20widely%20distributed%20owls%2C%20Asio%20flammeus,suited%20to%20relatively%20flat%20land)

### **burrowing owl (*Athene cunicularia*)**

#### Description/ Status:

*Athene cunicularia*, or the burrowing owl, is a CDFW species of special concern. The burrowing owl is a small bird measuring 19-25 cm tall and have a wingspan of approximately 53-61 cm. This species has bright yellow eyes, white brows, and no ear tufts. Adults are brown with striped, white chests and white spots on the back. Young burrowing owls have no stripes on the chest and only few spots on the back.



#### Habitat:

Habitat commonly consists of prairies, farmland, airfields, and grazed, non-native grassland. Favorable habitats are primarily open, flat areas with short grass or bare soil. Nesting consists of building a 6-10 ft. long burrow that contains a nest chamber at the end. Evidence of burrows may include feathers and whitewash on the ground. In the west, the monogamous owls will lay 7-10 white eggs that get stained from the soils in the burrow. The burrowing owl diet consists of insects and small mammals or amphibians; hunting primarily occurs at night but will occur day and night during breeding season.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **western bumble bee (*Bombus occidentalis*)**

#### Status/Description:

*Bombus occidentalis*, or western bumble bee, is a state candidate endangered species. The females, or worker and queens, have 12 antenna segments and six segments with a yellow thorax and yellow sides on the abdominal segment and a reddish-black fifth segment. Males have similar coloration; except they have 7 abdominal segments and 13 antenna segments. This species has six segmented legs with thin wings that are approximately the same size as the body.



#### Habitat:

This is a pollinator species that associates with a wide range of flowering plants and crops within open coniferous, deciduous and mixed-woodland forests, wet and dry meadows. The western bumble bee is capable of foraging in cold, rainy weather conditions and commonly nests underground.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **marbled murrelet (*Brachyramphus marmoratur*)**

#### Description/Status:

*Brachyramphus marmoratur*, or the marbled murrelet, is a state endangered and federally threatened seabird species. The marbled murrelet is a small seabird species that has an approximate wingspan of 10 inches wide. This species appears red-brown with mottled, white spots during the breeding season and appear to have dark grey backsides and white undersides with white patches on the face and shoulder areas during the nonbreeding season.



#### Habitat:

This species favors nesting sites in old-growth coniferous forests or rocky talus slopes near the Pacific Ocean, up to approximately 15 miles inland. The marbled murrelet nests on large branches approximately 4 inches in diameter or larger that create a platform that may be screened from predators or wind by branches of nearby trees, where the female will lay one yellow, olive, or blue-green egg with brown, black, and lavender specks. This seabird forages in coastal marine habitats, dieting on primarily fish and crustaceans.



#### CNDDDB Occurrence:

This species is presumed to be present at multiple locations within five miles of the project area with the majority of known occurrences located south of PCCP near Butano State Park. There are eleven occurrences within one mile of the project area with four of those located within the PCCP boundary. Although not recognized by this CNDDDB inquiry, audio-visual surveys within PCCP indicate the presence of this species within the park boundary. Of those four occurrences, two are within vicinity of Pescadero Creek on the east side of the property, one is near Camp Pomponio Road off of Shingle Mill Creek, and one is near the northwest corner of PCCP.

### **Barrow's goldeneye (*Bucephala islandica*)**

#### Description/Status:

*Bucephala islandica* has no federal or state listing but is listed as a species of special concern by CDFW. Males are crisp black-and-white, with a purplish head, a long white crescent on the face, and a row of white “windows” along the shoulder. Females are a cool gray with rich brown heads and usually a mostly orange-yellow bill. They nest in holes in trees (or in nest boxes) in remote boreal and montane forests—often in old nests of Northern Flickers or Pileated Woodpeckers.<sup>69</sup>

#### Habitat:

Barrow's Goldeneyes breed on shallow freshwater lakes in subalpine and alpine settings, beaver ponds, and small sloughs, usually in coniferous or aspen woodlands, at elevations up to about 6,100 feet. Breeding lakes must be near treed areas in order for the birds to find nesting sites. Most Barrow's Goldeneyes winter on sheltered saltwater habitats such as bays, harbors, or inlets, often near mussel beds. Many also remain in interior rivers and lakes if they stay unfrozen. They favor shallower waters than Common Goldeneyes.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Vaux's swift (*Chaetura vauxi*)**

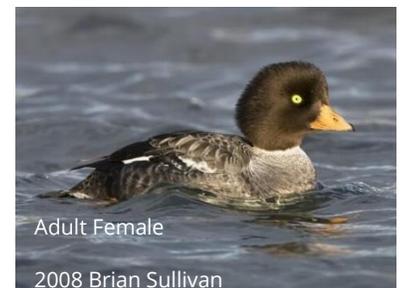
#### Description/Status:

*Chaetura vauxi* is listed by CDFW as a species of special concern. They are a small-bodied bird with long, very narrow swept-back wings that curve along both leading and trailing edges. They are brownish overall, with throat, chest, and uppertail a slightly paler brownish gray. A highly aerial species normally observed only during flight, which is fluttery, stiff-winged, and rapid, often in flocks or pairs.

#### Habitat:



Adult Male  
2020 Blair Dudeck



Adult Female  
2008 Brian Sullivan



2015 Steve Kolbe

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<sup>69</sup> [https://www.allaboutbirds.org/guide/Barrows\\_Goldeneye/overview](https://www.allaboutbirds.org/guide/Barrows_Goldeneye/overview)

*Chaetura vauxi* nests and roost in large hollow trees in mature and old-growth coniferous and mixed forests. Forages over forest, rivers, lakes, fields, and gaps in forest, such as burned areas. Flocks preparing for migration roost in trees and also in chimneys, including in urban areas.<sup>70</sup>

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Northern harrier (*Circus hudsonius*)**

Description/Status:

*Circus hudsonius*, formerly *Circus cyaneus*, is listed by CDFW as a species of special concern. Northern Harriers are slender, medium-sized raptors with long, fairly broad wings and a long, rounded tail. They have a flat, owl-like face and a small, sharply hooked bill. Harriers often fly with their wings held in a dihedral, or V-shape above the horizontal. Males are gray above and whitish below with black wingtips, a dark trailing edge to the wing, and a black-banded tail. Females and immatures are brown, with black bands on the tail. Adult females have whitish undersides with brown streaks, whereas immatures are buffy, with less streaking. All Northern Harriers have a white rump patch that is obvious in flight.



Habitat:

Northern Harriers breed in wide-open habitats ranging from Arctic tundra to prairie grasslands to fields and marshes. Their nests are concealed on the ground in grasses or wetland vegetation. In migration and winter, harriers typically move south away from areas that receive heavy snow cover, ending up in open habitats similar to those in which they breed.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

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<sup>70</sup> [https://www.allaboutbirds.org/guide/Vauxs\\_Swift/overview](https://www.allaboutbirds.org/guide/Vauxs_Swift/overview)

### **Olive-sided flycatcher (*Contopus cooperi*)**

#### Description/Status:

*Contopus cooperi* is listed by CDFW as a species of special concern. A stocky, barrel-chested flycatcher, with a large head and a heavy, long bill for its size. It has rather long wings that can make the tail look short. They are a sooty gray-brown above (with olive tones only in optimal light and fresh plumage), paler below. The dark gray sides of the breast contrast with white in the center, making it look as if the bird is wearing a vest. From the rear, large white tufts at the sides of the back are sometimes visible.<sup>71</sup>



#### Habitat:

Breeds mostly in northern and montane coniferous forest from sea level to timberline and the edge of the tundra. They are most numerous in mid- and higher-elevation forest in mountains (3,000–7,000 feet elevation) and around burned or boggy areas with numerous openings and dead trees. Migrants and wintering birds also favor gaps in coniferous forest.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Townsend's big eared bat (*Corynorhinus townsendii*)**

#### Description/Status:

The Townsend's big eared bat, or *Corynorhinus townsendii*, is a CDFW species of special concern. This medium-sized bat can reach approximately 90 to 115mm long and has large ears that can reach approximately 38 mm in length and are curved when relaxed. The dorsal side of this species is brown or pale grey, and the underside is generally buff or tan colored. The Townsend's big eared bat has two large glands beside the elongated nostrils and there are generally no visible differences between sexes.



#### Habitat:

This species favors dense coniferous forests, native prairies, and coastal communities usually below 3,300 meters elevation. This bat prefers dark, open caves or cliffs in cold areas for roosting and does

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<sup>71</sup> [https://www.allaboutbirds.org/guide/Olive-sided\\_Flycatcher/id](https://www.allaboutbirds.org/guide/Olive-sided_Flycatcher/id)

not roost in rock crevices. The primary food source for this species is moths, however, beetles and other small insects are also common.

### **Black swift (*Cypseloides niger*)**

Description/Status:

*Cypseloides niger* is listed by CDFW as a species of special concern. They have a large swift with long, curved, and pointed wings. The tail is slightly notched, but often appears square. It has a tiny, almost invisible bill and very small feet. They are entirely blackish with whitish spots on the side of the forehead that are difficult to see on flying birds. Juveniles are blackish with white edging on the body and flight feathers.<sup>72</sup>



Habitat:

*Cypseloides niger* nests on cliff ledges and behind waterfalls in areas inaccessible to predators. Forages over forests and open areas.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **California giant salamander (*Dicamptodon ensatus*)**

Description/ Status:

*Dicamptodon ensatus*, or the California giant salamander, is a CDFW species of special concern. Adults are stout with a long tail reaching about 30 cm in total length. The bodies are light brown to brassy and have distinct dark patches. The front two feet have four toes and the hind feet have five toes.



Habitat:

The California giant salamander requires habitat with cover for hiding, sun protection, and breeding and can be found under rocks, logs, or stones. This species' aquatic habitat consists of lakes, ponds, rivers, streams, or fast-moving water. Females deposit 85-200 eggs underwater and protect the eggs until they hatch. This species has a relatively slow reproduction rate due to long gestation period and they do not reach sexual maturity until they are 5-6 years old.

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<sup>72</sup> [https://www.allaboutbirds.org/guide/Black\\_Swift/overview](https://www.allaboutbirds.org/guide/Black_Swift/overview)

CNDDDB Occurrence:

Although there are no recorded occurrences within a 5-mile radius of the park boundary, observations within the park confirm the presence of this species.

**white-tailed kite (*Elanus leucurus*)**

Description/ Status:

*Elanus leucurus*, or the white-tailed kite, is a CDFW fully protected species. This species has narrow, pointed wings with a long tail. The white-tailed kite can reach a length of approximately 32-38 cm and the wingspan can reach approximately 99-110 cm. The body is white and the wings have black patches on the shoulders and grey tips. The eyes are red with dark outlines.

Habitat:

The white-tailed kite occurs in open woodlands, grasslands, and marshes. This species commonly nests in trees on forest edges. Nests are made with twigs, leaves, and grasses, where the female will lay approximately 4 white eggs with dark spots. The primary diet of this species consists of small mammals, insects, and birds.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.



**Western Mastiff Bat (*Eumops perotis californicus*)**

Description/Status:

*Eumops perotis californicus* is listed by CDFW as a species of special concern. It is easily identified by large ears united across the top of its skull and projecting about 10 mm beyond its snout. It is the largest molossid in North America. Characteristic to the family Molossidae, its wings are distinctively long but rather narrow. Their flight membranes are tough and leathery. This is a free-tailed bat



with relatively large feet. Its pelage is short, velvety, and whitish at the roots. Coloration is dark to greyish brown dorsally and more pale ventrally.<sup>73</sup>

**Habitat:**

Suitable habitat for the western mastiff bat consists of extensive open areas with potential roost locations having vertical faces to drop off from and take flight, such as crevices in rock outcroppings and cliff faces, tunnels, and tall buildings. This species inhabits various types of open, semi-arid to arid habitats. These include coastal and desert scrublands, annual and perennial grasslands, conifer, and deciduous woodlands, as well as palm oases.

**CNDDDB Occurrence:**

No known or recorded occurrences within a 5-mile radius of the park boundary.

**bald eagle (*Haliaeetus leucocephalus*)**

**Status/Description:**

*Haliaeetus leucocephalus*, or the bald eagle, is a large raptor listed as a state endangered species. This species has a wingspan of approximately 80 inches and length that ranges from approximately 27 to 38 inches. Adults have white, feathered heads with dark brown wings and bodies that are mottled with white. The underside of the tail is white and the legs and bills are bright yellow. Juvenile bald eagles are mostly uniformly brown and obtain the adult plumage in approximately 5 years.



**Habitat:**

This species nests in open country or mountains near lakes, reservoirs, rivers, marshes, and coasts. Nests are usually located in trees or large cliffs and are comprised of large sticks and lined with fine materials where 1-3 white eggs are laid. The bald eagle diet primarily consists of fish, birds, and mammals.

**CNDDDB Occurrence:**

No known or recorded occurrences within a 5-mile radius of the park boundary.

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<sup>73</sup> [https://animaldiversity.org/accounts/Eumops\\_perotis/](https://animaldiversity.org/accounts/Eumops_perotis/)

### **Loggerhead shrike (*Lanius ludovicianus*)**

#### Description/Status:

*Lanius ludovicianus* is listed by CDFW as a species of special concern. It is a gray bird with a black mask and white flashes in the black wings. The gray head contrasts with the wide, black mask, black bill, and white throat. The tail is black with white corners; the wings are black with white at the base of the primaries that form a small “handkerchief” spot when the wing is closed and larger white patches in flight. Juveniles have darker barring above and below. They have large, blocky heads and a thick bill with a small hook. The tail is fairly long and rounded.<sup>74</sup>



Michael Smith

#### Habitat:

Open country with scattered shrubs and trees is the typical habitat of Loggerhead Shrike, but the species can also be found in more heavily wooded habitats with large openings and in very short habitats with few or no trees.

### **Western red bat (*Lasiurus blossevillii*)**

#### Description/Status:

*Lasiurus blossevillii* is listed by CDFW as a species of special concern. It is a medium sized bat with red-colored pelage, varying from rusty red to brownish red. This red fur distinguishes *L. blossevillii* from all other western bats with the exception of the Eastern Red Bat, *Lasiurus borealis*, which is slightly larger. Most cranial measurements of *L. blossevillii* are significantly larger than other species. *Lasiurus blossevilli* has a short rostrum and ears that are short and rounded, with a prominent tragus. Its interfemoral membrane is covered in fur, with the exception of the last posterior third of the membrane, which is only sparsely haired. Their tails extend to the edge of the uropatagium. Western red bats have a total length of 103 mm. Length from notch to ear averages 13 mm, and forearm length is 35 to 45 mm. Average length of tail is 49 mm, with a foot length of 10 mm.<sup>75</sup>



Don Endicott

#### Habitat:

Roosting sites of *Lasiurus blossevillii* are found in the foliage of trees and shrubs in forests, most commonly 1.5 to 12 m above the ground. The western red bat's ideal roosting tree is dark and sheltered above the roost sit for protection from predators and clear below the roost, allowing the bat to easily exit and approach the tree. It often relies on riparian trees for roosting and foraging, and

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<sup>74</sup> [https://www.allaboutbirds.org/guide/Loggerhead\\_Shrike/id#](https://www.allaboutbirds.org/guide/Loggerhead_Shrike/id#)

<sup>75</sup> [https://animaldiversity.org/accounts/Lasiurus\\_blossevillii/](https://animaldiversity.org/accounts/Lasiurus_blossevillii/)

has been associated with mature stands of cottonwood, sycamore, and willows adjacent to streams. *Lasiurus blossevillii* has also been associated with some fruit trees in orchards, and some evidence has been found to indicate that they may occasionally use caves. They can often be seen feeding in rural and suburban areas, around streetlights and other light sources.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*)**

Description/Status:

The San Francisco dusky-footed woodrat, or *Neotoma fuscipes annectens*, is a CDFW species of special concern. This rodent species can reach approximately 9 inches in length and the tail adds approximately 6.5 to 8 inches to its length. The underside of this woodrat is white or grey and the dorsal side is primarily brown or grey in coloration. The San Francisco dusky-footed woodrat has large round ears and light colored, slightly hairy feet.



Habitat:

This species prefers moderate canopy coverage in oak woodland, chaparral or shrubland, and coniferous forest communities. The San Francisco dusky-footed woodrat builds complex nests from sticks and debris that can reach up to approximately 8 feet wide and 6 feet tall. Nests are typically occupied by a single adult, except for a short period of time after the female gives birth to her pups. The diet for this species consists of woody plant species such as maple, coffeeberry, alder, live oak, and elderberry.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **Coho salmon- central California coast (*Oncorhynchus kisutch* pop. 4)**

Description/Status:

*Oncorhynchus kisutch* pop. 4, or the central California coast Coho salmon (CCC Coho salmon), is a federally and state endangered species. Coho Salmon are a medium to large salmon, with spawning adults typically measuring 55 to 70 cm fork length and weighing from 3 to 6 kg. Spawning males are characteristically dark red on the sides, with the head and back dark green and the belly gray to black. Females are less colorful than males and often appear dull in comparison, with dark pink on the sides. Most spawning males are



characterized by a hooked jaw and slightly humped backs. The jaw is less hooked in jacks (2-year-olds) and only very slightly hooked in females. Both sexes have small black spots on the dorsal (back) fin and upper lobe of the caudal (tail) fin, with no spots on the lower lobe of the caudal fin. The gums of the lower jaw are usually gray, except for the upper area at the base of the teeth, which is white.<sup>76</sup>

Habitat:

CCC Coho salmon spend approximately the first half of their life cycle rearing and feeding in streams and small freshwater tributaries. Spawning habitat is comprised of small streams with stable gravel substrates. These fish need cold, clean freshwater streams to lay their eggs, along with side channels and floodplains where young fish can find food and hide from predators. The remainder of their life cycle is spent foraging in estuarine and marine waters of the Pacific Ocean. Timing of streamflow is critically important to CCC Coho salmon. Severe high flow events that occur early in winter (December, January) can scour holding pools, move large wood cover, open lagoon mouths for migration, and generally improve Coho habitat, while similar flood events later in the season (February, March) can wash away redds and eggs or flush juvenile CCC Coho out of over-wintering habitat such as pools, side channels, or estuaries.<sup>77</sup>

**steelhead – central California coast (*Onchorhynchus mykiss irideus pop.8*)**

Description/Status:

*Onchorhynchus mykiss irideus pop.8*, or the central California coast steelhead, is a federally threatened species along the central coast of California. This anadromous trout species can range from approximately 35 to 65 cm in length and can weigh up to approximately 12 pounds. Adults appear primarily silver in coloration with pink cheeks and green backs and often have black spots along the tail and fins. Juveniles resemble adults in color; however, they have an additional dark oval marks located along the lateral line and between the head and dorsal fin.



Habitat:

This is an anadromous fish species that occurs in freshwater Pacific coast streams. This steelhead species will migrate to marine waters once it nears maturity, then returns to freshwater streams for spawning. Typically, this species requires a minimum of approximately 7 inches of water depth for migration and favors spawning habitat between 6 and 24 inches deep, usually in slow moving currents. High water velocities and low water depth can impede on this species' capability to migrate.

CNDDDB Occurrence:

This species is presumed to be present at three locations within five miles of the property boundary. The nearest of these occurrences is located approximately 0.5 miles to the west of the property

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<sup>76</sup> <https://wildlife.ca.gov/Conservation/Fishes/Coho-Salmon>

<sup>77</sup> <https://caltrout.org/sos/species-accounts/salmon/coho-salmon/central-california-coast-coho-salmon>

boundary in Pescadero Creek which extends into the PCCP boundary. PCCP may contain suitable habitat for this species.

### **Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)**

Description/Status:

*Passerculus sandwichensis alaudinus* is listed by CDFW as a species of special concern. Identification is speculative outside of breeding season because of the high degree of individual variation within subspecies. Savannah Sparrows are brown above and white below, with crisp streaks throughout. Their upperparts are brown with black streaks, and the underparts are white with thin brown or black streaks on the breast and flanks. Look for a small yellow patch on the face in front of the eye.<sup>78</sup>



Habitat:

This sparrow occupies low tidally influenced habitats, adjacent ruderal areas, moist grasslands within and just above the fog belt, and, infrequently, drier grasslands. Bay-shore habitats are composed primarily of broad expanses of higher parts of Pickleweed marsh, 1.5 to 3 m above mean sea level, above cord grass stands, and where the Pickleweed community merges into grassland.<sup>79</sup>

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **purple martin (*Progne subis*)**

Description/ Status:

*Progne subis*, or the purple martin, is a CDFW species of special concern. This bird species measures approximately 19-20 cm in length with a wingspan ranging from 39-41 cm. Adult males have brown to black wings and tails and bodies with iridescent dark blue-purple coloration. Adult females have patches of iridescent blue purple but are overall duller in coloration consisting of grey and browns throughout the body and a whitish underside. Young purple martins resemble females in coloration.



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<sup>78</sup> [https://fog.ccsf.edu/~jmorlan/SavannahSparrowIMG\\_8588.htm](https://fog.ccsf.edu/~jmorlan/SavannahSparrowIMG_8588.htm)

<sup>79</sup> [https://www.allaboutbirds.org/guide/Savannah\\_Sparrow/id](https://www.allaboutbirds.org/guide/Savannah_Sparrow/id)

#### Habitat:

This species favors habitats in open fields, dunes, wet meadows, and in developed areas near water sources for foraging. It is common for them to nest in natural cavities like dead trees, holes in trees, and cliffs. The nests are made of twigs, stems, mud, and grass, where 3-6 pure white eggs would be laid. The purple martin diet consists of insects such as, but not limited to flies, beetles, moths, spiders, termites, mayflies, and wasps.

#### CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

#### **mountain lion (*Puma concolor*)**

#### Description/ Status:

*Puma concolor*, formerly *Felis concolor*, or the mountain lion, is a CDFW species of special concern. Adult mountain lions have a tan coat and white to cream underside. Males and females appear the same in coloration, however, males can reach approximately 6 to 8 feet in total length whereas females are generally smaller reaching approximately 5-7 feet in length. Mountain lion cubs have dark spots on their bodies and rings around their tails that fade as they mature.



#### Habitat:

This species prefers dense vegetative areas within mountain ranges of coniferous forests, scrub and oak woodlands, and arid communities. Mountain lions are territorial and development has limited their available habitat. This species is an opportunistic hunter that primarily feeds on deer, farm animals, and small mammals such as coyotes, raccoons, and feral pigs.

#### CNDDDB Occurrence:

Although there are no recorded occurrences within a 5-mile radius of the park boundary, wildlife cameras and observations within the park confirm the presence of this species.

### **foothill yellow-legged frog (*Rana boylei*)**

#### Description/ Status:

*Rana boylei*, or the foothill yellow-legged frog, is a frog from the genus *Rana* in the family Ranidae that is a state endangered species and a CDFW species of special concern. The foothill yellow-legged frog is a small-sized 3.72–8.2 cm (1.46–3.23 in) that ranges from gray, brown, olive, or reddish in coloration. This species often has dark molting or spots and yellow undersides on its hind legs.



#### Habitat:

Habitat is primarily foothill and mountain streams with rocky substrate in open, sunny banks within forests, chaparral, or woodland communities.

#### CNDDDB Occurrence:

This species is presumed to be present at nine locations within five miles of the property boundary. Of those occurrences, one is located within the property boundary on the westside of the park in Pescadero Creek. The next closest occurrence is near Old Haul Road just outside of PCCP boundary to the West. One occurrence is roughly a ¼ mile to the east of treatment of the PCCP boundary in Pescadero Creek. One occurrence is roughly a mile to the West of PCCP boundary in Pescadero Creek. The remaining five occurrences are over a mile and half outside of PCCP boundary with three to the Northwest, one to the east, and one to the Southeast. PCCP contains suitable habitat for this species.

### **California red-legged frog (*Rana draytonii*)**

#### Description/ Status:

*Rana draytonii*, or the California red-legged frog, is a federally endangered species and CDFW species of special concern. This species ranges from 1.75-5.25 inches long with reddish-brown or brown, gray, or olive coloration. The skin is smooth with small black spots on the back and dark bands on the legs. The hind legs and belly are red on the underside and the chest region is creamy and marbled with gray.



#### Habitat:

Common habitat consists of locations near ponds or along streams in humid forests, grasslands, and coastal scrub communities that contain plant cover. This species breeds in permanent water sources and requires moist refuges, like animal burrows, for cover in the dry season.

#### CNDDDB Occurrence:

This species is presumed to be present within five miles of the property boundary. Most of these occurrences are between 4 to 5 miles outside of the PCCP boundary to the southeast. The closest

occurrences are roughly 1 mi from PCCP boundary with one located to the west of Butano Ridge Road and one located to the North of Old Haul Road. PCCP may contain suitable habitat for this species.

### **Yellow warbler (*Setophaga petechia*)**

Description/Status:

*Setophaga petechia*, yellow warbler, is listed by CDFW as a species of special concern. Yellow Warblers are small, evenly proportioned songbirds with medium-length tails and rounded heads. For a warbler, the straight, thin bill is relatively large. Yellow Warblers are uniformly yellow birds. Males are a bright, egg-yolk yellow with reddish streaks on the underparts. Both sexes flash yellow patches in the tail. The face is unmarked, accentuating the large black eye.



Habitat:

Yellow Warblers breed in shrubby thickets, particularly along watercourses and in wetlands. Common trees include willows, alders, and cottonwoods across North America up to about 9,000 feet in the West. In winter they mainly occur in mangrove forests of Central and South America.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

### **longfin smelt (*Spirinchus thaleichthys*)**

Description/ Status:

*Spirinchus thaleichthys*, or the longfin smelt, is a California threatened species and federal candidate species endemic to California and Alaska. This anadromous fish can reach between 3.5 – 4.3 inches in length and has long pectoral fins that reach the pelvic fins. The longfin smelt appears silver to transparent in coloration with light grey to brown coloration on the upper surface. Spawning occurs in freshwater over sandy or gravel substrates, where females can lay between 5,000 and 24,000 adhesive eggs.



Habitat:

This species is euryhaline, meaning it can tolerate a wide range of salinities, and favors nearshore waters, estuaries, and lower freshwater streams. The longfin smelt forages on small shrimp-like crustaceans, such as opossum shrimp.

CNDDDB Occurrence:

This species is presumed to be present at one location within five miles of the property boundary. The known occurrence located roughly 4.5 miles to the west of the property boundary. PCCP does not contain suitable habitat for this species.

**American badger (*Taxidea taxus*)**

Description/ Status:

*Taxidea taxus*, or the American badger, is a CDFW species of special concern. The American badger has thick brown or black fur with white stripes on its cheeks and an upturned nose. They have short and stout legs with a flat body that reaches approximately 1.5-2 ft in length, are muscular, and have long claws. The adult females will prepare a large burrow up to 10 ft below the surface for her offspring.



Habitat:

Habitat consists of open areas such as prairies, farmland, and plains as well as edges of woods. The American badger is a nocturnal carnivore, and its diet primarily consists of small rodents, reptiles, birds, and insects.

CNDDDB Occurrence:

No known or recorded occurrences within a 5-mile radius of the park boundary.

**San Francisco gartersnake (*Thamnophis sirtalis tetrataenia*)**

Description/Status:

The San Francisco gartersnake, or *Thamnophis sirtalis tetrataenia*, is a state and federally endangered species endemic to the San Francisco Bay area of California. Adults can reach 18 to 55 inches in length and have large eyes on the sides of their narrow head. This species has many dorsal stripes that are blue-green or greenish yellow to white, black, and red with a blue-green underside and red head.



Habitat:

This species favors openings in grasslands or wetland areas near ponds, marshes, or sloughs and is capable of swimming. During the dry season, the San Francisco gartersnake may become dormant in rodent burrows. The primary diet consists of amphibians, small mammals, reptiles, earthworms, slugs, slugs, and leeches.

CNDDDB Occurrence:

The CNDDDB does not have coordinates for the occurrences of this species, however, San Francisco gartersnake occurrences have been recorded and are presumed to be present within the Mindogo Hill quadrangle which contains a portion of the property. PCCP may contain suitable habitat for this species.

## Botanical Resources

### Anderson's manzanita (*Arctostaphylos andersonii*)

#### Description/ Status:

*Arctostaphylos andersonii*, or Anderson's manzanita, is a shrub species endemic to the Santa Cruz Mountains of California listed as a 1B.2 species under the CRPR. This species is tree-like and can reach 2-5 m in height, is covered with bristles, and has pink, urn-shaped flowers that bloom in early to late spring. The bark is smooth and dark brown-red in coloration with alternate, oblong, heart-shaped leaves.



#### Habitat:

This species grows in openings in redwood forests or near forest edges, usually below 700 meters (2300 feet) elevation. The Anderson manzanita favors hot areas in broadleaved upland forests, chaparral communities, and North coast coniferous forests.

#### CNDDDB Occurrence:

This species is presumed to be present at multiple locations within five miles of the property boundary. The occurrences are located to the south of the property with two occurrences within the PCCP boundary along Butano Ridge Road. PCCP may contain suitable habitat for this species.

### King's mountain manzanita (*Arctostaphylos regismontana*)

#### Description/Status:

The King's mountain manzanita, or *Arctostaphylos regismontana*, is shrub endemic to California that is ranked as a 1B.2 species on the CRPR. This erect shrub can reach 2-4 meters tall and consists of dense foliage that is bristly and exudes sticky resins. The flowers are cone-shaped and make up a cluster of white or pink flowers.



#### Habitat:

This species grows in openings on granite or sandstone outcrops with fast-draining soils. The King's mountain manzanita favors full sun and low moisture habitats within chaparral, broadleaf, or coniferous forests.

#### CNDDDB Occurrence:

This species is presumed to be present at two locations within five miles of the property boundary. The occurrences are located to the south and west of the property approximately 3.5 miles away. PCCP may contain suitable habitat for this species.

**coastal marsh milk-vetch (*Astragalus pycnostachyus* var. *pycnostachyus*)**

Description/Status:

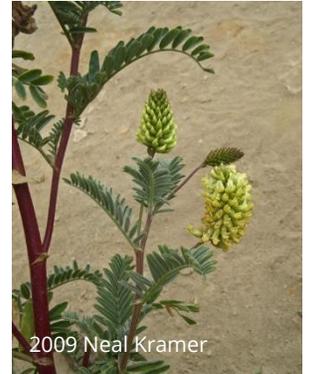
*Astragalus pycnostachyus* var. *pycnostachyus*, or the coastal marsh milk-vetch, is an herb species listed as 1B.2 under the CRPR that is endemic to the California coastline. This species can reach up to 1 meter tall with hairy, cupped leaflets. The inflorescence consists of many cone-shaped yellow flowers.

Habitat:

The coastal marsh milk-vetch favors cool areas in coastal dune or scrub communities and often favors moist areas in marshes and swamps along the coast, usually in elevations below 155 meters.

CNDDDB Occurrence:

This species is presumed present in one location within 5 miles north of the property boundary. PCCP does not contain any coastal dune or scrub communities, marshes, or swamps, so it is unlikely that this species would occur in the property.



**Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*)**

Description/ Status:

*Chorizanthe pungens* var. *hartwegiana*, or the Ben Lomond spineflower, is federally endangered and a CRPR 1B.1 species. This annual herb is erect with hairy, reddish stems. Leaves are oblanceolate and form a basal rosette at the lowest nodes. The cymose inflorescence is surrounded by pink to purple bracts with tube-shaped, lobed flower that ranges from white to pink in coloration.



Habitat:

The Ben Lomond spineflower grows in marine sand deposits within sandhill chaparral communities and lower montane coniferous forests usually below 610 meters elevation.

CNDDDB Occurrence:

This species is presumed to be present at one location roughly 3.5 miles south of the PCCP boundary. PCCP may contain suitable habitat for this species.

### **western leatherwood (*Dirca occidentalis*)**

#### Description/Status:

*Dirca occidentalis*, or the western leatherwood, is a shrub endemic to the San Francisco Bay area of California and is listed as a 1B.2 species under the CRPR. This species can reach approximately 2 meters in height and has mottled grey bark with light green, oval leaves. The yellow flowers usually precede the leaves and dangle upside down with filament that exceed the length of the petals.

#### Habitat:

This species grows in moist locations with partial shade. The western leatherwood can be found in riparian or wetland habitats within chaparral, cismontane woodlands, north coast coniferous forests and broadleaved upland forests.

#### CNDDDB Occurrence:

This species is presumed to be present at multiple locations within 5 miles of the property boundary. All known occurrences are located to the north of the park with the closest occurrence being approximately 3 miles to the northwest of the park boundary. PCCP may contain suitable habitat for this species.



### **San Mateo woolly sunflower (*Eriophyllum latilobum*)**

#### Status/Description:

*Eriophyllum latilobum*, or the San Mateo woolly sunflower, is state and federally endangered and is listed as a 1B.1 species under the CRPR. This flowering herb can reach up to 3 feet tall and has triangularly lobed leaves. The inflorescence is comprised of ray and disc flowers that are yellow in coloration that is encompassed with acute phyllaries.

#### Habitat:

This species favors oak woodlands and grows in foothill woodland, cismontane woodland, coastal scrub, lower montane coniferous forest usually in elevations between 45 and 330 meters.

#### CNDDDB Occurrence:

This species is presumed to be present at two locations within five miles of the property boundary. One of which is roughly 1.5 miles to the west of the property boundary. The other is roughly 3.5 miles north of the property boundary. PCCP may contain suitable habitat for this species.



### **minute pocket moss (*Fissidens pauperculus*)**

#### Description/ Status:

*Fissidens pauperculus*, or the minute pocket moss, is listed as a 1B.2 species under the CRPR. This species has oblong leaves that are strongly folded and light green to dark green in coloration. The leaves consist of the 3 parts including the strongly folded lamina, apical lamina, and dorsal lamina.



#### Habitat:

Minute pocket moss grows in redwood forests and north coast coniferous forests on bare damp soil banks along the coast, and in dry streambeds and stream banks between 10 to 1020 meters in elevation.

#### CNDDDB Occurrence:

This species is presumed to be present at three locations within 5 miles the property boundary. The closest occurrence in proximity to PCCP is located approximately 0.3 miles to the west of the park boundary. PCCP may contain suitable habitat for this species.

### **Toren's grimmia (*Grimmia torenii*)**

#### Description/ Status:

*Grimmia torenii*, or Toren's grimmia, is a moss that is listed as a 1B.3 species under the CRPR. This species reaches approximately 1.5 cm in length and appears green, grey-green, opaque-green, to black in coloration. The leaves are ovate-lanceolate with entire to incurved margins. The urns are erect and symmetrical and smooth to slightly wrinkled when dry.



#### Habitat:

This species favors rocky openings within chaparral, cismontane woodland, and lower montane coniferous forest communities between 325 to 1160 meters in elevation.

#### CNDDDB Occurrence:

This species is presumed to be present at two locations within 5 miles of the park boundary. The known occurrences are located to the south of the park between approximately 1.5 miles away. PCCP may contain suitable habitat for this species.

### **Vaginulate grimmia (*Grimmia vaginulata*)**

#### Description/ Status:

*Vaginulate grimmia*, or Vaginulate grimmia, is a moss that is listed as a 1B.1 species under the CRPR. This species was recently classified/discovered in 2011. It is characterized by its very small plants that are julaceous wet or dry, upper leaves with hyaline margins, dissected peristome, and a conspicuous and persistent ochrea sheathing the entire seta to just below the base of the capsule.



#### Habitat:

This species favors limestone, rocky openings, boulder and rock walls open chapparal between 684 and 1135 meters in elevation.

#### CNDDDB Occurrence:

This species is presumed to be present at one location within 5 miles of the property boundary. The known occurrence is located approximately 1.7 miles to the southeast of the park. The habitat range for this species is higher than the elevation of the park making it unlikely that this species is present within treatment areas.

### **Butano Ridge cypress (*Hesperocyparis abramsiana* var. *butanoensis*)**

#### Description/ Status:

*Hesperocyparis abramsiana* var. *butanoensis*, or the Butano Ridge Cypress, is a tree endemic to California and is listed as a 1B.2 species under the CRPR. This species can reach approximately 15 meters in height and has fibrous bark with thin vertical strips or plates. The needles are scale-like and bright to deep green in coloration. Male cones are quadrangular and contain approximately 4-6 pollen sacs per scale. Mature seed cones are spheric to widely elliptic, brown in coloration, and contain approximately 8-10 scales.



#### Habitat:

This species is known only to occur along the Butano Ridge within the Santa Cruz Mountains within chaparral or closed-cone pine forest communities between 400 and 490 meters in elevation.

#### CNDDDB Occurrence:

This species is known to occur within the park boundary along Butano Ridge.

### **legenere (*Legenere limosa*)**

#### Status/Description:

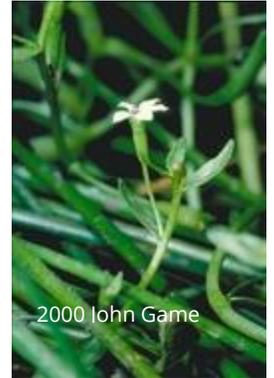
*Legenere limosa*, or legenere, is an herb species that is listed as a 1B.1 under the CRPR. This species has a slender, stiff, fleshy stem with erect lateral branches and narrowly triangular leaves. The inflorescence is an ovate raceme with triangular, white petals.

#### Habitat:

This species grows in wetlands and favors vernal-pools, valley grassland, freshwater wetland and wetland-riparian communities below 950 meters.

#### CNDDDB Occurrence:

This species is presumed to be present in one location within 5 miles south of the property boundary. The known occurrence is located approximately 4.6 miles to the North of PCCP. PCCP may contain suitable habitat for this species.



### **Point Reyes meadowfoam (*Limnanthes douglasii* spp. *sulphurea*)**

#### Description/ Status:

*Limnanthes douglasii* spp. *sulphurea*, or the Point Reyes meadowfoam, is an annual herb endemic to California that is listed as a 1B.2 species under the CRPR. The Point Reyes meadowfoam can reach approximately 1.6 feet tall and develops yellow flowers that consist of five notched, or heart-shaped, petals with yellow anthers. The leaflets are ovate and irregularly toothed or lobed.

#### Habitat:

This species favors full-sun locations within wetland and coastal prairie communities on the edges of meadows, freshwater-marshes, and vernal-pools, generally below 3,300 feet in elevation.

#### CNDDDB Occurrence:

This species is presumed to be present at one location within five miles of the property boundary. The known occurrence is located approximately 4.5 miles to the southwest of the property boundary. PCCP may contain suitable habitat for this species.



**arcuate bush-mallow (*Malacothamnus arcuatus*)**

Description/ Status:

*Malacothamnus arcuatus*, or the arcuate bush-mallow, is a perennial evergreen shrub endemic to California and is listed as a 1B.2 species by the CRPR. This woody, multi-stemmed shrub is erect reaching up to 5 meters in height with densely tomentose, or wooly stems, and leaves. This species has clusters of rose-like flowers that are pink and encompassed by wooly sepals and leaves.



Habitat:

This species favors habitats in early-successional or post-burn slopes within chaparral and cismontane woodland communities between 15-355 meters elevation.

CNDDDB Occurrence:

This species is presumed to be present at multiple locations within 5 miles of the property boundary. The occurrences are located to the north of the property. PCCP may contain suitable habitat for this species.

**woodland woollythreads (*Monolopia aracilens*)**

Description/Status:

*Monolopia aracilens*, or the woodland woollythreads, is a flowering herb endemic to coastal areas near San Francisco Bay in California and is a 1B.2 species under the CRPR. This species has a woolly, branching stem that can reach approximately 2-3 feet tall. The slender stems branch into inflorescences with yellow, hemispheric flower heads comprised of ray florets and disc florets.



Habitat:

This species grows in openings of grasslands, chaparral, redwood forests, and oak woodland communities. The woodland woollythreads favors serpentine soils between 100- and 1200-meters elevation.

CNDDDB Occurrence:

This species is presumed to be present at multiple locations within 5 miles of the property boundary. The occurrences are located to the north and east of PCCP. The closest occurrence in proximity to the property boundary is located approximately 2.5 miles away to the north. PCCP may contain suitable habitat for this species.

**Kellman's bristle moss (*Orthotrichum kellmanii*)**

Description/ Status:

*Orthotrichum kellmanii*, or Kellman's bristle moss, is a moss endemic to California that is listed as a 1B.2 species under the CRPR. This species appears to be green to yellow to orange in coloration with slightly succulent leaves that have pointed tips. Kellman's bristle moss blooms January to February.



Habitat:

This species favors sandstone and carbonate rocks within chaparral and cismontane woodlands between 340 to 685 meters in elevation.

CNDDDB Occurrence:

This species is presumed to be present at two locations within 5 miles of the property boundary. The known occurrences are located to the south of the park with the nearest located approximately 1.5 miles away near China Grade Rd. PCCP may contain suitable habitat for this species.

**Dudley's lousewort (*Pedicularis dudleyi*)**

Description/ Status:

*Pedicularis dudleyi*, or Dudley's lousewort, is a state rare species and is listed as a 1B.2 species under the CRPR. This perennial herb is woolly, single or multi-stemmed and reach approximately 1 foot in height. The leaves are divided into lobed leaflets. The inflorescence, a raceme, consists of club-shaped flowers with upper and lower lips that are white or pink to purple in coloration.



Habitat:

Dudley's lousewort grows in chaparral, cismontane woodlands, north coast coniferous forests, and valley or foothill grasslands usually in elevations under 900 meters.

CNDDDB Occurrence:

This species is presumed to be present at one location within five miles of the property boundary. The known occurrence is located approximately a ½ mile to the East property boundary and of treatment unit 4. PCCP may contain suitable habitat for this species.

**white-flowered rein orchid (*Piperia candida*)**

Description/ Status:

*Piperia candida*, or white-flowered rein orchid, is listed as a 1B.2 species under the CRPR. This species is a perennial herb that can reach approximately 1.5 feet in height. The stems are erect and is spike-like near the inflorescence, which has many small, white flowers with green veins. The basal leaves are approximately 18 cm long and 3 cm wide and are reduced in size higher up on the stem.

Habitat:

The white-flowered rein orchid grows in coniferous forests within coastal mountain ranges usually in elevations below 1500 meters.

CNDDDB for Occurrence:

This species is presumed to be present at three locations within five miles of the property boundary. The closest known occurrence is located approximately a 1/4 mile to the East property boundary. PCCP may contain suitable habitat for this species.



**Choris' popcornflower (*Plagiobothrys chorisianus* var. *chorisianus*)**

Description/Status:

The Choris' popcornflower, or *Plagiobothrys chorisianus* var. *chorisianus*, is a California endemic herb that is listed as a 1B.2 species under the CRPR. This species has a decumbent to erect, branching stem with spiny hairs and sheathing leaves. The inflorescence has bracts at the base and are comprised of a white, lobed corolla with yellow coloration from the center.

Habitat:

This species grows in moist, grassy areas in wetlands or ephemeral drainages. The Choris' popcornflower favors coastal prairie, chaparral, northern coastal scrub, and wetland-riparian communities below 240 meters elevation.

CNDDDB Occurrence:

This species is presumed to be present at multiple locations within 5 miles of PCCP. The occurrences are located to the north and west of the park boundary. PCCP may contain suitable habitat for this species.



### **chaparral ragwort (*Senecio aphanactis*)**

#### Description/Status:

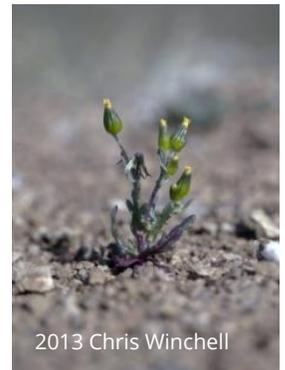
*Senecio aphanactis*, or the chaparral ragwort, is a flowering herb species listed as 2B.2 under the CRPR. This species reaches approximately 8 inches in height and has linear, lobed leaves that occasionally clasp the stem at the base. The urn-shaped inflorescence is encompassed by woolly phyllaries and comprised of yellow ray or disc florets.

#### Habitat:

The chaparral ragwort grows in dry coastal areas with alkaline soils and favors foothill woodland, northern coast scrub, and coastal sage scrub communities between 130-660 meters elevation.

#### CNDDDB Occurrence:

This species is presumed to be present in one location within 5 miles north of PCCP. It is unlikely that the PCCP contains potentially suitable habitat for this species because there are no coastal plant communities present in the park boundary.



### **Santa Cruz clover (*Trifolium buckwestiorum*)**

#### Description/ Status:

*Trifolium buckwestiorum*, commonly known as the Santa Cruz clover, is endemic to California where it has very few occurrences in Monterey, Santa Cruz, and Sonoma counties. This Santa Cruz clover is listed under the CRPR as a 1B.1 species. The foliage is green or reddish, with finely toothed leaflets, and a head-like inflorescence with pale pink or white, tubed flowers.

#### Habitat:

This species favors habitat in disturbed grassy or gravelly coastal prairie or mixed evergreen forests in elevations below 710 meters. Feral pig rooting is a threat to this species.

#### CNDDDB Occurrence:

This species is presumed to be present at one location within 5 miles of PCCP. This occurrence is located approximately 4.9 miles to the north of the park boundary. PCCP may contain suitable habitat for this species.



## APPENDIX C: CULTURAL AND HISTORIC RESOURCES

An archaeological records check request for the entirety of PCCP property was submitted to the Northwest Information Center (NWIC) at Sonoma State University on February 18<sup>th</sup>, 2022, and confidential results were received on March 14<sup>th</sup>, 2022.

A general summary of historical information is provided that is a culmination of multiple references, projects, and management plans from San Mateo County. For project specific actions, depending on the permit action, it can be expected that an Archaeological Survey Report, a California Archaeological Addendum, or a Confidential Archaeological Letter will need to be generated for specific treatment activities proposed in the CHRP.

### Cultural Setting

#### *Prehistory*

The concept of prehistory refers to the period of time before events were recorded in writing and varies worldwide. Because there is no written record, our understanding of California prehistory relies on archaeological materials and oral histories passed down through generations. Early archaeological research in this area began with the work of Max Uhle and Nels Nelson. Uhle is credited with the first scientific excavation in California with his work at the Emeryville Shellmound in 1902, and Nelson spent several years (1906 to 1908) surveying the San Francisco Bay margins and California coast for archaeological sites. In the 1930s, archaeologists from Sacramento Junior College and the University of California began piecing together a sequence of cultures primarily based on burial patterns and ornamental artifact from sites in the lower Sacramento Valley (Lillard *et al.* 1939; Heizer and Fenenga 1939). Their cultural sequence became known as the Central California Taxonomic System (CCTS), which identified three culture periods termed the Early, Middle, and Late Horizons, but without offering date ranges. Refinement of the CCTS became a chief concern of archaeologists as the century progressed with publications by Richard Beardsley (1948, 1954) and Clement Meighan (1955) based on materials excavated by the University of California archaeological survey.

In 1973, David Fredrickson synthesized prior work, and in combination with his own research, he developed a regional chronology that is used to this day, albeit modified for locality-specific circumstances. Fredrickson's scheme shows that native peoples have occupied the region for over 11,000 years (which is supported by Erlandson *et al.* 2007), and during that time, shifts took place in their social, political, and ideological regimes (Fredrickson 1973). While Fredrickson's chronology was adopted by many archaeologists, Beardsley's cultural sequence was adopted by others creating a roughly North Bay-South Bay division in usage.

In an effort to bridge the differences between chronologies, Milliken *et al.* (2007) presented a concordance for comparing time periods, cultural patterns, and local variations for the

San Francisco Bay Area. Milliken included Dating Scheme D, as presented by Groza in 2002, which is a refinement of previous radiocarbon-based temporal sequences for the San Francisco Bay Area. More recently, Byrd, Whitaker, Mikkelsen, and Rosenthal (2017) called upon archaeologists to abandon previous temporal sequences in favor of Scheme D, further refined in Groza *et al.* 2011. Table 2 assimilates Scheme D, Fredrickson's (1973) chronology, and the obsidian hydration dating scheme from Origer (1987). Note that the Early, Middle, Late Horizon scheme is still evident though refinements have been made within those categories.

Early occupants of this region in coastal California appear to have had an economy based largely on hunting, with limited exchange, and social structures based on the extended family unit. Later, milling technology and an inferred acorn economy were introduced. This diversification of economy appears to be coeval with the development of sedentism and population growth and expansion. Sociopolitical complexity and status distinctions based on wealth are also observable in the archaeological record, as evidenced by an increased range and distribution of trade goods (e.g., shell beads, obsidian tool stone), which are possible indicators of both status and increasingly complex exchange systems.

These horizons or periods are marked by a transition from large projectile points and milling slabs, indicating a focus on hunting and gathering during the Early Period, to a marine focus during the Middle Period evidenced by the number of shell mounds in the Bay Area. The Middle Period also saw more reliance on acorns and the use of bowl-shaped mortars and pestles. Acorn exploitation increased during the Late Period and the bow and arrow were introduced.

Prehistoric archaeological site indicators expected to be found in the region include but are not limited to obsidian and chert flakes and chipped stone tools; grinding and mashing implements such as slabs and hand-stones, and mortars and pestles; and locally darkened midden soils containing some of the previously listed items plus fragments of bone, shellfish, and fire-affected stones.

Temporal Period <sup>1</sup>	Approximate Time Range <sup>1</sup>	~ Hydration Interval ( $\mu$ ) <sup>2</sup>	Scheme D Periods <sup>3</sup>	Approximate Time Range <sup>4</sup>	~ Hydration Interval ( $\mu$ ) <sup>5</sup>
Historical	< A.D. 1800	<1.20	Historic Mission	A.D. 1835 to A.D. 1770	1.10 - 1.27
Upper Emergent	A.D. 1800 to A.D. 1500	1.21 - 1.84	Late 2	A.D. 1770 to A.D. 1520	1.28 - 1.80
Lower Emergent	A.D. 1500 to A.D. 1000	1.85 - 2.58	Late 1b	A.D. 1520 to A.D. 1390	1.81 - 2.02
			Late 1a	A.D. 1390 to A.D. 1265	2.03 - 2.22
			Middle/Late Transition	A.D. 1265 to A.D. 1020	2.23 - 2.55
			Middle 4	A.D. 1020 to A.D. 750	2.56 - 2.88
Upper Archaic	A.D. 1000 to 500 B.C.	2.59 - 4.05	Middle 3	A.D. 750 to A.D. 585	2.89 - 3.06
			Middle 2	A.D. 585 to A.D. 420	3.07 - 3.23
			Middle 1	A.D. 420 to 200 B.C.	3.24 - 3.80
			Early/Middle Transition	200 B.C. to 600 B.C.	3.81 - 4.13
			Early	600 B.C. to 2100 B.C.	4.14 - 5.18
Middle Archaic	500 B.C. to 3000 B.C.	4.06 - 5.72			
Lower Archaic	3000 B.C. to 6000 B.C.	5.73 - 7.23			
Paleo-Indian	6000 B.C. to 8000 B.C.	7.24 - 8.08+			

<sup>1</sup> based on Fredrickson (1994)

<sup>2</sup> based on Napa Glass Mountain rate by Origer (1987)

<sup>3</sup> based on Groza *et al.* (2011)

<sup>4</sup> based on Groza *et al.* (2011) and Byrd *et al.* (2017)

<sup>5</sup> based on Origer (1987) and Effective Hydration Temperature value from the vicinity of Santa Rosa, Sonoma County

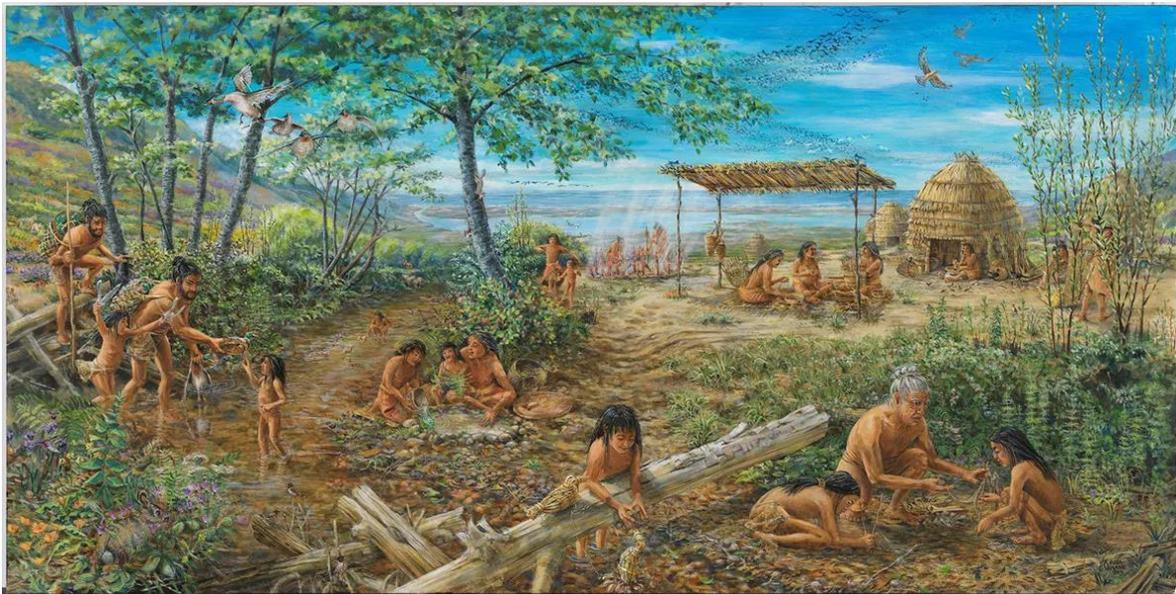
Figure 25 San Francisco Bay Area Chronology

### Indigenous Peoples/Prehistoric

At the time of Euromerican contact, the people living in the general area of the Pescadero Creek County Park were speakers of the Ramaytush language, part of the Costanoan/Ohlone language family (Levy 1978: 485). Using Milliken's study of various mission records, the area now known as Pescadero Creek County Park is located within the historic lands of the Oljon tribe, a single band of the Ohlone, who held the lower drainages of San Gregorio Creek and Pescadero Creek on the Pacific Coast and West of the Santa Clara Valley (Milliken 1995: 249).

Today the term “Ohlone” refers to several native groups of the north-central coast of California who spoke similar languages, and who eventually became part of the Spanish missions. The Spanish referred to these people as *costeños* (coastal people), and anthropologists later anglicized that to “Costanoan.” Today the term “Ohlone,” is more common, and comes from a village on the San Mateo County coast, whose name was *ʔolxon*, sometimes spelled *Alchone*, *Olchone*, *Oljon* or *Ol-hon*.

Ohlone subsistence relied on seasonally available resources that could be hunted and gathered, such as waterfowl, deer, fish, shellfish, acorns, seeds, and berries. Primary village sites were occupied continually, while temporary sites were visited to procure resources that were especially abundant or available only during certain seasons. Sites often were situated near fresh water sources and in ecotones where plant life and animal life were diverse and abundant. Furthermore, periodic burning of the landscape was conducted to promote the growth of native grasses for seed gathering and to create forage for deer and elk.



*Figure 26 Depiction of Pruristac, a Ramaytush village in what is now Pacifica*



*Figure 27 Ramaytush Ohlone in a tule boat in the San Francisco Bay, 1816*

### **Property History/Historic**

The first contact between Ohlone groups and the Spanish most likely took place in 1602, when Sebastián de Vizcaíno's expedition arrived in the Monterey area, searching for a safe harbor for Spanish ships. After Vizcaíno, however, the Spanish paid little attention to Alta California, until 1769, when Gaspar de Portola's expedition arrived in the Monterey area and established the presidio there. That is when continuous contact between the Ohlone and the Spanish really began.<sup>80</sup>

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<sup>80</sup> [https://www.californiafrontier.net/ohlone-tribe-language-food-clothing/#The\\_Ohlone\\_Name](https://www.californiafrontier.net/ohlone-tribe-language-food-clothing/#The_Ohlone_Name)

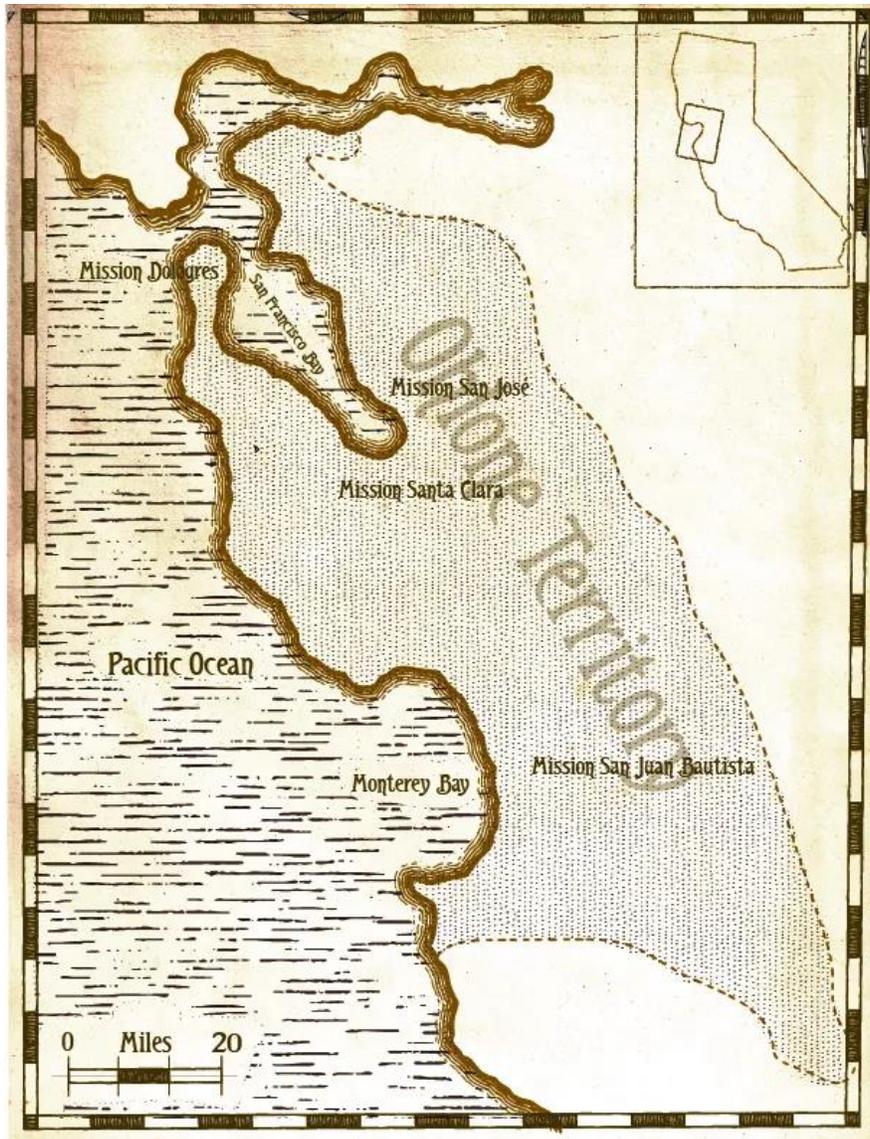


Figure 28 Map of Ohlone Territory

Between 1777 and 1797, Spanish missionaries established seven missions in Ohlone/Costanoan territory disrupting Ohlone lifeways and cultural identities and decimating the population. Richard Levy (1978) estimated that Costanoans numbered 10,000 in 1770 and less than 2,000 in 1832 as new diseases were introduced, leading to higher mortality rates and lower birth rates. Many of the Oljon tribe members travel north to Mission Deloris during this period (Milliken *et al.* 2009). See Figure 27 for a map of the Ohlone Territory.

The near complete destruction of the Ramaytush resulted in large part from disease, and poor living and working conditions at the mission. At Mission Dolores average life

expectancy after baptism was only four years. The high rates of death inevitably destroyed tribal communities and tribal culture.<sup>81</sup>

In 1821 Mexico gained independence from Spain and “Alta California” became a Mexican province rather than a Spanish colony.<sup>82</sup> The Mexican Secularization Act of 1833 granted only a few mission Indians land, but the vast majority of natives fled the missions and became an exploited laboring class on Spanish and Mexican ranchos across the State. “While missionization destroyed populations and dismantled families and tribes, secularization dispersed the remaining Indians across the state.”<sup>83</sup>

“The destruction, dismantling, and dispersion of the missionized California Indians was further exacerbated by the genocide, kidnapping, and legalized servitude of Indians by European Americans. “Still, a few lineages, families, and tribes did survive to the present, but like many other Indians in the State, missionized Indians faced problems associated

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<sup>81</sup> [https://www.nps.gov/articles/impact-of-spanish-colonization.htm?utm\\_source=article&utm\\_medium=website&utm\\_campaign=experience\\_more&utm\\_content=small](https://www.nps.gov/articles/impact-of-spanish-colonization.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small)

<sup>82</sup>

<https://www.nps.gov/nr/travel/ca/intro.htm#:~:text=The%20Spanish%20divided%20California%20into,control%20over%20the%20native%20people.>

<sup>83</sup>[https://www.nps.gov/articles/impact-of-spanish-colonization.htm?utm\\_source=article&utm\\_medium=website&utm\\_campaign=experience\\_more&utm\\_content=small](https://www.nps.gov/articles/impact-of-spanish-colonization.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small)

with extreme poverty—poor health care, substandard education, and unemployment—which continues to this day.” By 1850 only about five Ramaytush families survived.

In 1848 gold was discovered at Sutter’s Mill and dramatically altered the course of California’s history as miners rushed to the area. On September 9th, 1850, California



Figure 29 Native dancers in traditional Miwok headbands at mission San Francisco

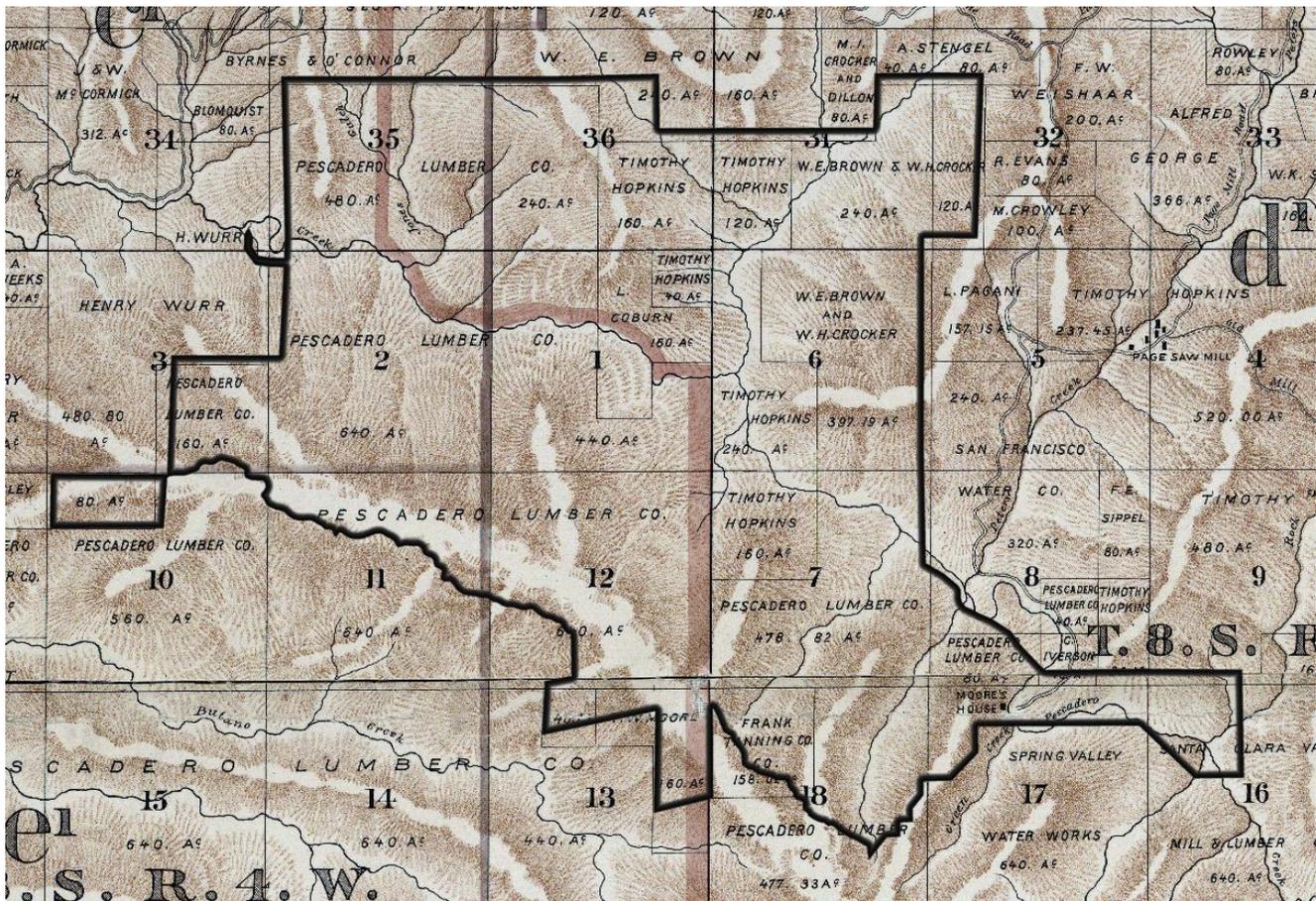
became a state. The Gold Rush brought thousands of immigrants, both foreign and domestic, to California.<sup>84</sup>

During the latter half of the 19<sup>th</sup> century, California saw rapid population growth partially due to the states seemingly endless resources. In 1856, the town of Pescadero was established, however, it wasn’t until the 1890s when excellent trout fishing helped establish it as a booming seaside resort.<sup>85</sup>

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<sup>84</sup><https://www.nps.gov/nr/travel/ca/intro.htm#:~:text=The%20Spanish%20divided%20California%20into,control%20over%20the%20native%20people.>

<sup>85</sup> <https://www.ventureretreat.org/blog/history-pescadero-california>



*Figure 30 Historic 1894 Ownership Pescadero Creek County Park (Bromfield, 1894)*

A historic parcel map of San Mateo County shows that the majority of Pescadero Creek County Park was previously owned by the Pescadero Lumber Co., see Figure 29.

Whether or not the Pescadero Lumber Co. logged any of the area now known as Pescadero Creek County Park (PCCP) is unclear, however, if any logging did occur on these lands prior to 1923 it was relatively low production. It is known that at some point between 1894 and 1923 the portions of Pescadero Lumber Co. within what is now PCCP was acquired by Henry Cowell Estates and was subsequently purchased by George Ley, however, when this transition occurred is unclear.

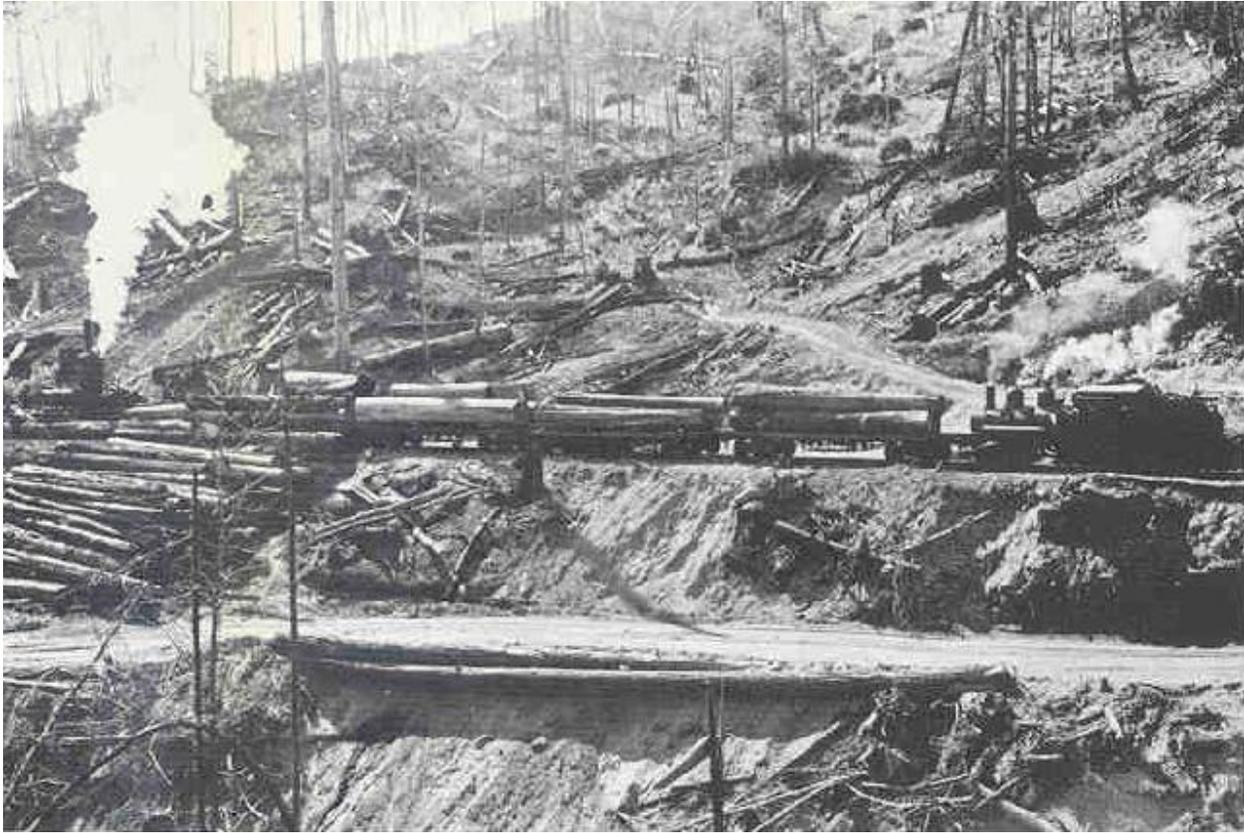
Early logging outfits of the region such as the Western Shore Lumber Company, Santa Cruz Lumber Company, and San Vicente Lumber Company were quick to take to the forests surrounding new towns and settlements and harvest expansive tracts of old growth redwood. See Figures 30, 31, and 32 for historic photos of logging operations along Pescadero Creek.



*Figure 31 Oxen Pulling Split Products*



*Figure 32 Train Moving Logs Along Pescadero Creek on Santa Cruz Lumber Railroad*



*Figure 33 Steam Donkey and Train Working Along Pescadero Creek.*

Within PCCP, logging and milling operations took place primarily on the south side of Pescadero Creek through the mid-1900s. At least two small lumber mills have reportedly operated within park bounds: one located near the confluence of Hoffman and Pescadero Creeks that ran until approximately 1893, and another short-lived tie mill that operated along Tarwater Creek between 1915 and 1916.<sup>86</sup>

The Santa Cruz Lumber Company incorporated in 1923 with George Ley and Hiram Steen as the principal stockholders (Oakland Tribune 1923; Santa Cruz Evening News 1923). Within four months, Steen died of pneumonia, leaving Ley at the company's helm. Initially, the company focused on timber at the headwaters of Pescadero Creek where a mill was constructed at Waterman Gap. Fabing (1978:3) misidentifies the location as "Saratoga Gap" but his map clearly shows the mill location at Waterman Gap. He describes the mill as having a large mill pond and an inclined tramway connecting it to the county road to the east. Of the labor force, Fabing (1978:3) writes, "In the early days 80 to 85 men were employed at the mill and in the woods logging. Most of the men were single, lived-in bunk

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<sup>86</sup> 1983 Natural Resources Management Program for PCCP

houses and ate at the mess hall provided by the company.” Owing to the steepness of the remote canyon, equipment and supplies were brought in by highline or on the incline tram.

As timber surrounding the mill was exhausted, the company acquired additional land on Pescadero Creek, downstream of the Waterman Gap mill and further west into San Mateo County. Highlines and skidways were used to bring logs to the mill until 1930 when three miles of railroad track were laid from the mill to logging areas on Pescadero Creek. The locomotive and five cars were transported across the canyon to the new track by way of a



Figure 34 Santa Cruz Lumber Co. Historic Railroad drawing

highline. The railroad was later extended another three miles down Pescadero Creek, through what is now Pescadero Creek County Park, and was the primary method for moving logs to the mill until 1950 (Figure 33). In 1950, the railroad was abandoned, and the tracks removed. The demise of the railroad was reported in the Santa Cruz Sentinel Sun on December 17, 1950. “The Santa Cruz Lumber company, in its logging operations on Pescadero creek and the Butano, will replace its 42-ton Shay locomotive and seven miles of standard gauge track with huge diesel trucks and private roads” (Rowland 1950). Rowland also noted the evolution of the company’s transport system; Teams of oxen, horses, and mules were replaced by skidways and donkey engines, which were replaced by the railroad, which was then replaced by diesel trucks. The former railroad grade with its gradual incline became the main artery for the logging trucks after 1950.

San Mateo County purchased the land now known as PCCP from the Santa Cruz Lumber Co. in 1968, however, the Santa Cruz Lumber Co. retained logging rights of large trees and

continued to log the property until 1971 (Figure 34)<sup>87</sup>. The county originally planned for the Army Corps of Engineers to construct a 400-foot-high dam blocking Pescadero Creek that would have created a lake containing 60,000-acre feet of water. It was a massive plan that never happened due to opposition of conservationist and anti-development factions who saw the lake as a threat to the rural Coast side. The availability of cheap irrigation and domestic water would, in the view of many, spur agricultural and residential development. The dam and lake plan were abandoned after a series of public hearings which ultimately made way for a new county park instead. With the plans for PCCP changing after the transaction with Santa Cruz Lumber Co. the County wanted to fight to retain as many of the legacy old growth trees as they could. With limited funds, County Parks Director, Ralph Shaw drove through the forest tagging redwood groves he wanted preserved. Each tree had to be purchased individually from the Santa Cruz Lumber Co.

A Boy Scout facility, called Camp Pomponio, was closed in the late 1960's - early 1970's when the area was logged by Santa Cruz Lumber Company. The boy Scouts had developed

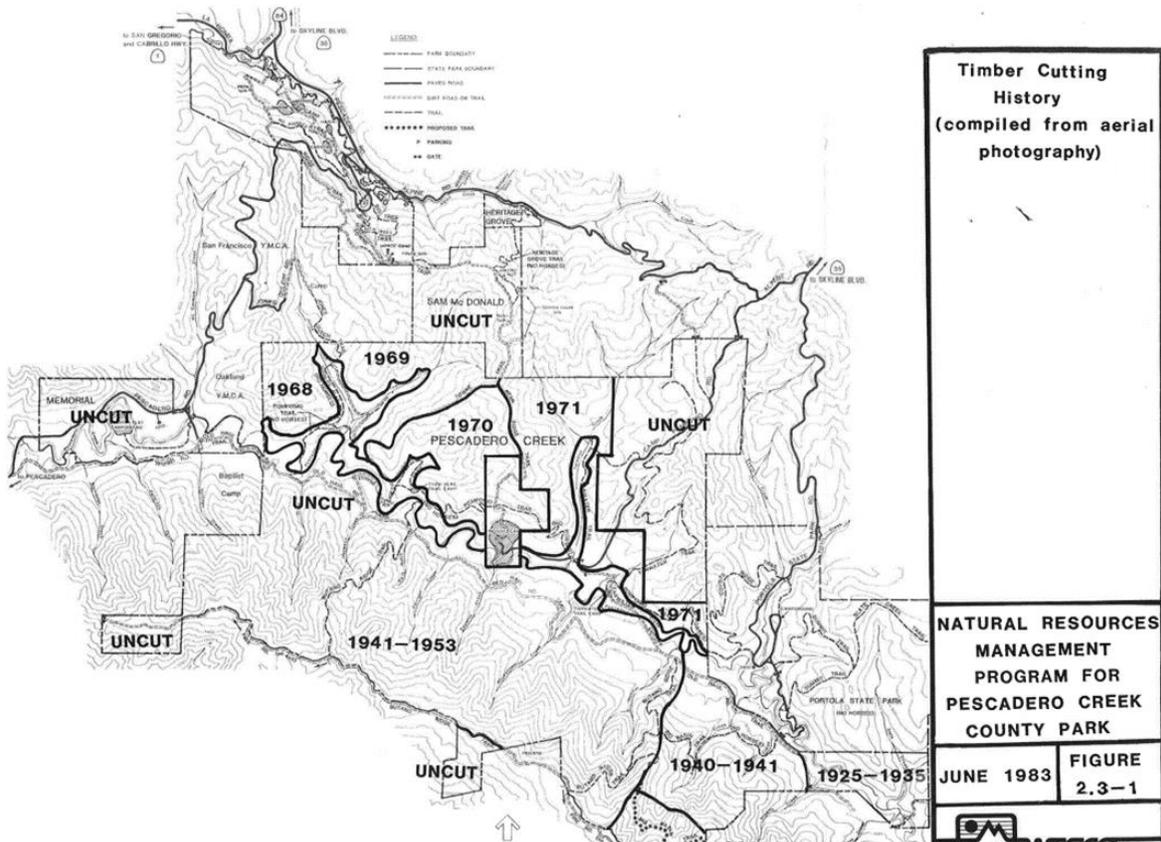


Figure 35 Map of Timber Harvesting History for Pescadero Creek County Park

<sup>87</sup> <https://supportparks.org/parks-map/pescadero-creek-county-park/#:-:text=History,cutting%20rights%20of%20large%20trees.>

many of the trails, some existing logging roads that are still in use today. Camp Pomponio was part of the County's acquisition and became the Men's Correctional Facility operated by the Sheriff's Office and was renamed The Honor Camp.<sup>88</sup> The minimum-security facility housed prisoners who helped clear the land for the lumber company. The Camp's most famous prisoner was Ken Kesey, author of *One Flew Over the Cuckoo's Nest*, who was sentenced to the Honor Camp for six months. He described it as "a health spa with cops". The Honor Camp was closed in 2003 due to budget cutbacks.

### Radial Core Sampling

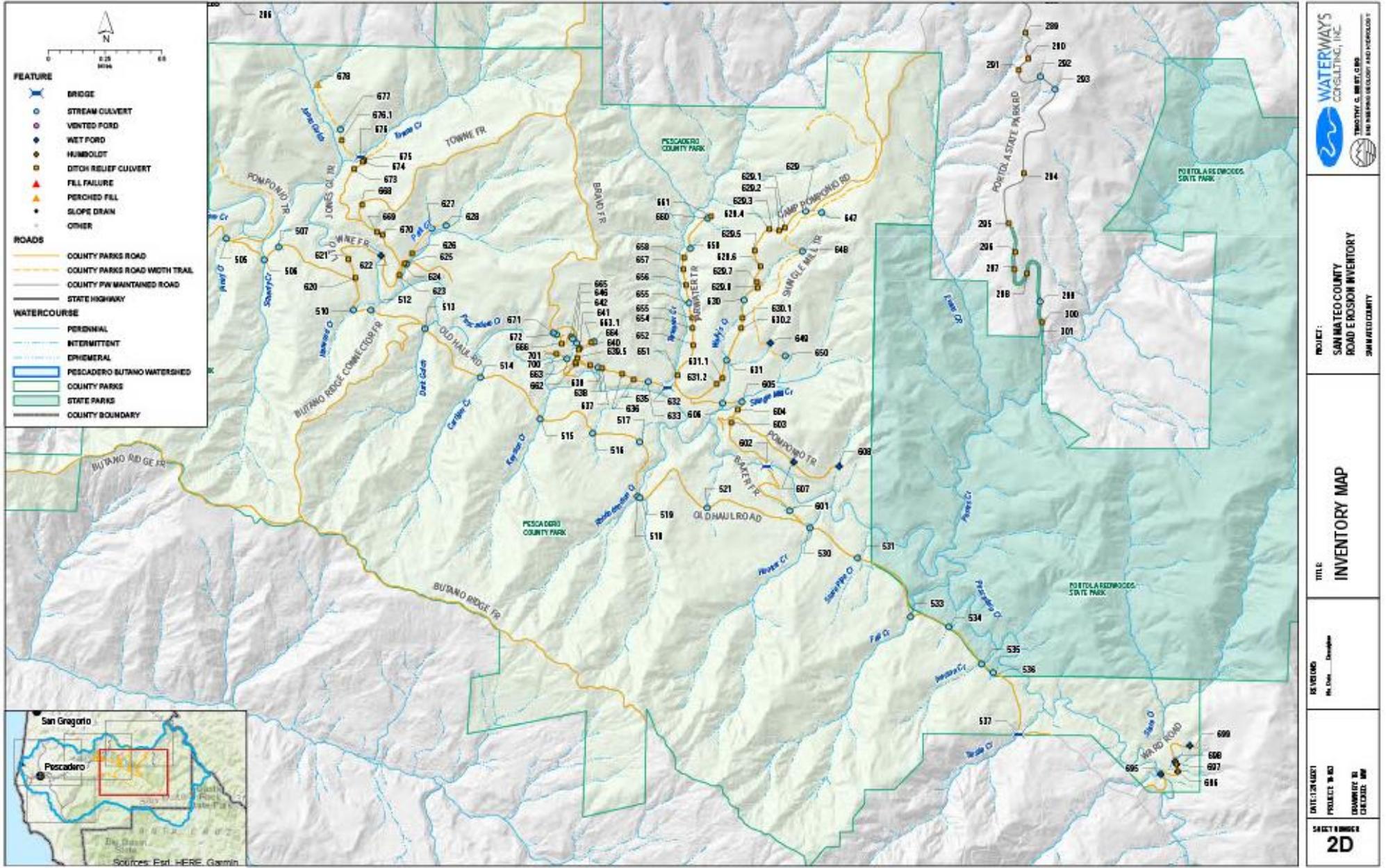
Samples extracted from representative or old growth trees within forest monitoring plots were closely examined for tree or stand age, historic wildfire occurrence, growth rates, history of suppression and stand release, major geologic events, and confirming harvest history. Many of these radial cores, particularly those sampled from the north facing aspects of PCCP below Butano Ridge in areas that experienced clear-cut logging, indicated "release" events based on tree ring dating that showed an abrupt increase in tree volume per year following disturbance factors that produced less competition among residual trees. The concept of "growth release" in trees depends on environmental influences that create more individual growing space and lessen the limitations of available resources and nutrients among a stand. In the Santa Cruz Mountains, wildfire and logging are the key producers of this dynamic.

Many old growth coast redwood stumps can be observed throughout the park that have been left behind from early logging practices. Regenerative, or "second-growth" groves of redwood often occupy the space around cut old growth stumps as a product of the ability of redwood to resprout prolifically following disturbance. Second-growth forests inherently increase the number of trees per acre in previously logged stands as a form of ecological succession. As new growth is recruited, the carrying capacity of the stand limits the amount of above-ground biomass that will ultimately occupy the stand. Generally, wood volume allocated across several large-diameter, well-spaced trees is more resilient to climatic and environmental conditions than if the same amount of volume was made up of many small-diameter trees.

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<sup>88</sup> <https://parks.smcgov.org/pescadero-creek-park-history>

# APPENDIX D: STREAM CROSSINGS AND DESCRIPTIONS



Road Name	Stream Crossing ID*	Description
Old Haul Road	503	18" X 30' CMP AT SMALL EPHEMERAL WATERCOURSE. CROSSING LOCATED WITHIN A LOW GRADIENT COLLUVIAL FILLED VALLEY DRAINING A ~40 ACRE FORESTED WATERSHED. ABOUT 100 FEET UPSTREAM OF THE CROSSING A PRIVATE DIRT ROAD ON AN ADJACENT PROPERTY CROSSES THE LOW GRADIENT VALLEY BOTTOM. IN THIS AREA THE STREAM CHANNEL IS VERY SHALLOW AND ALTHOUGH DRAINING A FAIRLY LARGE BASIN IS SOMEWHAT POORLY DEFINED. DOWNSTREAM OF THE ROAD THE STREAM CHANNEL BECOMES ENTRENCHED 3 FEET DEEP BEFORE REACHING THE CULVERT. THE CULVERT IS CALCULATED AS WELL UNDERSIZED FOR 100 YEAR FLOOD, HOWEVER FIELD OBSERVATIONS INDICATE LIMITED STREAM FLOW. THERE IS A DIVERSION POTENTIAL TO THE LEFT BANK IF THE CULVERT WERE TO PLUG AND OVERTOP. STREAM FLOW WOULD BE DIVERTED ONLY A SHORT DISTANCE DOWN THE ROAD (<150 FEET) AND DISCHARGE ONTO MODERATE GRADIENT GROUND BEFORE DRAINING BACK INTO THE NATIVE WATERCOURSE. THE LIKELIHOOD OF A STREAM DIVERSION TO OCCUR AND THE AMOUNT OF EROSION IS FOUND TO BE LOW.
Old Haul Road	505	48" X 40' HDPE CULVERT AT AN INTERMITTENT STREAM DRAINING A 53 ACRE FORESTED WATERSHED. CULVERT REPLACED IN 2020 AS PART OF THE CZU FIRE. CULVERT IS ADEQUATELY SIZED AND FUNCTIONAL. THE CROSSING SITE IS LOCATED ON A MODERATE GRADIENT ALLUVIAL/COLLUVIAL FILLED VALLEY BOTTOM WITH THE STREAM INCISED ABOUT 3 FEET DEEP. THE ACTIVE CHANNEL IS 2 TO 3 FEET WIDE, SAND AND SILT BEDDED WITH A 10% CHANNEL GRADE. THE CHANNEL BANKS ARE WELL VEGETATED. THE CROSSING VOLUME IS LESS THAN 100 CY WITH FILL LESS THAN 6 FEET DEEP.
Old Haul Road	506	48" X 40' UNDERSIZED AND RUSTED MULTI-PLATE CMP AT SCHENLY CREEK, AN INTERMITTENT WATERCOURSE DRAINING A 282-ACRE FORESTED WATERSHED. THE CROSSING FILL IS CALCULATED AT APPROXIMATELY 610 CY WITH FILL ABOUT 15 FEET DEEP. THE EXISTING PIPE APPEARS TO BE PLACED HIGH IN THE CROSSING FILL WITH AN ADDITIONAL 150 CY OF MATERIAL BACKED UPSTREAM OF THE CROSSING TO MAXIMUM DEPTH OF 5 FEET. AT THE CULVERT INLET IS A CONCRETE AND ROCK CHUTE MEASURING 15 FEET LONG AND 6 FEET WIDE WITH 4-FOOT-HIGH WALLS. THE OUTER EDGE OF THE CROSSING EMBANKMENT IS PARTIALLY SUPPORTED BY A 7-FOOT-HIGH OLD CRIB WALL. A 6-FOOT-HIGH DROP IS FOUND AT THE PIPE OUTLET. DOWNSTREAM OF THE CROSSING IS A LOG JAM AND LWD FROM PAST LOGGING. THE CROSSING WAS MOST LIKELY CONSTRUCTED AS A HUMBOLDT LOG CROSSING WITH ROADBED BUILT UP ON CRIB LOGS. THIS CROSSING MAY HAVE PLUGGED NECESSITATING THE 48-INCH PIPE TO BE INSTALLED AT A LATER DATE. THE CULVERT BOTTOM IS RUSTED WITH PIN HOLES DEVELOPING. THE LOGS THAT COMPRISE THE CRIB WALL ARE IN VARYING DEGREES OF DEGRADATION AND THEIR LONG- TERM STABILITY IS QUESTIONABLE.

Old Haul Road	507	15" X 20' CMP DRAINING ROAD DITCH AND UPSLOPE POST FIRE WATERCOURSE (SWALE). PRIOR TO THE 2020 FIRE THIS CULVERT MAINLY RECEIVED RUNOFF FROM A LONG ROAD DITCH, WHICH WAS CORRECTED IN 2020. BELOW THE CULVERT RUNOFF HAD FLOWED DOWN AN OLD SIDE ROAD FOR OVER 800 FEET RESULTING IN RILLING OF THE ROAD TREAD. POST CZU FIRE WE OBSERVED INCREASED FLOW WITHIN THE SWALE WHICH WOULD NOW BE CLASSIFIED THE SWALE AS A WATERCOURSE. MOST OF THE WATER IS LIKELY FROM SEASONAL SEEPS. POST FIRE ROAD WORK ALSO INADVERTENCY PLUGGED THE DRAINAGE SWALE ABOVE THE CULVERT RESULTING IN THE (NEW) WATERCOURSE TO DISCHARGE ONTO AND BE DIVERTED DOWN THE ROAD FOR ABOUT 150 FEET. LOCAL GULLY OF THE HILLSIDE AND FILL PRISM OBSERVED WHERE WATER ULTIMATELY DISCHARGES OFF OF THE ROAD. THE CHANNEL DISCHARGES ONTO A FLAT AND IT IS UNCERTAIN AS TO HOW MUCH SEDIMENT WOULD ACTUALLY MAKE TO DOWN TO SCHENLY CREEK LOCATED 300 FEET BELOW. WE CONSERVATIVELY ESTIMATE 150 CY OF EROSION WITH 75% SEDIMENT DELIVERY (150X3X1+300X4X3). HIGHER PRIORITY DUE TO LOW COST.
Old Haul Road	510	48" X 80' HDPE STC AT HARWOOD CREEK THAT WAS REPLACED IN 2019. CULVERT IS ADEQUATELY SIZED AND WITHOUT PROBLEMS. CRITICAL DIP ON THE RIGHT BANK SHOULD BE ENLARGED.
Old Haul Road	512	30" X 60' CMP WITH FLARED INLET AT SMALL EPHEMERAL WATERCOURSE DRAINING A 20 ACRE WATERSHED. THE CROSSING VOLUME IS 300 CY WITH FILL 12 FEET DEEP. PIPE DRAINS ONTO CHUNKS OF CONCRETE WITH MINIMAL EROSION. THE OUTER EDGE OF THE CROSSING APPEARS TO HAVE FAILED IN PAST, PROBABLY DUE TO CONCENTRATED ROAD RUNOFF DISCHARGING OVER THE FILL EMBANKMENT. THIS PROBLEM HAS SINCE BEEN CORRECTED. THE CROSSING IS PRESENTLY IN GOOD CONDITION.
Old Haul Road	513	66" X 240' CMP AT DARK GULCH THAT WAS REPLACED IN 2020. CULVERT IS ADEQUATELY SIZED AND WITHOUT PROBLEMS.
Old Haul Road	514	THIS IS A LARGE POTENTIALLY UNSTABLE CRIB LOG CROSSING ON CARRIGER CREEK. THE CROSSING FILL IS GREATER THAN 25,000 CY AND 60 FEET DEEP. ADDITIONAL MATERIAL HAS LIKELY BACKED UPSTREAM OF THE CROSSING. THE UPSTREAM EMBANKMENT FACE IS PARTIALLY SUPPORTED BY 25-FOOT-HIGH STACKED CRIB WALL CONSTRUCTED FROM LARGE- DIAMETER OLD GROWTH CRIB LOGS THAT ARE IN VARYING STATES OF DECAY. THE DOWNSTREAM EMBANKMENT FACE APPEARS UNSTABLE WITH SEVERAL 1- TO 4-FOOT-HIGH NESTED SCARPS OBSERVED ACROSS THE EMBANKMENT FACE. PRESENTLY RUNOFF FLOWS AND PERCOLATES THROUGH SMALL CAVITIES IN THE CROSSING FILL. THERE IS A POTENTIAL FOR SLOW PROGRESSIVE FAILURE OF THE CROSSING AS THE LOGS WITHIN THE CROSSING DEGRADE AND THE CAVITIES WITHIN THE CROSSING COLLAPSE. CATASTROPHIC FAILURE OF THE FILL EMBANKMENT IS POSSIBLE, ESPECIALLY IF THE CROSSING WERE TO PLUG AND ACT AS A DAM. CONTINUED DEGRADATION OF THE CROSSING FILL AND THE FORMATION OF SINKHOLES IF UNDISCOVERED PRESENT A SIGNIFICANT HAZARD TO USERS. THE TREATMENT PRIORITY OF CARRIGER CREEK WAS REDUCED TO MODERATE DUE TO THE RELATIVELY HIGH COST OF REPAIR, UNCERTAINTY OF THE RATE OF FUTURE EROSION, AND BECAUSE WE BELIEVED THAT FUNDS WOULD BE BETTER SPENT ON REPAIRING THE MULTIPLE SMALLER CROSSINGS THAN THIS SINGLE CROSSING.
Old Haul Road	515	60" X 100' HDPE AT KEYSTON CREEK THAT WAS REPLACED IN 2019. CULVERT IS ADEQUATELY SIZED AND WITHOUT PROBLEMS.

Old Haul Road	516	THIS IS A 5-FOOT DIAMETER BY 80-FOOT-LONG CMP AT UNNAMED INTERMITTENT STREAM DRAINING A 51-ACRE FORESTED WATERSHED. THE CULVERTED CROSSING IS LOCATED ABOUT 75 TO 100 FEET UPSTREAM OF THE ORIGINAL RAILROAD CROSSING WITH THE ROAD DROPPING ABOUT 9 FEET IN ELEVATION OFF OF THE OLD RAILROAD GRADE ON ASPHALT PAVEMENT BEFORE CROSSING THE STREAM. OVERALL, THIS CROSSING IS IN POOR CONDITION WITH SEVERAL SIGNIFICANT PROBLEMS. THE ORIGINAL RAILROAD CROSSING APPEARS TO HAVE BEEN HUMBOLDT LOG CROSSING SIMILAR THAT INFILLED OF OVER 220 FEET OF THE STREAM CHANNEL. MUCH OF THE OLD RAILROAD FILL THAT HAD BEEN PLACED AT THE CROSSING HAS EITHER BEEN PARTIALLY REMOVED OR ERODED OUT. THE EXISTING CULVERT INLET APPEARS TO BE LOCATED SLIGHTLY ABOVE NATURAL CHANNEL GRADE; THE CULVERT OUTLET IS LOCATED ON TOP OF AND ADJACENT TO BURIED LOGS FROM THE ORIGINAL RAILROAD CROSSING. WE CALCULATE THERE IS ABOUT 1,680 CY OF FILL PLACED ABOUT 22 FEET DEEP AT THE ROAD CROSSING WITH AN ADDITIONAL 2,140 TO 2,500+ CY OF RESIDUAL RAILROAD FILL FOUND DOWNSTREAM AND ALONG THE LATERAL MARGINS OF THE CROSSING. THE DOWNSTREAM FILL EMBANKMENT IS UNSTABLE AND ACTIVELY ERODING AND FAILING WITH A 2 TO 3-FOOT-HIGH SCARP EXTENDING ACROSS THE EMBANKMENT FACE ABOVE THE CULVERT. THE OUTLET OF THE PIPE IS IMPINGED BY A SLOPE FAILURE COMING OFF OF THE LEFT (WEST) FILL EMBANKMENT OF THE ORIGINAL RAILROAD CROSSING. THIS FAILURE PROTRUDES OUT INTO THE DOWNSTREAM CHANNEL PARTIALLY BLOCKING THE PIPE OUTLET. ROAD RUNOFF HAS ERODED 10'W X 15'L X 4' DEEP GULLY INTO THE FILL EMBANKMENT TO THE RIGHT (EAST) SIDE OF THE PIPE OUTLET FROM ROAD. BELOW THE CULVERT OUTFALL AND EXTENDING ABOUT 150 FEET DOWNSTREAM IS THE REMNANTS OF THE OLD RAILROAD CROSSING WITH THE STREAM CHANNEL INFILLED 10+ FEET DEEP WITH FILL. AT THE PIPE OUTLET AND ERODED INTO THE RESIDUAL RAILROAD CROSSING FILL IS A ~25-FOOT-LONG, 10 DEEP DISCONTINUOUS ACTIVELY ERODING GULLY. WHAT IS INTERESTING IS THAT THE GULLY ENDS ABRUPTLY ENDS AT 10-FOOT-HIGH VERTICAL FACE WITH THE WATERCOURSE DRAINING INTO A SMALL DIAMETER SOIL PIPE. THIS SOIL PIPE IS PROBABLY THE OLD "LOG CULVERT" WHICH MOSTLY PLUGGED WITH SEDIMENT. OUR REVIEW FINDS THERE IS A HIGH POTENTIAL FOR THE CULVERTED CROSSING TO FAIL. IN ADDITION, CHRONIC SLOW EROSION OF THE DOWNSTREAM CHANNEL IS EXPECTED. WE ESTIMATE FUTURE EROSION AT GREATER THAN 3,820 CY. THIS INCLUDES 1,680 CY FROM THE FAILURE OF THE ROAD CROSSING EMBANKMENT AND AN ADDITIONAL 2,140+ CY FROM EROSION OF THE RESIDUAL OLD RAILROAD FILL ALONG THE MARGIN AND DOWNSTREAM OF THE ROAD CROSSING.
Old Haul Road	517	RUSTED 30" X 70' CMP AT A MARGINAL EPHEMERAL WATERCOURSE WITH VERY LOW FLOW. CROSSING FILL IS APPROXIMATELY 350 CY AND UP TO 11 FEET DEEP. BOTTOM OF THE PIPE IS PARTIALLY RUSTED OUT. THE CULVERT IS FUNCTIONAL BUT THE PIPE IS STARTING TO DEGRADE WITH THE AMOUNT OF RUST HAVING INCREASED IN SIZE SINCE 2015. DISCHARGES ONTO FLAT GROUND, THEREFORE ULTIMATELY ONLY 50% SEDIMENT DELIVERY.

Old Haul Road	518	60 INCHES BY 40 FOOT CMP LOCATED ON THE MAINSTEM OF RHODODENDRON CREEK. THE CULVERT APPEARS TO HAVE BEEN PLACED AT OR NEAR STREAM GRADE, IS ADEQUATELY SIZED AND IS CURRENTLY FUNCTIONAL. DOWNSTREAM OF THE CROSSING RHODODENDRON CREEK APPEARS HEAVILY IMPACTED FROM PAST ROAD CONSTRUCTION AND LOGGING ACTIVITIES RESULTING IN ABUNDANT FILL AND LOGS. THE STREAM PARALLELS THE ROAD FOR SEVERAL HUNDRED FEET AND IS WELL INCISED WITH STEEP ACTIVELY ERODING AND UNSTABLE BANKS. SOME OF THIS EROSION IS ATTRIBUTED TO INCREASED STREAM FLOW FROM THE DIVERTED TRIBUTARY DRAINING INTO THE CHANNEL FROM THE ADJACENT 24 INCH CULVERT. SOME BENEFIT MAY BE ACHIEVED BY PULLING BACK PERCHED AND UNSTABLE FILL AT SELECT LOCATIONS, THOUGH CARE SHOULD BE MADE NOT TO OVERLY DISRUPT THE SITE. ADDITIONAL WORK WILL BE REQUIRED TO IDENTIFY THESE SITES.
Old Haul Road	519	THIS IS AN UNDERSIZED 24 INCH BY 30 FOOT CMP DRAINING A 133 ACRE FORESTED TRIBUTARY TO RHODODENDRON CREEK. THIS STREAM IS INTENTIONALLY DIVERTED 100 FEET TO THE LEFT (WEST) IN A SHALLOW 2' DEEP DITCH ABOVE THE ROAD BEFORE DRAINING THROUGH THE 24" CULVERT AND INTO THE MAINSTEM OF RHODODENDRON CREEK. THE DIVERSION WAS PRESUMABLY MADE TO FACILITATE THE CONSTRUCTION OF A LARGE LANDING BELOW THE ROAD. CONSTRUCTION OF THE LANDING RESULTED IN THE INFILLING OF OVER 200 FEET OF STREAM CHANNEL. THE DEPTH OF FILL IS UNKNOWN BUT LIKELY EXCEEDS 20 FEET. MUCH OF THE FILL MATERIAL WAS GENERATED FROM THE CONSTRUCTION OF A DEEP THROUGH CUT LOCATED IMMEDIATELY TO THE EAST WHERE THE RAILROAD CUTS THROUGH A SPUR RIDGE. THE OLD AND NOW ABANDONED TRIBUTARY CHANNEL IS FOUND BELOW THE LANDING ABOUT 200 FEET FROM WHERE THE STREAM WAS DIVERTED. THIS CHANNEL STILL FLOWS WITH WATER COMING FROM SEEPS. THE NATURAL CONFLUENCE OF THE TRIBUTARY AND RHODODENDRON CREEK IS LOCATED ABOUT 500+ FEET FURTHER DOWNSTREAM. THE CROSSING HAS LIKELY OVERTOPPED IN THE PAST WITH THE STREAM DIVERTED 150 FEET TO THE RIGHT (EAST) WHERE IT CONTRIBUTED TO A GULLY ERODED THROUGH THE CROSSING FILL. THERE ARE TWO SIGNIFICANT PROBLEMS ASSOCIATED WITH THE 24 INCH CULVERT. FIRST, THE DIVERTED STREAM RESULTS IN A 70% INCREASE IN STREAM FLOW IN MAINSTEM OF RHODODENDRON CREEK CONTRIBUTING TO EROSION AND INSTABILITY WITHIN THE CHANNEL. HOW SIGNIFICANT THIS IS REQUIRES FURTHER EVALUATION. SECOND, THE DITCH AND 24 INCH CULVERT ARE WELL UNDERSIZED WITH A HIGH POTENTIAL FOR OVERTOPPING AND FAILURE. FAILURE COULD RESULT IN A FUTURE STREAM DIVERSION TO THE EAST RESULTING IN RENEWED GULLYING OF THE FILL EMBANKMENT. WE ESTIMATE 450 CY OF FUTURE EROSION IF THE STREAM IS DIVERTED (300X8X5)

Old Haul Road	521	36" X 70' CULVERT WITH FLARED INLET AT AN EPHEMERAL WATERCOURSE DRAINING A 44 ACRE WATERSHED. THOUGH CALCULATED AS UNDERSIZED FIELD OBSERVATIONS SUGGESTS LOW FLOW. THE CROSSING VOLUME IS ABOUT 1050 CY WITH FILL ABOUT 18 FEET DEEP. STREAM IS STABLE AND NO EROSION NOTED. THE BOTTOM OF THE CULVERT IS STARTING TO RUST OUT AND HAS SHOWN CONTINUED DEGRADATION BETWEEN 2014 AND 2020. PIPE IS 25% PLUGGED WITH SEDIMENT. PLUGGED POTENTIAL REDUCED DUE TO LOW EXPECTED FLOWS. CONTINUED DEGRADATION NECESSITATES REPLACEMENT.
Old Haul Road	530	HOOKER CREEK: 48" X 60' RUSTED CMP WITH FLARED INLET. THE CULVERT APPEARS TO HAVE BEEN INSTALLED ON TOP OF THE ORIGINAL HUMBOLDT LOG CROSSING FOR THE RAILROAD. CROSSING VOLUME IS GREATER THAN 1100 CY WITH FILL 20 FEET THICK. ADDITIONAL MATERIAL BACK UPSTREAM OF THE INLET. CULVERT BOTTOM IS RUSTED BUT STILL FUNCTIONAL. PIPE IS WELL UNDERSIZED FOR 100 YEAR FLOW. ACTIVE EROSION AND INSTABILITY OBSERVED DOWNSTREAM WHERE THE STREAM GRADIENT NATURALLY INCREASED. MUCH OF THE EROSION IS ASSOCIATED WITH THE ORIGINAL HUMBOLDT CROSSING ERODING OUT.
Old Haul Road	531	48" X 60' RUSTED OUT AND UNDERSIZED CMP STC AT STOVEPIPE CREEK AND OFFSET ABOUT 100 FEET FROM THE NATIVE CHANNEL. SITE IS LOCATED AT EDGE OF BENCH WHICH SLOPE GRADIENTS STEEPEN BELOW THE ROAD. IN THIS AREA SEVERAL HUNDRED FEET OF THE RAILROAD GRADE WAS BEEN BUILT UP 10 VERTICAL FEET ON A FILL EMBANKMENT (CAUSEWAY) PROBABLY TO ELEVATED THE ROAD ABOVE WHAT APPEARS TO BE SEASONALLY WET GROUND. AS A RESULT, THE FILL EMBANKMENT EFFECTIVELY BLOCKED STREAM FLOW. THE 48 INCH CULVERT WAS INSTALLED AT THE WESTERN END OF THE EMBANKMENT AND OFFSET ABOUT 100 FEET FROM THE NATURAL CHANNEL. AS A RESULT OF THIS DIVERSION A DEEP ACTIVE GULLY HAS FORMED BELOW THE PIPE OUTFALL WITH STEEP UNSTABLE CHANNEL BANKS. CONTINUED EROSION IS EXPECTED. THE BOTTOM OF THE EXISTING 48 INCH CULVERT IS RUSTED OUT BUT WITHOUT EROSION. PIPE APPEARS PARTIALLY PLUGGED WITH SEDIMENT. CROSSING VOLUME IS ESTIMATED AT 380 CY WITH FILL 12 FEET DEEP. ESTIMATE 750 CY OF FUTURE EROSION IF LEFT UNTREATED (300 OF CROSSING FILL AND 450 OF CONTINUED DOWNSTREAM CHANNEL BANK EROSION (300'L X 20'H X 1' BANK EROSION X 2 EACH SIDE).
Old Haul Road	533	FALL CREEK: 48" X 60' CMP AT AN INTERMITTENT STREAM AND UPSTREAM OF OLD WASHED-OUT RAILROAD CROSSING. CULVERT IS PLACED HIGH IN FILL AND DISCHARGES ONTO SHORT CONCRETE APRON WITH 3-FOOT-HIGH KNICK POINT. THE CROSSING VOLUME IS ABOUT 1,100 CY WITH FILL 17 FEET DEEP. AN ADDITIONAL 50+ CY OF MATERIAL BACK UPSTREAM. CROSSING VOLUME IS APPROXIMATE AND A SUBSURFACE INVESTIGATION WILL BE REQUIRED TO CONFIRM. LARGE WOODY DEBRIS AND ADDITIONAL FILL MATERIAL FROM THE OLD RAILROAD CROSSING FOUND DOWNSTREAM OF THE CROSSING WITH THE CHANNEL ERODED THROUGH OLD FILL WITH STEEP CHANNEL BANKS. SEVERAL CRIB LOGS PARTIALLY SUPPORT THE ROAD. THE CULVERT DRAINS A 300 ACRE FORESTED WATERSHED WITH THE PIPE WELL UNDERSIZED FOR 100-YEAR DISCHARGE EVENT. PIPE DOES NOT APPEAR TO BE SIGNIFICANTLY DEGRADED AND IS NOT PLUGGED. THE CULVERT IS JUDGED TO HAVE A MODERATE PLUG POTENTIAL DUE TO BEING UNDERSIZED.
Old Haul Road	534	24" X 30' HDPE CULVERT AT SHALLOW SMALL EPHEMERAL WATERCOURSE DRAINING A 23 ACRE WATERSHED. CROSSING IS LOCATED ON ACTIVE DOWN DROPPED DEEP-SEATED LANDSLIDE WITH ABOUT 200 LF OF THE ROAD PRISM HAVING DOWNDROPPED 11 FEET VERTICAL FEET. THE ROAD CURRENTLY DROPS STEEPLY DOWN ACROSS THE SLIDE BLOCK. UPSTREAM CHANNEL IS SHALLOW, DOWNSTREAM CHANNEL BECOMES MORE INCISED. SLIDE ACTIVITY IS MOST LIKELY NATURAL AND NOT RELATED TO THE ROAD. ONGOING DEEP- SEATED LANDSLIDE INSTABILITY IS EXPECTED RESULTING IN PERIODIC DAMAGE TO THE ROAD REQUIRING ONGOING MAINTENANCE. THE CROSSING CONSISTS OF ABOUT 60 CY OF FILL UP TO 6.5 FEET DEEP. THE CULVERT CALCULATES AS BEING UNDERSIZED FOR 100 YEAR STORM EVENT BUT APPEARS REASONABLY SIZED BASED ON FIELD OBSERVATIONS.

Old Haul Road	535	5' X 50' CMP WITH STACKED CONCRETE INLET HEADWALL AND SHOTGUNNED (4 FT) OUTLET. CROSSING IS LOCATED ON AN INCISED WATERCOURSE WITH STEEP CHANNEL BANKS. SMALL RUSTED PINHOLES DEVELOPING MID PIPE. PIPE APPEARS WELL ALIGNED BUT SIMPLY DEGRADING. CROSSING CONSISTS OF 630 CY OF FILL 17 FEET DEEP. THE CULVERT IS FUNCTIONAL BUT WILL NEED TO EVENTUALLY BE REPLACED. HIGHER PRIORITY BECAUSE OF LARGE CROSSING VOLUME.
Old Haul Road	536	24" X 40' RUSTED CMP SMALL INCISED EPHEMERAL WATERCOURSE. ORIGINAL RAILROAD CROSSING APPEARS TO HAVE BEEN BUILT UP ON A THICK FILL EMBANKMENT ESTIMATED TO CONSIST OF 800 CY OF FILL PLACED 15 FEET DEEP, THOUGH THERE IS SOME UNCERTAINTY ON THIS. EXPLORATORY DRILLING WOULD CONFIRM FILL DEPTH. CURRENT CULVERT PLACED HIGH IN CROSSING WITH SEDIMENT APPEARING TO HAVE BACKED UPSTREAM. BOTTOM OF CULVERT IS COMPLETELY RUSTED OUT AND OUTLET IS STARTING TO ERODE. FILL EMBANKMENT IS OVERSTEEPENED. CONTINUED DEGRADATION OF THIS CULVERT COULD RESULT IN COLLAPSE AND POSSIBLE FILL INSTABILITY. WE ESTIMATE THAT A FUTURE FAILURE AT THIS SITE COULD MOBILIZE IN EXCESS OF 400 CY OF MATERIAL.
Old Haul Road	537	BRIDGE OVER TRESTLE CREEK, REPLACED DURING THE 2020 CZU FIRE
Baker Fire Road	601	30" X 30' RUSTED CMP WITH RSP HEADWALL DRAINING LOW GRADIENT EPHEMERAL STREAM WITH VERY LOW FLOW (SPILLWAY TO LAKE KENNEDY?). CROSSING CONSISTS OF 80+ CY OF FILL ABOUT 6.5 FEET DEEP. GROUND APPEARS SEASONALLY WET. BOTTOM OF THE PIPE IS TOTALLY RUSTED OUT. CULVERT IS UNDERSIZED FOR DESIGN FLOW. UPSTREAM IS LOW GRADIENT AND POSSIBLY AGGRADED STREAM CHANNEL, DOWNSTREAM THE WATERCOURSE BECOME MORE INCISED WITH DEEP GULLY. ABOUT 950 FEET OF ROAD PRISM DRAINS TO THE CROSSING. THE RB DRAINS THROUGH A THRU CUT AND IS NOT CORRECTABLE. THE RIGHT BANK IS FLAT AND SHEETS OFF WITH LITTLE EROSION. ROAD PRISM IS ROCKED.
Baker Fire	602	BAKER BRIDGE OVER PESCADERO CREEK. LB. ROAD APPROACH IS POORLY DRAINED FOR 400 FEET DISCHARGING ONTO A FLAT ADJACENT TO BRIDGE (75% SD). BEST TO ADD 1 DITCH RELIEF CULVERT TO BREAK UP DRAINAGE. RB CLIMBS AT STEEP GRADE FOR 500 FEET WITH WELL VEGETATED CUT AND IBD, AND APPARENT LOW EROSION. UP PORTION OF THIS REACH IS IN THRU CUT. THIS SEGMENT OF ROAD WILL BE DIFFICULT TO DRAIN DUE TO STEEP GRADE, STEEP SLOPES BELOW THE ROAD, AND THRU CUT, AND THEREFORE IS NOT RECOMMENDED. IN 2020 A LARGE TREE FELL ON THE BRIDGE NECESSITATING BRIDGE REPLACEMENT.
Baker Fire Road	603	12" X 20' RUSTED CMP DRAINING POSSIBLE WET AREA. THE BOTTOM OF THE PIPE IS TOTALLY RUSTED OUT AND NEEDS TO BE REPLACED. DRAINS INTO DRY SWALE WITHOUT EROSION
Baker Fire Road	604	12" X 20' RUSTED OUT CMP DRC DRAINING 150 FEET OF ROAD. PROBABLE SEDIMENT DELIVERY TO STREAM.
Baker Fire Road	605	DOUBLE 48" X 20' HDPE CULVERTS AT CONFLUENCE OF 2 WATERCOURSES, WHICH EACH DRAINING A SEPARATE WATERCOURSE. PIPE APPEARS FUNCTIONAL WITH NO PROBLEMS OBSERVED. SHALLOW FILL PRISM SO LITTLE EROSION IF OVERTOPS. 350 FEET OF ROAD DRAINS TO CROSSING BUT MOSTLY SHEET FLOWS ACROSS VEGETATED GROUND WITH LITTLE SEDIMENT DELIVERY
Baker Fire Road	606	A 60" CMP WITH ROCK HEADWALL AT PERENNIAL LOW GRADIENT TO FLAT PERENNIAL STREAM. PIPE IS RUSTED BUT NO HOLES OBSERVED. CULVERT IS FUNCTIONAL WITH NO OBVIOUS PAST PROBLEMS. CROSSING VOLUME IS 260 CY WITH FILL 13 FEET DEEP. BOTH ROAD APPROACHES ARE WELL DRAINED

Pomponio Trail Road	607	EARTH FORD AT SMALL EPHEMERAL STREAM THAT APPEARS TO HAVE BEEN RECENTLY INFILLED AS PART OF CZU FIRE ACCESS. THE STREAM DRAINS ONTO THE ROAD WHERE IT FORMS A SMALL FAN. BELOW THE ROAD THE STREAM IS SOMEWHAT INCISED. THERE IS A DIVERSION POTENTIAL DOWN THE ROAD FOR 800 FEET WHERE RUNOFF WOULD EVENTUALLY DISCHARGE ONTO MODERATE GRADIENT GROUND. BECAUSE OF THE SMALL SIZE OF THIS WATERCOURSE IT IS MOST LIKELY THAT EROSION OF THE DITCH WOULD BE FAIRLY SMALL AND MORE THAN LIKELY WOULD SPREAD OUT ON MODERATE GRADIENT GROUND WITHOUT SEDIMENT DELIVERY. HIGHER TREATMENT PRIORITY DUE TO EASE OF UPGRADE.
Pomponio Trail Road	608	EARTH FORD AT LOW GRADIENT EPHEMERAL STREAM. ROAD SIMPLY DIPS THROUGH BOARD VALLEY BOTTOM WITH LITTLE FILL. NO EROSION OBSERVED. COULD BE SEASONALLY WET.
Lower Towne Fire Road	620	15" X 50' CMP DRC LOCATED ABOUT 120 FEET FROM THE INTERSECTION WITH OLD HAUL ROAD (OHR). THE CULVERT INLET AND OUTLET ARE PARTIALLY PLUGGED WITH SEDIMENT AND NEED TO BE CLEANED. HISTORICALLY, THIS CULVERT HAD RECEIVED CONSIDERABLE RUNOFF FROM OHR RESULTING IN THE DEPOSITION OF SEDIMENT ALONG THE INBOARD ROAD SHOULDER ABOVE THE CULVERT INLET AND THE FORMATION OF A 75'L X 6-10'W X 3- 10'D GULLY AT THE OUTLET. THE GULLY DISCHARGES ONTO A FLAT BENCH WHICH INTERCEPTED SEDIMENT AND WITH NO CLEARLY DEFINED FLOW PATH BEYOND. IT IS QUESTIONABLE IF THE GULLY WOULD HISTORICALLY BEEN CLASSIFIED AS A WATERCOURSE. REGARDLESS, DRAINAGE ON OHR WAS UPGRADED IN 2020 RESULTING IN GREATLY DIMINISHED FLOWS REACHING THE CULVERT. UNDER THE CURRENT CONDITION OF REDUCED FLOWS AND THE FACT THAT THERE IS NO DEFINED CHANNEL ACROSS THE FLAT DRAINAGE IS NOT CURRENTLY CONSIDERED A WATERCOURSE.
Lower Towne Fire Road	621	POSSIBLE OLD LOG CULVERT CONSISTING OF ROTTEN 18" LOG PLACED PERPENDICULAR TO THE ROAD. THE CULVERT DOES NOT APPEAR TO BE FUNCTIONAL. THE MAIN CONCERN IS CONTINUED DECAY OF THE LOG MAY RESULT IN SMALL SINKHOLE FORMING ON THE ROAD. THIS CAN BE CORRECTED BY REMOVING THE LOG. IF THE LOG IS REMOVED THEN A NEW CULVERT SHOULD BE INSTALLED.
Lower Towne Fire Road	622	WET FORD CROSSING ON PESCADERO CREEK DRAINING 500' RB AND 700' LB. ROAD CROSSES THE STREAM ON UNIMPROVED GRAVEL BAR, WHICH GENERALLY APPEARS STABLE. BOTH ROAD APPROACHES ARE POORLY DRAINED AND SHOULD BE IMPROVED BY INSTALLING NEW ROLLING DIPS AND ROCKING 100+ FEET OF ROAD TO EITHER SIDE USING 4" MINUS ROCK.
Lower Towne Fire Road	623	PLUGGED AND RUSTED OUT 15"X20' CMP DRC DRAINING 400 FT OF ROAD. AN OLD 70'LX4'WX3'D GULLY HAS ERODED INTO THE HILLSIDE AT OUTLET, DISCHARGING INTO A WATERCOURSE. THE GULLY APPEARS OLD AND CURRENT EROSION APPEARS TO BE MUCH LOWER. THERE ARE SEVERAL SMALL AND MOSTLY BROKEN-DOWN DIPS ON THE ROAD THAT LIKELY REDUCED THE AMOUNT OF WATER TO THIS DRC. A SMALL DIP IS LOCATED JUST PAST THE CULVERT WHICH CURRENTLY DRAINS THE ROAD WITHOUT SIGNIFICANT EROSION AT THE OUTLET. THE PIPE IS NOT REQUIRED PROVIDED DRAIN DIPS ARE INSTALLED.
Lower Towne Fire Road	624	18" X 40' CMP DRC DRAINING 50 FEET OF ROAD AND SEVERAL HUNDRED FEET OF ROAD WIDTH TRAIL (UPPER SHAW TRAIL). THE CULVERT HAS SOME RUST BUT NO HOLES. PIPE DISCHARGES ONTO STEEP CHANNEL BANK WITH 5 FEET DROP BUT WITHOUT PROBLEMS. IBD DRAINING TO THE CULVERT COULD BE IMPROVED TO FACILITATE DRAINAGE.

Lower Towne Fire Road	625	48" X 60 CMP STC W/ FLAIR INLET AT INTERMITTENT STREAM DRAINING A 275 ACRE FORESTED WATERSHED. THE CROSSING CONSISTS OF 730 CY OF FILL PLACED 17 FEET DEEP. THE CULVERT APPEARS WELL INSTALLED AT NATIVE CHANNEL GRADE. PIPE SHOWS RUST BUT NO RUST HOLES PRESENT. IN THE FIELD THE CULVERT APPEARS WELL SIZED FOR THE STREAM CHANNEL THOUGH CALCULATES AS BEING ABLE TO CARRY ONLY 35% OF THE EXPECTED 100-YEAR DISCHARGE AT A 0.9HW/D. AT A HW/D =3 (WATER BACKED UP TO TOP OF ROAD) THE CROSSING COULD HANDLE THE ESTIMATED 100 YEAR DISCHARGE. ADDITIONAL REVIEW WILL BE REQUIRED TO FURTHER EVALUATE CROSSING CAPACITY AT THIS SITE. THERE IS A DIVERSION POTENTIAL TO THE RIGHT BANK WHICH CAN EASILY BE CORRECTED. ABOUT 200 FEET OF THE RIGHT BANK ROAD APPROACH IS HYDROLOGICALLY CONNECTED. PWA (2003) REPORTS THE CULVERT TO HAVE BEEN RECENTLY INSTALLED. TREATMENT PRIORITY REDUCED TO MODERATE.
Parke Gulch Trail	626	12"X40' CMP STC (?)/DRC DRAINING WHAT APPEARS TO BE A SMALL SEASONAL WET AREA ABOVE THE ROAD INFREQUENT SEASONAL RUNOFF EMERGES FROM THE BASE OF THE TREE OF A LARGE LEANING TREE, LOCATED ABOUT 150 FEET LATERAL AND UPSLOPE FROM THE CULVERT, WHERE IT HAS FORMED A DEFINED CHANNEL. RUNOFF THEN DRAINS INTO THE SHALLOW IBD AND DOWN THE ROAD FOR APPROXIMATELY 100 FEET TO THE STC. AN OLD GULLY HAS FORMED AT THE PIPE OUTLET FROM THE COMBINATION OF FLOW FROM THE WET AREA AND ROAD DRAINAGE. INSTALLATION OF DIPS (NOW UNDERSIZED AND INFILLED) HAD REDUCED THE AMOUNT OF WATER REACHING THE CULVERT AND THEREFORE REDUCING THE AMOUNT OF ACTIVE EROSION BELOW THE PIPE. OVERALL, THE EROSION PROBLEM AT THIS SITE IS MINOR AND CAN EASILY BE CORRECTED BY ADDING ADDITIONAL DRAINAGE DIPS.
Parke Gulch Trail	627	30"X40' HDPE STC DRAINING INTERMITTENT WATERCOURSE. THE CROSSING CONSISTS OF ABOUT 25 CY OF FILL ABOUT 5 FEET DEEP. THE CULVERT WAS PLACED NEARLY FLAT WITH A CONVEX (CONCAVE UP) PROFILE THAT COULD, IN A WORST-CASE SCENARIO, LEAD TO PLUGGING. THE PIPE CALCULATED AT 70% OF THE 100-YEAR DISCHARGE. DUE TO THE RELATIVELY SMALL VOLUME OF FILL AT THE CROSSING, EXISTENCE OF A CRITICAL DIP, AND REASONABLY SIZED PIPE, REPLACEMENT OF THE CULVERT IS NOT WARRANTED AT THIS TIME.
Parke Gulch Trail	628	18"X20' RUSTED CMP INSTALLED AS A DRC BUT DRAINING AN INTERMITTENT STREAM. THE SITE IS LOCATED ON AN OLD LOGGING ROAD THAT TERMINATES AT AN OLD INSTREAM LANDING LOCATED ON THE FLAT VALLEY BOTTOM. THE GROUND IN THIS AREA APPEARS TO HAVE BEEN DISTURBED BY HISTORIC TRACTOR LOGGING OPERATIONS. THE INTERMITTENT STREAM, DRAINING A 100 ACRE FORESTED WATERSHED, IS DIVERTED AROUND THE BACK EDGE OF THE LANDING AND DOWN THE ROAD FOR 250 FEET ERODING AN AVG 5'W X 2'D (90 CY) GULLY BEFORE REACHING THE CULVERT. THE GULLY BANKS ARE NEAR VERTICAL AND SHOW SIGNS OF ACTIVE BUT SLOW EROSION. THE CULVERT BOTTOM IS PARTIALLY RUSTED OUT. THE CULVERT IS WELL UNDERSIZED AND APPEARS TO OVERTOP FREQUENTLY RESULTING IN THE STREAM BEING PERIODICALLY DIVERTED AN ADDITIONAL 50 FEET, ERODING A SMALL (5 CY) INTO THE OUTER EDGE OF THE ROAD (TRAIL). BOTH THE CULVERT AND DIVERTED STREAM DISCHARGE ONTO FLAT GROUND WHERE FLOW TENDS TO DISPERSE AND A WELL-DEFINED CHANNEL IS ABSENT. CONTINUED SLOW AND INFREQUENT EROSION IS LIKELY TO OCCUR, MAINLY ALONG THE PORTION OF THE INCISED CHANNEL PARALLELING THE ROAD. ESTIMATE FUTURE EROSION OF 250'LX2'H'X1'W = 18 CY ALONG DIVERSION AND 5 CY AT DISCHARGE POINT. MUCH OF THIS MATERIAL WILL LIKELY SETTLE OUT ON THE FLAT GROUND. NO SIGNIFICANT CHANGE OBSERVED IN THE SITE SINCE PWA'S REVIEW. DUE TO LOW RATE OF EROSION THE TREATMENT PRIORITY IS LOW TO MODERATE

Camp Pomponio Road	629	24" X 80' HDPE CULVERT DRAINS 250' OF IBD AND EPHEMERAL WATERCOURSE. THE SITE IS LOCATED WHERE THE ROAD WAS CONSTRUCTED ACROSS THE BACK EDGE OF AN OLD LANDSLIDE BENCH WITH THE GROUND LIKELY BEING SEASONALLY WET. UPSLOPE OF THE BENCH IS A DEFINED DRAINAGE THAT PRIOR TO ROAD CONSTRUCTION DISCHARGED ONTO THE BENCH WHERE FLOW BECAME DISPERSED. THE ROAD WAS CONSTRUCTED ACROSS THE BACK EDGE OF THE BENCH WITH A DEEP IBD AND BERM, PROBABLY TO CAPTURE BANK SEEPS TO KEEP THE ROAD TREAD DRY. RUNOFF WAS THEN CONVEYED IN THE IBD FOR ~500 FEET AND AROUND THE CORNER OF A BROAD RIDGE TO A 15"/18" CMP DRC (NOW PLUGGED). AN OLD ERODED AND VEGETATED CHANNEL EXISTS BELOW THIS NOW NON- FUNCTIONAL PIPE. AT SOME LATER DATE THE 24" PIPE WAS INSTALLED WHICH NOW DISCHARGES ON THE NOSE OF THE BROAD RIDGE WITH NO OBSERVED EROSION AND ONLY VERY LIMITED EVIDENCE OF PAST FLOW. CURRENTLY THE SITE IS FUNCTIONAL. THE MAIN CONCERN IS WHETHER OR NOT EROSION WITH SEDIMENT DELIVERY WILL OCCUR AT THE OUTFALL OF THE NEW CULVERT. WE BELIEVE THERE IS A LOW LIKELIHOOD OF THIS TO OCCUR GIVEN LOW DISCHARGE VOLUMES AND LOW GRADIENT GROUND AT THE PIPE OUTLET. IN ADDITION, WE DID NOT FIND A BETTER LOCATION TO DISCHARGE RUNOFF DURING EITHER OUR FIELD RECONNAISSANCE OR REVIEW OF LIDAR DATA. CULVERT APPEARS TO HAVE BEEN INSTALLED PER PWA 2003 RECOMMENDATIONS.
Camp Pomponio Road	629.1	REVIEW INCOMPLETE
Camp Pomponio Road	629.2	REVIEW INCOMPLETE
Camp Pomponio Road	629.3	5' X 2' "PUNCHEON" DRAINS SEASONALY WET IBD. VERY LITTLE FLOW. CONSISTS OF 12 TO 14 RAILROAD RAILS WITH METAL DECK. FUNCTIONAL
Camp Pomponio Road	629.4	REVIEW INCOMPLETE
Camp Pomponio Road	629.5	REVIEW INCOMPLETE
Camp Pomponio Road	629.6	REVIEW INCOMPLETE
Camp Pomponio Road	629.7	REVIEW INCOMPLETE
Camp Pomponio Road	629.8	REVIEW INCOMPLETE

Camp Pomponio Road	630	36" X 100' HDPE AT INTERMITTENT STREAM. PAVED ROAD EXTENDS UP THE VALLEY BOTTOM WITHIN OR IMMEDIATELY ADJACENT TO THE SHALLOW WATERCOURSE WITH THE ROAD CONSTRUCTED NEAR NATIVE GRADE. THE ROAD CROSSES THE WATERCOURSE AT AN OBLIQUE ANGLE REQUIRING THE LONG PIPE. TO INSTALL THE CULVERT A 100 FOOT LONG, 5+/- FOOT WIDE 5+/- FOOT DEEP TRENCH WAS EXCAVATED ACROSS THE ROAD WITH AN ADDITIONAL EXTENDING 60+ FEET UPSTREAM. A 100-FOOT-LONG CULVERT WAS INSTALLED AND THE ROAD REPAVED. THE UPSTREAM TRENCH PROBABLY INTENDED TO HAVE A CULVERT INSTALLED AS WELL, AS THERE IS 40 FEET OF UNUSED PIPE ON THE GROUND. PRESENTLY UPSTREAM EXCAVATED TRENCH WALLS ARE 5 TO 6 FEET HIGH, NEAR VERTICAL AND ACTIVELY ERODING/FAILING WITH FAILURE ENCROACHING TO THE EDGE OF THE ROADWAY. THERE IS ALSO A SOME HEAD CUTTING AT THE HEAD OF THE TRENCH. OVERALL, IT APPEARS THE REPAIR AT THIS SITE WAS NEVER FULLY COMPLETED. PRIOR TO INSTALLING THE 36" CULVERT, STREAM FLOW WAS DIRECTED IN THE IBD TO DOUBLE 15" CMPS ABOUT 120 FEET FURTHER DOWN THE ROAD. THESE CULVERTS NOW ACT AS DITCH RELIEF AND OVERFLOW PIPES. THE 36 INCH CULVERT IS PROBABLY UNDERSIZED FOR A 100 YEAR STORM AND WOULD BE EXPECTED TO OVERTOP. EXCESS STREAMFLOW WOULD DRAIN TO THE DOUBLE 15" CULVERTS. IF THESE CULVERTS IN TURNED FAILED, RUNOFF WOULD BE DIVERTED 250 FEET FURTHER DOWN THE ROAD WHERE IT WOULD LIKELY ERODED OUT A PORTION OF THE ROAD PRISM. THE PRINCIPAL PROBLEMS WITH THIS SITE ARE 1) UNSTABLE AND ERODING UPSTREAM TRENCH. TO MITIGATE THIS THE ADDITIONAL PIPE SHOULD BE INSTALLED AND A ROCKED HEADWALL CONSTRUCTED TO STABILIZE THE CHANNEL WHERE IT DISCHARGES INTO THE CULVERT, AND 2) DIVERSION POTENTIAL, WHICH CAN BE MITIGATED BY INSTALLING A CRITICAL DIP AND ROCK ARMORING THE OUTFALL. CULVERT APPEARS TO HAVE BEEN INSTALLED PER PWA 2003 RECOMMENDATIONS. CULVERT CALCULATES AS WELL UNDERSIZED FOR DESIGN 100 YEAR FLOW BUT BASED ON FIELD OBSERVATIONS APPEARS REASONABLE AS IT IS NOT POSSIBLE TO INSTALL A LARGER DIAMETER PIPE. CROSSING VOLUME IS 150 CY WITH FILL 6' DEEP.
Camp Pomponio Road	630.1	REVIEW INCOMPLETE
Camp Pomponio Road	630.2	REVIEW INCOMPLETE
Camp Pomponio Road	631	AT THIS SITE THERE IS A 200-FOOT-LONG SEGMENT OF THE ROAD ALIGNMENT WHERE THERE ARE TWO SEPARATE AND PARALLEL ROADS TO ALLOW FOR PASSING. BOTH ROADS CROSS THE VALLEY BOTTOM OF AN INTERMITTENT STREAM. THERE ARE 4 CULVERTS ON THE TWO ROADS (TWO ON EACH). THE MAIN ROAD (NORTH) HAS TWO CULVERTS 1 AND 2. C1 IS A 12" X 20' SINGLE WALL HDPE THAT DRAINS MAINLY A SEEP AND POSSIBLE OVERFLOW WHEN PIPE C2 IS OVERTOPPED. THE OUTFALL OF THIS PIPE IS TRENCHED 2' W AND 2' D TO DRAIN TWO C3 AND C4 ON THE BYPASS (SOUTH) ROAD. C2 IS AN 24" X 30' SINGLE WALL HDPE PIPE ON THE MAIN WATERCOURSE. THIS PIPE CROSSES THE ROAD AT AN OBLIQUE ANGLE. THE PIPE IS UNDERSIZED BUT FUNCTIONAL. ON THE BYPASS (SOUTH ROAD) THERE ARE TWO 18" X 20' DOUBLE WALL HDPE CULVERTS (C3 AND C4). ALL OF THE PIPES ARE PLACED AT CHANNEL GRADE WITH THIN FILL (~ 3 FEET DEEP). COMBINED THE CULVERS ARE UNDERSIZED AND WITH STREAM FLOW LIKELY OVERTOPPING THE ROAD SURFACE DURING LARGE STORM EVENTS. WE OBSERVED SOME EROSION OF THE SMALL DOWNSTREAM FILL EMBANKMENT OF THE BYPASS ROAD, BUT OVERALL, THIS WAS FAIRLY MINOR
Camp Pomponio Road	631.1	REVIEW INCOMPLETE
Camp Pomponio Road	631.2	REVIEW INCOMPLETE

Camp Pomponio Road	632	100-FOOT-LONG BAILY BRIDGE OVER TARWATER CREEK. RIGHT APPROACH CONSISTS OF THROUGH CUT DRAINING TO THIS CROSSING. LEFT BANK HAS TWO 12 INCH SLOPE DRAINS. IN 2003 PWA REPORTED OLD ROAD FILL LEFT UNDER THE BRIDGE ON LEFT APPROACH THAT COULD RESULT IN ESTIMATE 500 CY OT FUTURE EROSION IS LIKELY OVER THE NEXT DECADE BUT VERY DIFFICULT TO PREVENT. IN 2017 PLACEWORKS MADE A PRELIMINARY ASSESSMENT OF THIS BRIDGE AS PART OF THEIR "HONOR CAMP ALTERNATIVE PARK COMPATIBLE REUSE FEASIBILITY STUDY". AT THIS BRIDGE PLACEWORKS REPORTED THAT "BANK EROSION HAD OCCURRED, EXPOSING THE BRIDGE ABUTMENTS. TO IMPROVE THIS, THE BANKS WILL NEED TO BE REPAIRED, WHICH WILL CONSIST OF BACKFILLING TO BRING THE CREEK BANK GRADE HIGHER AT THE ABUTMENT. FURTHER BANK STABILIZATION USING ARMOR STONE MAY ALSO BE NECESSARY. IT APPEARS THAT THE ABUTMENTS ARE NOT CURRENTLY UNDERCUT, WHICH WOULD REQUIRE SIGNIFICANTLY MORE BANK REPAIR WORK IF THEY BECAME UNDERCUT IN THE FUTURE." IN NOVEMBER 2021 WE OBSERVED TAR WATER CREEK TO BE DEEPLY INCISED WITH REMNANTS OF AN OLD LOG STRINGER BRIDGE AND CRIB LOG ABUTMENTS VISIBLE. WE CONCUR WITH PWA THAT THERE IS RESIDUAL FILL ON THE LEFT BANK THAT WILL EVENTUALLY ERODED OUT THOUGH WILL PROBABLY TAKE MANY DECADES. REMOVAL OF THIS MATERIAL WILL BE VERY DIFFICULT REQUIRING THE REMOVAL OF THE BRIDGE. BECAUSE OF THE DIFFICULTY IN REMOVING THIS MATERIAL WITH THE ASSOCIATED GROUND DISTURBANCE IT IS UNLIKELY THAT THERE WOULD BE ANY NET SEDIMENT SAVINGS. AS FOR PLACEWORKS CONCLUSION THAT THE ABUTMENTS NEED TO BE REPAIRED, ADDITIONAL INFORMATION AS THE DEPTH AND DESIGN OF THE CURRENT ABUTMENTS IS REQUIRED.
Camp Pomponio Road	633	18"X20' RUSTED CMP STC AT SMALL LOW FLOW EPHEMERAL WATERCOURSE WITHOUT PROBLEMS. THIN FILL.
Camp Pomponio Road	635	AT THIS SITE THERE ARE TWO DRCS DRAINING IBD ON FLAT GROUND. THE FIRST, LOCATED ON THE MAIN ROAD, IS AN 18"X30' CMP THAT IS RUSTED (UNKNOWN IF THERE ARE HOLES IN THE PIPE) THAT IS 10% PLUGGED WITH SEDIMENT BUT STILL FUNCTIONAL. THE SECOND, LOCATED ON A SIDE ROAD, IS AN 18"X20' CMP THAT IS RUSTED (UNKNOWN IF THERE ARE HOLES IN THE PIPE) THAT IS 75% PLUGGED WITH SEDIMENT BUT STILL FUNCTIONAL. SMALL FILL VOLUME. NO SIGNIFICANT CHANGE SINCE PWA 2003 INVENTORY. IN LONG TERM THE CULVERT WILL NEED TO BE REPLACED.
Camp Pomponio Road	636	6" X 60'? UNDERSIZED PVC DRC DRAINING FLAT GROUND NEAR ENTRANCE. PWA REPORTED THIS TO BE TWO PIPES JOINTED AS ONE: UPSTREAM 8" PVC AND DOWNSTREAM 6" CMP. IN OUR 2021 REVIEW THE OUTLET TO THE PIPE WAS NOT FOUND AND ASSUMED TO BE PLUGGED. CU. RT RECEIVES VERY LITTLE FLOW. NO EROSION OBSERVED. UNKNOWN IF EARLIER CMP EXISTED NEAR THIS LOCATION. NO CHANGE FROM 2003 PWA INVENTORY.
Camp Pomponio Road	637	18"X20' CMP DRC DRAINING LONG IBD ON FLAT GROUND. BOTTOM OF THE PIPE IS TOTALLY RUSTED OUT; INLET IS PARTIALLY PLUGGED. DEFINED CHANNEL BELOW OUTLET THAT APPEARS RELATIVELY STABLE. PWA (2003) REPORTED A 8'WX4'DX125' GULLY BELOW THE OUTLET DELIVERING TO MAINSTEM.

Camp Pomponio Road	638	18"X20' CMP STC OFFSET SLIGHTLY FROM A SMALL WATERCOURSE. BOTTOM OF THE CULVERT IS RUSTED OUT. DIVERSION POTENTIAL TO RIGHT BANK. SMALL SHALLOW CHANNEL AT OUTLET; INLET HAS 2'W X 1'D DEFINED CHANNEL. AT THE INLET IS A BURIED 8 INCH CMP RUNNING LENGTHWISE ALONG THE ROAD AND WHICH COULD HAVE BEEN A SUBDRAIN. THE CULVERT DRAINS A SOMEWHAT COMPLEX AREA TOTALING 24 ACRES. THE NATURAL DRAINAGE ABOVE THE CULVERT IS 6.5 ACRES, HOWEVER, RUNOFF FROM AN ADDITIONAL 17 ACRES OF GROUND, LOCATED ABOVE THE MEDIUM SECURITY FACILITY, IS DITCHED AROUND THE FACILITY AND DISCHARGED TOWARDS THE HEAD OF THE 6.5 ACRE WATERSHED. IT IS UNCERTAIN HOW MUCH WATER ACTUALLY MAKES IT INTO THE HEAD OF THE 6.5 ACRE DRAINAGE. THE DITCH DRAINING AROUND THE PRISON IS SHALLOW AND DOES NOT SHOW SIGNS OF SIGNIFICANT RUNOFF. OUR INSPECTION OF THE STREAM CHANNEL UPSTREAM OF THE CROSSING REVEALED A DEFINED CHANNEL ABOUT 2 TO 3 FEET WIDE AND 1 TO 2 FEET DEEP WITH PARTIALLY VEGETATED CHANNEL BANKS. NO RECENT EROSION OBSERVED. PWA (2003) REPORTED GULLYING ALONG THIS CHANNEL BUT THIS MAY HAVE BEEN DUE TO THE LARGE 1996 STORMS. STREAM CHANNEL AT THE PIPE OUTFALL IS SMALL AND ALSO WITHOUT SIGNIFICANT EROSION. WE ESTIMATE 90 CY OF EROSION IF THE STREAM WERE TO DIVERT (200'L X 4'W X 3'D).
Camp Pomponio Road	639	18"X20' CMP DRC. BOTTOM OF THE PIPE IS TOTALLY RUSTED OUT; INLET IS PARTIALLY PLUGGED. LOCATED ON PAVED ROAD THAT TRAVERSES STEEP SLOPES ABOVE PESCADERO CREEK.
Camp Pomponio Road	639.5	15"X20' CMP DDC.
Camp Pomponio Road	640	18"X40' CMP/PVC DRC DRAINING IBD OF ROAD EXTENDING UP TO MEDIUM SECURITY BUILDING. THE CMP IS RUSTED AND BEGINNING TO FAIL. THERE IS AN GREEN 8" PVC PIPE AT THE OUTLET SUGGESTING THIS CULVERT HAS HAD PROBLEMS IN THE PAST. FAILURE OF THIS PIPE WILL DIVERT FLOW FURTHER DOWN THE ROAD BUT WILL NOT RESULT IN SEDIMENT DELIVERY TO A WATERCOURSE.
Camp Pomponio Road	641	18"X40' STC/DRC. THE CULVERT IS RUSTED AND PARTIALLY PLUGGED WITH SEDIMENT, THOUGH STILL FUNCTIONAL. THE CULVERT DRAINS A BROAD 2.5 ACRE BASIN THAT INCLUDES THE UPSLOPE MEDIUM SECURITY FACILITY CONSTRUCTED IN THE AXIS OF THE BROAD VALLEY. THE NATURAL WATERSHED ABOVE THE CULVERT IS ACTUALLY 20 ACRES, HOWEVER RUNOFF FROM THE UPPER 17 ACRES OF THIS WATERSHED IS COLLECTED IN A SHALLOW DITCH AND CONVEYED AROUND THE UPPER MOST MEDIUM SECURITY BUILDING AND DISCHARGED ONTO THE SLOPES TO THE EAST. THIS DITCH THAT INTENTIONALLY DIVERTS STREAM FLOW APPEARS WEATHERED AND DUFF FILLED SUGGESTING ONLY LIMITED FLOW. ADDITIONAL SITE REVIEW IS REQUIRED TO DETERMINE IF THE DITCH IS STILL FULLY FUNCTIONAL OR IF IT HAS BECOME PLUGGED. FAILURE OF THE DITCH DRAINING AROUND THE BUILDING COULD DAMAGE THE BUILDING AND POTENTIALLY RESULT IN INCREASED FLOWS REACHING THE DRC, THOUGH THIS WILL PROBABLY NOT RESULT IN A SIGNIFICANT INCREASE IN EROSION.

Camp Pomponio Road	642	<p>THIS SITE IS LOCATED JUST BEFORE THE LARGE PARKING LOT AT THE HONOR CAMP WHERE THERE IS A SERIES OF FOUR RUSTED CULVERTS THAT ARE IN MODERATE TO POOR CONDITION AND WHICH DRAIN A SMALL EPHEMERAL WATERCOURSE. THE WATERCOURSE, WHICH DRAINS A ROUGHLY 17 ACRE FORESTED WATERSHED, IS DITCHED AND DIVERTED FOR 500+ FEET AROUND THE PARKING AREA AND SEVERAL CAMP BUILDINGS THAT HAVE BEEN BUILT WITHIN THE BROAD VALLEY BOTTOM. THE DITCH DIVERTING RUNOFF AROUND THE CAMP DOES NOT APPEAR TO HAVE BEEN MAINTAINED AND IS IN MIXED CONDITION WITH PORTIONS HAVING INFILLED WITH SEDIMENT AND MUCH OF IT VEGETATED. IT IS UNKNOWN IF THE DITCH IS FULLY FUNCTIONAL. PRESENTLY THE LOWER PORTION OF THE DITCH IS PARTIALLY FILLED WITH DUFF SUGGESTING ONLY LIMITED RUNOFF. AT THE EAST END OF THE PARKING LOT THE DITCH DRAINS INTO A SERIES OF FOUR INTERCONNECTED CULVERTS. C1 IS A 18"X20 RUSTED AND PARTIALLY PLUGGED SHALLOW CMP LOCATED ON A SIDE ROAD. C2 IS A SECOND RUSTED SHALLOW 18"X20' CMP LOCATED ON THE MAIN ROAD WITH AN OPEN CONCRETE JUNCTION BOX BETWEEN C1 AND C2. C3 IS A 24"X-40' RUSTED SHALLOW CMP THAT DIRECTS FLOW AROUND THE LOWER SEWAGE TREATMENT PLANT (?) BELOW THE ROAD. THE BOTTOM OF C3 IS PARTIALLY RUSTED OUT. THERE IS AN OPEN CONCRETE JUNCTION BOX BETWEEN C2 AND C3. C4 IS A RUSTED 18" X 60(?)' CMP THAT CONVEYS RUNOFF DOWNSLOPE PAST THE SIDE OF THE LOWER SEWER PLANT. THERE APPEARS TO BE A CONCRETE JUNCTION BOX BETWEEN C3 AND C4 WITH AN ELEVATED GRATE. THERE IS A CONCRETE HEADWALL AT THE C4 OUTLET WITH A DEFINED CHANNEL DRAINING A SHORT DISTANCE DOWN TO MAIN WATERCOURSE. OVERALL, DRAINAGE CONDITIONS AT THIS SITE ARE POOR. THE DITCH THAT DIVERTS RUNOFF AROUND THE CAMP HAS NOT BEEN MAINTAINED AND MAY NOT BE FUNCTIONAL. ALL FOUR CULVERTS ARE UNDERSIZED FOR A 100 YEAR STORM EVENT, ARE RUSTED, AND ARE AT RISK FOR FAILURE. FUTURE EROSION IS EXPECTED ALONG THE DITCH DIVERTED AROUND THE PARKING AREA AND AT THE CULVERTS. EROSION COULD ALSO OCCUR IF FLOW WERE TO OVERTOP THE CULVERTS AND DRAIN THROUGH THE PARKING AREA. IT IS UNCLEAR, HOWEVER, HOW MUCH EROSION WILL OCCUR GIVEN THE RELATIVELY GENTLE NATURE OF THE GROUND. EROSION OF THE DITCH COULD BE AS MUCH AS 55 CY BASED ON 500 LF OF DITCH, 3 FEET DEEP WITH 0.5 FEET OF BANK EROSION ON EACH SIDE. EROSION OF THE TOP TWO CULVERTS (ON THE ROAD) WOULD LIKELY BE MINIMAL DUE TO LOW GRADIENT GROUND AND EXISTENCE OF CONCRETE HEADWALLS WHICH WOULD PROTECT THE UPSTREAM FILL FROM EROSION. FAILURE OF EITHER OF THE TWO DOWNSTREAM CULVERTS COULD RESULT IN A 150'L X 4'W X 2'D GULLY GENERATING 45 CY OF SEDIMENT. IN TOTAL AN ESTIMATED 100 CY OF FUTURE EROSION IS POSSIBLE IN THE EVENT OF A LARGE PRECIPITATION EVENT.</p>
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Camp Pomponio Road	646	<p>THIS SITE IS LOCATED ON THE DOWNSLOPE SIDE OF THE LARGE (~0.4 ACRE) ASPHALT PARKING LOT OF THE MAIN HONOR CAMP. THE CROSSING VOLUME IS ESTIMATED AT 275+CY WITH FILL &gt;8 FEET DEEP. THE PARKING LOT AND SEVERAL OF THE ADJACENT BUILDINGS WERE CONSTRUCTED ALONG THE BOTTOM OF A BROAD GENTLY SLOPING VALLEY WITH THE EPHEMERAL WATERCOURSE DRAINING THE VALLEY BEING DIVERTED AROUND THE EAST SIDE OF THE CAMP IN AN EARTHEN DITCH (SEE PREVIOUS SITE FOR FURTHER DESCRIPTION). THE DOWNSLOPE SIDE OF THE PARKING AREA WAS CONSTRUCTED ACROSS THE VALLEY BOTTOM ON 8+FEET OF FILL RETAINED BY A LOG CRIBWALL THAT IS IN VARYING STATE OF DECAY. THERE ARE MULTIPLE CULVERTS AT THIS LOCATION. AT THE BOTTOM OF THE WALL ARE TWO CULVERTS; A 12 INCH CMP THAT IS MOSTLY RUSTED OUT AND PROBABLY IS NOT FUNCTIONAL, AND A 12 INCH SINGLE WALL HDPE THAT IS ABOUT 50% PLUGGED WITH SEDIMENT. PROTRUDING OUT OF THE WALL FACE ABOUT 3 TO 4 FEET ABOVE THE GROUND IS A ~4 INCH WHITE PVC PIPE, AND DOWNSLOPE OF THE WALL ARE TWO OTHER PVC PIPES. ALL OF THE PIPE'S DISCHARGE INTO VALLEY BOTTOM DRAINED BY SHALLOW BUT DEFINED WATERCOURSE. NONE OF THE CULVERT INLETS WERE FOUND, AND THE ORIGIN, AGE AND PURPOSE OF THESE PIPES IS UNKNOWN. BECAUSE THE SITE IS LOCATED WITHIN A VALLEY THAT HAD BEEN PROBABLY DRAINED BY AND EPHEMERAL WATERCOURSE (NOW DITCHED AND DIVERTED) IT IS POSSIBLE THAT THE PIPES WERE INSTALLED AS SUBDRAINS TO DEWATER THE SITE, THOUGH ADDITIONAL WORK WILL BE REQUIRED TO CONFIRM THIS. OF CONCERN ARE TWO 12 INCH DIAMETER, 8+ INCH DEEP "SINKHOLES" LOCATED ABOUT 50 FEET BACK FROM THE WALL AND ROUGHLY ALIGNED WITH THE TWO 12 INCH CULVERTS. THOUGH THERE ARE SEVERAL POSSIBLE EXPLANATIONS FOR THESE SINKHOLES, OF CONCERN IS WHETHER THEY ARE A RESULT OF SOIL PIPING ALONG THE RUSTED OUT 12 INCH CMP. BECAUSE THE 12 INCH CMP DISCHARGES INTO AN EPHEMERAL WATERCOURSE, CONTINUED EROSION AND FAILURE OF THE FILL WILL RESULT IN ONGOING SEDIMENT DELIVERY TO A WATERCOURSE AND THEREFORE WILL NEED TO BE CORRECTED.</p>
Shingle Mill Trail	647	<p>WE DID NOT REVIEW THIS SITE IN DETAIL. PWA REPORTS THIS TO BE A 15" UNDERSIZED CMP WITH A LARGE FILL CROSSING AT AN EPHEMERAL WATERCOURSE AND DRAINING 1580 LF OF FAINTLY WATER BARRED RB ROAD. PIPE WAS PLACED HIGH IN THE FILL WITH SHOTGUNNED OUTLET AND GULLY. THERE IS A DIVERSION POTENTIAL. PWA DID NOT REPORT THE CROSSING VOLUME BUT DID STATE THAT 720 CY OF FUTURE EROSION WITH 900 CY OF MATERIAL NEEDING TO BE REMOVED TO REPLACE THE PIPE. WHILE WE DID NOT REVIEW THIS SITE IN DETAIL, THE VOLUME ESTIMATE REPORTED BY PWA APPEARS TO BE HIGH. PWA REPORTS A HIGH PLUG POTENTIAL AND MH TREATMENT PRIORITY. IN 2003 THIS WAS A ROAD, PRESENTLY IT IS A ROAD WIDTH TRAIL.</p>

Shingle Mill Trail	648	24"X40' CMP RUSTED CMP STC AT EPHEMERAL WATERCOURSE CROSSING DRAINING A 22.8 ACRE WATERSHED. THE BOTTOM OF THE PIPE IS STARTING TO RUST OUT NECESSITATING REPLACEMENT. POSSIBLE SOIL PIPING THE CROSSING CONSISTS OF 110+ CY OF FILL WITH FILL 6.5' DEEP. PWA (2003) REPORTS THIS TO AN "18" ROTTEN CMP" (UNCERTAIN AS TO WHY THEY REPORTED AN 18 INCH DIAMETER - WE MEASURED 24 INCHES). PWA ALSO REPORTS "INDICATIONS OF A MUCH LARGER CROSSING INSTALLED IN THE PAST BUT WAS PARTIALLY WASHED OUT" AND ESTIMATED 133CY OF PAST EROSION. WE DID NOT OBSERVE THIS AND CANNOT CONFIRM PWA'S OBSERVATIONS. PWA ALSO REPORTS THE BOTTOM IF THE PIPE IS RUSTED OUT WITH FLOWS UNDERNEATH, WHICH WE ALSO OBSERVED.
Shingle Mill Trail	649	WE DID NOT REVIEW THIS SITE. PWA REPORTS AN UNCULVERTED FILL CROSSING AT AN EPHEMERAL STREAM WITH 365' OF RB ROAD DRAINING TO THE CROSSING. PWA REPORTS 28 CY OF PAST EROSION AND 83 CY OF FUTURE EROSION WITH MODERATE EROSION POTENTIAL AND MODERATE TO HIGH TREATMENT PRIORITY.
Shingle Mill Trail	650	WE DID NOT REVIEW THIS SITE. PWA (2003) REPORTS 12" CMP SERVES BRADED CHANNEL OF SHINGLE MILL CREEK. SMALL CMP IS PRONE TO PLUGGING WITH LEAVES BUT IMMEDIATE COMES FROM RB APPROACH. PW REPORTS APPROXIMATELY 40 CY OF FUTURE EROSION WITH L EROSION POTENTIAL AND LM TREATMENT PRIORITY.
Tarwater Trail	651	15"X20' CMP DRC IN GOOD CONDITION BUT DRAINING 450 FEET OF ROAD TO EITHER SIDE. CULVERT DISCHARGES 50 FEET ABOVE TARWATER CREEK AND IS HYDRO CONNECTED
Tarwater Trail	652	24"X60'? HDPE DRC. PIPE IS MUCH LONGER THAN IT NEEDS TO BE. PIPE IS FUNCTIONAL AND WITHOUT PROBLEMS
Tarwater Trail	653	12"X20' CMP DRC. PARTIALLY PLUGGED BUT FUNCTIONAL.
Tarwater Trail	654	15"X20' CMP DRC. 75% PLUGGED AND MAY BE RUSTED. FAILURE WOULD RESULT IN DITCH FLOW DRAINING TO PREVIOUS CULVERT.
Tarwater Trail	655	36" X 70' WELL PLACED HDPE CULVERT AT INTERMITTENT STREAM.
Tarwater Trail	656	12" X 20' SW HDPE DRC. FUNCTIONAL
Tarwater Trail	657	12" X 20' CMP DRC. BOTTOM RUSTED OUT AND WILL LIKELY FAIL.
Tarwater Trail	658	18"X20' CMP DRC. PIN HOLES IN PIPE OBSERVED
Tarwater Trail	659	12" X 20' CMP STC/DRC LOCATED ON POSSIBLE EPHEMERAL WATERCOURSE WITH VERY LOW FLOW. PIPE DISCHARGES ABOVE NICK POINT OF DEEPLY INCISED CHANNEL. CULVERT IS STARTING TO RUST OUT AND WILL NEED TO BE REPLACED. CULVERT CALCULATES AS UNDERSIZED FOR 100 YEAR DISCHARGE EVENT. CROSSING CONSISTS OF 10 CY OF FILL LESS THAN 3 FEET DEEP.

Tarwater Trail	660	THIS IS A PLUGGED AND NON-FUNCTIONAL WOOD BOX CULVERT AT AN EPHEMERAL WATERCOURSE DRAINING A 27-ACRE FORESTED WATERSHED. THE WATERCOURSE IS DIVERTED 165 FEET DOWN THE ROAD ERODING A 3'WX1.5'DEEP GULLY BEFORE DRAINING INTO A 24 INCH CMP. BASED ON FIELD OBSERVATIONS AND REVIEW OF THE EARLIER PWA ROAD INVENTORY EROSION HAS BEEN SLOW BUT ONGOING. THE 24 INCH CULVERT DISCHARGES ONTO MODERATE GRADIENT BENCH WHERE MOST OF THE FLOW DISPERSES WITH NO CLEARLY DEFINED CHANNEL. (ASSUME 50%) SEDIMENT DELIVERY. AT THE WOOD BOX CULVERT, THE CROSSING CONSISTS OF 300 CY OF FILL UP TO 10 FEET DEEP. APPROXIMATELY 30 TO 50 CY OF EROSION HAS OCCURRED OVER THE PAST 20 TO 30 YEARS WITH AN ADDITIONAL 50 CY EXPECTED IF LEFT UNTREATED. IT IS IMPORTANT TO NOTE THAT SIGNIFICANT EROSION DOES NOT APPEAR TO HAVE OCCURRED IN THE 20 YEARS SINCE PWA'S INVENTORY.
Tarwater Trail	661	THIS IS A 24" X 20' STC LOCATED WHERE THE PREVIOUS DIVERTED WATERCOURSE DISCHARGES OFF THE ROAD NEAR THE INTERSECTION WITH CANYON TRAIL. THE CULVERT RECEIVES RUNOFF FROM THE DIVERTED EPHEMERAL WATERCOURSE (DRAINING A 27 ACRE WATERSHED) AND FROM RUNOFF COMING DOWN THE ADJACENT TRAIL. THE PIPE DISCHARGES ONTO RELATIVELY FLAT GROUND WITHOUT CLEAR EVIDENCE OF A DEFINED CHANNEL. THE CULVERT IS FUNCTIONAL WITHOUT RUST AND CAN BE RETAINED, HOWEVER THE STREAM DIVERSION AT THE PREVIOUS SITE SHOULD BE CORRECTED.
Honor Camp Road 63	662	18"X20' CMP DRC.
Honor Camp Road 63	663	18"X20' CMP DRC, INLET 50% PLUGGED
Honor Camp Road 63	663.1	RUSTED OUT 15" X 80' CMP DRC IN UPPER PARKING LOT OF THE SECURITY FACILITY.
Honor Camp Road 63	664	AT THIS SITE AN EPHEMERAL WATERCOURSE DRAINING A 17.5 ACRE WATERSHED IS DITCH BEHIND THE MEDIUM SECURITY FACILITY AND DIVERTED OUTSIDE ITS NATIVE CHANNEL TO THE EAST. THERE APPEARS TO BE A CULVERT LOCATED WHERE THE DITCH DRAINS ACROSS AN OVERGROWN SPUR ROAD ACCESSING THE UPPER SEWER FACILITY. THE CULVERT IS MOSTLY PLUGGED AND ITS LONG-TERM EFFECTIVENESS IS QUESTIONABLE. PAST EROSION APPEARS TO HAVE BEEN LIMITED. BECAUSE OF THE DEVELOPMENT OF THE MEDIUM SECURITY FACILITY AND DOWNSLOPE ROADS IT IS NOT FEASIBLE TO REDIRECT STREAMFLOW BACK INTO ITS NATIVE CHANNEL AND BECAUSE NO SIGNIFICANT EROSION WAS OBSERVED DOES NOT APPEAR TO BE NECESSARY. SOME BENEFIT WILL BE ACHIEVED BY CLEANING THE DITCH AND REMOVING THE OLD CULVERT TO FACILITATE POSITIVE DRAINAGE.
Honor Camp Road 63	665	12" X? CMP DRC W/ GRATE OVER PIPE INLET DRAINING SWALE PAST ROAD. OUTLET TO THE PIPE WAS NOT FOUND AND COULD BE BURIED OR COULD EXTEND 120 FEET DOWN TO LOG CRIBWALL AT THE BASE OF THE LARGE PARKING AREA. CULVERT DOES NOT APPEAR TO RECEIVE MUCH FLOW SO FROM A SEDIMENT STANDPOINT IS NOT A LARGE CONCERN.
Honor Camp Road 63	666	18"X20' CMP DRC W/ CONC HW AT INLET AND OUTLET. INLET 25% PLUGGED, OUTLET 75% PLUGGED WITH SEDIMENT AND LEAF LITTER. APPEARS TO RECEIVE LITTLE FLOW. UNABLE TO DETERMINE IF RUSTED. NO SIGNIFICANT EROSION AT OUTLET.

Towne Fire Road	668	18"X20' CMP DRC WITH PARTIALLY PLUGGED INLET AND OUTLET DUE TO LACK OF MAINTENANCE
Towne Fire Road	669	12"X20' CMP DRC, RUSTED AND PLUGGED. DRAINS 800 LF OF RB ROAD. OLD CHANNEL OBSERVED BELOW PIPE OUTLET BUT MAY NOT BE THRU GOING AND COULD BE A RELIC FEATURE. IN LARGE STORM LIKELY HAVE SOME LIMITED SEDIMENT DELIVERY. EASY TO TREAT BY INSTALLING ADDITIONAL DRAIN DIPS TO BREAK UP FLOW.
Towne Fire Road	670	12" WOOD BOX DRC. WOOD IS DEGRADED AND APPEARS ONLY marginally FUNCTIONAL. LOCATED IN SWALE WITHOUT DEFINED CHANNEL. DRAINS ABOUT 400 LF OF ROAD. FILL EMBANKMENT IS OVERSTEEPENED AT 1:1. PWA (2003) ID THIS AS AN EPHEMERAL STREAM.
Bravo Fire Road	671	24" X 90' HDPE DRC/STC DRAINING ROAD AND QUESTIONABLE EPHEMERAL WATERCOURSE. PRIOR TO THIS SITE ABOUT 500 LF BRAVO FIRE ROAD DROPS DOWN A BROAD SWALE THAT PROBABLY EXPERIENCES FLOW DURING LARGE STORM EVENTS. RUNOFF FROM THE SWALE DRAINED ONTO THE ROAD AND WAS EVENTUALLY DISCHARGED OFF OF THE ROAD AT A KNOCKOUT ABOUT 100 FEET UP FROM THE CULVERT. A WELL DEFINED BUT SMALL CHANNEL WAS OBSERVED AT THE OUTFALL OF THE KNOCKOUT WHERE FLOW DRAINS OVER A STEEP ESCARPMENT. THIS KNOCKOUT HAS SINCE BEEN PLUGGED FROM ROAD WORK AND RUNOFF NOW FLOWS A SHORT DISTANCE FURTHER DOWN THE ROAD TO THE 24" CULVERT. THIS CULVERT THEN CONVEYS THE FLOW 90 FEET laterally AND DISCHARGES IT INTO AN ADJACENT EPHEMERAL WATERCOURSE W/O PROBLEMS OR EROSION. THE MAIN ISSUE WITH THIS SITE IS FINE GRAINED EROSION FROM THE RELATIVELY LONG SEGMENT OF ROAD DRAINING TO THE CULVERT, THOUGH THE RATE OF EROSION APPEARS LOW AND NOT SIGNIFICANT ENOUGH TO WARRANT MITIGATION. THE WATERCOURSE THAT THE CULVERT DRAINS INTO EVENTUALLY DISCHARGES ONTO A RELATIVELY FLAT BENCH WHERE IT IS UNCERTAIN AS TO HOW MUCH SEDIMENT ACTUALLY MAKES IT TO PESCADERO CREEK. FOR THIS ASSESSMENT WE ESTIMATED 50% SEDIMENT DELIVERY. THE PIPE IS CALCULATED AS BEING UNDERSIZED FOR A 100 YEAR DISCHARGE EVENT BUT THIS IS NOT SUPPORTED BY FIELD OBSERVATIONS. THE PIPE IS CALCULATED AS BEING UNDERSIZED FOR A 100 YEAR DISCHARGE EVENT BUT THIS IS NOT SUPPORTED BY FIELD OBSERVATIONS.
Bravo Fire Road	672	15"X20' CMP STC W/ CONC HW AT HEAD OF A SMALL EPHEMERAL WATERCOURSE DRAINING A 1.5 ACRE WATERSHED WITHIN THE COMPOUND. THERE IS METAL GRATE OVER THE INLET TO ACT AS A TRASH RACK. THE CULVERT APPEARS TO RECEIVE ONLY LIMITED FLOW. THE INLET IS CLEAR BUT THE OUTLET IS 50% PLUGGED WITH SEDIMENT. BECAUSE THE OUTLET IS 50% PLUGGED WITH SEDIMENT THERE IS A MODERATE PLUG POTENTIAL NECESSITATING WORK TO CLEAR THE OUTFALL. NOT A SIGNIFICANT SOURCE OF SEDIMENT, HOWEVER. THE WATERCOURSE THAT THE CULVERT DRAINS INTO EVENTUALLY DISCHARGES ONTO A RELATIVELY FLAT BENCH WHERE IT IS UNCERTAIN AS TO HOW MUCH SEDIMENT ACTUALLY MAKES IT TO PESCADERO CREEK. FOR THIS ASSESSMENT WE ESTIMATED 50% SEDIMENT DELIVERY
Jones Gulch	673	18"X20' CMP DRC DRAINING UP TO 650' OF LEFT BANK ROAD. PIPE PLACED ON GENTLY SLOPING GROUND W/ 18"X18"X50' EXCAVATED DITCH AT OUTFALL. PART OF THE DITCH WALL HAS FAILED BLOCKING FLOW, BUT THIS HAS NOT CAUSED A PROBLEM. THOUGH THE DITCH MAY RECEIVE RUNOFF FROM 650 FEET OF ROAD, THERE IS LITTLE EVIDENCE OF SIGNIFICANT FLOW IN THE PIPE. THERE ARE SEVERAL SMALL UNDERSIZED AND PARTIALLY INFILLED DIPS ALONG THE SEGMENT OF ROAD, WHICH HAD LIKELY SHED WATER OFF OF THE ROAD BEFORE REACHING THE CULVERT AND WHICH SHOULD BE UPGRADED

Jones Gulch	674	18"X20' CMP RUSTED OUT DRC DRAINING UP TO 300' OF LEFT BANK IBD. PIPE OUTLET IS TOTALLY RUSTED OUT. THE CULVERT IS LOCATED WHERE THE ROAD TRAVERSES THE OUTER EDGE OF A NATURAL BENCH WITH STEEP STREAMSIDE SLOPES DROPPING OFF SHARPLY BELOW THE ROAD AND EXTENDING DOWN TO THE STREAM. THERE APPEARS TO HAVE BEEN A PAST OLD FILL FAILURE AT THIS SITE RESULTING IN THE CURRENTLY OVERSTEEPENED FILL EMBANKMENT. EROSION BELOW THE CULVERT COULD FURTHER UNDERMINE THE SLOPE RESULTING IN FUTURE SLOPE FAILURE.
Jones Gulch	675	OLD DEGRADED AND MOSTLY PLUGGED LOG DRC. NO EVIDENCE OF SIGNIFICANT FLOW AT OUTLET. DITCH FLOW EITHER DRAINS THROUGH THE CULVERT OR CONTINUES PAST THE CULVERT FOR 50 FEET TO THE NEXT DRC WITHOUT PROBLEMS
Jones Gulch	676	30-FOOT-LONG FAILING LOG STRINGER BRIDGE OVER MCCORMICK CREEK DRAINING A 475 ACRE FORESTED WATERSHED. BRIDGE CONSISTS OF 36 INCH DIAMETER LOG STRINGERS DECKED WITH 24 INCH LOGS AND CAPPED BY 1 FOOT OF DIRT. STRINGERS ARE PLACED ON BURIED LOG ABUTMENTS. LEFT BANK ABUTMENT IS PLACED ON BEDROCK THAT IS EXPOSED IN CHANNEL BANK; RIGHT BANK ABUTMENT IS FOUNDED ON A LARGE BOULDER OR BEDROCK. THE BRIDGE STRINGERS AND DECKING ARE STARTING TO FAIL WHICH COULD BLOCK THE STREAM CHANNEL. FUTURE EROSION IS ESTIMATED AT THE VOLUME OF FILL ON TOP OF THE BRIDGE (30X16X1 = 18 CY) PLUS ANY EROSION OF THE CHANNEL BANKS (ASSUME 30X10X5 = 55) = 55+18= 75.
Jones Gulch	676.1	24" X 30' HDPE DRC W/ 30' DOWNSPOUT AND 40' OF ADDITIONAL UNCONNECTED PIPE. SINGLE POST TRASH RACK. VERY LOW FLOW. MOST ROAD RUNOFF DOES NOT APPEAR TO ENTER THE PIPE.
Jones Gulch	677	24"X40' HDPE STC W/ SINGLE POST TR AT SMALL EPHEMERAL WATERCOURSE W/O PROBLEMS. 200' OF RB ROAD DRAINS TO STC. THIS SEGMENT OF ROAD HAS SMALL DRAIN DIPS THAT HAVE INFILLED OR BROKEN DOWN AND ARE NOT EFFECTIVE AND NEEDS TO BE UPGRADED.
Jones Gulch	678	PERCHED FILL AT OLD PULLED 36" CMP/HUMBOLDT CROSSING. CROSSING WAS APPARENTLY REMOVED SOMETIME AFTER 2003. THE SITE IS CHARACTERIZED BY OVERSTEEPENED CHANNEL BANKS ~ 7 FEET HIGH, INCLINED AT 1:1 SLOPE AND EXTENDING FOR ~30 FEET ALONG BOTH SIDES OF THE STREAM CHANNEL. THE CHANNEL BOTTOM IS SOMEWHAT NARROWED BY RESIDUAL FILL. THERE ARE SEVERAL LOGS WITHIN THE CHANNEL AND THE STEEP CHANNEL BANKS ARE VEGETATED WITH GRASS AND BRUSH. THE CURRENT RATE OF EROSION APPEARS LOW, THOUGH THIS COULD BE DUE TO THE ONGOING DROUGHT. ESTIMATE CHANNEL BANKS COULD ERODED BACK TO A 1.5H:1V SLOPE. REMOVAL OF THE PERCHED FILL WOULD RESULT IN SIGNIFICANT GROUND DISTURBANCE WHICH WOULD LIKELY NEGATE ANY NET BENEFIT. BEST TO LET THE FILL SLOWLY METER OUT OVER TIME.
Ward Road	695	PARTIAL ROCK FORD OVER PESCADERO CREEK. THE CROSSING HAD BEEN ARMORED WITH CONCRETE SACKS, THOUGH MOST OF THESE HAVE WASHED OUT. PRESENTLY THE ROAD SIMPLY DIPS THROUGH THE CROSSING BOTTOM ON NATIVE GRAVEL. THIS ROAD RECEIVES VERY LITTLE USE AND HAS BEEN WATER BARRED AFTER THE CZU FIRE TO RESTRICT LARGE VEHICLE ACCESS. ROAD ACCESSING CROSSING HAS RECENTLY BEEN WATER BARRED WITH MINIMAL HYDROLOGIC CONNECTIVITY.
Ward Road	696	LARGE HUMBOLDT CROSSING AT EPHEMERAL WATERCOURSE. CROSSING CONSISTS OF ABOUT 340 CY WITH FILL 12 FEET DEEP. THE DOWNSTREAM END OF THE CROSSING IS SLOWLY ERODING WITH MULTIPLE CAVITIES. WE REVIEWED THIS CROSSING 5+ YEARS AGO AND IT HAS SHOWN LITTLE CHANGE SINCE THEN. PWA (2003) DESCRIPTION OF THE SITE SUGGESTS LITTLE CHANGE IN THE PAST 20 YEARS. NONETHELESS, CONTINUED EROSION IS EXPECTED EVENTUALLY LEADING TO THE COLLAPSE OF THE FILL EMBANKMENT.

Ward Road	697	FILL CROSSING OR OLD HUMBOLDT ON EPHEMERAL WATERCOURSE DRAINING A 39 ACRE WATERSHED. THE WATERCOURSE CROSSING APPEARS UNDERSIZED FOR THE WATERSHED IT DRAINS. THIS MAY BE BECAUSE THE UPPER PORTION OF THE WATERSHED IS BENCHED WITH LIKELY ONLY LIMITED RUNOFF. THE CROSSING CONSISTS OF ABOUT 65CY WITH FILL 7 FEET DEEP. THE CROSSING IS LOCATED ON THE DOWNSLOPE SIDE OF A GENERALLY SLOPING BENCH WITH SHALLOW WATERCOURSE. THERE IS A 12" TO 18" DIAMETER CRIB LOG SUPPORTING THE OUTER EDGE OF THE FILL PRISM. MOST OF THE RUNOFF APPEARS TO PERCOLATE THROUGH THE FILL WITHOUT RESULTING IN MUCH EROSION. WELL DEFINED.
Ward Road	698	SMALL FILL CROSSING AT SMALL EPHEMERAL WATERCOURSE. THE CROSSING CONSISTS OF LESS THAN 30 CY OF FILL WITH FILL LESS THAN 3 FEET DEEP. UPSTREAM THE SHALLOW WATERCOURSE DRAINS ACROSS 30% GRADIENT BENCH AND APPEARS STABLE. AT THE CROSSING THE WATERCOURSE HAS ERODED A 4'W X 1'D X 15'L GULLY INTO THE FILL EMBANKMENT.
Ward Road	699	EARTH FORD AT SMALL EPHEMERAL WATERCOURSE. CROSSING HAS BEEN DIPPED OUT WITH MINIMAL RESIDUAL FILL.
Honor Camp Road 64	700	18" (?) PARTIALLY PLUGGED SHALLOW HDPE STC ON AND UNUSED ROAD AND DRAINING 25 ACRE FOREST WATERSHED. THE CROSSING IS LOCATED AT THE MOUTH OF A STEEP GRADIENT, NARROW AND INCISED WATERCOURSE THAT DISCHARGES ONTO GENTLY SLOPING GROUND AT THE BACK EDGE OF AN UPLIFTED GENTLY SLOPING ALLUVIAL/COLLUVIAL FILLED MEANDER BEND OF PESCADERO CREEK. THE MEANDER BEND MAKES A GENTLY SLOPING HORSESHOE SHAPED VALLEY ABOUT 30 VERTICAL FEET ABOVE PESCADERO CREEK. RUNOFF FROM THE CULVERT PRESENTLY DRAINS TO THE WEST (RIGHT) WHERE IT HAS ERODED A 4'WX3'D CHANNEL ACROSS THE VALLEY BOTTOM
Honor Camp Road 65	701	15"X20' RUSTED DRC. CULVERT LOCATED WHERE ROAD PRISM IS ELEVATED ABOUT 3 FEET ON FILL, PROBABLY TO FACILITATE DRAINAGE. THE BOTTOM OF THE CULVERT IS COMPLETELY RUSTED OUT. THERE APPEARS TO BE LITTLE DITCH FLOW AND NO TREATMENT IS REQUIRED UNLESS THE ROAD IS TO BE REOPENED.

**\*Stream Crossing IDs are referenced from "Pescadero-Butano Watershed County Road Inventory and Sediment Assessment" (March 2022)**

## **APPENDIX E: FOREST HEALTH FUELS REDUCTION STANDARDS**

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## CLIMATE AND HABITAT RESILIENCY PLAN - FOREST HEALTH FUELS REDUCTION TREATMENT STANDARDS

<b>X = Indicates that the Forest Health Fuels Reduction Treatment Standards Apply</b>		<b>Forest Health Fuels Reduction</b>				
Forest Health and Fuels Reduction (FHFR) Treatment Standards	Requirement	Mechanic	Manual	Rx Burning	Prescribed Herbivory	Herbicide
FHFR AD-1	San Mateo County Park (SMCP) Coordination	San Mateo County Parks (SMCP) Coordination: For treatments coordinated with CAL FIRE (burning or density reduction treatments where commercialization could occur), CAL FIRE will meet with SMCP to discuss all natural and environmental resources that must be protected using SPRs and any applicable mitigation measures; identify any sensitive resources onsite; and discuss resource protection measures. For any prescribed burn treatments, CAL FIRE will also discuss the details of the burn plan in the incident action plan (IAP).				
FHFR AD-2	Delineate Protected Resources	Delineate Protected Resources: SMCP or a qualified designee will clearly define the boundaries of the treatment area and protected resources on maps for the treatment area and with highly visible flagging or clear, existing landscape demarcations (e.g., edge of a roadway) prior to beginning any treatment to avoid disturbing the resource. "Protected Resources" refers to environmentally sensitive places within or adjacent to the treatment areas that would be avoided or protected to the extent feasible during planned treatment activities to sustain their natural qualities and processes. This work will be performed by a qualified person, as defined for the specific resource (e.g., qualified Registered Professional Forester or biologist).				
FHFR AD-3	Consistency with Local Plans, Policies, and Ordinances	Consistency with Local Plans, Policies, and Ordinances: SMCP will design and implement the treatment in a manner that is consistent with applicable local plans (e.g., general plans, considers Community Wildfire Protection Plans, and CAL FIRE Unit Fire Plans), policies, and ordinances to the extent the project is subject to them. Applicable local plans, policies, and ordinances may include, but are not limited to: - Santa Cruz County – San Mateo County Community Wildfire Protection Plan - CAL FIRE San Mateo – Santa Cruz Unit 2021 Strategic Fire Plan - Bay Area Air Quality Management District: Procedures for Conducting Wildland Vegetation Management Fires (Prescribed Burning) in the Bay Area - Decision-Making Guidelines for Vegetation Management, San				

		Mateo County Parks - County of San Mateo Routine Maintenance Program Manual						
FHFR AD-4	Public Notifications for Prescribed Burning	Public Notifications for Prescribed Burning: At least three days prior to the commencement of prescribed burning operations, SMCP, in coordination with CAL FIRE , will: 1) post signs along the closest public roadway to the treatment area describing the activity and timing, and requesting persons in the area to contact a designated representative of SMCP (contact information will be provided with the notice) if they have questions or smoke concerns; 2) publish a public interest notification in a local newspapers or other widely distributed media source describing the activity, timing, and contact information; 3) send the San Mateo County supervisor and county administrative officer (or equivalent official responsible for distribution of public information) a notification letter describing the activity, its necessity, timing, and measures being taken to protect the environment and prevent prescribed burn escape. This FHFR applies only to prescribed burn treatment activities and all treatment types, including treatment maintenance.	X	X	X	X	X	
FHFR AD-5	Maintain Site Cleanliness	Maintain Site Cleanliness: If trash receptacles are used on-site, the project proponent will use fully covered trash receptacles with secure lids (wildlife proof) to contain all food, food scraps, food wrappers, beverages, and other worker generated miscellaneous trash. Remove all temporary non-biodegradable flagging, trash, debris, and barriers from the project site upon completion of project activities. Contractors, treatment crews, personnel, and all others affiliated with treatment scoping, implementation, and close-out shall adhere to the "Crumb-Clean" program philosophy to reduce predatory corvid activity within park bounds .	X	X	X	X	X	

FHFR AD-6	Public Notifications for Treatment Projects	Public Notifications for Treatment Projects. One to three days prior to the commencement of a treatment activity, SMCP or a designee will post signs in a conspicuous location near the treatment area describing the activity and timing, and requesting persons in the area to contact a designated representative of SMCP (contact information will be provided with the notice) if they have questions or concerns. Prescribed burning is subject to the additional notification requirements of FHFR AD-4.	X	X	X	X	X
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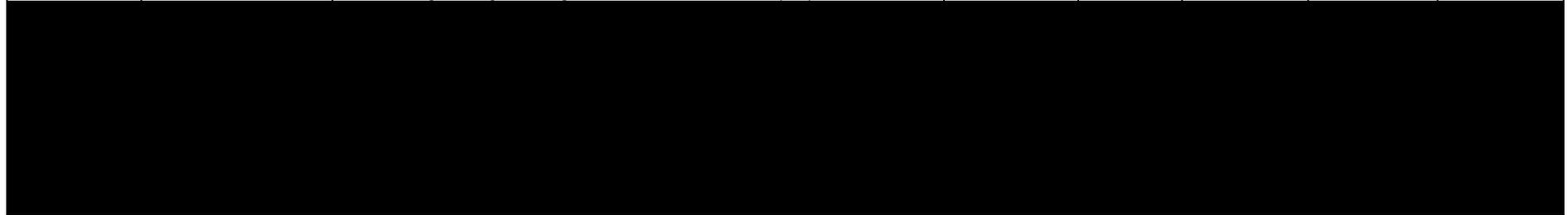
FHFR AD-7	Provide Information on Proposed, Approved, and Completed Treatment Projects	<p>Provide Information on Proposed, Approved, and Completed Treatment Projects. For any vegetation treatment project using the CalVTP PEIR for CEQA compliance, the project proponent will provide the information listed below to the Board or CAL FIRE during the proposed, approved, and completed stages of the project. The Board or CAL FIRE will make this information available to the public via an online database or other mechanism.</p> <p>Information on proposed projects (PSA in progress):</p> <ul style="list-style-type: none"> <li>- GIS data that include project location (as a point);</li> <li>- project size (typically acres);</li> <li>- treatment types and activities; and</li> <li>- contact information for a representative of the project proponent.</li> </ul> <p>Information on approved projects (PSA complete):</p> <ul style="list-style-type: none"> <li>- A completed PSA Environmental Checklist;</li> <li>- A completed Mitigation Monitoring and Reporting Program (using Attachment A to the Environmental Checklist);</li> <li>- GIS data that include a polygon(s) of the project area, showing the extent of each treatment type included in the project (ecological restoration, fuel break, WUI fuel reduction)</li> </ul> <p>Information on completed projects:</p> <ul style="list-style-type: none"> <li>- GIS data that include a polygon(s) of the treated area, showing the extent of each treatment type implemented (ecological restoration, fuel break, WUI fuel reduction)</li> <li>- A post-project implementation report (referred to by CAL FIRE as a Completion Report) that includes <ul style="list-style-type: none"> <li>- Size of treated area (typically acres);</li> <li>- Treatment types and activities;</li> <li>- Dates of work;</li> </ul> </li> <li>- A list of the SPRs and mitigation measures that were implemented</li> <li>- Any explanations regarding implementation if required by SPRs and mitigation measures (e.g., explanation for feasibility determination required by SPR BIO-12; explanation for reduction of a no-disturbance buffer below the general minimum size described in Mitigation Measures BIO-1a and BIO-2b).</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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FHFR AD-8	Request Access for Post-Treatment Assessment	Request Access for Post-Treatment Assessment. For CAL FIRE projects, during contract development, CAL FIRE will include access to the treated area over a prescribed period (usually up to three years) to assess treatment effectiveness in achieving desired fuel conditions and other CalVTP objectives as well as any necessary maintenance, as a contract term for consideration by the landowner. For public landowners, access to the treated area over a prescribed period will be a requirement of the executed contract. This FHFR applies to all treatment activities and all treatment types, including treatment maintenance.	X	X	X	X	X	
Aesthetic and Visual Resource		Requirement						
FHFR AES-1	Vegetation Thinning and Edge Feathering	Vegetation Thinning and Edge Feathering: SMCP will thin and feather adjacent vegetation to break up or screen linear edges of the clearing and mimic forms of natural clearings as reasonable or appropriate for vegetation conditions. In general, thinning and feathering in irregular patches of varying densities, as well as a gradation of tall to short vegetation at the clearing edge, will achieve a natural transitional appearance. The contrast of a distinct clearing edge will be faded into this transitional band. Pre-field work to determine treatment types and boundaries will take into consideration topographical features with the intent to create irregular vegetation densities and treatment area size.	X	X				
FHFR AES-2	Avoid Staging within Viewsheds	Avoid Staging within Viewsheds: SMCP will store all treatment-related materials, including vehicles, vegetation treatment debris, and equipment, outside of the viewshed of public trails, parks, recreation areas, and roadways to the extent feasible if there is potential for the public to interact with treatment areas. The project proponent will also locate materials staging and storage areas outside of the viewshed of public trails, parks, recreation areas, and roadways to the extent feasible.	X	X	X	X	X	
FHFR AES-3	Provide Vegetation Screening	SMCP will preserve sufficient vegetation within, at the edge of, or adjacent to treatment areas to screen views from public trails, parks, recreation areas, and roadways as reasonable or appropriate for vegetation conditions.	X	X	X	X	X	

Air Quality Standard Project Requirements		Requirement					
FHFR AQ-1	Comply with Air Quality Regulations	Comply with Air Quality Regulations: SMCP will comply with the applicable air quality requirements of air districts within whose jurisdiction the project is located.	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
FHFR AQ-2	Submit Smoke Management Plan	SMCP will submit a smoke management plan for all prescribed burns to the Bay Area Air Quality Management District (BAAQMD) through the Prescribed Fire Information Reporting System (PFIRS), in accordance with 17 CCR Section 80160. Pursuant to this regulation, a smoke management plan will not be required for burns less than 10 acres that also will not be conducted near smoke sensitive areas, unless otherwise directed by the air district.			<b>X</b>	<b>X</b>	<b>X</b>
FHFR AQ-3	Create Burn Plan	SMCP will create a burn plan using the CAL FIRE burn plan template for all prescribed burns. The burn plan will include a fire behavior model output of First Order Fire Effects Model and BEHAVE or other fire behavior modeling simulation and that is performed by a qualified fire behavior technical specialist that predicts fire behavior, calculates consumption of fuels, tree mortality, predicted emissions, greenhouse gas emissions, and soil heating. The project proponent will minimize soil burn severity from broadcast burning to reduce the potential for runoff and soil erosion. The burn plan will be created with input from a qualified technician or certified State burn boss.			<b>X</b>	<b>X</b>	<b>X</b>

FHFR AQ-4	Minimize Dust	<p>Minimize Dust: To minimize dust during treatment activities, SMCP will implement the following measures:</p> <ul style="list-style-type: none"> <li>- Limit the speed of vehicles and equipment traveling on Old Haul Road and unpaved areas to 15 miles per hour to reduce fugitive dust emissions, in accordance with the California Air Resources Board (CARB) Fugitive Dust protocol.</li> <li>- If road use creates excessive dust, SMCP will wet appurtenant, unpaved, dirt roads using water trucks or treat roads with a non-toxic chemical dust suppressant (e.g., emulsion polymers, organic material) during dry, dusty conditions. Any dust suppressant product used will be environmentally benign (i.e., non-toxic to plants and will not negatively impact water quality) and its use will not be prohibited by ARB, EPA, or the State Water Resources Control Board (SWRCB). The project proponent will not over-water exposed areas such that the water results in runoff. The type of dust suppression method will be selected by SMCP based on soil, traffic, site-specific conditions, and air quality regulations.</li> <li>- Remove visible dust, silt, or mud tracked-out on to public paved roadways where sufficient water supplies and access to water is available. SMCP will remove dust, silt, and mud from vehicles at the conclusion of each workday, or at a minimum of every 24 hours for continuous treatment activities, in accordance with Vehicle Code Section 23113.</li> <li>- Suspend ground-disturbing treatment activities, including land clearing and bulldozer lines, when there is visible dust transport (particulate pollution) outside the treatment boundary, if the particulate emissions may "cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property," per Health and Safety Code Section 41700.</li> </ul>	X	X	X	X	X
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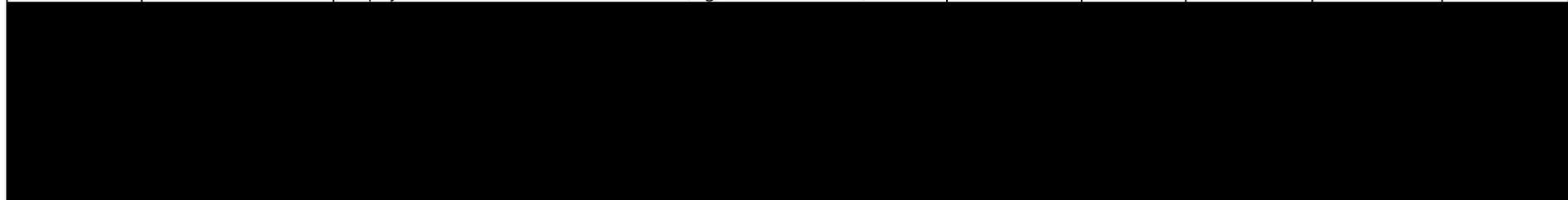
FHFR AQ-5	Avoid Naturally Occurring Asbestos	<p>Avoid Naturally Occurring Asbestos: SMCP will avoid ground-disturbing treatment activities in areas identified as likely to contain naturally occurring asbestos (NOA) per maps and guidance published by the California Geological Survey, unless an Asbestos Dust Control Plan (17 CCR Section 93105) is prepared and approved by the BAAQMD. Any NOA-related guidance provided by the BAAQMD will be followed.</p> <p>Two ultramafic rock outcrops that may contain naturally occurring asbestos have been identified in San Mateo County; however, they are not located in proximity to PCCP . No additional known or reported locations of historic asbestos mines, asbestos prospects, or other natural occurrences of asbestos are documented within San Mateo County.</p>	X	X	X	X	X
FHFR AQ-6	Prescribed Burn Safety Procedures	<p>Prescribed burns planned and managed by non-CAL FIRE crews will follow all safety procedures required of CAL FIRE crew, including the implementation of an approved Incident Action Plan (IAP). The IAP will include the burn dates; burn hours; weather limitations; the specific burn prescription; a communications plan; a medical plan; a traffic plan; and special instructions such as minimizing smoke impacts to specific local roadways. The IAP will also assign responsibilities for coordination with the BAAQMD, such as conducting onsite briefings, posting notifications, weather monitoring during burning, and other burn related preparations.</p>			X	X	X



Archaeological, Historical, and Tribal Cultural Resources		Requirement					
FHFR CUL-1	Conduct Record Search	Conduct Record Search: An archaeological and historical resource record search will be conducted per the "Archaeological Review Procedures for CAL FIRE Projects" and applicable procedures determined by the County of San Mateo Planning and Building Division . Instead of conducting a new search, SMCP may use recent record searches completed within 5 years prior to project development.	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
FHFR CUL-2	Contact Geographically Affiliated Native American Tribes	<p>Contact Geographically Affiliated Native American Tribes: SMCP will obtain the latest Native American Heritage Commission (NAHC) provided Native Americans Contact List to notify the California Native American Tribes within San Mateo County.</p> <p>The notification will contain the following:</p> <ul style="list-style-type: none"> <li>- A written description of the treatment location and boundaries.</li> <li>- Brief narrative of the treatment objectives.</li> <li>- A description of the activities used (e.g., prescribed burning, mastication) and associated acreages.</li> <li>- A map of the treatment area at a sufficient scale to indicate the spatial extent of activities.</li> <li>- A request for information regarding potential impacts to cultural resources from the proposed treatment.</li> <li>- A detailed description of the depth of excavation, if ground disturbance is expected.</li> </ul> <p>In addition, SMCP will contact the NAHC for a review of their sacred lands file.</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
FHFR CUL-3	Pre-field Research	Pre-field Research: SMCP will conduct research prior to implementing treatments as part of the cultural resource investigation. The purpose of this research is to properly inform survey design, based on the types of resources likely to be encountered within the treatment area, and to be prepared to interpret, record, and evaluate these findings within the context of local history and prehistory. The qualified archaeologist and/or archaeologically-trained resource professional will review records, study maps, read pertinent ethnographic, archaeological, and historical literature specific to the area being studied, and conduct other tasks to maximize the effectiveness of the survey.	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

FHFR CUL-4	Archaeological Surveys	<p>Archaeological Surveys: SMCP will coordinate with an archaeologically-trained resource professional and/or qualified archaeologist to conduct a site-specific survey of the treatment area. The survey methodology (e.g., pedestrian survey, subsurface investigation) depends on whether the area has a low, moderate, or high sensitivity for resources, which is based on whether the records search, pre-field research, and/or Native American consultation identifies archaeological or historical resources near or within the treatment area. A survey report will be completed for every cultural resource survey completed. The specific requirements will comply with the "Archaeological Review Procedures for CAL FIRE Projects" and applicable procedures determined by the County of San Mateo Planning and Building Division as needed.</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
FHFR CUL-5	Treatment of Archaeological Resources	<p>Treatment of Archaeological Resources: If cultural resources are identified within a treatment area, and cannot be avoided, a qualified archaeologist or archaeologically-trained resource professional will notify the culturally affiliated tribe(s) based on information provided by NAHC and assess whether an archaeological find qualifies as a unique archaeological resource, a historical resource, or in coordination with said tribe(s), a tribal cultural resource. SMCP, in consultation with culturally affiliated tribe(s), will develop effective protection measures for important cultural resources located within treatment areas. These measures may include adjusting the treatment location or design to entirely avoid cultural resource locations or changing treatment activities so that damaging effects to cultural resources will not occur. SMCP will defer implementing the treatment until the tribe approves protection measures, or if agreement cannot be reached after a good-faith effort, SMCP determines that any or all feasible measures have been implemented, where feasible, and the resource is either avoided or protected.</p> <p>These protection measures will be written in clear, enforceable language, and will be included in the survey report in accordance with "Archaeological Review Procedures for CAL FIRE Projects" and/or applicable procedures determined by the County of San Mateo Planning and Building Division as needed.</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

FHFR CUL-6	Treatment of Tribal Cultural Resources	Treatment of Tribal Cultural Resources: SMCP, in consultation with the culturally affiliated tribe(s), will develop effective protection measures for important tribal cultural resources located within treatment areas. These measures may include adjusting the treatment location or design to entirely avoid cultural resource locations or changing treatment activities so that damaging effects to cultural resources will not occur. SMCP will provide the tribe(s) the opportunity to submit comments and participate in consultation to resolve issues of concern. SMCP will defer implementing the treatment until the tribe approves protection measures, or if agreement cannot be reached after a good-faith effort, the proponent determines that any or all feasible measures have been implemented, where feasible, and the resource is either avoided or protected. This SPR applies to all treatment activities and treatment types, including treatment maintenance.	X	X	X	X	X
FHFR CUL-7	Avoid Built Historical Resources	Avoid Built Historical Resources: If the records search or field investigation identifies built historical resources, as defined in Section 15064.5 of the State CEQA Guidelines, SMCP will avoid these resources. Within a buffer of 100 feet of the built historical resource, there will be no prescribed burning or mechanical treatment activities. Buffers less than 100 feet for built historical resources will only be used after consultation with and receipt of written approval from a qualified archaeologist. If the records search does not identify known historical resources in the treatment area, but structures (i.e., buildings, bridges, roadways) over 50 years old that have not been evaluated for historic significance are present in the treatment area, they will similarly be avoided.	X	X	X	X	X
FHFR CUL-8	Cultural Resource Training	Cultural Resource Training: SMCP will train all crew members and contractors implementing treatment activities on the protection of sensitive archaeological, historical, or tribal cultural resources. Workers will be trained to halt work if archaeological resources are encountered on a treatment site and the treatment method consists of physical disturbance of land surfaces (e.g., soil disturbance).	X	X	X	X	X



Biological Resources		Requirement					
FHFR - BIO - QUAL	Qualified Registered Professional Forester (RPF), Biologist, Botanist, or Biologist	<p>Qualified Registered Professional Forester (RPF) or Biologist: To be qualified, an RPF or biologist would hold a wildlife biology, botany, ecology, forestry, or other relevant degree from an accredited university and: 1) be knowledgeable in relevant species life histories and ecology, 2) be able to correctly identify relevant species and habitats, 3) have experience conducting field surveys of relevant species or resources, 4) be knowledgeable about survey protocols, 5) be knowledgeable about state and federal laws regarding the protection of special-status species, and 6) have experience with CDFW's California Natural Diversity Database (CNDDDB) and Biogeographic Information and Observation System (BIOS). If species-specific protocol surveys are performed, surveys would be conducted by qualified RPFs or biologists with the minimum qualifications required by the appropriate protocols, including having CDFW or USFWS approval to conduct such surveys, if required by certain protocols.</p> <p>Qualified RPF or Botanist: To be qualified, an RPF or botanist would 1) be knowledgeable about plant taxonomy, 2) be familiar with plants of the region, including special-status plants and sensitive natural communities, 3) have experience conducting floristic botanical field surveys as described in CDFW "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" (current version dated March 20, 2018), or experience conducting such botanical field surveys under the direction of an experienced botanical field surveyor, 4) be familiar with the California Manual of Vegetation (Sawyer et al. 2009 or current version, including updated natural communities data at <a href="http://vegetation.cnps.org/">http://vegetation.cnps.org/</a>), and 5) be familiar with federal, state, and local statutes and regulations related to plants and plant collecting.</p> <p>Qualified RPF or Biological Technician: To be qualified, an RPF or biological technician would 1) be knowledgeable in relevant species life histories and ecology, 2) be able to correctly identify relevant species and habitats, 3) have experience conducting biological monitoring of relevant species or resources, and 4) be knowledgeable about state and federal laws regarding the protection of special-status species. SMCP will review the resume and approve the qualifications of RPFs or biological technicians.</p>	X	X	X	X	X

FHFR BIO-1	Review and Survey Project-Specific Biological Resources	<p>Review and Survey Project-Specific Biological Resources. San Mateo County Parks will require a qualified RPF or biologist to conduct a data review and reconnaissance-level survey prior to treatment, no more than one year prior to the submittal of the permit for each treatment project, and no more than one year between completion of the permit and implementation of the treatment project.</p> <p>The data reviewed will include the biological resources setting, species and sensitive natural communities tables, and habitat information for the ecoregion(s) where the treatment will occur. It will also include review of the best available, current data for the area, including vegetation mapping data, species distribution/range information, CNDDDB, California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California, relevant BIOS queries, and relevant general and regional plans.</p> <p>Reconnaissance-level biological surveys will be general surveys that include visual and auditory inspection for biological resources to help</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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determine the environmental setting of a project site. The qualified surveyor will 1.) identify and document sensitive resources, such as riparian or other sensitive habitats, sensitive natural communities to an alliance level per the 2nd Manual of California Vegetation, wetlands, or wildlife nursery site or habitat (including bird nests), and 2.) assess the suitability of habitat for special-status plant and animal species. The surveyor will also record any incidental wildlife observations. For each treatment project, habitat assessments will be completed at a time of year that is appropriate for identifying habitat and no more than one year prior to the submittal of a CalVTP PSA, unless it can be demonstrated that habitat assessments older than one year remain valid (e.g., site conditions are unchanged and no treatment activity has occurred since the assessment). If more than one year passes between completion of the permit and initiation of the treatment project, SMCP will verify the continued accuracy of the permit prior to beginning the treatment project by reviewing for any data updates and/or visiting the site to verify conditions. Based on the results of the data review and reconnaissance-level survey, San Mateo County Parks, in consultation with a qualified RPF or biologist, will determine which one of the following best characterizes the treatment:

1. Suitable Habitat Is Present but Adverse Effects Can Be Clearly Avoided. If, based on the data review and reconnaissance-level survey, the qualified RPF or biologist determines that suitable habitat for sensitive biological resources is present but adverse effects on the suitable habitat can clearly be avoided through one of the following methods, the avoidance mechanism will be implemented prior to initiating treatment and will remain in effect throughout the treatment:
  - a. by physically avoiding the suitable habitat, or
  - b. by conducting treatment outside of the season when a sensitive resource could be present within the suitable habitat or outside the season of sensitivity (e.g., outside of special-status bird nesting season, during dormant season of sensitive annual or geophytic plant species, or outside of maternity and rearing season at wildlife nursery sites ).

Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat. For physical avoidance, a buffer may be implemented as determined necessary by the qualified RPF or biologist.

FHFR BIO-2	Require Biological Resource Training for Workers	<p>Require Biological Resource Training for Workers. San Mateo County Parks will require crew members and contractors to receive training from a qualified RPF or biologist prior to beginning a treatment project. The training will describe the appropriate work practices necessary to effectively implement the biological FHFRs and mitigation measures and to comply with the applicable environmental laws and regulations. The training will include the identification, relevant life history information, and avoidance of pertinent special-status species; identification and avoidance of sensitive natural communities and habitats with the potential to occur in the treatment area; impact minimization procedures; and reporting requirements. The training will instruct workers when it is appropriate to stop work and allow wildlife encountered during treatment activities to leave the area unharmed and when it is necessary to report encounters to a qualified RPF, biologist, or biological technician.</p> <p>The qualified RPF, biologist, or biological technician will immediately contact CDFW or USFWS, as appropriate, if any wildlife protected by the California Endangered Species Act (CESA) or Federal Endangered Species Act (ESA) is encountered and cannot leave the site on its own (without being handled).</p>	X	X	X	X	X
FHFR BIO-3	Survey Sensitive Natural Communities and Other Sensitive Habitats	<p>Survey Sensitive Natural Communities and Other Sensitive Habitats. If FHFR-BIO-1 determines that sensitive natural communities or sensitive habitats may be present and adverse effects cannot be avoided, SMCP will:</p> <ul style="list-style-type: none"> <li>- require a qualified RPF or biologist to perform a protocol-level survey following the CDFW "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" (current version dated March 20, 2018) of the treatment area prior to the start of treatment activities for sensitive natural communities and sensitive habitats. Sensitive natural communities will be identified using the best means possible, including keying them out using the most current edition of A Manual of California Vegetation (including updated natural communities data at <a href="http://vegetation.cnps.org/">http://vegetation.cnps.org/</a>), or referring to relevant reports (e.g., reports found on the VegCAMP website).</li> <li>- map and digitally record, using a Global Positioning System (GPS), the limits of any potential sensitive habitat and sensitive natural community identified in the treatment area.</li> </ul>	X	X	X	X	X

FHFR BIO-4	Design Treatment to Avoid Loss or Degradation of Riparian Habitat Function	<p>Design Treatment to Avoid Loss or Degradation of Riparian Habitat Function. SMCP, in consultation with a qualified RPF or qualified biologist, will design treatments in riparian habitats to retain or improve habitat functions by implementing the following within riparian habitats:</p> <ul style="list-style-type: none"> <li>- Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat identified and mapped during surveys conducted pursuant to FHFR-BIO-3. Native riparian vegetation will be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities.</li> <li>- Treatments will be limited to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are characteristic of healthy stands of the riparian vegetation types characteristic of the region. This includes hand removal (or mechanized removal where topography allows) of dead or dying riparian trees and shrubs, invasive plant removal, selective thinning, and removal of encroaching upland species.</li> <li>- Removed trees will be felled away from adjacent streams or waterbodies and piled outside of the riparian vegetation zone (unless there is an ecological reason to do otherwise that is approved by applicable regulatory agencies, such as adding large woody material to a stream to enhance fish habitat, e.g., see Accelerated Wood Recruitment and Timber Operations: Process Guidance from the California Timber Harvest Review Team Agencies and National Marine Fisheries Service).</li> <li>- Vegetation removal that could reduce stream shading and increase stream temperatures will be avoided.</li> <li>- Ground disturbance within riparian habitats will be limited to the minimum necessary to implement effective treatments. This will consist of the minimum disturbance area necessary to reduce hazardous fuels and return the riparian community to a natural fire</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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	<p>regime (i.e., Condition Class 1) considering historic fire return intervals, climate change, and land use constraints.</p> <ul style="list-style-type: none"><li>- San Mateo County Parks will notify CDFW pursuant to California Fish and Game Code Section 1602 prior to implementing any treatment activities in riparian habitats. Notification, which could come in the form of a CalVTP PSA per SPR-BIO 2, will identify the treatment activities, map the vegetation to be removed, identify the impact avoidance identification methods to be used (e.g., flagging), and appropriate protections for the retention of shaded riverine habitat, including buffers and other applicable measures to prevent erosion into the waterway. Vegetation removal that could reduce stream shading and increase stream temperatures will be avoided.</li><li>- Ground disturbance within riparian habitats will be limited to the minimum necessary to implement effective treatments. This will consist of the minimum disturbance area necessary to reduce hazardous fuels and return the riparian community to a natural fire regime (i.e., Condition Class 1) considering historic fire return intervals, climate change, and land use constraints.</li><li>- Only hand application of herbicides approved for use in aquatic environments will be allowed and only during low-flow periods or when seasonal streams are dry.</li><li>- San Mateo County Parks will notify CDFW pursuant to California Fish and Game Code Section 1602 prior to implementing any treatment activities in riparian habitats. Notification, which could come in the form of a CalVTP PSA per SPR-BIO 2, will identify the treatment activities, map the vegetation to be removed, identify the impact avoidance identification methods to be used (e.g., flagging), and appropriate protections for the retention of shaded riverine habitat, including buffers and other applicable measures to prevent erosion into the waterway.</li></ul>					
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FHFR BIO-5	Avoid Environmental Effects of Type Conversion and Maintain Habitat Function in Chaparral and Coastal Sage Scrub	<p>Avoid Environmental Effects of Type Conversion and Maintain Habitat Function in Chaparral and Coastal Sage Scrub . SMCP will design treatment activities to avoid type conversion where native coastal sage scrub and chaparral are present. An ecological definition of type conversion for assessment of environmental effects: a change from a vegetation type dominated by native shrub species that are characteristic of chaparral and coastal sage scrub vegetation alliances to a vegetation type characterized predominantly by weedy herbaceous cover or annual grasslands. Type conversion is considered in terms of habitat function, which is defined here as the arrangement and capability of habitat features to provide refuge, food source, and reproduction habitat to plants and animals, and thereby contribute to the conservation of biological and genetic diversity and evolutionary processes. Some modification of habitat characteristics may occur provided habitat function is maintained (i.e., the location, essential habitat features, and species supported are not substantially changed).</p> <p>During the reconnaissance-level survey required in FHFR BIO-1, a qualified RPF or biologist will identify chaparral and coastal sage scrub vegetation to the alliance level and determine the condition class and fire return interval departure of the chaparral and/or coastal sage scrub present in each treatment area.</p> <p>For all treatment types in chaparral and coastal sage scrub, SMCP, in consultation with a qualified RPF or qualified biologist will:</p> <ul style="list-style-type: none"> <li>- Develop a treatment design that avoids environmental effects of type conversion in chaparral and coastal sage scrub vegetation alliances, which will include evaluating and determining the appropriate spatial scale at which the proponent would consider type conversion, and substantiating its appropriateness. SMCP will demonstrate with substantial evidence that the habitat function of chaparral and coastal sage scrub would be at least maintained within the identified spatial scale at which type conversion is evaluated for the specific treatment project. Consideration of factors such as site hydrology, erosion potential, suitability of wildlife habitat, spatial</li> </ul>	X	X	X	X	X
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needs of sensitive species, presence of sufficient seed plants and nurse plants, light availability, and edge effects may inform the determination of an appropriate spatial scale.

- The treatment design will maintain a minimum percent cover of mature native shrubs within the treatment area to maintain habitat function; the appropriate percent cover will be identified by SMCP in the development of treatment design and be specific to the vegetation alliances that are present in the identified spatial scale used to evaluate type conversion. Mature native shrubs that are retained will be distributed contiguously or in patches within the stand. If the stand consists of multiple age classes, patches representing a range of middle to old age classes will be retained to maintain and improve heterogeneity, to the extent needed to avoid type conversion.

These FHFR requirements apply to all treatment activities and all treatment types, including treatment maintenance.

Additional measures will be applied to ecological restoration treatment types:

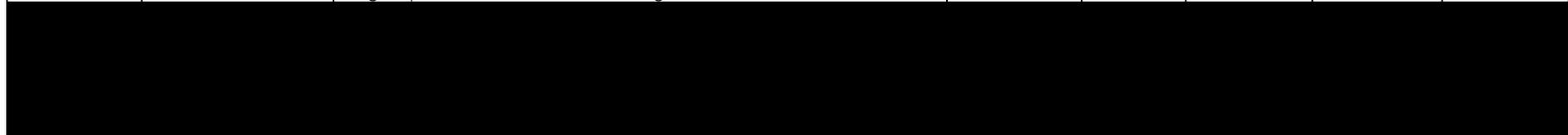
- For ecological restoration treatment types, complete removal of the mature shrub layer will not occur in native chaparral and coastal sage scrub vegetation types.
- A minimum of 35 percent relative cover of existing shrubs and associated native vegetation will be retained at existing densities in patches distributed in a mosaic pattern within the treated area or the shrub canopy will be thinned by no more than 20 percent from baseline density (i.e., if baseline shrub canopy density is 60 percent, post treatment shrub canopy density will be no less than 40 percent).

A different percent relative cover can be retained if SMCP demonstrates with substantial evidence that alternative treatment design measures would result in effects on the habitat function of chaparral and coastal sage scrub that are equal or more favorable than those expected to result from application of the above measures. Biological considerations that may inform a deviation from the minimum 35 percent relative cover retention include but are not

	<p>limited to soil moisture requirements, increased soil temperatures, changes in light/shading, presence of sufficient seed plants and nurse plants, erosion potential, and site hydrology.</p> <ul style="list-style-type: none"><li>- If the stand within the treatment area consists of multiple age classes, patches representing a range of middle to old age classes will be retained to maintain and improve heterogeneity.</li></ul> <p>These FHFR requirements apply to all treatment activities and only the ecosystem restoration treatment type, including treatment maintenance.</p> <p>A determination of compliance with the SB 1260 prohibition of type conversion in chaparral and coastal sage scrub is a statutory issue separate from CEQA compliance that may involve factors additional to the ecological definition and habitat functions presented in the CalVTP PEIR, such as geographic context. It is beyond the legal scope of the CalVTP PEIR to define SB 1260 type conversion and statutory compliance. SMCP, acting as lead agency for the proposed later treatment project, will be responsible for defining type conversion in the context of the project and making the finding that type conversion would not occur, as required by SB 1260.</p>					
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FHFR BIO-6	Prevent Spread of Plant Pathogens	<p>Prevent Spread of Plant Pathogens. When working in sensitive natural communities, riparian habitats, or oak woodlands that are at risk from plant pathogens, SMCP will implement the following best management practices to prevent the spread of Phytophthora (sudden oak death, madrone cankers) and other plant pests and pathogens (e.g., California oakworm, Annosus root disease):</p> <ul style="list-style-type: none"> <li>- clean and sanitize vehicles, equipment, tools, footwear, and clothes before arriving at a treatment site and when leaving a contaminated site, or a site in a county where contamination is a risk;</li> <li>- include training on Phytophthora diseases and other plant pests and pathogens in the worker awareness training;</li> <li>- minimize soil disturbance as much as possible by limiting the number of vehicles, avoiding off-road travel as much as possible, and limiting use of mechanized equipment;</li> <li>- minimize movement of soil and plant material within the site, especially between areas with high and low risk of contamination;</li> <li>- clean soil and debris from equipment and sanitize hand tools, buckets, gloves, and footwear when moving from high-risk to low-risk areas or between widely separated portions of a treatment area; and</li> </ul> <p>follow the procedures listed in Guidance for plant pathogen prevention when working at contaminated restoration sites or with rare plants and sensitive habitat (Working Group for Phytoptheras in Native Habitats 2016).</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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FHFR BIO-7	Survey for Special-Status Plants	<p>Survey for Special-Status Plants. If FHFR-BIO-1 determines that suitable habitat for special-status plant species is present and cannot be avoided, SMCP will require a qualified RPF or botanist to conduct protocol-level surveys for special-status plant species with the potential to be affected by a treatment prior to initiation of the treatment. The survey will follow the methods in the current version of CDFW's "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities." Surveys to determine the presence or absence of special-status plant species will be conducted in suitable habitat that could be affected by the treatment and timed to coincide with the blooming or other appropriate phenological period of the target species (as determined by a qualified RPF or botanist), or all species in the same genus as the target species will be assumed to be special-status.</p> <p>If potentially occurring special-status plants are listed under CESA or ESA, protocol-level surveys to determine presence/absence of the listed species will be conducted in all circumstances, unless determined otherwise by CDFW or USFWS.</p> <p>For other special-status plants not listed under CESA or ESA, as defined in Section 3.6.1 of this PEIR, surveys will not be required under the following circumstances:</p> <ul style="list-style-type: none"> <li>- If protocol-level surveys, consisting of at least two survey visits (e.g., early blooming season and later blooming season) during a normal weather year, have been completed in the 5 years before implementation of the treatment project and no special-status plants were found, and no treatment activity has occurred following the protocol-level survey, treatment may proceed without additional plant surveys.</li> <li>- If the target special-status plant species is an herbaceous annual, stump-sprouting, or geophyte species, the treatment may be carried out during the dormant season for that species or when the species has completed its annual lifecycle without conducting presence/absence surveys provided the treatment will not alter habitat or destroy seeds, stumps, or roots, rhizomes, bulbs and other underground parts in a way that would make it unsuitable for the target species to reestablish following treatment.</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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Invasive Plants and Wildlife		Requirement					
FHFR BIO-9	Prevent Spread of Invasive Plants, Noxious Weeds, and Invasive Wildlife	SMCP will take the following actions to prevent the spread of invasive plants, noxious weeds, and invasive wildlife (e.g., New Zealand mudsnail): clean clothing, footwear, and equipment used during treatments, for all heavy equipment and vehicles traveling off road, pressure wash, if feasible, inspect all heavy equipment, vehicles, tools, or other treatment-related materials for sand, mud, or other signs that weed seeds or propagules could be present prior to use in the treatment area, stage equipment in areas free of invasive plant infestations, identify significant infestations of invasive plant species (i.e., those rated as invasive by Cal-IPC or designated as noxious weeds by California Department of Food and Agriculture) during reconnaissance-level surveys and target them for removal during treatment activities, treat invasive plant biomass onsite to eliminate seeds and propagules, and implement Fire and Fuel Management BMPs outlined in the "Preventing the Spread of Invasive Plants.	X	X	X	X	X
Wildlife		Requirement					
FHFR BIO-10	Survey for Special-Status Wildlife and Nursery Sites	Survey for Special-Status Wildlife and Nursery Sites. If SPR BIO-1 determines that suitable habitat for special-status wildlife species or nurseries of any wildlife species is present and cannot be avoided, SMCP will require a qualified RPF or biologist to conduct focused or protocol-level surveys for special-status wildlife species or nursery sites (e.g., marbled murrelet nesting sites, bat maternity roosts, deer fawning areas) with potential to be directly or indirectly affected by a treatment activity. The survey area will be determined by a qualified RPF or biologist based on the species and habitats and any recommended buffer distances in agency protocols. The qualified RPF or biologist will determine if following an established protocol is required, and SMCP may consult with CDFW and/or USFWS for technical information regarding appropriate survey protocols. Unless otherwise specified in a protocol, the survey will be conducted no more than 14 days prior to the beginning of treatment activities. Focused or protocol surveys for a special-status species with potential to occur in the treatment area may not be required if presence of the species is assumed.	X	X	X	X	X

FHFR BIO-11	Install Wildlife-Friendly Fencing (Prescribed Herbivory).	<p>Install Wildlife-Friendly Fencing (Prescribed Herbivory). If temporary fencing is required for prescribed herbivory treatment, a wildlife-friendly fencing design will be used. SMCP will require a qualified RPF or biologist to review and approve the design before installation minimize the risk of wildlife entanglement. The fencing design will meet the following standards:</p> <ul style="list-style-type: none"> <li>- Minimize the chance of wildlife entanglement by avoiding barbed wire, loose or broken wires, or any material that could impale or snag a leaping animal; and, if feasible, keeping electric netting-type fencing electrified at all times or laid down while not in use.</li> <li>- Charge temporary electric fencing with intermittent pulse energizers; continuous output fence chargers will not be permitted.</li> <li>- Allow wildlife to jump over easily without injury by installing fencing that can flex as animals pass over it and installing the top wire low enough (no more than approximately 40 inches high on flat ground) to allow adult ungulates to jump over it. The determination of appropriate fence height will consider slope, as steep slopes are more difficult for wildlife to pass.</li> <li>- Be highly visible to birds and mammals by using high-visibility tape or wire, flagging, or other markers.</li> </ul>				<b>X</b>	
FHFR BIO-12	Protect Common Nesting Birds, Including Raptors	Protect Common Nesting Birds, Including Raptors. SMCP will schedule treatment activities to avoid the active nesting season of common native bird species, including raptors, that could be present within or adjacent to the treatment site, if feasible. Common native birds are species not otherwise treated as special-status. The active	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

nesting season will be defined by the qualified RPF or biologist. If active nesting season avoidance is not feasible, a qualified RPF or biologist will conduct a survey for common nesting birds, including raptors. Existing records (e.g., CNDDDB, eBird database, State Wildlife Action Plan) should be reviewed in advance of the survey to identify the common nesting birds, including raptors, that are known to occur in the vicinity of the treatment site. The survey area will encompass reasonably accessible areas of the treatment site and the immediately surrounding vicinity viewable from the treatment site. The survey area will be determined by a qualified RPF or biologist, based on the potential species in the area, location of suitable nesting habitat, and type of treatment. For vegetation removal or project activities that would occur during the nesting season, the survey will be conducted at a time that balances the effectiveness of detecting nests and the reasonable consideration of potential avoidance strategies. Typically, this timeframe would be up to 3 weeks before treatment. The survey will occur in a single survey period of sufficient duration to reasonably detect nesting birds, including raptors, typically one day for most treatment projects (depending on the size, configuration, and vegetation density in the treatment site), and conducted during the active time of day for target species, typically close to dawn and/or dusk. The survey may be conducted concurrently with other biological surveys, if they are required by other FHFRs. Survey methods will be tailored by the qualified RPF or biologist to site and habitat conditions, typically involving walking throughout the survey area, visually searching for nests and birds exhibiting behavior that is typical of breeding (e.g., delivering food).

If an active nest is observed (i.e., presence of eggs and/or chicks) or determined to likely be present based on nesting bird behavior, SMCP will implement a feasible strategy to avoid disturbance of active nests, which may include, but is not limited to, one or more of the following measures:

- Establish Buffer. SMCP will establish a temporary, species-

appropriate buffer around the nest sufficient to reasonably expect that breeding would not be disrupted. Treatment activities will be implemented outside of the buffer. The buffer location will be determined by a qualified RPF or biologist. Factors to be considered for determining buffer location will include: presence of natural buffers provided by vegetation or topography, nest height above ground, baseline levels of noise and human activity, species sensitivity, and expected treatment activities. Nests of common birds within the buffer need not be monitored during treatment. However, buffers will be maintained until young fledge or the nest becomes inactive, as determined by the qualified RPF, biologist, or biological technician.

- Modify Treatment. SMCP will modify the treatment in the vicinity of an active nest to avoid disturbance of active nests (e.g., by implementing manual treatment methods, rather than mechanical treatment methods). Treatment modifications will be determined by SMCP in coordination with the qualified RPF or biologist.
- Defer Treatment. SMCP will defer the timing of treatment in the portion(s) of the treatment site that could disturb the active nest. If this avoidance strategy is implemented, treatment activity will not commence until young fledge or the nest becomes inactive, as determined by the qualified RPF, biologist, or biological technician. Feasible actions will be taken by SMCP to avoid loss of common native bird nests. The feasibility of implementing the avoidance strategies will be determined by SMCP based on whether implementation of this FHFR will preclude completing the treatment project within the reasonable period of time necessary to meet CHRP objectives, including, but not limited to, protection of vulnerable communities. Considerations may include limitations on the presence of environmental and atmospheric conditions necessary to execute treatment prescriptions (e.g., the limited seasonal windows during which prescribed burning can occur when vegetation moisture, weather, wind, and other physical conditions are suitable). If it is infeasible to avoid loss of common bird nests (not including raptor nests), SMCP will document the reasons implementation of the avoidance strategies is infeasible. After completion of the treatment permit and prior to or during treatment implementation, if there is any change in the feasibility of avoidance strategies from those explained in the treatment permit, this will be documented in the post-project implementation report (referred to by CAL FIRE as a Completion Report), when applicable.

The following avoidance strategies may also be considered together with or in lieu of other actions for implementation by SMCP to avoid disturbance to raptor nests:

- Monitor Active Raptor Nest During Treatment. A qualified RPF, biologist, or biological technician will monitor an active raptor nest during treatment activities to identify signs of agitation, nest defense, or other behaviors that signal disturbance of the active nest is likely (e.g., standing up from a brooding position, flying off the nest). If breeding raptors are showing signs of nest disturbance, one of the other avoidance strategies (establish buffer, modify treatment or defer treatment) will be implemented or a pause in the treatment activity will occur until the disturbance behavior ceases.
- Retention of Raptor Nest Trees. Trees with visible raptor nests, whether occupied or not, will be retained.

FHFR BIO-13	California red-legged frog and foothill yellow-legged frog	<p>California Red-Legged Frog (<i>Rana draytonii</i>) and foothill yellow-legged frog (<i>Rana boylei</i>). The project area occurs within the historic range of California red-legged frog, so presence is assumed unless protocol-level surveys demonstrate absence.</p> <p>Avoidance and retention measures required by the Standard Project Requirements (SPR) and Mitigation Measures (MM) in the California Vegetation Treatment Program (CalVTP) Program Environmental Impact Report (PEIR) will be included in the project-specific analysis (PSA) for any Forest Health Fuels Reduction (FHFR) treatments under the Climate and Habitat Resiliency Plan. In some cases, SPRs and MMs from the PEIR are refined for the project to reflect site-specific conditions. Project-specific avoidance and retention measures shall be provided in the Project Description and the Mitigation Monitoring and Reporting Program (MMRP) of future CalVTP PSAs. Retention measures were informed in part by the recommendations in Wildfire-</p>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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		<p>Friendly Fuels Reduction in Dry Forests in the Pacific Northwest (Strong and Bevis 2016). Figures 4 and 5 from this article are provided below to show planned treatment outcomes proposed by implementing FHFRs under the Climate and Habitat Resiliency Plan.</p> <p>Habitat Retention Standards to Create a Mosaic of Vegetation</p> <p>Following Treatments:</p> <ul style="list-style-type: none"> <li>o Retain a mosaic of remaining trees comprised of approximately 100–200 healthy trees per acre generally, removing dead, dying, and diseased trees first and select live trees less than or equal (<math>\leq</math>) to 16 inches DBH.</li> <li>o Where there are only stands made up of trees less than 16 inches DBH, these stands of smaller trees will be spaced approximately 10–20 feet apart. Healthy trees less <math>\leq</math>16 inches DBH will be favored for retention over diseased trees <math>\leq</math>16 inches DBH to meet the spacing goal.</li> <li>o Retain snags greater than 12 inches DBH that are at least 100 feet from key infrastructure and recreation assets; target retention per acre is 1–2 snags per acre prioritizing snags with cavities for habitat.</li> <li>o Retention of woody debris in strategic locations to maintain forest floor complexity while reducing fuel connectivity. When masticating, operators will minimize disturbance to down wood greater than 12 inches in diameter where feasible, only moving large pieces of woody debris when necessary to reduce fire behavior or gain access to larger portions of treatment areas, with a per acre retention target of 1–4 downed logs 15 feet in length and greater than or equal to 12 inches in diameter per acre.</li> <li>o The following understory retention will be implemented to create a mosaic of vegetation to maintain suitable non-aquatic habitat for California red-legged frog: <ul style="list-style-type: none"> <li>§ Hydrophytic riparian species such as (e.g., sedges [<i>Carex</i> spp.], rushes [<i>Juncus</i> spp.], western azalea [<i>Rhododendron occidentale</i>], red elderberry [<i>Sambucus racemosa</i>] and blue elderberry [<i>Sambucus cerulea</i>], and ferns [Pteridophyta]) will be retained unless there is a safety issue, and that species needs to be removed.</li> </ul> </li> </ul>					
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		<p>§ California hazelnut (<i>Corylus cornuta</i>), where it occurs, shall be maintained at a spacing between 25–100 feet depending on frequency per acre, steepness of slope related to exacerbation of fire behavior, or proximity to key infrastructure and assets.</p> <p>§ Outside of the drip line of retained trees, shrubs (not subject to other retention standards) shall be retained to achieve a horizontal crown separation of approximately 50–75 feet. Spacing may be closer to 50 feet on flatter ground and 75 feet on steeper ground or completely removed to provide defensible space when in proximity to infrastructure or near homes within treatment areas. Remaining clumps of brush and shrubs should not exceed approximately 15–25 feet in diameter and will consist of healthy appearing specimens where feasible. At no time shall more than 66% of any contiguous stand of shrubs be removed that is mapped in a single treatment polygon unless the treatment activity is Fuel Break. Consideration shall be given to maintaining a diversity of understory vegetation, brush, and shrub species in these areas.</p> <p>§ In areas specified for retention of vegetation outside of riparian habitat, maintain associated herbaceous vegetative understory components with an overall goal of maintaining a typical minimum of approximately 5-10% herbaceous understory vegetation per acre unless removal is warranted with respect to recreation, community protection, or other key infrastructure or assets including roads and staging areas.</p> <ul style="list-style-type: none"> <li>o No cutting of California buckeye (<i>Aesculus californica</i>), California nutmeg (<i>Torreya californica</i>), California Big leaf-maple (<i>Acer macrophyllum</i>), western sycamore (<i>Platanus racemose</i>), and box elder (<i>Acer negundo</i> var. <i>californicum</i>), unless their removal is warranted for crew safety or proximity with respect to recreation or other infrastructure assets including roads and staging areas.</li> <li>o Micro stands of untreated oak trees with a cluster radius of approximately 25 feet (50-foot diameter) shall be periodically maintained throughout the project area where feasible; and should be spaced approximately 75–150 feet apart depending on the steepness of slope related to exacerbation of fire behavior or proximity to key infrastructure and assets.</li> <li>o The residual masticated material shall remain uniformly spread to the extent feasible within the project area, shall not exceed a depth of approximately 6 inches and should average 3 inches. Tracked chippers will be restricted to manual treatment units where slopes do not exceed 35 percent.</li> </ul>					
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FHFR-BIO-14	Marbled Murrelets	<p>The following recommended Best Management Practices consider the recorded localized marbled murrelet behaviors analyzed SMCP, the scale and impact of the CZU Fire to marbled murrelet habitat, and the urgency to minimize the threat of further loss of murrelet habitat as a result of extreme wildfires and climate change through proactive forest management:</p> <p>Operational Window: High decibel work (See APPENDIX H) in proximity or within areas identified as murrelet habitat, occupied or important habitat areas in Pescadero Creek County Park may begin on August 15th and continue to March 24th, except for the following conditions:</p> <ul style="list-style-type: none"> <li>o New Audio-Visual (AV) or Acoustic Recording Unit (ARU) data suggests different dates when murrelets nest in these areas.</li> <li>o High decibel work may occur year around in areas of the CZU Fire that burned at moderate-high and high severities (<a href="https://sig-gis.com/czu-lightning-complex-map/">https://sig-gis.com/czu-lightning-complex-map/</a>) within the CZU Fire where murrelet habitat was significantly compromised or destroyed.</li> <li>o Working Hours: Do not work during the dawn and dusk period in areas identified as murrelet habitat, occupied or important habitat areas that experienced low or moderate burn severity. Work from 1.5 hours after sunrise to 1 hour before sunset between March 24th – August 15th in marbled murrelet important areas within Pescadero Creek County Park.</li> </ul> <p>Noise Restrictions: Noise restrictions should be in place that address any chronic noise production or new noise that is 30-35 dB above background (See APPENDIX H). These noises should be carefully evaluated and minimized to the extent possible.</p> <ul style="list-style-type: none"> <li>o Habitat Buffer: Sound analysis work and data indicates that in areas of low to moderate fire severity identified as murrelet habitat, where occupied or important habitat areas in the Santa Cruz Mountains still exist, disturbance buffers can be reduced to 330 feet to allow larger handwork crews and mastication equipment to conduct forest restoration and resiliency treatments greater than normal routine maintenance actions and park use, from March 24th to August 15th</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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		<p>in Pescadero Creek County Park.</p> <p>Strategic Planning: Time forestry work to occur as far from murrelet habitat in the July timeframe and gradually work towards murrelet habitat as the season tapers off.</p> <p>Continued Monitoring: AV and ARU monitoring will continue in areas where these recommendations are being followed to monitor changes in murrelet behavior supporting adaptive management strategies as needed to protect the species. Survey data will be shared with Agencies as it is available post-season to adjust work windows based on new information.</p>					
Geology, Soils, and Mineral Resource		Requirement					
FHFR GEO-1	Suspend Disturbance during Heavy Precipitation	<p>Suspend Disturbance during Heavy Precipitation: SMCP will suspend mechanical and herbicide treatments if the National Weather Service forecast is a "chance" (30 percent or more) of rain within the next 12 hours from 6:00 am to 6:00 pm. Activities that cause mechanical soil disturbance may resume when precipitation stops and soils are no longer saturated (i.e., when soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur). Indicators of saturated soil conditions may include, but are not limited to: (1) areas of ponded water, (2) pumping of fines from the soil or road surfacing, (3) loss of bearing strength resulting in the deflection of soil or road surfaces under a load, such as the creation of wheel ruts, (4) spinning or churning of wheels or tracks that produces a wet slurry, or (5) inadequate traction without blading wet soil or surfacing materials.</p>	X				X
FHFR GEO-2	Limit High Ground Pressure Vehicles	<p>Limit High Ground Pressure Vehicles: SMCP will limit heavy equipment that could cause soil disturbance or compaction to be driven through treatment areas when soils are wet and saturated to avoid compaction and/or damage to soil structure. Saturated soil means that soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur. If use of heavy equipment is required in saturated areas, other measures such as operating on organic debris or using low ground pressure vehicles will be implemented to minimize soil compaction. Existing compacted road surfaces are exempted as they are already compacted from use.</p>	X				

FHFR GEO-3	Stabilize Disturbed Soil Areas	Stabilize Disturbed Soil Areas: SMCP will stabilize soil disturbed during mechanical treatment that results in exposure of bare soil over 50 percent or more of the treatment area with mulch or its equivalent immediately after treatment activities, to the maximum extent practicable, to minimize the potential for substantial sediment discharge. If mechanical treatment activities could result in substantial sediment discharge from soil disturbed by machinery, organic material from mastication or mulch will be incorporated onto at least 75 percent of the disturbed soil surface where the soil erosion hazard is moderate or high, and 50 percent of the disturbed soil surface where soil erosion hazard is low to help prevent erosion. Where slash mulch is used, it will be packed into the ground surface with heavy equipment so that it is sufficiently in contact with the soil surface.	<b>X</b>				
FHFR GEO-4	Erosion Monitoring	Erosion Monitoring: SMCP will inspect treatment areas for the proper implementation of erosion control standards and mitigations prior to the rainy season. If erosion control measures are not properly implemented, they will be remediated prior to the first rainfall event per FHFR-GEO-3 and GEO-8. Additionally, SMCP will inspect for evidence of erosion after the first large storm or rainfall event (i.e., ≥ 1.5 inches in 24 hours) as soon as is feasible after the event. Any area of erosion that will result in substantial sediment discharge will be remediated within 48 hours per the methods stated in FHFR-GEO-3 and GEO-8.	<b>X</b>	<b>X</b>			
FHFR GEO-5	Drain Stormwater via Water Breaks	Drain Stormwater via Water Breaks: SMCP will drain compacted and/or bare linear treatment areas capable of generating storm runoff via water breaks using the spacing and erosion control guidelines contained in Sections 914.6, 934.6, and 954.6(c) of the 2021 California Forest Practice Rules. Where waterbreaks cannot effectively disperse surface runoff, including where waterbreaks cause surface run-off to be concentrated on downslopes, other erosion controls will be installed as needed to maintain site productivity by minimizing soil loss.	<b>X</b>	<b>X</b>	<b>X</b>		
FHFR GEO-6	Minimize Burn Pile Size	Minimize Burn Pile Size: SMCP will not create burn piles that exceed 20 feet in length, width, or diameter, except when on landings, road surfaces, or on contour to minimize the spatial extent of soil damage. In addition, burn piles will not occupy more than 15 percent of the total treatment area (Busse et al. 2014). The project proponent will not locate burn piles in a Watercourse and Lake Protection Zone as defined in 14 CCR Section 916.5 of the 2021 California Forest Practice Rules.	<b>X</b>	<b>X</b>	<b>X</b>		

FHFR GEO-7	Minimize Erosion	<p>Minimize Erosion: To minimize erosion, SMCP will:</p> <p>(1) Prohibit use of heavy equipment where any of the following conditions are present:</p> <p>(i) Slopes steeper than 65 percent.</p> <p>(ii) Slopes steeper than 50 percent where the erosion hazard rating is high or extreme based on calculations obtained pursuant to 14 CCR Section 912.5.</p> <p>(iii) Slopes steeper than 50 percent that lead without flattening to sufficiently dissipate water flow and trap sediment before it reaches a watercourse or lake.</p> <p>On slopes between 50 percent and 65 percent where the erosion hazard rating is moderate, and all slope percentages are for average slope steepness based on sample areas that are 20 acres, or less, heavy equipment will be limited to:</p> <p>(i) Existing tractor roads that do not require reconstruction, or</p> <p>(ii) New tractor roads flagged by SMCP prior to the treatment activity.</p> <p>Prescribed herbivory treatments will not be used in areas with over 50 percent slope.</p>	X				
FHFR GEO-8	Steep Slopes	<p>Steep Slopes: SMCP will require a Registered Professional Forester (RPF) or licensed geologist to evaluate treatment areas with slopes greater than 50 percent for unstable areas (areas with potential for landslide) and unstable soils (soil with moderate to high erosion hazard). If unstable areas or soils are identified within the treatment area, are unavoidable, and will be potentially directly or indirectly affected by the treatment, a licensed geologist (P.G. or C.E.G.) will determine the potential for landslide, erosion, of other issue related to unstable soils and identify measures (e.g., those in FHFR-GEO-7) that will be implemented by SMCP such that substantial erosion or loss of topsoil would not occur to avoid adverse impacts to TMDL requirements.</p>	X	X			
<b>Greenhouse Gas Emissions</b>		<b>Requirement</b>					
FHFR GHG-1	Contribute to the AB 1504 Carbon Inventory Process	<p>SMCP will be subject to the AB 1504 process will provide all necessary data about the treatment that is needed by the U.S. Forest Service and FRAP to fulfill requirements of the AB 1504 carbon inventory</p>	X	X	X		

Hazardous Material and Public Health		Requirement					
FHFR HAZ-1	Maintain All Equipment	Maintain All Equipment: SMCP will maintain all diesel- and gasoline-powered equipment per manufacturer's specifications, and in compliance with all state emissions requirements defined by the California Air Resources Board. Maintenance records will be made available for verification. Prior to the start of treatment activities, SMCP will inspect all equipment for leaks and inspect everyday thereafter until equipment is removed from the site. Any equipment found leaking will be promptly removed from the treatment area.	X	X	X	X	X
FHFR HAZ-2	Require Spark Arrestors	Require Spark Arrestors: SMCP will require mechanized hand tools to have federal- or state-approved spark arrestors.		X			
FHFR HAZ-3	Require Fire Extinguishers	Require Fire Extinguishers: SMCP will require tree cutting crews to carry one fire extinguisher per chainsaw. Each vehicle would be equipped with one long-handled shovel and one axe or Pulaski consistent with PRC Section 4428.		X			
FHFR HAZ-4	Prohibit Smoking in Vegetated Areas	Prohibit Smoking in Vegetated Areas: SMCP will require that smoking is only permitted in designated smoking areas barren or cleared to mineral soil at least 3 feet in diameter (PRC Section 4423.4).	X	X	X	X	X
FHFR HAZ-5	Spill Prevention and Response Plan	Spill Prevention and Response Plan: SMCP or licensed Pest Control Advisor (PCA) will prepare a Spill Prevention and Response Plan (SPRP) prior to beginning any herbicide treatment activities to provide protection to onsite workers, the public, and the environment from accidental leaks or spills of herbicides, adjuvants, or other potential contaminants. The SPRP will include (but not be limited to): <ul style="list-style-type: none"> <li>- a map that delineates staging areas, and storage, loading, and mixing areas for herbicides;</li> <li>- a list of items required in an onsite spill kit that will be maintained throughout the life of the activity;</li> <li>- procedures for the proper storage, use, and disposal of any herbicides, adjuvants, or other chemicals used in vegetation treatment.</li> </ul>					X

FHFR HAZ-6	Comply with Herbicide Application Regulations	<p>Comply with Herbicide Application Regulations: SMCP will coordinate pesticide use with the applicable County Agricultural Commissioner(s), and all required licenses and permits will be obtained prior to herbicide application. SMCP will prepare all herbicide applications to do the following:</p> <ul style="list-style-type: none"> <li>- Be implemented consistent with recommendations prepared annually by a licensed PCA.</li> <li>- Comply with all appropriate laws and regulations pertaining to the use of pesticides and safety standards for employees and the public, as governed by the EPA, DPR, and applicable local jurisdictions.</li> <li>- Adhere to label directions for application rates and methods, storage, transportation, mixing, container disposal, and weather limitations to application such as wind speed, humidity, temperature, and precipitation.</li> <li>- Be applied by an applicator appropriately licensed by the State.</li> </ul>					<b>X</b>
FHFR HAZ-7	Triple Rinse Herbicide Containers	<p>Triple Rinse Herbicide Containers: SMCP will triple rinse all herbicide and adjuvant containers with clean water at an approved site, and dispose of rinsate by placing it in the batch tank for application per 3 CCR Section 6684. SMCP will puncture used containers on the top and bottom to render them unusable, unless said containers are part of a manufacturer's container recycling program, in which case the manufacturer's instructions will be followed. Disposal of non-recyclable containers will be at legal dumpsites. Equipment will not be cleaned, and personnel will not be washed in a manner that would allow contaminated water to directly enter any body of water within the treatment area or adjacent watersheds. Disposal of all herbicides will follow label requirements and waste disposal regulations.</p>					<b>X</b>
FHFR HAZ-8	Minimize Herbicide Drift to Public Areas	<p>Minimize Herbicide Drift to Public Areas: The project proponent SMCP will employ the following herbicide application parameters during herbicide application to minimize drift into public areas:</p> <ul style="list-style-type: none"> <li>- application will cease when weather parameters exceed label specifications or when sustained winds at the site of application exceeds 7 miles per hour (whichever is more conservative);</li> <li>- spray nozzles will be configured to produce the largest appropriate droplet size to minimize drift;</li> <li>- low nozzle pressures (30-70 pounds per square inch) will be utilized to minimize drift; and</li> <li>- spray nozzles will be kept within 24 inches of vegetation during spraying.</li> </ul>					<b>X</b>

FHFR HAZ-9	Notification of Herbicide Use in the Vicinity of Public Areas	Notification of Herbicide Use in the Vicinity of Public Areas: For herbicide applications occurring within or adjacent to public recreation areas, residential areas, schools, or any other public areas within 500 feet, the project proponent SMCP will post signs at each end of herbicide treatment areas and any intersecting trails notifying the public of the use of herbicides. The signs will include the signal word (i.e., Danger, Warning or Caution), product name, and manufacturer; active ingredient; EPA registration number; target pest; treatment location; date and time of application; restricted entry interval, if applicable per the label requirements; date which notification sign may be removed; and a contact person with a telephone number. Signs will be posted prior to the start of treatment and notification will remain in place for at least 72 hours after treatment ceases.					<b>X</b>
Hydrology and Water Quality		Requirement					
FHFR HYD-1	Comply with Water Quality Regulations	Comply with Existing Lake and Streambed Alteration Agreement: An existing Lake and Streambed Alteration Agreement (Notification No. 1600-2019-0144-R3) between the California Department of Fish and Wildlife (CDFW) and the County of San Mateo Public Works Department (Permittee) provides terms and conditions, agreed upon pursuant to Fish and Game Code, to allow for routine maintenance activities to be conducted within San Mateo County pursuant to the Routine Maintenance Manual. SMCP The project proponent will comply with all applicable routine maintenance requirements and allowable activities authorized by CDFW under the agreement in areas where sensitive species have the potential to occur, in order to prevent take of state listed or fully protected species.	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

FHFR HYD-2	Comply with Regional Water Quality Regulations	<p>Comply with Regional Water Quality Regulations: SMCP must also conduct proposed vegetation treatments in conformance with the San Francisco Bay Regional Water Quality Control Board timber, vegetation, and land disturbance related Waste Discharge Requirements (WDRs) and/or related Conditional Waivers of Waste Discharge Requirements (Waivers), and Basin Plan prohibitions. Where these regulatory requirements differ, the most restrictive will apply</p> <p>SMCP will comply with all applicable water quality requirements adopted by the San Francisco Bay RWQCB Basin Plan , which includes the Pescadero-Butano Watershed Sediment TMDL and Habitat Enhancement Plan (Section 7.4.2), in order to prevent degradation of the quality and Beneficial Uses of water consistent with 14 CCR § 916.2[936.2,956.2].</p>	X	X	X	X	X
FHFR HYD-3	Water Quality Protections for Prescribed Herbivory	<p>Water Quality Protections for Prescribed Herbivory: SMCP will include the following water quality protections for all prescribed herbivory treatments:</p> <ul style="list-style-type: none"> <li>- Environmentally sensitive areas such as waterbodies, wetlands, or riparian areas will be identified in the treatment prescription and excluded from prescribed herbivory project areas using temporary fencing or active herding. A buffer of approximately 50 feet will be maintained between sensitive and actively grazed areas.</li> <li>- Water will be provided for grazing animals in the form of an on-site stock pond or a portable water source located outside of environmentally sensitive areas.</li> <li>- Treatment prescriptions will be designed to protect soil stability. Grazing animals will be herded out of an area if accelerated soil erosion is observed.</li> </ul>				X	

FHFR HYD-4	Identify and Protect Watercourse and Lake Protection Zones (WLPZ)	<p>Identify and Protect Watercourse and Lake Protection Zones: SMCP will establish Watercourse and Lake Protection Zones (WLPZs) on either side of watercourses as defined in the table below, which is taken from 14 CCR Section 916.5 of the 2021 California Forest Practice Rules. WLPZ's are classified based on the uses of the stream and the presence of aquatic life. Wider WLPZs are required for steep slopes. The following WLPZ protections will be applied for all treatments:</p> <ul style="list-style-type: none"> <li>- Treatment activities with WLPZs will retain at least 75 percent canopy cover and 50 percent surface cover and undisturbed area to act as a filter strip for raindrop energy dissipation and for wildlife habitat. If this percentage is reduced, a qualified RPF will provide SMCP with a site- and/or treatment activity-specific explanation for the percent surface cover reduction. This requirement is based on 14 CCR Section 916.4 [936.4, 956.4] Subsection (b)(6) and 14 CCR Section 916.5.</li> <li>- Equipment, including tractors and vehicles, must not be driven in wet areas or WLPZs, except over existing roads or watercourse crossings where vehicle tires or tracks remain dry.</li> <li>- Equipment used in vegetation removal operations will not be fueled or serviced within 65 feet of a watercourse, within wet meadows or other wet areas, or in locations that would allow grease, oil, or fuel to pass into lakes, watercourses, or wet areas.</li> <li>- WLPZs will be kept free of slash, debris, and other material that harm the beneficial uses of water. Accidental deposits will be removed immediately.</li> <li>- Burn piles will be located outside of WLPZs.</li> <li>- No fire ignition (nor use of associated accelerants) will occur within WLPZs; however, low intensity backing fires may be allowed to enter or spread into WLPZs.</li> <li>- Pursuant to 14 CCR 916.7, within Class I and Class II WLPZs, locations where project operations expose a continuous area of mineral soil 800 square feet or larger shall be treated for reduction of soil loss. Treatment shall occur prior to October 15th and disturbances that are created after October 15th shall be treated</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
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within 10 days. Stabilization measures shall be selected that will prevent significant movement of soil into water bodies and may include but are not limited to mulching, rip-rap, grass seeding, or chemical soil stabilizers.

Where mineral soil has been exposed by project operations on approaches to watercourse crossings of Class I, II, or III within a WLPZ, the disturbed area shall be stabilized to the extent necessary to prevent the discharge of soil into watercourses or lakes in amounts that would adversely affect the quality and beneficial uses of the watercourse.

Where necessary to protect beneficial uses of water from project operations, protection measures such as seeding, mulching, or replanting shall be used to retain and improve the natural ability of the ground cover within the WLPZ to filter sediment, minimize soil erosion, and stabilize banks of watercourses and lakes.

- Equipment limitation zones (ELZs) will be designated adjacent to Class III watercourses with minimum widths of 30 feet where side-slope is less than 30 percent and 50 feet where side-slope is 30 percent or greater. An RPF will describe the limitations of heavy equipment within the ELZ and, where appropriate, will include additional measures to protect the beneficial uses of water.

FHFR HYD-5	Protect Non-Target Vegetation and Special-status Species from Herbicides	<p>Protect Non-Target Vegetation and Special-status Species from Herbicides: SMCP will implement the following measures when applying herbicides:</p> <ul style="list-style-type: none"> <li>- Locate herbicide mixing sites in areas devoid of vegetation and where there is no potential of a spill reaching non-target vegetation or a waterway.</li> <li>- Use only herbicides labeled for use in aquatic environments when working in riparian habitats or other areas where there is a possibility the herbicide could come into direct contact with water. Only hand application of herbicides will be allowed in riparian habitats and only during low-flow periods or when seasonal streams are dry.</li> <li>- No terrestrial or aquatic herbicides will be applied within WLPZs of Class I and II watercourses, if feasible. If this is not feasible, hand application of herbicides labeled for use in aquatic environments may be used within the WLPZ provided that SMCP notifies San Francisco Bay Regional Water Quality Control Board no fewer than 15 days prior to herbicide application. The feasibility of avoiding herbicide application within WLPZ of Class I and II watercourses will be determined by SMCP and may be based on whether doing so will preclude achieving program objectives, including, but not limited to, protection of vulnerable communities and health of the Pescadero-Butano . The reasons for infeasibility will be documented in the permit.</li> <li>- No herbicides will be applied within a 50-foot buffer of ESA or CESA listed plant species or within 50 feet of dry vernal pools.</li> <li>- For spray applications in and adjacent to habitats suitable for special-status species, use herbicides containing dye (registered for aquatic use by DPR, if warranted) to prevent overspray.</li> <li>- Application will cease when weather parameters exceed label specifications or when sustained winds at the site of application exceeds 7 miles per hour (whichever is more conservative); Spray application of herbicides will not be carried out when wind speeds are 7 miles per hour or greater.</li> <li>- No herbicide will be applied during precipitation events or if precipitation is forecast 24 hours before or after project activities.</li> </ul> <p>This FHFR applies to herbicide treatment activities and all treatment types, including treatment maintenance.</p>					x
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Noise		Requirement					
FHFR NOI-1	Limit Heavy Equipment Use to Daytime Hours	Limit Heavy Equipment Use to Daytime Hours: SMCP will require that operation of heavy equipment associated with treatment activities (heavy off-road equipment, tools, and delivery of equipment and materials) will occur during daytime hours if such noise would be audible to receptors (e.g., residential land uses, schools, hospitals, places of worship). Per San Mateo County Code of Ordinances Title 4, Chapter 4.88, activities associated with noise-generating vegetation treatment will be limited to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, and between 9:00 a.m. and 5:00 p.m. on Saturdays. Noise-generating treatment activities are not permitted to take place on Sundays, Thanksgiving Day, or Christmas Day. If SMCP is not subject to local ordinances (e.g., CAL FIRE), it will adhere to the restrictions stated above or may elect to adhere to the restrictions identified by the local ordinance encompassing the treatment area.	X	X			
FHFR NOI-2	Equipment Maintenance	Equipment Maintenance: SMCP will require that all powered treatment equipment and power tools will be used and maintained according to manufacturer specifications. All diesel- and gasoline-powered treatment equipment will be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations.	X	X	X		
FHFR NOI-3	Engine Shroud Closure	Engine Shroud Closure: SMCP will require that engine shrouds be closed during equipment operation.	X				
FHFR NOI-4	Locate Staging Areas Away from Noise-Sensitive Land Uses	Locate Staging Areas Away from Noise-Sensitive Land Uses: SMCP will locate treatment activities, equipment, and equipment staging areas away from nearby noise-sensitive land uses (e.g., residential land uses, schools, hospitals, places of worship), to the extent feasible, to minimize noise exposure.	X	X	X	X	X
FHFR NOI-5	Restrict Equipment Idle Time	Restrict Equipment Idle Time: SMCP will require that all motorized equipment be shut down when not in use. Idling of equipment and haul trucks will be limited to 5 minutes.	X	X			

FHFR NOI-6	Notify Nearby Off-Site Noise-Sensitive Receptors	Notify Nearby Off-Site Noise-Sensitive Receptors: For treatment activities utilizing heavy equipment, SMCP will notify noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship) located within 1,500 feet of the treatment activity. Notification will include anticipated dates and hours during which treatment activities are anticipated to occur and contact information, including a daytime telephone number, of the project representative. Recommendations to assist noise-sensitive land uses in reducing interior noise levels (e.g., closing windows and doors) will also be included in the notification.	X				
Recreation		Requirement					
FHFR REC-1	Notify Recreational Users of Temporary Closures	Notify Recreational Users of Temporary Closures. If a treatment activity would require temporary closure of a public recreation area or facility, San Mateo County Parks SMCP reserves the right to implement necessary closures along trails and park roads to preserve public safety. If temporary closure of a recreation area or facility is required, San Mateo County Parks will post notifications of the closure at least 2 weeks prior to the commencement of the treatment activities.	X	X	X	X	X
Transportation		Requirement					
FHFR TRAN-1	Implement Traffic Control during Treatments	Implement Traffic and Pedestrian Control during Treatments: Prior to initiating vegetation treatment activities, SMCP will implement necessary traffic and pedestrian control over affected roadways and public trails during treatment activities. A Traffic Management Plan (TMP) will be developed if traffic generated by the project would result in obstructions, hazards, or delays exceeding applicable San Mateo County Department of Public Works standards along access routes for individual vegetation treatments. If needed, a TMP will be prepared to provide measures to reduce potential traffic obstructions, hazards, and service level degradation along affected roadway facilities. The scope of the TMP will depend on the type, intensity, and duration of the specific treatment activities. Measures could include, but are not limited to, construction signage to provide motorists and pedestrians with notification and information when approaching or traveling along the affected roadway facilities, trail or park closures, flaggers for lane closures to provide temporary traffic control along affected roadway facilities, treatment schedule restrictions to avoid seasons or time periods of	X	X	X	X	X

		peak vehicle traffic, haul-trip, delivery, and/or commute time restrictions that would be implemented to avoid peak traffic days and times along affected roadway facilities.						
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FHFR TRAN-2	Smoke Management Specific to Traffic Operations	Smoke Management Specific to Traffic Operations Smoke generated during prescribed burn operations could potentially affect driver visibility and traffic operations along nearby county-maintained roadways that may include, but are not limited to, Pescadero Road, Alpine Road, and Wurr Road. Direct smoke impacts to roadway visibility and indirect impacts related to driver distraction will be considered during the planning phase of burning operations. Smoke impacts and smoke management practices specific to traffic operations during prescribed fire operations will be identified and addressed within the TMP. The TMP will include measures to monitor smoke dispersion onto public roadways, and traffic control operations will be initiated in the event burning operations could affect traffic safety along any roadways.			X			
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Public Services and Utilities		Requirement					
FHFR UTIL-1	Solid Organic Waste Disposition Plan	Solid Organic Waste Disposition Plan. For projects requiring the disposal of material outside of the treatment area, SMCP will prepare an Organic Waste Disposition Plan prior to initiating treatment activities. The Solid Organic Waste Disposition Plan will include the amount (e.g., tons) of solid organic waste to be managed onsite (i.e., scattering of wood materials, generating unburned piles, and pile burning) and transported offsite for processing (i.e., biomass power plant, wood product processing facility, composting). If SMCP intends to transport solid organic waste offsite, the Solid Organic Waste Disposition Plan will clearly identify the location and capacity of the intended processing facility, consistent with local and state regulations to demonstrate that adequate capacity exists to accept the treated materials.	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

## **APPENDIX F: FOREST DENSITY REDUCTION TREATMENT STANDARDS**

*This page intentionally left blank; Forest Density Reduction Treatment Standards follow*

**CLIMATE AND HABITAT RESILIENCY PLAN - FOREST DENSITY REDUCTION TREATMENT STANDARDS**

<b>X = Forest Density Reduction Treatment Standards Apply</b>			<b>Forest Density Reduction</b>
<b>Forest Density Reduction (FDR) Treatment Standards</b>		<b>Requirement</b>	
FDR SILV-1	Silviculture	<p>Only un-even aged silvicultural methods shall be applied that meet the following standards:</p> <ul style="list-style-type: none"> <li>- a 10-year re-entry period shall apply to plans that propose to remove ≤50 percent of trees &gt;18" DBH.</li> <li>- Density reduction treatments will retain 60% or more of trees 12" – 18" DBH.</li> <li>- Density reduction treatments will retain 50% or more of trees &gt;18" DBH.</li> <li>- For second growth trees &gt;38" DBH, a minimum retention average of 10-15 trees per acre shall be maintained across a treatment area when existing stand conditions allow for it.</li> <li>- During any 10-year re-entry period, no more than 33% of second growth trees &gt;38" DBH may be removed within any treatment area.</li> </ul> <p>o Within treatment areas, an average of 10-15 trees &gt;38" DBH per acre at a minimum shall be marked with a "W" on the bole to be retained as a "development tree". Development Trees are those selected for long-term resiliency in a stand as individuals with potential for becoming future old growth trees. "W"s marked on trees shall face away from roads, trails, and the public viewshed to the extent feasible.</p> <p>§ It is possible these trees may need to be substituted or replaced for various issues over time including, but not limited to, becoming a hazard, death or dying, damage by fire, or its position in the grove is compromised with respect to another tree that is healthier, more vigorous and has taken the appropriate dominant position in the grove to become the new "W" tree.</p>	<b>X</b>

		<p>o Leave trees shall be thrifty coniferous trees, which are dominant or co-dominant in crown class prior to timber harvesting or which have crowns typical of such dominant or co-dominant trees. They shall be free from significant damage caused by timber operations. No conifer shall be cut which is more than 22.9 m (75 feet) from a leave tree 30.5 cm (12 in.) DBH or larger located within the logging area. Any density reduction treatments shall maintain minimum basal area standards based on the Site Class of the treatment area.</p> <ul style="list-style-type: none"><li>- A minimum basal area of 180 sq. ft. per acre shall be retained on Site Class II lands.</li><li>- A minimum basal area of 150 sq. ft. per acre shall be retained on Site Class II lands.</li></ul>	
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FDR OG-1	Old Growth	<p>No old growth trees, live or dead, will be cut. Old growth characteristic redwood and Douglas-fir trees can be described as being approximately 60 inches at DBH and were present in the dominant overstory during the late successional stages of forest development of the first-growth stands (pre 1800's). These trees have outward indicators such as platy bark with deep fissures, basal hollows with fire scars of multiple ages, large complex branching structures, flat tops, and limbs at least 8-10 inches in diameter that provide an opportunity for platforms/nesting. In very rare instances, a downed log may be milled for park infrastructure, or an old growth tree might have to be cut for workplace or a public safety issue.</p>	<b>X</b>
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FDR WRTS-1	Wildlife Tree Retention and Snags	<p>Tree marking shall be conducted with consideration for wildlife tree retention and snags using the following characteristics as a guide:</p> <ul style="list-style-type: none"> <li>- Redwoods with boles having at least 75% defect;</li> <li>- Trees with "goose-pens" boles (basal cavities) extending four feet or more above the ground level and hollowing out more than 50% of the stem basal area</li> <li>- Stand alone granary trees (granary trees are redwood or Douglas-fir trees with numerous holes in the bark that are used by woodpeckers to store acorns);</li> <li>- Stand alone Douglas-firs with "woffy" branching structure, including large, spreading limbs and/or large crown;</li> <li>- Douglas-fir trees significantly infected (50% or more of the tree visibly affected) with <i>Fomes pini</i>;</li> <li>- Hardwoods <math>\leq 24</math> inches DBH, where present on site not directly inhibiting growth of conifers. If 24" DBH trees are not available, next largest diameters on site can be utilized.</li> <li>- Deformed stems including dead, reiterated, or flat tops, epicormic branching or platforms.</li> <li>- Isolated or unique trees exhibiting multiple characteristics are preferred wildlife trees and shall be retained unless removal is specifically needed to address unavoidable safety hazards, forest health fuels reduction, grassland encroachment, or pertaining to infrastructure utilization. These trees shall not be painted and will therefore be retained. The RPF shall complete a sample mark of the harvest trees prior to the PHI for review.</li> <li>- Contractor shall consider maintaining an appropriate number of snags within the harvest area; at least 1-2 per acre. The only instance in which snags shall be felled in excess of this number is in the case of crew safety.</li> </ul>	<b>X</b>
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FDR LTO-1	Felling Instructions to Licensed Timber Operator	Trees to be cut will be marked by the RPF or a supervised designee prior to felling operations with a horizontal stripe of blue paint on at least two sides as well as a painted stump mark. Marking will focus on removal of poorer growing trees, while providing for spacing, release potential, aesthetics, and retention of wildlife habitat. All operations will be conducted to minimize damage to residual conifer species. j The fallers shall consult with the RPF or a supervised designee on any and all questionable tree marking.; Falling of trees across Class III watercourses is allowed in the general logging season, unless water is present. If water is present, trees shall be felled away from Class III watercourses.	<b>X</b>
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<p>FDR FP-1</p>	<p>Forest Pathogens</p>	<p>Measures to mitigate adverse infestations or infections:</p> <ul style="list-style-type: none"> <li>- Pitch Canker: The plan area is located within the Coastal Pitch Canker Zone of Infestation. Pitch Canker is caused by the fungus <i>Fusarium subglutinans</i>, sp. pini. Several native conifer species known to exist in the general vicinity of the plan area (San Mateo County) are susceptible to the disease, including: Monterey pine (<i>Pinus radiata</i>), knobcone pine (<i>Pinus attenuata</i>), ponderosa pine (<i>Pinus ponderosa</i>), and Douglas-fir (<i>Pseudotsuga menziesii</i>). No pitch canker symptoms have been observed at PCCP, although Douglas-fir is present. The disease is spread by a variety of insects that carry the pathogen and bore into the host species. Management for the disease is limited to controlling availability of vector breeding material, restricting planting of host species, and controlling presence of the inoculum. No trees known to be infected with pitch canker will be cut as part of the proposed harvest. Proposed operations should not increase the incidence of the disease in the harvest area, if observed.</li> <li>- Sudden Oak Death: The THP is located within the Zone of Infestation for Sudden Oak Death. The California Oak Mortality Task Force monitors the distribution of sudden oak death at (<a href="http://www.suddenoakdeath.org">www.suddenoakdeath.org</a>). Sudden Oak Death may be present in limited amounts within the project area, but it is not having an adverse impact on forest health. The RPF has seen scattered tanoaks in the harvest area with outward indicators of Sudden Oak Death and recognizes the disease is present in the general project area.</li> <li>- The THP shall function as the compliance agreement</li> </ul>	<p><b>X</b></p>
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to allow for the removal of hardwood from the project area for commercialization for the duration of the approved THP. If hardwood removal is to occur as a part of this THP and SOD regulations have been revised, the RPF shall amend the plan to conform to current regulations. To function as the compliance agreement, the following information and mitigation is contained in the THP:

- Counties regulated for Sudden Oak Death at the time of plan submittal include Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma and Trinity.

; Regulated Hosts:

*Acer macrophyllum*\* Bigleaf maple

*Acer pseudoplatanus* Planetree maple

*Adiantum aleuticum*\* Western maidenhair fern

*Adiantum jordanii*\* California maidenhair fern

*Aesculus californica*\* California buckeye

*Aesculus hippocastanum* Horse chestnut

*Arbutus menziesii*\* Madrone

*Arctostaphylos manzanita*\* Manzanita

*Calluna vulgaris*\* Scotch heather

*Camellia* spp.\* Camellia - all species, hybrids and cultivars

*Castanea sativa*\* Sweet chestnut

*Cinnamomum camphora*\* Camphor tree

*Fagus sylvatica* European beech

*Frangula californica* California coffeeberry

*Frangula purshiana* Cascara

*Fraxinus excelsior* European ash

*Gaultheria procumbens*\* Eastern teaberry

*Griselinia littoralis*\* Griselinia

*Hamamelis virginiana*\* Witch hazel

		<p>Heteromeles arbutifolia* Toyon  Kalmia spp.* Mountain laurel - all species, hybrids and cultivars  Laurus nobilis* Bay laurel  Lithocarpus densiflorus Tanoak  Lonicera hispidula* California honeysuckle  Maianthemum racemosum False Solomon's seal  Michelia doltsopa* (Magnolia dolstopa), Michelia  Parrotia persica* Persian ironwood  Photinia fraseri* Red tip photinia  Pieris spp.* Andromeda, Pieris - all species, hybrids and cultivars  Pseudotsuga menziesii var. Menziesii, Douglas fir  Quercus agrifolia Coast live oak  Quercus cerris European turkey oak  Quercus chrysolepis Canyon live oak  Quercus falcata Southern red oak Quercus ilex* Holm oak  Quercus kelloggii California black oak  Quercus parvula var. shrevei Shreve's oak  Rhododendron spp.* Rhododendron (including azalea) –  Rosa gymnocarpa* Wood rose  Salix caprea* Goat willow  Sequoia sempervirens* Coast redwood</p> <p>Syringa vulgaris* Lilac  Taxus baccata* European yew  Trientalis latifolia* Western starflower  Umbellularia californica* California bay laurel, pepperwood, Oregon myrtle  Vaccinium ovatum* Evergreen huckleberry  Viburnum spp.* Viburnum – all species, hybrids and cultivars</p> <p>- Coast live oak, tanoak and madrone may be removed from the THP area either as logs stripped of branches, hardwood rounds, or split firewood. No host foliage will be removed from the project area.</p>	
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		<ul style="list-style-type: none"><li>- Host material will not be moved outside of the regulated area.</li><li>- The approved THP will function as the compliance agreement to allow for the movement of hardwood within the regulated area.</li><li>- Hardwood removed from the THP area will go to a distributor located in San Mateo, Santa Cruz, or Santa Clara County.</li><li>- No material from host plants less than four inches in diameter will be removed from the THP area.</li><li>- The LTO will visually inspect all vehicles containing host material leaving the project area to insure that the vehicles are free of host plant debris (leaves, twigs, and branches).</li><li>- Host material greater than 4 inches in diameter does not require a closed container for transportation.</li><li>- An amendment will be submitted if SOD information or mitigation measures change.</li><li>- Prior to entering the plan area and upon leaving the plan area, heavy equipment, saws and boots shall have accumulations of soil, mud, and organic debris removed or washed off and sanitized using a disinfectant solution (e.g. Lysol spray, bleach) not less than 100 feet from any watercourse with no solution reaching a watercourse.</li></ul>	
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<p>FDR SS-1</p>	<p>Soil Stabilization</p>	<p>Unless noted elsewhere in the plan at a specific mitigation point, the following will apply for the treatment of roads, landings, temporary crossings, skid trails and bared areas; All skid trails utilized (existing or proposed) in the operation shall be oFHFRloped to the extent possible (except where stated otherwise) and waterbarred. Skid trail sections on steeper ground and sections near watercourses shall be surfaced with tractor-crushed slash or hand spread slash, where feasible, following completion of use, or as otherwise specified in the plan. ; Landings shall be sloped or ditched to prevent water from accumulating on the landings. Discharge points shall be located and designed to reduce erosion. Landing surfaces shall be treated with effective erosion control measures upon completion of operations, prior to the winter period.; Effective Erosion Control Measures may include, but are not limited to, seed (preferred is a sterile barley and not including annual rye), weed free straw mulch, tractor crushed slash, or hand placed slash.; Grass seeding for Effective Erosion Control purposes may include seeding at an application rate of 25 – 35 lbs. per acre at the discretion of the RPF or his supervised designee. Barley, wheat or other species known to effectively control surface erosion may be spread (not including annual rye). Other recommended seed species includes California brome and blue wild rye. ; The RPF, or his supervised designee, shall flag the location of all waterbreaks on the truck roads prior to installation. Truck roads shall be oFHFRloped where feasible. The LTO shall install waterbreaks on truck roads and skid trails at a moderate or high EHR spacing throughout the project area, unless extreme</p>	<p><b>X</b></p>
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		<p>EHR spacing is specified at a specific mitigation point. Waterbars shall always be placed in a manner where the outlet drains to a stable soil configuration to minimize sediment movement or road failure. 14CCR 914.6(c) Maximum Distance Between Waterbreaks (in feet); Per 923.5(e) where waterbreaks are to be used to control surface runoff on logging roads, the waterbreaks shall be cut diagonally a minimum of six inches into the firm roadbed and shall have a continuous firm embankment of at least six inches in height immediately adjacent to the lower edge of the waterbreak cut. Per 923.5(g) Where sloping and rolling dips are used to control surface runoff of logging roads, the dip in the logging road grade shall be sufficient to capture runoff from the logging road surface. Per 923.5(h) Drainage facilities and structures shall discharge into vegetation, woody debris, or rock wherever possible. Where erosion-resistant material is not present, slash, rock, or other energy dissipating material shall be installed below the drainage facility or drainage structure outlet as necessary to minimize soil erosion and sediment transport and to prevent significant sediment discharge. Per 916.9(m) all tractor roads shall have drainage and/or drainage collection and storage facilities installed as soon as practical following yarding and prior to either (1) start of any rain which causes overland flow across or along the disturbed surface within a WLPZ or within any ELZ or EEZ designated for watercourse or lake protection, or (2) any day with a National Weather Service forecast of a chance of rain of 30 percent or more, a flash flood warning, or a flash flood watch. Sidecast or fill material extending more than 20 ft. in slope distance from the edge of the</p>	
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roadbed which has access to a watercourse or lake which is protected by a WLPZ shall be seeded, slash packed, planted, mulched, removed or treated as specified in the THP to adequately reduce soil erosion. ; Sidecast or fill material extending more than 20 ft. in slope distance from the oFHFRide edge of the landing and which has access to a watercourse or lake shall be seeded, slash packed, planted, mulched, removed, or treated as specified in the THP to adequately reduce soil erosion.; Sidecast treated in place will be laid back to a slope not to exceed 66% prior to treatment. If removed, sidecast will be incorporated into the roadbed or taken to a stable location oFHFRide of the WLPZ. ; Areas in the WLPZ exceeding 100 contiguous square feet where timber operations have exposed bare soil or any other area of disturbed soil that threatens to discharge sediment into waters in amounts deleterious to the quality and beneficial uses of water shall be treated with mulching. ; Slash Pack Guidelines for the LTO:□ The slash should be small enough in diameter so that it can be crushed and embedded into the soil by track walking over it with a cat; generally 2 to 3 inch diameter and smaller.□ Place slash on the bare soil surface, by hand or with equipment, so that at least 90% of the ground surface is covered with slash.□ The slash should be placed no more than 1 foot thick, so that it can be effectively crushed and embedded in the soil by the cat.□ After the slash is placed, the cat should walk over the slash until most of the pieces of slash are touching the ground, and most of the length of any individual piece of slash is in contact with the ground.; Saturated Soil Conditions: Use of logging roads, tractor roads, or landings shall not take place at any location where saturated soil conditions exist, where a stable logging road or landing operating surface does not exist, or when visibly turbid water from the road, landing, or skid trail surface or inside ditch may reach a watercourse or lake. Grading to

		obtain a drier running surface more than one time before reincorporation of any resulting berms back into the road surface is prohibited.	
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FDR WLPZSS-1	Watercourse and Lake Protection Zone and Soil Stabilization	<p>Within the WLPZ, and within any ELZ or EEZ designated for watercourse or lake protection, treatments to stabilize soils, minimize soil erosion, and prevent significant sediment discharge shall be described in the plan as follows.;</p> <p>Soil stabilization is required for the following areas:</p> <ul style="list-style-type: none"> <li>□ Areas exceeding 100 contiguous square feet where timber operations have exposed bare soil. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.</li> <li>□ Approaches to tractor road watercourse crossings between the drainage facilities closest to the crossing. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.</li> <li>□ Any other area of disturbed soil that threatens to discharge sediment into waters in amounts that would result in a significant sediment discharge. The standard treatment shall be straw mulch and seed, hand slashing, or slash packing.</li> </ul> <p>Soil stabilization treatment measures may include, but need not be limited to, removal, armoring with rip-rap, replanting, mulching, seeding, installing commercial erosion control devices to manufacturer’s specifications.;</p> <p>Where straw or slash mulch is used, the minimum straw coverage shall be 90 percent, and any treated area that has been reused or has less than 90 percent surface cover shall be treated again by the end of timber operations.;</p> <p>Where slash mulch is packed into the ground surface through the use of a tractor or equivalent piece of heavy equipment the minimum slash coverage shall be 75 percent.;</p> <p>For areas disturbed from May 1 to October 15, treatment shall be completed prior to the start of any rain that causes overland flow across or along the disturbed surface that could deliver sediment into a watercourse or lake in quantities deleterious to the beneficial uses of water.;</p> <p>Where the natural ability of ground cover is inadequate to protect beneficial uses of water by minimizing soil erosion or by filtering sediment, the plan shall specify protection measures to retain and</p>	<b>X</b>
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		improve the natural ability of the ground cover to filter sediment and minimize soil erosion.	
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<p>FDR WO-1</p>	<p>Winter Operations</p>	<p>Winter period operations may occur from October 15 – November 30 (or the accumulation of &gt;4 inches of precipitation after October 15. Ground based operations are proposed through this time period for the harvest area of the WLPZ. Log hauling, erosion control and road maintenance on the seasonal haul road are also allowed during this time period. Ground based operations within the WLPZ (except for log hauling, erosion control and road maintenance on the seasonal haul road) shall be completed by November 30 (or a trigger of a rainfall event with accumulation of &gt;1/4" of precipitation after October 15, whichever comes first). No hauling or other ground-based operations may occur during periods of saturated soil conditions. December 1 (or the accumulation of &gt;4 inches of precipitation after Oct. 15, whichever comes first) – April 15: Operations allowed during this time period include timber falling of the WLPZ, lopping, tree planting, and erosion control. ATV's, foot traffic, and other light tracking vehicles will be allowed to access the property. No heavy equipment operations, including loading and log hauling, shall be permitted during this period.</p> <ul style="list-style-type: none"> <li>- Erosion control structures shall be installed on landings and truck roads prior to the end of the day if the National Weather Service forecasts a 30% or more chance of rain before the next day or prior to any weekend or other shutdown period (as per 14 CCR 914.6(a)(2)).</li> <li>- Erosion control structures for roads in use will consist of rolling dips or waterbars.</li> <li>- All tractor roads shall have drainage facilities installed following completion of yarding and prior to</li> </ul>	<p><b>X</b></p>
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either (1) the start of any rain which causes overland flow across or along the disturbed surface within a WLPZ or within any ELZ designated for watercourse or lake protection, or (2) any day with a National Weather Service forecast of a chance of rain of 30% or more, a flash flood warning, or a flash flood watch.

- Landings used in the winter period will be seeded with a sterile barley variety at 25-35 lbs. per acre and straw mulched to a depth of one-three inches or tractor packed with slash upon completion of the use of that landing within the winter period.
- Not more than two skid trails (refers only to trails > 300 feet in length) per piece of skidding equipment shall be open (i.e. not waterbarred) at any time.
- Operation of trucks and heavy equipment on roads and landings shall be limited to those with a stable operating surface.
- All road, skid trail, and landing construction shall occur prior to the onset of the wet season.
- During the wet season, hauling and loading of logs shall occur during daylight hours only.
- Trees shall be felled away from riparian habitat including springs, seeps, bogs, and other wet areas of saturated ground.
- Prior to operations during the winter period, all materials, including but not limited to straw mulch, seed, waddles, or slash accumulations, shall be prepositioned in locations to allow for rapid and timely treatment application of erosion control measures pursuant to this winter operating plan.
- Class III crossings may be used in the winter operating period. During this period, Class III crossings shall be dipped out and slashed (or straw mulched) for 25 feet in each direction prior to either (1) the start of any rain which causes overland flow within the Class III channel, or (2) any day with a National Weather Service forecast (Pescadero, CA) of a 30% chance of rain or more, a flash flood warning, or a flash flood watch. After October 15, mulching

		materials for the skid trail surface (straw bales, slash piles) shall be staged on site next to the crossings.	
FDR PCHRZ-1	Pescadero Creek Habitat Restoration Zone	<p>Pescadero Creek Habitat Restoration Zone: Recognizing the sensitivity of Pescadero Creek's in-stream habitat within the coastal anadromy zone and its potential functionality as a flyway for special-status birds, a Habitat Restoration Zone (HRZ) will be implemented along the stream channel by using existing topography and geomorphic features as a guide. The top edge of the stream bank, where the incised watercourse corridor begins, predominantly forms the landward boundary of the HRZ and will act as the Watercourse Transition Line (WTL) per 14 CCR § 895.1. On average, the HRZ boundary/WTL lies 100-300 feet from the active stream channel, which exceeds the zonal protection standards outlined in CCR § 916.9.; Restoration projects to increase the complexity of the vegetation in the HRZ zone, install structures in the stream that increase pool habitat, add downed woody debris, stabilize creek banks, remove invasive species, or encourage select trees to be immediately recruited into the stream channel may occur in the HRZ with appropriate permitting and coordination with CDFW.</p>	<b>X</b>

FDR-WLPZ-1	Watercourse and Lake Protection Zone	<p>The following protection measures shall be afforded to the watercourses throughout the project area.</p> <ul style="list-style-type: none"> <li>- CLASS I WATERCOURSE WITH A CONFINED CHANNEL PROTECTION MEASURES</li> <li>- The Class I WLPZ shall be clearly identified on the ground by the RPF who prepared the plan, or a designee, with paint, flagging, or other suitable means. The WLPZ boundary shall be identified with blue/white striped flagging based on the following parameters per 14 CCR § 916.5:</li> </ul> <p>Slope: &lt;30% 30-50% &gt;50%</p> <p>WLPZ Width: 50 Feet 75 Feet 100 Feet</p> <ul style="list-style-type: none"> <li>- To ensure retention of shade canopy, filter strip properties, and the maintenance of wildlife values described in 14 CCR 916.4(b), trees within the WLPZ shall be marked by the RPF or a supervised designee.</li> <li>- Core Zone: Per 14 CCR § 916.9, the minimum width of the Core Zone shall be 30 feet measured from the Watercourse Transition Line/HRZ boundary. No timber operations will occur within this zone unless actions are proposed that are designed to improve salmonid habitat consistent with 14 CCR § 916.9 subsections (a) and (c).</li> <li>- Inner Zone: The minimum width of the Inner zone shall be 70 feet measured from the landward edge of Core Zone. Timber operations are permitted in this zone when conducted to meet the goals of this section, objectives for the Inner Zone in 14 CCR § 916.9 subsection (c)(2).</li> <li><input type="checkbox"/> No Sanitation-Salvage is proposed within the Inner Zone.</li> <li><input type="checkbox"/> Postharvest stand shall have a minimum 80% overstory canopy cover in the Coast and Southern</li> </ul>	<b>X</b>
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		<p>Forest Districts of the coastal anadromy zone. The postharvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.</p> <p>□ Postharvest stand shall retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the Core and Inner Zones.</p> <p>□ Large trees retained to meet 14 CCR § 916.9 [936.9, 956.9], subsections (f)(2)(B)(1.) and (3.) above that are the most conducive to recruitment to provide for the beneficial functions of riparian zones (e.g., trees that lean towards the channel, have an unimpeded fall path toward the watercourse, are in an advanced state of decay, are located on unstable areas or downslope of such an unstable areas, or have undermined roots) are to be given priority to be retained as future recruitment trees.</p> <p>- CLASS II WATERCOURSE AND CLASS II POND PROTECTION MEASURES</p> <p>Slope: &lt;30% 30-50% &gt;50%</p> <p>WLPZ Width: 50 Feet 75 Feet 100 Feet</p> <p>- The Class II WLPZ shall be clearly identified on the ground by the RPF who prepared the plan, or a supervised designee, with paint, flagging, or other suitable means.</p> <p>- To ensure retention of shade canopy, filter strip properties, and the maintenance of wildlife values described in 14 CCR 916.4(b), trees within the WLPZ</p>	
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		<p>shall be marked by the RPF or a supervised designee.</p> <ul style="list-style-type: none"> <li>- No equipment will be operated within the Class II WLPZ unless mapped and described elsewhere in the plan.</li> <li>- No salvage logging shall occur within the Class II WLPZ.</li> <li>- Retain all trees within the Class II WLPZ that meet the following criteria: <ul style="list-style-type: none"> <li><input type="checkbox"/> all trees located within the channel zone;</li> <li><input type="checkbox"/> all trees that have boles that overlap the edge of the channel zone; and</li> <li><input type="checkbox"/> all trees with live roots permeating the bank or providing channel grade control, with the following exception: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1/3 of the stems of redwoods with live roots permeating the bank or providing channel grade control may be harvested.</li> </ul> </li> </ul> </li> <li>- Where sufficient spacing exists prior to harvesting, retained redwood trees greater than or equal to 12 inches DBH shall not be spaced more than 25 feet apart.</li> <li>- A minimum of 80% overstory canopy shall be maintained within the channel zone. If 80% overstory canopy is not present within the channel zone, the existing overstory canopy within the channel shall not be reduced. Throughout the remainder of the Class II WLPZ, at least 50% of the total canopy covering the ground shall be left in a well-distributed, multistoried stand composed of a diversity of species similar to that found prior to the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.</li> <li>- Recruitment of large woody debris for instream habitat shall be provided by retaining at least two living conifers per acre at least 16 inches diameter breast high and 50 ft. tall within 50 ft. of all Class II watercourses.</li> <li>- CLASS III WATERCOURSE PROTECTION MEASURES</li> <li>- Establish a 30-foot wide ELZ on both sides of the</li> </ul>	
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		<p>watercourse for slopes less than 30% and an additional 20-foot wide ELZ where sideslopes are &gt;30%. The following are the minimum requirements for timber operations in Class III watercourses, unless explained and justified in the plan and approved by the Director:</p> <ul style="list-style-type: none"> <li>□ no new construction of tractor roads permitted;</li> <li>□ no ground-based equipment on slopes &gt;50%; and</li> <li>□ ground-based operations are limited to existing stable tractor roads that show no visible evidence of sediment deposition being transported into the adjacent watercourse</li> </ul> <ul style="list-style-type: none"> <li>- Retain all pre-existing large wood on the ground within the ELZ that is stabilizing sediment and is necessary to prevent potential discharge into the watercourse.</li> <li>- Retain all pre-existing down wood and debris in the channel zone.</li> <li>- Retain hardwoods, where feasible, within the ELZ.</li> <li>- Retain all snags (except as required for safety) within the ELZ.</li> <li>- Retain all countable trees needed to achieve resource conservation standards in 14 CCR § 912.7 within the ELZ.</li> <li>- Retain all trees in the ELZ and channel zone which show visible indicators of providing bank or bed stability, excluding sprouting conifers that do not have boles overlapping the channel zone. Visible indicators of stability include roots that permeate the bank or provide channel grade control.</li> <li>- At least 50% of the understory vegetation present before operations shall be left living and well distributed adjoining Class III watercourses to maintain soil stability.</li> <li>- Soil deposited during timber operations in a Class III watercourse other than at a temporary crossing shall be removed and debris deposited during timber operations shall be removed or stabilized before the</li> </ul>	
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		conclusion of timber operations, or before October 15.	
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FDR BR-T-1	Training	<p>Prior to commencing treatment activities and operations, all operating personnel will attend a worker environmental awareness training program. The training will include a brief review of special-status species, sensitive habitats, and other sensitive resources that may exist in the project area, including field identification, habitat requirements, and the legal status and protection of each relevant species, as well as locations of sensitive biological resources. The training will include materials concerning the following topics: sensitive resources, resource avoidance, permit conditions, and possible consequences for violations of State or Federal environmental laws. The training will cover the planned operation's conservation measures, environmental permits, and regulatory compliance requirements, as well as the roles and authority of the monitors and biologist(s). It will include printed material and an oral training session by a qualified biologist.</p>	<b>X</b>
FDR-BR-S-2	Survey	<p>A reconnaissance level biological resources survey will be conducted by a qualified biologist, qualified RPF, or other qualified professional prior to any operations to determine if any rare, threatened, or endangered (RTE) species as well as any species of special concern that are present within or adjacent to treatment areas. If this survey determines that sensitive species are present in or around the project area operations will cease and an appropriate buffer shall be installed until the appropriate regulatory agency is contacted and appropriate mitigation measures are validated or modified.</p>	<b>X</b>

<p>FDR BR-NB-3</p>	<p>Nesting Birds</p>	<p>There are multiple bird species listed as species of special concern (SSC) by the California Department of Fish and Wildlife (CDFW) that may be found within the Pescadero Creek County Park (PCCP) boundary. This includes the tricolored blackbird (<i>Agelaius tricolor</i>), grasshopper sparrow (<i>Ammodramus savannarum</i>), Golden Eagle (<i>Aquila chrysaetos</i>), short-eared owl (<i>Asio flammeus</i>), long-eared owl (<i>Asio otus</i>), Burring owl (<i>Athene cunicularia</i>), Barrow's goldeneye (<i>Bucephala islandica</i>), Vaux's swift (<i>Chaetura vauxi</i>), Northern harrier (<i>Circus hudsonius</i>), Olive-sided flycatcher (<i>Contopus cooperi</i>), Black Swift (<i>Cypseloides niger</i>), white-tailed kite (<i>Elanus leucurus</i>), Bald Eagle (<i>Haliaeetus leucocephalus</i>), Loggerhead shrike (<i>Lanius ludovicianus</i>), Bryant's savannah sparrow (<i>Passerculus sandwichensis alaudinus</i>), Purple martin (<i>Progne subis</i>), and the Yellow warbler (<i>Setophaga petechia</i>).</p> <ul style="list-style-type: none"> <li>- Should operations occur during the nesting period of February 1 through August 31, qualified biologist, qualified RPF, or other qualified professional. biologist will survey the project area for signs of active nests prior to operations. This includes nests, breeding behavior, whitewash, pellets, feathers, plucking posts, and other appropriate signs.</li> <li>- If nesting birds are found, a qualified RPF, qualified professional, or qualified biologist will identify an appropriate buffer based on a site-specific evaluation and will contact CDFW if appropriate.</li> <li>- The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately ofHFRide the buffer zone.</li> <li>- No trees or shrubs shall be disturbed that contain known active bird nests until all eggs have hatched, and young have fully fledged (are no longer being fed by the adults and have completely left the nest site).</li> <li>- Non-Listed Nesting Raptors: If active non-listed</li> </ul>	<p><b>X</b></p>
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		<p>raptor nests are located prior to or during operations, activities shall cease within 300 feet of the nest and contact shall be made with the a qualified biologist, qualified RPF, or other qualified professional to determine the appropriate buffer. Consultation shall be made with CDFW and CAL FIRE to confirm the appropriate protection measures prior to fledging.</p>	
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FDR BR-B-4	Bats	<p>Suitable habitat for this species will be assessed prior to operations by a qualified RPF, qualified professional, or qualified biologist during the pre-operational biological survey. If high-quality habitat for roosting bats (i.e., large trees with cavities of sufficient size to support roosting bats, or buildings providing suitable roost sites) is present within a planned work area, a qualified biologist, qualified RPF, or other qualified professional will conduct a survey to look for evidence of bat use prior to the onset of active operations. If evidence of bat occupancy is observed, or if high-quality roost sites are present in areas where evidence of bat use might not be detectable (such as a tree cavity), an evening survey and/or nocturnal acoustic survey may be necessary to determine if a bat colony is present and to identify the specific location of the bat colony.</p> <ul style="list-style-type: none"> <li>- If no active maternity colony or non-breeding bat roost is located, operations can continue as planned.</li> <li>- If an active maternity colony or non-breeding bat roost is located, the project work will be redesigned to avoid disturbance of the roosts.</li> <li>- If an active maternity colony is located, and the project cannot be redesigned to avoid removal or disturbance of the occupied tree or structure, disturbance will not take place during the maternity season (March 15 – July 31), and a disturbance-free buffer zone (determined by a qualified biologist, qualified RPF, or other qualified professional) will be observed during this period.</li> <li>- If an active non-breeding bat roost is located, and the project cannot be redesigned to avoid removal or disturbance of the occupied tree or structure, the individuals will be safely evicted between August 1 and October 15 or between February 15 and March 15 (as determined by a Memorandum of Understanding with CDFW). Bats may be evicted through exclusion after notifying CDFW. Trees with roosts that need to be removed will first be disturbed at dusk, just prior</li> </ul>	<b>X</b>
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		to removal that same evening, to allow bats to escape during the darker hours.	
FDR BR-WBB-5	Western Bumble Bee	Western bumble bee ( <i>Bombus occidentalis</i> occidentalis): Any occupied habitat that may be found during the pre-operational biological survey shall have an appropriate buffer established around it if determined necessary by a qualified biologist, qualified RPF, or other qualified professional. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.	<b>X</b>

FDR BR-SFDW-6	San Francisco Dusky-Footed Woodrat	San Francisco Dusky-footed Woodrat ( <i>Neotoma fuscipes annectens</i> ): Any nests or individuals located during the pre-operational reconnaissance survey will be flagged for avoidance with approximately a 10ft buffer. Operators shall avoid running heavy equipment near woodrat nests during treatment activities wherever feasible.	<b>X</b>
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FDR BR-ML-7	Mountain Lion	Mountain Lion ( <i>Felis concolor</i> ): Any lion sightings or detection of den/rendezvous sites from the pre-operational biological survey shall be immediately reported to the CDFW and an appropriate no-operations buffer shall be established, as determined by a qualified biologist, around the potential habitat. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.	<b>X</b>
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<p>FDR BR-FROG-8</p>	<p>California Red-legged Frog and Foothill Yellow-legged Frog</p>	<p>California red-legged frog (<i>Rana draytonii</i>) and Foothill yellow-legged frog (<i>Rana boylei</i>): The following protection measures were developed with assistance and input from CDFW and consulting biologists on previous land management plans in the Santa Cruz Mountains and have been successful in avoiding negative impacts to the California red-legged frog (CRLF) and foothill yellow-legged frog caused by operations. The following mitigation is generally consistent with a hybrid of USFWS scenarios III and IV outlined in a March 25, 2008 guidelines for THP's. The mitigation limits active operations within 300 feet of suitable breeding habitat during the wet season except for the use of vehicles/equipment on existing haul roads.</p> <ul style="list-style-type: none"> <li>- Prior to the commencement of operations, a qualified biologist shall meet with the operating crew to provide information on the CRLF. The intent of the meeting shall be to educate the crew on CRLF life history in order to avoid harm to the species during operations. The meeting shall include: <ul style="list-style-type: none"> <li>- A physical description of the CRLF with color photograph showing identifying features.</li> <li>- A brief description of the life history of CRLF.</li> <li>- Information of suitable habitat during various life stages.</li> <li>- Directions to cease all operations within 50 feet, or other specified distances provided within below stated restrictions, of observed CRLF.</li> <li>- Direction to immediately contact the project lead or designated supervisor of any observed sighting of CRLF.</li> <li>- Wet Season Restrictions (*see below for the definition of the wet season):</li> </ul> </li> </ul>	<p><b>X</b></p>
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		<ul style="list-style-type: none"> <li>- No treatment operations within 300 feet of suitable breeding habitat (except for use of existing haul roads)</li> <li>- During the wet season, no operation activities will occur within the WLPZ of class I or II watercourses that have water present.</li> <li>- All crossing replacement or upgrading shall occur prior to the onset of the wet season.</li> <li>- Any sighting of CRLF reported to the project lead or designated supervisor by the crew foreman shall be disclosed to SMCP, CAL FIRE, and CDFW. The project supervisor shall also disclose any and all take avoidance measures being implemented to avoid take of the individual.</li> <li>- Dry Season Restrictions</li> <li>- All suitable habitat must maintain a 30-foot no-cut buffer; no equipment within the no cut buffer; trees felled away from suitable habitat.</li> <li>- Trees shall be felled away from riparian features including springs, seeps, bogs, Class I and II watercourses and other wet areas of saturated ground.</li> <li>- Any sighting of CRLF reported to the project lead or designated supervisor by the crew foreman shall be disclosed to SMCP, CAL FIRE, and CDFW. The RPF shall also disclose any and all take avoidance measures being implemented to avoid take of the individual.</li> <li>- * Wet Season Definition: For purposes of protection of red-legged frogs, the wet season begins with the first frontal rain system depositing a minimum of 0.25 inches of rain after October 15 and ending on April 15. Barring rain events that total 0.25 inches of rain as, wet season restrictions shall apply on November 30.</li> </ul>	
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FDR BR SSP-9	Special-Status Plant Species	<p>Special-Status Plant Species. If it is determined after the pre-operational biological survey that a special-status plant species is present within a planned operation area, then the identified species will be flagged for avoidance in coordination with a qualified biologist, qualified RPF, or other qualified professional in order to limit the amount of potential disturbance. Any findings of previously unrecorded sensitive plant species shall be reported to CDFW and CAL FIRE with a map and description of protection measures to be implemented. Measures shall insure negative impacts to the individual plant or plants during operations are avoided and shall be developed in consultation with a qualified biologist.</p>	<b>X</b>
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<p>FDR BR-AMP-10</p>	<p>California Giant Salamander, Santa Cruz Black Salamander, and Western Pond Turtle</p>	<p>California Giant Salamander, Santa Cruz Black Salamander, and Western Pond Turtle. In areas of documented California giant salamander, Santa Cruz black salamander, or western pond turtle occurrences, or where suitable habitat for one or more of these species is determined to exist in or around the planned operation area, SMCP will implement applicable protection measures as follows:</p> <ul style="list-style-type: none"> <li>- If no California giant Salamander, Santa Cruz black salamander, or western pond turtle is found during the pre-operational biological survey, the work may proceed, however, operators shall avoid moving large woody debris where feasible, particularly in riparian areas.</li> <li>- If eggs or larvae of the California giant salamander, Santa Cruz black salamander, are found, a qualified biologist, a qualified RPF, or other qualified professional will establish a buffer around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed, or the Permittee shall contact CDFW to develop site appropriate avoidance and minimization measures.</li> <li>- If an active western pond turtle nest is detected within the activity area, a 10-foot buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist, a qualified RPF, or another qualified professional.</li> <li>- If adult or non-larval juvenile California giant salamanders, Santa Cruz black salamanders, or western pond turtles are found, one of the following two procedures will be implemented: <ul style="list-style-type: none"> <li>- If, in the opinion of the qualified biologist, qualified RPF, or other qualified professional, capture and</li> </ul> </li> </ul>	<p><b>X</b></p>
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		<p>removal of the individual to a safe place outside of the work area is less likely to result in adverse effects than leaving the individual in place and rescheduling the work (e.g., if the species could potentially hide and be missed during a follow-up survey), the individual will be captured and relocated by a qualified biologist to suitable habitat at least 100 meters away and work may proceed.</p> <p>- b. If, in the opinion of the qualified biologist, qualified RPF, or other qualified professional the individual is likely to leave the work area on its own, and work can be feasibly rescheduled, a buffer will be established around the location of the individual(s) and work may proceed outside of the buffer zone. No work will occur within the buffer zone until the turtle has left the work area. Work within the buffer zone will be rescheduled if necessary.</p>	
FDR BR-SFGS-11	San Francisco Garter Snake	San Francisco gartersnake ( <i>Thamnophis sirtalis tetrataenia</i> ): should a San Francisco garter snake be found during operations in the project area, or during the pre-operational biological survey, operations that could potentially harm the individual will cease and CDFW will be contacted immediately. Operations in immediate vicinity to the siting shall not commence until appropriate buffers have been approved by a qualified biologist and CDFW.	
FDR BR-AB-12	American Badger	American Badger ( <i>Taxidea taxus</i> ): Any occupied habitat that may be found during the pre-operational biological survey shall have an appropriate buffer established around it if determined necessary by a qualified biologist, qualified RPF, or other qualified professional. Treatment operations shall not commence within the no-operations buffer until appropriate buffers and mitigation measures can be determined and approved by CDFW.	<b>X</b>

FDR BR-MM-13	Marbled Murrelet	<p>Forest Density Reduction Treatments conducted in Pescadero Creek County Park will adhere to protective measures outlined in 14 CCR Section 919.11 of the Forest Practice Rules which state:Where there is evidence of an active murrelet site in or adjacent to the THP area, or where there is evidence of a potential Impact to a murrelet, the Director shall consult with CDFW as to whether the proposed THP will result in a "take" or "jeopardy" (pursuant to the California Endangered Species Act) of the murrelet before the Director may approve or disapprove a THP. Biological Assessments submitted with the THP that are prepared according to the CDFW Guidelines for Consultation shall be provided to the CDFW during consultation. If CDFW determines jeopardy or a take will occur as a result of operations proposed in the THP, the Director shall disapprove the THP unless the THP is accompanied by authorization by a wildlife agency acting within its authority under state or federal endangered species acts.; FDR treatment activities conducted under a THP may be able to adhere to recommendations in APPENDIX I and protection measures described in FHFR BIO-14 Marbled Murrelets (<i>Brachyramphus marmoratus</i>). Treatment activities that qualify will be evaluated on a project-by-project basis and CDFW will be contacted prior to developing treatment designs.</p>	X
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## **APEPNDIX G: SAN MATEO COUNTY PARKS MARBLED MURRELET MONITORING INFORMATION**

### **Marbled Murrelet Monitoring Summary**

#### **Pescadero Creek County Park**

*Evan Cole*

*Natural Resource Manager, San Mateo County Parks*

*September 2022*

### **Introduction**

Within San Mateo County Parks (SMCP) properties, including Pescadero Creek County Park (PCP), marbled murrelet (MAMU) monitoring has been implemented for nearly three decades. Audio/Visual (A/V) surveys have been conducted sporadically by outside consultants since the 1990s, then annually by SMCP natural resource management staff since 2015. Annual Autonomous Recording Unit (ARU) monitoring has been implemented annually since 2021.

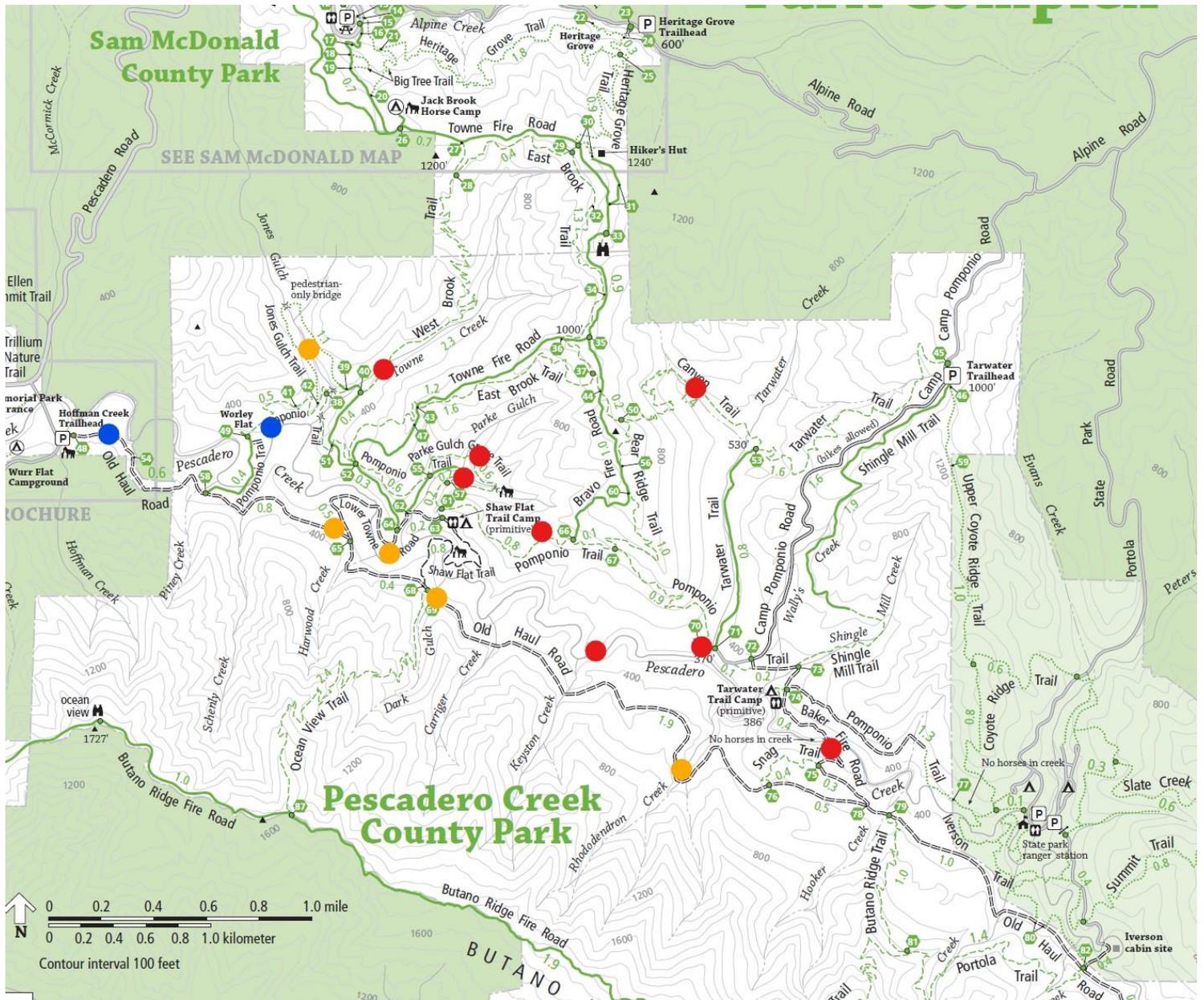
### **Methodology**

#### ***Active Monitoring***

All SMCP surveyors have undergone a three-day certification training course recognized by U.S. Fish and Wildlife Service, as well as annual two-day recertification. There are currently four SMCP staff certified to conduct MAMU A/V surveys.

A/V surveys are conducted annually during the MAMU breeding season, with surveys occurring May to August. Most surveys are scheduled to occur during the month of July, when MAMU breeding activity is known to peak within the Santa Cruz Mountains range for the species.

Survey sites have been established throughout Pescadero Creek County Park, as well as Memorial County Park, Sam McDonald County Park, and Huddart County Park (Figure 1).



**Figure 1.** Map of recurring A/V survey locations in the Pescadero Creek County Park Complex. Red = confirmed occupied behaviors; Yellow = possible occupation (limited sampling data or transient activity through survey stations which qualify as occupied behaviors); Blue = confirmed non-occupied behavior.

Over the course of the survey season, staff rotate to different sites rather than survey the same site each time to minimize any bias resulting from differences in experience or skill level. Within each site, one or more survey stations are established where canopy gaps allow surveyors to monitor suitable habitat.

Surveys are conducted from 45 minutes before dawn until 75 minutes after dawn, for a total of two hours. Each surveyor navigates to their respective survey station by vehicle or on foot depending on the location and is in position before the start of the survey. Data is collected by speaking into a handheld recording device, which allows detailed observation to be recorded without looking away from the sky. At the start of the survey, and again at sunrise and at the end of the survey, the surveyor records abiotic data from a Kestrel device, including surveyor's name, date and time, location, temperature, wind speed, cloud cover, horizontal and vertical visibility, ambient noise conditions, and height of tallest nearby tree (representing 100% or 1.0 canopy level). Overcast conditions with a moderate-to-high cloud layer are considered ideal, because birds are more easily seen when silhouetted against clouds rather than blue sky. Other bird species are noted throughout the survey, with particular attention given to corvids and raptors. The surveyor maintains eyesight through the canopy gap for the duration of the survey to visually detect birds flying or circling overhead. MAMU seen or heard more than five seconds apart are considered separate detections; multiple detections can be construed within that five second interval if the birds can be clearly distinguished or are obviously calling from different directions.

Visual detections are recorded according to the following observed behaviors:

- Circling over canopy – **occupied behavior**
- Fly through over canopy
- Fly through below canopy – **occupied behavior**
- Landing or taking off from nest/tree – **occupied behavior**
- Two or more birds joining or splitting apart in flight

Auditory detections are recorded according to the following observed behaviors:

- Keer (1, 2, 3, 4, or multiple)
- Groan
- Wing beat – **possible occupied behavior**
- Jet sound – **possible occupied behavior**
- Stationary call – **occupied behavior**

After the survey, data from the recording is transcribed to a paper datasheet and later to a summary spreadsheet in Microsoft Excel. Data is transcribed as soon as possible following the survey while the surveyor's memory of the survey is still clear.

### *Survey Site Selection*

Survey stations are established based on a variety of factors, including proximity to suitable habitat, canopy gap for visibility, low ambient noise to allow for audio detections, and accessibility. Survey stations are surveyed on a rotating basis, with some (e.g., Parke Gulch) prioritized depending on staff availability and MAMU activity level. SMCP has sought to

balance consistency of survey stations visited each year with the desire to investigate new areas to evaluate occupancy, limited by staff capacity and the annual survey window.

MAMU habitat suitability can vary across the species range but is generally distinguished by the presence of nesting platforms (typically large branches ranging from 4 to 32 inches), canopy structure providing sufficient cover while still allowing access to the nests, landscape disturbance, and distance to the ocean.

### *Limitations*

A/V surveys function as a snapshot of MAMU activity in a localized area during a fixed temporal window. Unlike the large datasets collected through passive monitoring with ARUs, A/V survey data lacks the consistency or frequency to easily extrapolate significant behavioral patterns or populations dynamics across the monitoring years. A/V surveys are limited by variability in surveyor skill level, as well as weather conditions that can further hamper a surveyor's ability to accurately detect MAMU. Also, some survey locations have highly restricted canopy gaps through which to spot birds, potentially skewing how perceived activity levels at different sites compare. It is important to note that A/V survey data is based on 'detections' rather than actual 'occurrences,' as birds that do not vocalize may not be seen, and the same birds may be counted multiples times if they are seen or heard more than five seconds apart.

### ***Passive Monitoring***

SMCP began deploying ARUs in Pescadero Creek County Park to provide supplemental data through passive monitoring in addition to the data provided by our active monitoring (i.e., A/V surveys).

### *Survey Station Selection*

The approach for ARU site selection changed between the 2021 and 2022 seasons.

In 2021, three ARUs were placed according to two factors:

- (1) ***Old growth forest stands as mapped in California State Parks Zone 6 Landscape Management Plan.*** Each ARU was placed in a separate old growth forest stand.
- (2) ***Burned vs. unburned landscape condition following the 2020 CZU Lighting Fire Complex.*** One ARU was deployed just north of Butano Ridge where the fire burned at moderate intensity, while the other two ARUs were deployed north of Pescadero Creek where the fire never reached.

In 2022, SMCP staff recognized that ARUs are better suited to assessing spatial and temporal distribution of MAMU within the park rather than identifying occupied habitat and deployed the units (now six in total) in an array along presumed travel corridors, including Pescadero Creek and its major tributaries across the park. ARUs strategically

staggered throughout the flyway could function similar to PIT Tag readers, but instead of tracking salmonid migration, they would be tracking MAMU movement between the ocean and terrestrial breeding habitat.

### *Limitations*

ARU data collection is limited to audio detections. Breeding or occupancy is difficult or impossible to establish through ARU monitoring, as most indicators of occupation are visual (e.g., circling flight over canopy). Behaviors such as jet sounds or wing beats may be detected by ARUs but are likely unreliable as indicators of occupation.

ARUs can be sensitive to failure or glitches caused by firmware issues, excessive moisture, hardware malfunctions, or human error in setting up the unit. ARUs are often placed in isolated, difficult to reach locations, and infrequent checks can result in periods of data lost. In 2022, the SD cards in three ARUs were found to have malfunctioned after two months in deployment, which resulted in a period of no data collection from those devices.

## Results

### *Active Monitoring Results*

**Table 1.** County Parks MAMU A/V Dataset 2016-2021.

<b>Date</b>	<b>Surveyor</b>	<b>Area</b>	<b>Site</b>	<b>Station</b>	<b>Detections</b>	<b>Occupied Behavior</b>
7/27/2021	HO	Pescadero Creek County Park	Baker Bridge	BABR-1	36	8
7/27/2021	DK	Pescadero Creek County Park	Parke Gulch	PAGU-2	39	3
7/27/2021	EC	Pescadero Creek County Park	Tarwater Bridge	TABR-1	12	0
7/22/2021	DK	Pescadero Creek County Park	Honor Camp	HOCA-2	70	22
7/22/2021	SC	Pescadero Creek County Park	Parke Gulch	PAGU-2	41	0
7/15/2021	DK	Pescadero Creek County Park	Canyon Trail	CATR-1	17	5
7/15/2021	HO	Pescadero Creek County Park	Canyon Trail	CATR-2	3	1
7/15/2021	EC	Pescadero Creek County Park	Parke Gulch	PAGU-2	21	0
7/15/2021	SC	Pescadero Creek County Park	West Brook Trail	WEBR-1	9	0
7/8/2021	HO	Pescadero Creek County Park	Parke Gulch	PAGU-2	37	1
7/8/2021	DK	Pescadero Creek County Park	Shaw Flat	1	37	1

7/8/2021	EC	Pescadero Creek County Park	West Brook Trail	WEBR-1	27	12
7/1/2021	SC	Pescadero Creek County Park	Dark Gulch	DG-01	65	9
7/1/2021	DK	Pescadero Creek County Park	Parke Gulch	PAGU-2	88	21
6/15/2021	HO	Pescadero Creek County Park	Parke Gulch	PAGU-2	3	0
6/15/2021	EC	Pescadero Creek County Park	Tarwater Bridge	TABR-1	11	4
6/8/2021	EC	Pescadero Creek County Park	Parke Gulch	PAGU-1	3	1
6/8/2021	DK	Pescadero Creek County Park	Worley Flat	WOLF-1	6	1
5/26/2021	EC	Pescadero Creek County Park	Baker Bridge	BABR-1	12	5
5/26/2021	HO	Pescadero Creek County Park	Parke Gulch	PAGU-2	1	0
5/11/2021	EC	Pescadero Creek County Park	Dark Gulch	DG-01	3	1
5/5/2021	DK	Pescadero Creek County Park	Parke Gulch	PAGU-2	3	0
7/27/2020	HO	Pescadero Creek County Park	Tarwater Bridge	TABR-1	138	31
7/23/2020	HO	Pescadero Creek County Park	Honor Camp	HOCA-1	39	0
7/23/2020	DK	Pescadero Creek County Park	Parke Gulch	PKGU-2	95	28

7/14/2020	DK	Pescadero Creek County Park	Old Haul Road East	OHRE-1	123	8
7/2/2020	DK	Pescadero Creek County Park	Wurr Flat	WUFL-1	13	0
7/17/2019	HO	Pescadero Creek County Park	Heritage Grove	HG-1	0	0
7/17/2019	DK	Pescadero Creek County Park	Jones Gulch	1	15	0
7/16/2019	HO	Pescadero Creek County Park	Dark Gulch	PG-1	44	
7/16/2019	HO	Pescadero Creek County Park	Shaw Flat	1	39	4
7/9/2019	HO	Pescadero Creek County Park	Dark Gulch	DG-5	20	0
7/9/2019	DK	Pescadero Creek County Park		TOFL-1	34	2
8/3/2017	RA	Pescadero Creek County Park	Harwood Creek	HAC-1	3	0
7/28/2017	ML	Pescadero Creek County Park	Harwood Creek	HAC-1	29	1
7/27/2017	ML	Pescadero Creek County Park	Harwood Creek	HAC-1	15	0
7/21/2017	ML	Pescadero Creek County Park	Harwood Creek	HAC-1	32	0
7/20/2017	ML	Pescadero Creek County Park	Harwood Creek	HAC-1	36	1
7/14/2017	RA	Pescadero Creek County Park	Harwood Creek	HAC-1	30	1
7/14/2017	ML	Pescadero Creek County Park	Honor Camp	HOC-2	45	0

7/13/2017	ML	Pescadero Creek County Park	Harwood Creek	HAC-1	22	2
7/13/2017	RA	Pescadero Creek County Park	Honor Camp	HOC-2	37	7
7/7/2017	RA	Pescadero Creek County Park	Harwood Creek	HAC-1	11	0
7/7/2017	ML	Pescadero Creek County Park	Honor Camp	HOC-1	14	2
7/6/2017	ML	Pescadero Creek County Park	Harwood Creek	1	17	0
7/6/2017	RA	Pescadero Creek County Park	Honor Camp	HOC-1	13	5
8/12/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	0	0
8/12/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	0	0
8/12/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	1
8/12/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	1
8/4/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	1	0
8/4/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	1	0
8/4/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	2	0
8/4/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	2	0

7/29/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	11	0
7/29/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	11	0
7/29/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/29/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/22/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	15	0
7/22/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	15	0
7/22/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	2	0
7/22/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	2	0
7/21/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	61	3
7/21/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	61	3
7/21/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	3	0
7/21/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	3	0
7/15/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	92	16
7/15/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	92	16

7/14/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	27	5
7/14/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	27	5
7/8/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	102	14
7/8/2016	RA	Pescadero Creek County Park	Dark Gulch	DG-1	102	14
7/8/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/8/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/8/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/8/2016	ML	Pescadero Creek County Park	Rhododendron Creek	RC-1	1	0
7/1/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	39	1
7/1/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	39	1
7/1/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	39	1
7/1/2016	ML	Pescadero Creek County Park	Dark Gulch	DG-1	39	1
7/1/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	0	0
7/1/2016	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	0	0

8/14/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-4	2	0
8/13/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-4	3	0
8/7/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-4	1	0
8/6/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-4	8	1
7/31/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-2	0	0
7/30/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-3	35	8
7/24/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-2	35	0
7/23/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-2	42	6
7/17/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-3	36	1
7/16/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-1	85	4
7/10/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	7	0
7/9/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-1	60	3
7/3/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	0	0
7/2/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-1	5	0

6/26/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	0	0
6/25/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-1	17	0
6/19/2015	RA	Pescadero Creek County Park	Rhododendron Creek	RC-1	2	0
6/18/2015	RA	Pescadero Creek County Park	Dark Gulch	DG-1	10	0
				<b>Average</b> =	25.52	2.949494949

A/V survey data from 2015-2021 (Table 1) indicates that seven of the fourteen recurrent survey sites are confirmed occupied habitat (i.e., MAMU breeding in vicinity). These include:

- Baker Bridge
- Canyon Trail
- Honor Camp
- Parke Gulch (Two stations: PAGU-2 and PAGU-3)
- Shaw Flat
- Tarwater Bridge
- West Brook Trail

Five of the fourteen recurrent survey sites can be classified as possibly occupied, including:

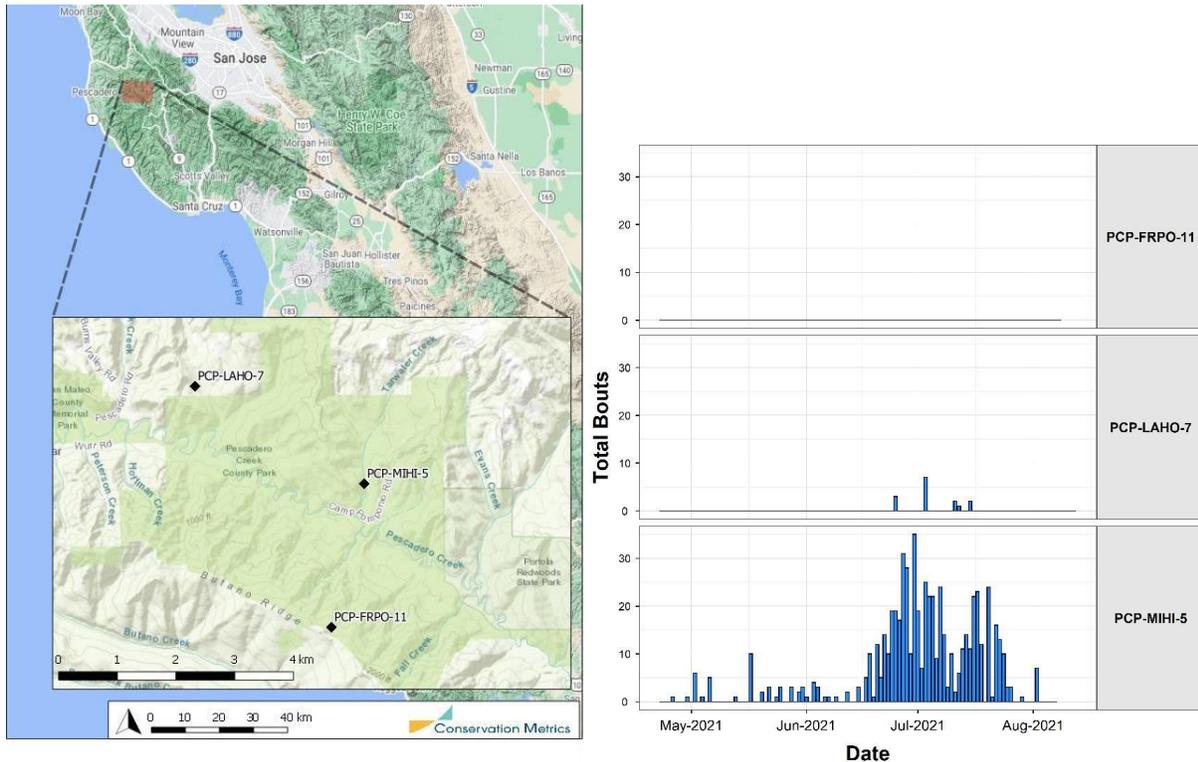
- Dark Gulch
- Harwood Creek
- Jones Gulch
- Lower Towne Fire Road (TOFL)
- Rhododendron Creek

These locations are inconclusive due to limited sampling data or observed transient activity through survey stations which may qualify as occupied behaviors (e.g., slight arcing flight over canopy, wingbeats, jet sound).

Only two of the fourteen recurrent survey sites are considered confirmed non-occupied habitat (i.e., no breeding in vicinity):

- Hoffman Flat
- Worley Flat

## Passive Monitoring Results



**Figure 2.** (Left) Map of 2021 ARU locations in Pescadero Creek County Park; (Right) Total number of detections or bouts of MAMU activity at each ARU location throughout the 2021 deployment season.

In 2021, three sensors were deployed at three locations between 22 April and 13 August 2021, with 1,206.35 hours of audio collected across 331 sensor-nights (Figure 2). MAMU “keer” calls were detected at two of the three sites surveyed: PCP-LAHO-7 and PCP-MIHI-5. MAMU tend to vocalize in calling bouts lasting multiple seconds. Therefore, individual call detections are grouped into bouts; where a calling bout is defined as a group of calls with no more than six seconds between each call.

PCP-MIHI-5 had many detections of MAMU scattered throughout the survey season, with concentrated activity in June and July. This site had consistent MAMU detections from 17 June to 18 July, despite a firmware issue that reduced the daily data collection. Detecting MAMU every day at a site for many weeks suggests that it is near an occupied stand or along a well-traveled flyway. This site also had many possible wingbeat sounds which is another indication that it could be in close proximity to an occupied nesting site.

Acoustic activity at PCP-LAHO-7 consisted of 18 total bouts across six days from 25 June to 29 July and one possible wingbeat sound. No activity was detected at site PCP-FRPO-11, which is in an area that burned in the CZU Lightning Complex fires in August 2020.

Nearly all acoustic activity occurred from -40 to 90 minutes after sunrise, with the peak in activity occurring slightly after sunrise. Previous studies have reported that in the Santa Cruz Mountains, MAMU activity peaks from 45 minutes before to 75 minutes after sunrise which aligns with results from this survey. The seasonal activity pattern at site PCP-MIHI-5 is similar compared to past surveys in the Santa Cruz Mountains, however some high activity sites such as Gazos Mt. Camp often show high activity continuing throughout July and into August.

## **Discussion**

The combined results of years of A/V surveys and ARU data collection indicate that significant portions of habitat in Pescadero Creek County Park are occupied and used for nesting by MAMU each year. Most (12 of 14) A/V survey stations have demonstrated confirmed occupied behavior or possible occupation. In cases of possible occupation, results were inconclusive due to limited sampling data (e.g., Lower Towne Fire Road) or because behavior was observed that could potentially qualify as either transient or occupied activities (e.g., arcing flight over Dark Gulch to follow Pescadero Creek towards the ocean).

Pescadero Creek appears to function as a primary flyway corridor through the watershed, with birds favoring subdrainages with suitable habitat (e.g., Tarwater, Parke Gulch) to breed. While no A/V surveys have been conducted south of Old Haul Road, ARU data from 2021 suggests that MAMU may not venture extensively along or below Butano Ridge; it is unknown if the 2020 CZU Fire may have affected MAMU use of the area which burned. Inconsistent results between survey stations in Pescadero Creek County Park and further downstream at Homestead Flat in Memorial County Park suggest that MAMU may utilize alternative travel corridors to enter Pescadero Creek County Park, mostly bypassing or flying well above the creek (out of eyesight or earshot) at Memorial.

## **APPENDIX H: GENERAL SOUND ASSESSMENT AND ACTION-GENERATED NOISE ANALYSIS**

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**General Sound Assessment and Action-Generated Noise  
Analysis within Huddart County Park, Pescadero Creek  
County Park, and Big Basin Redwoods State Park**

JULY 2022

*Prepared by:*

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## **Introduction**

A general sound level field assessment was conducted over three days in June of 2022 at various locations within San Mateo County Parks and California State Parks properties across the Santa Cruz Mountains. The intent of this exercise was to develop a broad dataset containing decibel (dB) readings recorded within different settings and environments for the purpose of observing how those readings compare with corresponding sound levels described in available literature.

The information in this assessment is intended to effectively inform management decisions and project design by providing site-specific observations of sound levels generated by approved vegetation treatment activities.

The primary sites assessed for sound levels during this exercise were within Huddart Park (HCP) and Pescadero Creek County Park (PCCP) in San Mateo County, as well as areas within Big Basin Redwoods State Park. Approximate site locations across all properties can be found in APPENDIX C. Additional information regarding the equipment used, methodology, data analysis and results, and limitations of the study is included henceforth.

## **Background**

The Santa Cruz Mountains are a geographically unique and extremely diverse natural resource along California's Central Coast. Among the vast array of floral and faunal species present within this region, many are considered sensitive and have been designated as special-status under interagency species protection programs. Coast redwood (*Sequoia sempervirens*) forests that occupy much of the coastal region from Monterey to San Mateo Counties provide distinctive habitat for endemic species of plants and animals that are managed under species-specific guidelines primarily developed by the California Department of Fish and Wildlife (CDFW) and the United States Fish and Wildlife Service (USFWS). Particularly, the marbled murrelet (*Brachyramphus marmoratus*) is a small special-status seabird that seasonally occupies coast redwood forests where they are known to utilize the branches of old growth trees to lay single, solitary eggs as high as 150 feet off the ground.

## **Purpose**

This general analysis was conducted in support of ongoing efforts to develop a comprehensive understanding of potential sound level impacts to sensitive wildlife species within the Santa Cruz Mountains and was designed to provide a frame of reference for site specific sound sources produced by regional forest health fuels reduction projects.

The August 2020 CZU Lightning Complex Fire was a monumental event in the Santa Cruz Mountains and the largest wildland fire incident in the region's recorded history at 86,509 acres. The event affected San Mateo and Santa Cruz Counties and persisted for 37 days

until it was fully contained in September 2020.<sup>89</sup> Post-fire vegetation severity levels across the burn scar are widely varied; however, fuel structures across the affected area and extreme northwest prevailing winds resulted in burn dynamics that produced significantly high mortality rates for trees and an abrupt and substantial loss of already limited suitable habitat for marbled murrelets and other sensitive wildlife.

In the era of unprecedented megadisturbances caused by wildfire, prolonged drought, and shifting climate regimes, it has become increasingly challenging to balance the needs of special-status wildlife with the goals and objectives of landowners, resource managers, and fire suppression agencies related to long-term forest health and resiliency.

### **Guidance**

In October of 2020, the United States Fish and Wildlife Service (USFWS) published a memorandum to a document titled *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (July 31, 2006 version) in that outlines revised guidelines related to action-generated activities that have the potential to disturb these sensitive species during their respective nesting seasons.

Figure 1 is a chart taken from the document that describes various human-induced, action-generated sound level estimates and how they influence various disturbance buffers for northern spotted owls and marbled murrelets based on pre-project or existing sound levels within proposed project areas. Based on this chart and the disturbance buffers identified, in-field measurements performed for this general assessment were focused on producing attributes that could be compared to the USFWS memorandum.

Anticipated Action-Generated Sound Levels are ranges of decibel sound levels associated with various noise sources measured at 50 feet. Based on the dB level of specific project-generated sound in excess of existing pre-project sound levels, disturbance buffers for marbled murrelets are then proposed “from the outer edge of the project footprint into unsurveyed, occupied, or presumed occupied nesting habitat”.

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<sup>89</sup> <https://www.fire.ca.gov/incidents/2020/8/16/czu-lightning-complex-including-warnella-fire/>

Existing (Ambient) Pre-Project Sound Level (dB) <sup>1, 2</sup>	Anticipated Action-Generated Sound Level (dB) <sup>2, 3</sup>			
	Moderate (71-80)	High (81-90)	Very High (91-100)	Extreme (101-110)
“Natural Ambient” <sup>4</sup> (<= 50)	50 (165) <sup>5,6</sup>	150 (500)	400 (1,320)	400 (1,320)
Very Low (51-60)	0	100 (330)	250 (825)	400 (1,320)
Low (61-70)	0	50 (165)	250 (825)	400 (1,320)
Moderate (71-80)	0	50 (165)	100 (330)	400 (1,320)
High (81-90)	0	50 (165)	50 (165)	150 (500)

<sup>1</sup> Existing (ambient) sound level includes all natural and human-induced sounds occurring at the project site prior to the proposed action, and are not causally related to the proposed action.

<sup>2</sup> See text for full description of sound levels.

<sup>3</sup> Action-generated sound levels are given in decibels (dB) experienced by a receiver, when measured or estimated at 50 ft from the sound source.

<sup>4</sup> “Natural Ambient” refers to sound levels generally experienced in habitats not substantially influenced by human activities.

<sup>5</sup> All distances are given in meters, with rounded equivalent feet in parentheses.

Figure 36 Estimated disturbance distance (in feet) due to elevated action-generated sound levels affecting the northern spotted owl and marbled murrelet, by sound level (provided by US Fish and Wildlife Service)

### **Limitations**

As a general assessment, this report is not intended to serve as an academic sound study. The purpose of this exercise is to provide a level of insight into site-specific sound disturbance dynamics within areas proposed for or actively undergoing forest health fuels reduction treatments. Some limitations and challenges presented themselves regarding the environment, methodology, instrumentation, and range of observable settings and are described in more detail below.

### **Approach**

In-field assessments of sound levels were conducted with professional discretion and to a degree that allowed for a well-constructed database given the time and resources available. The methodology utilized made every effort to maintain consistency and data integrity throughout the process of this assessment.

### *Environment*

In many cases during the field analysis, the capacity to measure isolated equipment dB levels at multiple ranges in a constant, regulated setting was at times constrained by environmental conditions beyond the recorders control. It should be noted that extraneous sound sources including but not limited to insects (cicadas), wildlife (ravens, ground dwelling critters), wind, overhead powerlines, and jet engines from planes were present throughout the field assessment, primarily at Huddart County Park.

The datasets shown in APPENDIX A include varying quantities of readings for each scenario. When equipment noise was isolated for longer periods of time, more readings were recorded. When equipment ran for short periods of time or when extraneous noise sources were present, less readings were recorded to ensure the readings were exclusive to the equipment targeted.

Additionally, potential barriers to sound or substantial changes to environmental factors within each setting were minimized as much as possible. In some instances, readings captured from the same sound source at multiple distances may have involved slightly varied topography, obstruction densities, or wind/climate factors. In general, data produced within each setting was gathered in the most consistent manner feasible.

### *Safety*

In some settings during active treatment operations, the recorders and equipment crew deemed it unsafe to approach certain equipment within 100 feet. Therefore, some active equipment sound was not assessed at 50 feet, which is the distance specified in the USFWS memorandum at which individual equipment sound levels are approximated.

To mitigate this to some degree, sound level values taken at specific ranges for each equipment type were used to project approximate sound levels between 50 and 500 feet when the actual recorded average was not available. These values are provided in graphical form in Figure 2.

### ***Instrumentation***

#### *Digital Decibel Meter*

The primary instrument used for this analysis is a VLIKE LCD Digital Audio Decibel Meter (Model VL6708). This is an intermediate level, handheld sound recording device intended for general sound level measurements between 30 - 130dB. The unit is equipped with a small condenser microphone and settings that allow for dynamic functionality, and complies with sound level meter standards IEC 651 Type 2 and ANSI S1.4 Type 2<sup>90</sup>.

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<sup>90</sup> <https://www.noisemeters.com/help/faq/standards/>

Product specifications from the manufacturer are listed below.

#### *Meter Specifications*

- Sound pressure accuracy:  $\pm 1.5$  dB (sound pressure standard, 94 dB @ 1KHz).
- Sound pressure accuracy:  $\pm 5$  dB (sound pressure standard, 94 dB @ 8KHz).
- Sound pressure frequency response: 30Hz - 8KHz.
- Dynamic range of sound pressure: 50 dB (for each measurement gear level).
- Sound pressure measurement scope: 30-130 dBA, 35-130 dBC.
- Sound pressure frequency weighting characteristics: A and C characteristics.
- Dynamic characteristic of sound pressure: FAST 125ms, SLOW 1sec
- Microphone: polarized capacitive microphone.
- Digital display: 4-digit, resolution: 0.1 dB, sampling rate: 2 times/sec.
- Analog bar display: Each analog bar represents 1 dB, sampling rate is 20 times/sec.
- Measurement gear level: 30-80 dB, 40-90 dB, 50-100 dB, 60-110 dB, 70-120 dB, 80-130 dB, 6 gear levels in total.
- Below or above limit prompt: indicated with "UNDER" $\pm$  or "OVER" display.

#### *Laser Rangefinder*

A Nikon Forestry Pro II Laser Rangefinder/Hypsometer was used to measure specific distances from sound sources. Generally, when equipment was mobile during the assessment, sound levels were only recorded when equipment was at or within a 10-15 foot radius from the target distance.

#### *Mechanized and Manual Equipment Types*

Table 1 refers to the active equipment evaluated for sound levels over the course of the assessment as well as their respective descriptions and stock power estimates. The machines listed represent the typical size and type of equipment generally used for landscape-level forest health fuels reduction treatments within the Santa Cruz Mountains.

Equipment	Description	Net Power Output	Operating Weight
Caterpillar 299D	Compact skid-steer track loader with drum-style mower head used primarily to mulch understory vegetation and downed woody material which may include small trees and shrubs.	95 hp	10,718 lbs
Link-Belt 145 X4	Mid-sized track crawler excavator with masticating head attached to the arm. Primarily used for precision mulching, roadside treatments, and selective tree removal.	102 hp	33,600 lbs
John Deere 135G	Mid-sized track crawler excavator used for culvert replacement work and digging.	101 hp	31,060 lbs
John Deere 650K XLT Dozer	Track crawler dozer with front-end blade used for high-volume earthmoving.	104 hp	22,343 lbs
Stihl MS 261 Chainsaw	Gas-powered chainsaw with a 16" guide bar used for handwork, small to mid-size tree felling and pruning, and general vegetation maintenance.	4 bhp	N/A

Table 15 Active Equipment Used in Assessment and Specifications

### **Methodology**

To attain a range of sound level values across various settings, data was collected for four days between June 9 and June 23, 2022 at over 14 sites within California State Parks and San Mateo County Parks properties. Ambient and operational sound levels were generally measured in 1 – 3 minute intervals using a VLIKE Digital Audio Decibel Meter (Model VL6708) that meet the ANSI Standards for Type 2 precision instrumentation. This model has an operating range of 30 to 130 dB, and an overall frequency range of 30 to 8,000 Hz.

### *Field Measurements*

During the measurement program, the device microphone was fitted with windscreen, set in a stationary position generally between 3 – 6 feet above ground, and located out of the influence of any vertical or horizontal reflecting surfaces. The sound meter was programmed to read A-weighted (dBA) sound level data at a slow speed setting.

All readings were recorded by the field observer in a notebook, with an effort to gather as many readings as possible for each isolated scenario/setting. In some instances, the readings displayed on the unit were video filmed and recorded manually at a later time to ensure all readings were included in the data analysis phase.

### Conditions

No precipitation occurred during the survey. All recordings took place during daylight hours between 9:00 AM – 2:00 PM with average temperatures ranging from 70 – 90°F over the course of the assessment.

No substantial deviations from normal operational or natural conditions were present during the survey.

#### Ambient Sound Assessment

Ambient or “natural” forest sound levels were recorded within Pescadero Creek County Park and Big Basin Redwoods State Park to set a baseline control. To obtain ambient sound levels, the meter was placed in a stationary position in representative areas of the park, primarily within forested stands with moderate canopy, and allowed to record uninfluenced by extraneous sound sources over 2- to 3-minute-long intervals. The observer recorded dB readings in a notebook, with an effort to record as many readings as possible.

Generally, ambient or “natural” sound level assessments were conducted in areas where, based on the professional discretion of the recorder, the environmental conditions present were deemed representative of normal, uninfluenced forest conditions. Measurable sound at these locations included wildlife activity such as bird calls and critter or insect sounds, vegetation and canopy movement, flowing water from nearby streams or ground springs, and wind.

#### Pescadero Creek County Park Road Assessment

Within Pescadero Creek County Park, measurements were taken on or in proximity to Old Haul Road and Towne Fire Road (APPENDIX C). Measurements taken at locations along these roads were intended to capture average ambient sound levels in areas with very low anthropogenic activity at the time of the assessment. To supplement the ambient sound level data, a mid-size pickup truck was then driven along the roads at 10 MPH past the sound meter to capture a general range of dB readings associated with vehicle travel.

Measurements along Old Haul Road were primarily taken in advanced second growth redwood dominant stands with moderate to dense canopy. Data gathered along Towne Fire Road was primarily done so in old growth mixed conifer redwood and Douglas-fir stands with moderate overstory and canopy openings. Ambient noise level data for PCCP was collected between June 9 and June 13, 2022.

#### Big Basin Redwoods State Park Roads Assessment

Within Big Basin Redwoods State Park (BBRSP), measurements were taken on or in proximity to Gazos Creek Road, North Escape Road, and Highway 236 near China grade (APPENDIX C). Measurements documented in locations along these roads were selectively recorded to capture ambient noise levels near primary access routes to the interior of the park. BBRSP experienced high-severity disturbance and vegetation mortality during the August 2020 CZU Lighting Complex Fire; most locations assessed for sound levels within the park were areas of high to very high fire severity.

## Operations Assessment at Huddart County Park (HCP) and Big Basin Redwoods State Park (BBRSP)

Equipment sound levels were recorded during active forest health fuels reduction treatments to develop a relative comparison to known or expected sound level estimates for similar equipment types (APPENDIX C).

Primarily, mechanized operations underway in HCP during the assessment were based on understory mastication and mulching, small tree removal, chipping, roadside vegetation treatments, and shaded fuel break maintenance. During assessments in BBRSP, mechanized equipment operations were focused on culvert replacement and road repair which primarily involved excavation and earthmoving. Readings gathered across these different settings and uses of equipment are intended to broaden and bolster the range of data for similar equipment types.

### *Data Analysis*

Measurements taken in the field were digitized into a database and used to develop sound level averages for each equipment type based on the settings in which they operated and their respective distances away from the sound meter.

Averages were used to quantify sound levels based on the readings gathered for each scenario. Scenarios refer to the equipment or tools being used, the setting in which they were used, and the specific ranges at which measurements were recorded.

## **Results**

### *Ambient Noise*

Table 2 provides a summary of ambient sound levels recorded at different sites within Huddart County Park and Big Basin Redwoods State Park under variable anthropogenic and non-anthropogenic circumstances. The purpose of these readings was to develop an initial baseline and reference for how human-generated sound compared to ambient conditions with no human activity.

Table 16 Existing Ambient Sound Level Summary Results

Ambient Sound Assessment		
Setting	Description	dB Average
Ambient at Toyon Group Camp	Toyon Group Camp at Huddart County Park; no human activity	42.0
Ambient at Werder Picnic Area	Werder Picnic Area and playground at Huddart County Park; families and children playing.	57.3
Ambient at Opal Creek	Opal Creek in Big Basin Redwoods State Park; no human activity	43.1

Sound readings recorded and averaged at Toyon Group Camp in HCP indicate a relatively low ambient sound level for the site. Based on Figure 1, Toyon Group Camp may be described as having a *Natural Ambient* existing sound level associated with it based on Figure 1. *Natural Ambient* refers to sound levels generally experienced in habitats not substantially influenced by human activities. At the time of the assessment for Toyon Group Camp, no human activity or human presence had occurred during sound measurements.

Werder Picnic Area in HCP was also assessed for sound in an attempt to capture noise levels associated with high anthropogenic vocals. At the time of the assessment, this site had approximately two dozen adults and children engaging in playful activity, yelling across lawns, and loading and unloading vehicles. With the meter deployed approximately 50 feet away from the activity, the sound level did not exceed 60 dB.

Lastly, ambient sound levels were recorded at Opal Creek in BBRSP where no human-generated activity was taking place. Similar to Toyon Group camp and the ambient values listed in Table 3, noise levels surrounding this site averaged in the low 40-44 dB range, being classifiable as a *Natural Ambient* sound level as described in Figure 1.

Table 3 provides a summary of additional average ambient sound levels measured along select roads within the assessment area and the respective distances at which the sound meter was deployed in relation to the road surface. Across all sites described within this dataset, ambient sound levels did not vary substantially.

Road Assessment		
Setting	Distance from Road (ft)	dB Average
Ambient at Old Haul Road; PCCP	175	41.5
Ambient at Old Haul Road, upslope from road; PCCP	100	41.9
Ambient with pickup passing at 10MPH on Old Haul Road; PCCP	100	42.7
Ambient at Towne Fire Road, downslope from road; PCCP	100	41.9
Ambient with pickup passing at 10MPH on Towne Fire Road; PCCP	100	42.1
Ambient at Towne Fire Road; PCCP	0	41.9
Ambient at North Escape Road along Opal Creek; BBRSP	0	42.2
Ambient at Gazos Creek near Middle Ridge Road; BBRSP	0	40.9
Ambient at Gazos Creek at county line; BBRSP	0	42.5
Ambient at Hwy 236 at China Grade; BBRSP	0	42.6
Ambient at Richards Fire Road; HCP	0	46.7

Table 17 Road Assessment Ambient Sound Level Summary Results

In general, sound levels taken at Huddart County Park tended to be higher than those taken in PCCP or BBRSP due to more frequent supplemental noise input such as wind, overhead jets, and a presumably denser concentration of noise-generating insects and birds. Still, HCP falls within the range identified by Figure 1 as being a *Natural Ambient* sound level.

Average ambient noise levels developed from data taken at BBRSP and PCCP indicate low sound levels for areas not influenced by human activity and are classified as *Natural Ambient* based on this assessment.

#### *Operational Noise*

Table 4 provides a summary of noise levels recorded during active equipment operations. Specific equipment types were assessed for sound at variable ranges to develop a reference scale for machinery that may be used during similar vegetation treatment projects. These values are approximate and are averages taken from the broader datasets for each setting/equipment type in APPENDIX A. USFWS estimates for various sound sources measured at 50 feet can be found in APPENDIX B.

Table 18 Operations Assessment Sound Level Summary Results by Equipment Type

Operations Assessment		
Equipment	Distance from Equipment (ft)	dB Average
CAT 299D Skid steer mower	165	59.5
	300	52.1
	500	49.0
Link-Belt 145 X4 excavator	120	65.8
	165	59.6
	300	52.0
	500	45.3
Stihl MS 261 chainsaw	165	62.6
	250	57.9
	300	55.9
	500	50.5
John Deere 135G excavator	50	57.7
	100	55.1
	165	46.2
	300	44.2
John Deere 650K XLT Dozer	50	68.7
	165	56.4
Handwork/Felling	50	83.7
	165	73.3
	300	62.7
	500	54.6

Predominantly, operational sound level readings did not vary substantially within each dataset, producing a generally representative average for each equipment type. Figure 2 provides a graph of recorded averages developed from actual readings as well as projected averages along an approximate trendline for each dataset. The plotted points on Figure 2 represent the dB averages developed from physical data while the associated trendline for each equipment type provides general, projected averages at measurement distances where actual data was not available.

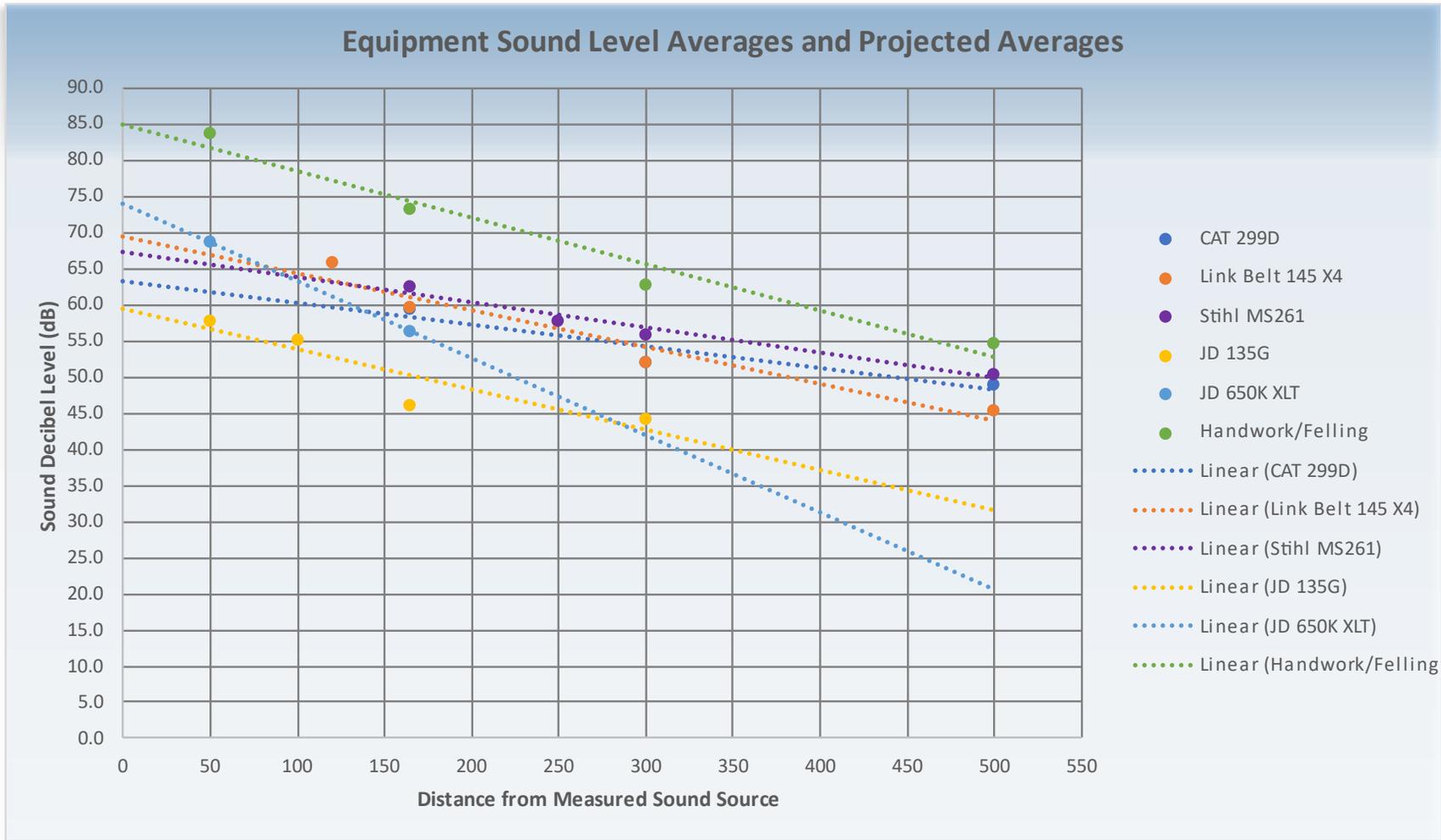


Figure 37 Equipment Sound Level Averages and Projected Averages by Source Type

The maximum recorded sound levels captured during the operational noise assessment were primarily the product of handwork and tree felling along Opal Creek in Big Basin Redwoods State Park. Crews utilized three (3) active chainsaws and hand equipment to fell trees near North Escape Road where noise levels were recorded at various ranges. Generally, this activity produced noise levels approximately 20-35 dB above the other measured equipment, on average.

The lowest general sound levels captured during the operational noise assessment were sourced from the John Deere 135G excavator (JD 135G) equipped with a standard bucket. This machine was primarily conducting earthmoving activities and digging during a culvert replacement project. This project also utilized a John Deere 650K XLT dozer (JD 650K) to mobilize and transport fill material. At the time of the assessment, only 50-foot and 165-foot measurements were taken for the JD 650K due to opportunity constraints. Sound measurements for this equipment type were recorded from the road with very minimal to no obstruction between the meter and the machinery.

The Link-Belt 145 X4 excavator, which is similar in operating weight and net power output to the JD 135G, produced moderate noise levels when compared to the other types of measured equipment. The Link-Belt was fitted with a masticating/brush mower head which was used for general vegetation treatment and small to mid-size tree removal, generally trees primarily along roads and trails. Generally, this unit when equipped with a masticating head produces noise approximately 10 dB above what the JD 135G produces, depending on the factors and use dynamics. A Caterpillar 299D skid steer dozer was onsite with the Link-Belt 145 and was fitted with a drum-style brush mower head primarily for understory fuels reduction work off of roads. Additional uses for this equipment type are providing access into treatment units, reducing woody debris piles, and higher precision treatment mobility around sensitive resources or tightly spaced areas.

The chart in Figure 2 provides an approximate scalar reference for sound sources and their associated noise levels on active project sites within the region. Exact values may be subject to factors not included or evaluated in this general study. For the purpose of this assessment, average dB levels and projections based on those averages were used to develop the results described above.

## **Discussion**

Following efforts to effectively monitor and record various noise levels at three different locations undergoing active equipment operations in the Santa Cruz Mountains, comparisons were made between the data reported in this assessment and existing values described in the USFWS memorandum regarding anticipated equipment sound levels.

According to the objective metrics provided in the USFWS document and the substantial literature review associated with its development, disturbance to marbled murrelets may reach the level of take<sup>91</sup> when one of the following conditions is met:

- Project-generated sound exceeds ambient nesting conditions by 20-25 decibels (dB).
- Project-generated sound, when added to existing ambient conditions, exceeds 90 dB.
- Human activities occur within a visual line-of-sight distance of 330 feet or less from a nest.

Based on our assessment of existing ambient sound levels at project sites and noise measurements sourced from active operations, the mechanized equipment described in this report, with the exclusion of handwork/felling, generally operates within or below the 20-25 dB range above ambient sound levels, making the likelihood for *take* of any special-status bird species to be very low based on the USFWS memorandum. No operations within this assessment exceeded or approached 90 dB when measured at 50 feet.

More notably, none of the mechanized equipment sound levels measured or projected at 50 feet, with the exception of handwork/felling, exceeded 70 dB. When compared to the USFWS chart in Figure 1 of this report for Anticipated Action-Generated Sound Levels, all of the mechanized activity described in this assessment falls below the dB range for *Moderate* sound levels (71-80 dB) which proposes a disturbance buffer of 165 feet from the outer edge of the project footprint into unsurveyed, occupied, or presumed occupied nesting habitat. This would include the singular Stihl MS 261 chainsaw measured for sound at 50 feet.

Additionally, it should be noted that the ambient sound levels measured across all sites were particularly conservative estimates for the environments in which they were recorded. Existing ambient noise conditions within the sites where readings were taken reflected periods of very low sound levels. It can be assumed that these levels have the potential to increase significantly in times of increased park activity. Table 2 of this report references the average sound level recorded in a scenario at HCP where picnic grounds

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<sup>91</sup> "The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct". Sourced from the Endangered Species Act of 1973, U.S. Fish and Wildlife Service.

being utilized by park visitors produced a noise level of 57.3 Db when measured at approximately 50 feet. This assessment provided a reference for what anthropogenic noise levels might produce on a decibel scale during human-based activity. The same level of human-induced activity presumably occurs at other sites within the San Mateo County Parks system on a frequent or daily basis including Pescadero Creek County Park. Therefore, at certain times of day, likely within the timeframe between 2 hours after sunrise and 2 hours before sunset, ambient sound levels at HCP, PCCP, and areas within BBRSP currently accessible to the public may be 10-15 dB higher than the ambient sound levels described in this assessment. This dynamic potentially elevates existing pre-project sound levels to the *Very Low* (51-60 dB) category for some areas of the assessment sites during certain hours of the day.

Based on our assessment, it appears that the mechanized equipment described in this report, which is typical for landscape scale vegetation treatment projects in the Santa Cruz Mountains, operates at *Low - Moderate* sound levels. Handwork and felling conducted by a fully outfitted crew produced the only sound levels above 70 dB when measured at 50 feet. Additionally, it is expected that sound levels will decrease at greater distances from the source, as indicated by the graph in Figure 2. Mechanized equipment noise measured at 165 feet produced sound levels between 45 - 65 dB, while the same equipment assessed at 300 feet produced sound levels between 43 - 57 dB; well below the +20 dB threshold for possible disturbance.

When our findings are compared with the reported decibel levels in the USFWS equipment sound level chart shown in APPENDIX B, it appears the sound levels we assessed at 50 feet produce sound, on average, at 15 - 20 dB below the reported sound levels for similar equipment types/project sound sources.

For all intents and purposes, this assessment is designed to provide a frame of reference for site specific sound sources produced by forest health fuels reduction projects in the Santa Cruz Mountains. In an effort to conduct ecologically-balanced, restorative treatment projects in sensitive habitats and areas drastically affected by the CZU Fire, it is essential that all facets of resource management and potential impacts to those resources are assessed with due diligence. This assessment was developed by resource managers, professional foresters, and agency representatives local to the Santa Cruz Mountains.

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**APPENDIX A: Ambient and Operational Sound Level Data**

Road Assessment								
Setting	Distance (ft)	dB					Average	
Ambient @ Old Haul Road; 175 feet off road	175	41.5	41.7	41.5	42.2	41.2	41.5	
		46.2	41.2	41.3	41.6	41.5		
		41.6	41.3	41.4	41.2	41.0		
		41.5	41.7	41.5	41.4	41.4		
		41.2	41.5	42.0	41.4	41.2		
		41.7	41.7	41.2	41.2	41.1		
		41.3	41.6	41.1	41.3			
		41.6	41.7	41.6	41.7			
		41.5	41.3	41.1	41.1			
		41.2	41.5	41.6	41.4			
Ambient @ Old Haul Road; 100 feet upslope	100	42.1	42.2	42.0	41.4	41.7	41.9	
		42.0	41.3	42.2	41.8			
		41.9	41.7	42.3	41.6			
		41.3	41.4	41.8	41.6			
		45.7	41.7	41.7	41.7			
		43.9	41.8	41.3	41.8			
		42.4	41.4	41.5	41.9			
		40.9	41.4	41.3	42.0			
		42.1	42.1	41.4	41.9			
		41.7	41.6	41.6	41.5			
Ambient + Pickup passing at 10MPH on Old Haul Road	100	41.8	41.5	43.3			42.7	
		42.4	43.5	42.7				
		45.5	41.6	44.6				
		41.4	41.8					
		41.7	42.7					
		44.2	41.5					
		41.7	42.2					
		42.0	42.9					
		43.4	43.8					
		41.9	43.4					
Ambient @ Towne Fire Road; 100 downslope	100	42.3	42.6	42.1	41.5	41.2	41.9	
		41.9	41.8	42.0	42.0	42.1		
		41.4	41.7	42.2	41.4	41.1		
		41.8	41.9	42.1	41.7	41.1		
		42.0	42.1	41.5	42.1	41.6		
		42.1	41.4	42.0	41.7	41.7		
		41.6	42.6	41.6	42.1	42.3		
		41.8	41.8	41.7	41.3	42.1		
		42.1	41.7	41.8	42.9	42.5		
		41.4	41.9	42.0	41.7			
Ambient + Pickup passing at 10MPH on Towne Fire Road	100	42.4	42.1				42.1	
		41.5	41.7					
		41.8	41.6					
		42.5	41.6					
		42.1	42.2					
		42.0	42.1					
		43.5	41.5					
		43.6	42.5					
		41.4	41.6					
		42.3	41.9					

Road Assessment					
Setting	Distance (ft)	dB			Average
Ambient @ Towne Fire Road; on road	0	41.9	41.4		41.9
		45.3	41.4		
		42.8	41.6		
		42.5	41.4		
		41.4	42.0		
		41.7	41.0		
		41.5	42.2		
		41.6	41.8		
		41.6	42.0		
		41.5	41.9		
Ambient @ North Escape Road along Opal Creek	0	44.0	41.9	42.3 40.6 41.8	42.2
		42.5	41.9	42.9 41.8 41.9	
		41.8	43.4	43.6 42.5 42.1	
		41.5	44.6	46.3 41.1 40.1	
		43.0	43.6	45.8 41.4 40.7	
		42.3	43.5	42.4 39.5 39.7	
		41.9	43.7	41.4 41.9 39.2	
		41.7	44.2	41.2 40.0 41.1	
		42.2	43.0	40.9 40.8 40.3	
		42.5	42.8	41.7 40.4 40.9	
		41.7	43.1	41.2 41.6 41.9	
		42.5	42.8	39.9 40.1 40.7	
		45.7	41.9	42.8 42.2	
		41.8	44.0	45.6 41.3	
		46.7	42.2	42.3 42.3	
		42.4	43.2	42.0 41.9	
		42.6	46.2	41.7 42.4	
Ambient @ Gazos Creek at Middle Ridge Road	0	39.1	41.1	41.2 41.4 40.2	40.9
		41.2	40.9	42.1 40.7 38.3	
		39.1	41.4	42.3 41.2 39.6	
		39.8	41.2	41.2 41.3 39.9	
		39.3	41.6	41.7 41.1 39.8	
		40.4	41.4	42.3 41.9	
		40.8	41.6	41.5 40.6	
		40.3	41.7	41.9 41.0	
		39.3	41.9	41.6 41.7	
		41.5	41.8	41.5 40.9	
Ambient @ Gazos Creek at county line	0	41.5	41.5	41.7 41.2 47.1	42.5
		41.3	41.6	41.6 42.7 47.5	
		41.3	41.6	41.3 41.2 48.1	
		41.5	41.1	40.5 41.8 47.4	
		41.2	41.3	40.7 41.7 47.5	
		40.3	41.2	40.3 41.6 47.3	
		41.2	40.6	40.6 41.8 46.8	
		41.3	40.8	40.8 43.6 46.0	
		41.1	40.7	40.7 46.0 44.4	
		41.0	40.9	41.5 47.0 44.0	
		41.3	40.3	40.3 46.8 43.8	
Ambient @ Hwy 236 at China Grade	0	42.7	42.5	43.6 39.8	
		42.6	43.4	42.7 42.5	
		42.1	43.4	42.4 43.1	
		42.8	44.1	42.0 43.6	
		43.0	42.7	41.3 43.0	
		42.3	42.3	42.9 42.5	
		43.7	42.0	43.1 42.1	
		44.8	42.7	41.3 42.0	
		44.1	43.0	40.9 41.6	
		43.0	42.6	42.0 41.5	

Setting	Distance (ft)	Equipment										Average
		dB										
CAT 299D Skid steer mower	165	55.0	54.9	60.6	58.8	58.7	61.3	62.5	57.6	53.6		
		56.3	58.5	62.9	61.1	55.9	62.2	63.0	58.4	63.8		
		58.3	53.9	62.2	63.1	57.8	58.5	63.1	61.9			
		58.0	60.7	63.3	63.4	55.7	60.0	59.4	58.5			59.5
	300	51.5	52.1	52.3	52.7	52.7	52.8	51.8				
		53.1	48.5	54.5	52.0	50.2	52.4					
		52.7	49.7	53.4	51.7	52.4	52.8					52.1
	500	57.9	50.3	48.0	46.8	46.4	51.0	50.5	47.7	47.6		
		53.6	50.9	48.5	47.6	46.1	50.4	51.1	47.6	47.0		
		52.8	50.7	48.0	47.0	47.0	51.6	50.3	46.8	46.4		
		53.3	49.9	49.8	46.4	46.6	50.7	47.3	47.1	46.8		
			51.1	51.0	48.9	46.8	47.9	50.2	48.5	46.7	46.2	49.0
Link-Belt 145 X4 excavator	120	66.8	69	66.2	64.7	97.4	69.1	64.6	65.8	67.4	64.8	
		65.6	70.5	68.6	68.4	71	63.1	62.6	67.3	61.8	68.6	
		66.1	63.8	62	66.7	70.7	63.9	60	62.8	60.1		
		63.6	65.7	61.6	63.2	65.8	64.6	61.6	66.7	69.2		
		64.3	62.5	65.1	66.8	67.6	63.6	62.8	62.7	67.2		
		65.5	67.3	64.6	63.4	66.7	64.1	64.1	65.7	66.1		
		61.7	66.1	67.8	64	66.4	62.6	62.7	71.5	61.5		
		70.4	65.9	67.7	66.4	62.6	63.3	63.1	67.1	64.1		
		64.8	63.1	68.1	65.2	65.5	63.2	66.2	73	65		
		66.1	65.1	66.8	63.7	65.7	62.8	64.1	70.2	67	65.8	
	165	55.0	55.3	58.8	59.1	60.2	56.8	57.8	57.7	57.2	59.2	
		66.5	61.5	55.4	57.5	57.8	57.9	63.1	60.7	55.2	58.2	
		51.4	59.7	57.3	58.7	59.8	58.3	62.4	61.0	62.5	59.1	
		71.7	63.3	63.8	59.7	61.3	57.6	59.1	58.8	61.8	60.5	
		65.9	64.7	59.0	60.7	58.4	58.8	55.5	64.6	59.8	58.8	
		63.9	63.4	59.7	61.1	57.3	62.6	61.7	62.7	60.7	60.0	
		55.7	56.2	62.1	59.2	57.8	60.1	55.3	61.2	62.7	60.5	
		59.8	54.6	56.9	56.8	56.2	63.9	56.4	59.2	58.0	64.3	
		65.8	56.9	59.7	61.7	57.1	57.9	55.7	57.5	58.3		
		54.1	59.9	60.9	61.2	56.5	65.3	57.8	66.4	56.0	59.6	
	300	53.3	54.2	49.6	47.9	50.8	50.0	50.2	49.2	54.6		
		50.2	57.9	50.0	48.5	53.4	56.1	52.4	56.0			
		51.7	53.0	50.6	51.0	56.3	50.1	57.8	52.1			
		47.1	46.0	57.5	55.0	55.8	57.8	47.7	50.9			
			53.7	40.4	52.1	58.5	48.3	50.1	49.5	55.4	52.0	
	500	46.6	45.1	46.6	45.5	50.2	43.0	43.8	45.0	41.8	44.1	
		45.8	43.9	45.6	46.7	50.3	44.0	43.6	47.6	43.1	43.1	
		46.3	43.2	46.1	47.8	46.9	43.2	42.2	45.4	45.4	42.6	
		45.7	42.4	43.5	48.5	46.4	43.6	42.5	45.2	47.9	41.0	
		47.7	43.4	43.7	46.4	48.2	44.5	43.1	47.1	44.8	45.9	
		48.0	49.9	48.3	48.7	46.1	45.6	43.3	44.5	44.0	43.8	
			47.6	46.8	43.6	45.9	45.1	45.5			45.3	

Stihl MS 261 chainsaw	165	55.6	54.2	73.9	74.4	63.3	66.0	66.8	74.6	50.8	73.3	<b>62.6</b>
		73.6	75.4	54.8	53.5	52.8	51.3	50.5	74.6	49.8		
	250	47.1	61.3	67.0	62.3	55.2	60.3	68.1	47.1			<b>58.0</b>
		69.3	46.8	46.1	50.3	59.1	64.1	47.2	68.7			
300	60.2	41.7	55.1	57.0	61.2	54.6	43.0	65.6			<b>55.9</b>	
	60.1	61.2	42.0	67.2	42.3	54.8	55.1	54.2				
500	49.1	58.6	49.2	60.2	58.8	55.0	49.3	56.6	41.9		<b>50.5</b>	
	53.6	59.5	41.9	54.4	41.1	53.1	58.7	41.5	47.6			
40.8	41.2	55.8	41.7	47.8	54.1	48.8	53.3					
JD 135G Excavator	50	53.4	59.7	61.1	56.2	55.3	55.2	62.0	58.5	63.6	55.9	<b>57.7</b>
		58.7	56.9	62.9	55.8	55.5	55.6	63.2	53.0	57.9	56.2	
		60.2	56.4	62.0	56.2	56.0	55.8	62.6	54.0	55.4	55.4	
		59.4	59.5	59.7	56.2	55.3	56.1	59.8	60.6	55.7	55.6	
		60.0	61.8	58.7	56.0	55.5	55.7	54.5	63.7	55.8	56.2	
		54.2	63.1	61.6	55.5	55.7	56.0	55.6	56.0	56.1	56.2	
	100	57.2	58.9	61.9	55.8							
		54.5	55.7	54.2	55.6	53.8	56.2	52.9	54.8	49.2	53.8	<b>55.1</b>
		54.9	59.6	51.3	54.5	54.9	56.0	54.9	55.3	56.5	58.9	
		56.1	56.4	50.9	55.0	56.0	56.6	55.0	56.6	53.2	56.4	
	54.3	58.7	51.2	55.4	59.0	56.9	54.8	55.2	54.2	55.1		
	165	44.5	45.6	45.1	43.6	46.7	47.1	46.7	44.6	44.3	45.2	<b>46.2</b>
		46.2	44.7	45.5	44.7	46.9	47.0	46.8	44.7	45.1	45.8	
		46.9	46.9	47.4	45.0	47.1	47.2	46.7	45.2	45.8	45.9	
		46.6	47.0	47.8	45.7	44.0	46.0	46.9	46.0	46.5	44.8	
		50.6	45.3	48.0	46.5	47.2	46.8	45.1	43.2	45.6	47.2	
47.2		46.2	47.7	45.4	47.3	47.9	46.8	46.5				
300	46.5	44.2	46.9	45.1	46.8	47.0	46.6	46.6				
	44.0	41.9	41.7	42.8	41.7	41.5	42.7	41.6	42.6	41.6	<b>42.2</b>	
	42.6	43.5	41.4	42.5	42.5	41.3	42.6	41.5	43.0	41.1		
	43.8	42.5	41.7	42.3	41.8	41.2	42.2	41.3	43.1	42.0		
	43.1	41.4	42.9	42.2	42.0	42.7	41.3	41.9	44.0	42.1		
	42.8	41.8	44.0	41.4	42.6	41.5	41.7	41.8	43.2	42.6		
	42.5	42.5	44.2	42.6	41.6	42.0	41.3	41.4	41.2	41.6		
43.1	41.7	42.3	42.1	41.4	41.8							

JD 650K XLT Dozer	50	70.9	68.7	72.2	66.3	66.4	67.3	72.0	67.9	66.1	68.3	68.7	
		70.5	69.4	72.3	67.9	65.6	67.3	72.4	66.8	65.9	67.9		
		69.2	70.2	72.6	69.1	70.7	67.5	71.9	66.6	65.6	67.5		
		68.0	73.6	71.7	70.0	72.1	62.4	72.4	66.0	65.7	67.7		
		67.7	69.2	66.6	69.5	71.0	62.1	72.2	69.5	66.1	66.7		
		66.9	67.1	65.6	69.1	70.9	62.1	71.5	68.4	69.0	67.0		
		66.8	74.1	65.2	68.3	71.1	61.2	71.9	66.5	72.7	70.8		
		66.0	73.8	64.8	67.9	71.3	61.5	71.3	67.2	72.8	70.4		
		66.4	73.6	63.1	67.1	69.5	72.7	71.2	66.2	68.1	72.5		
	64.8	73.1	65.8	66.3	68.4	73.0	70.7	66.2	67.9	72.3			
	68.9	69.7											
	165	53.9	56.2	55.1	56.3	58.4	57.3	55.5	55.4	55.2	56.0	56.4	
		57.0	54.6	55.7	56.4	56.9	58.6	53.8	56.2	55.8	58.1		
		59.9	54.7	56.8	56.3	55.9	57.7	58.2	56.6	55.6			
		59.1	54.3	57.5	55.8	55.3	56.4	58.0	58.6	55.8			
	Handwork/felling at Opal Creek	50	91.2	82.0	81.2	72.6	91.4	86.5	90.3	79.2	77.6	86.6	83.7
			81.2	85.4	83.7	78.9	90.5	80.5	92.4	80.2	80.5	87.3	
			76.4	88.9	82.0	79.5	87.8	81.3	78.2	82.3	85.3	85.5	
			84.0	91.4	90.0	81.1	81.6	83.4	78.4	80.9	84.3	81.7	
85.1			84.4	83.8	76.9	79.7	85.2	80.3	89.3	92.8			
165		72.0	73.2	80.4	66.7	74.0	75.3	68.0	79.3	79.8	62.0	73.3	
		72.0	70.3	76.0	65.7	65.7	77.1	69.5	80.3	71.6	64.8		
		73.3	66.8	76.2	66.4	76.7	75.3	81.2	74.2	74.1	78.9		
69.4		80.8	82.0	72.1									
300		57.6	66.6	61.1	57.3	66.7	63.0	61.5	60.2	64.4	60.0	62.7	
		59.2	62.1	59.7	62.8	69.2	65.7	56.3	58.7	65.4	60.6		
		62.5	63.6	61.0	65.0	70.0	59.3	62.5	67.0	64.2	67.6		
63.3													
500		46.1	48.9	54.7	53.1	46.2	56.7	60.3	64.3	50.1	58.3	54.6	
		50.0	49.8	53.6	54.0	47.7	56.3	61.5	59.3	50.9	56.5		
		48.3	52.9	55.1	55.1	49.6	54.7	55.6	61.4	55.2	61.1		
		47.7	51.3	55.0	61.7	49.8	56.5	54.2	56.8	57.1	59.2		
		49.3	56.6	54.1	65.0	50.8	55.1	54.8	59.6				

**APPENDIX B: Some Common Sound Levels for Equipment/Activities (US Fish and Wildlife Service)**

	<b>Range of Reported dB Values @ Distance Measure</b> <i>Distance Measure assumed to be 50 ft unless otherwise indicated.</i>	
<b>Project Sound Sources</b>	<b>Reported Decibel Level @ 50 ft.</b>	<b>Relative Noise Level <sup>2</sup></b>
Conversation	34	Ambient
Speech (normal)	41	Ambient
Milling Machine	61	Low
Motorcycle on Trail (620 cc street legal, meter at ground level)	62	Low
Power Lawn Mower	68	Low
Yelling	70	Low
Generator (25 KVA or less)	70	Low
Gas Lawn Mower	72	Moderate
Chainsaw (Stihl 025)	73	Moderate
Welder	74 <sup>3</sup>	Moderate
Pickup Truck (driving)	75 <sup>3</sup>	Moderate
Flatbed Pickup Truck	77	Moderate
Powerline	78	Moderate
Cat-skidder	80	Moderate
Compressor (air)	80 <sup>3</sup>	Moderate
Backhoe	80 <sup>3</sup>	Moderate
Concrete Mixer (Vibratory)	80 <sup>3</sup>	Moderate
Pumps	81 <sup>3</sup>	High
Horizontal Boring Hydraulic Jack	82 <sup>3</sup>	High
Slurry Machine	82 <sup>3</sup>	High
Vacuum Street Sweeper	82 <sup>3</sup>	High
Concrete Pump	82	High
Log Loader	83	High
Ground Compactor	83 <sup>3</sup>	High
Concrete Batch Plant	83	High
Dump Truck	84	High
Flat Bed Truck	84	High
Roller	85 <sup>3</sup>	High
Mowers, leaf blowers	85	High
Passenger Cars/Light Trucks (65 mph)	85	High
Auger Drill Rig	85	High

<b>Project Sound Sources</b>	<b>Reported Decibel Level @ 50 ft.</b>	<b>Relative Noise Level <sup>2</sup></b>
Truck Horn (Warning)	85 <sup>3</sup>	High
Equipment > 5 horsepower	85	High
Impact Wrench	85	High
Concrete Truck	85	High
Road Grader	85	High
Chain saws	85 <sup>3</sup>	High
Highway-Traffic	85	High
Dozer	85 <sup>3</sup>	High
Rock Drill	85 <sup>3</sup>	High
Crane	85 <sup>3</sup>	High
Paver	85 <sup>3</sup>	High
Scraper	85 <sup>3</sup>	High
Pneumatic tools	85 <sup>3</sup>	High
Large Diesel Engine	86	High
Generator	87	High
Front-end Loader	87	High
Drill Rig	88	High
Medium Trucks & Sport Vehicles (65 mph)	89	High
General construction	89	High
Large Truck	89	High
Jackhammer	89 <sup>3</sup>	High
Concrete Saw	90	High
Hydra Break Ram	90	High
Mounted Impact Hammer Hoe-Ram	90	High
Large Tree Falling	92	Very High
Clam Shovel	93	Very High
Jake Brake on Truck	94	Very High
Hydromulcher	94	Very High
Boat motors	95	Very High
RVs (large)	95	Very High
Pneumatic Chipper	95	Very High
Heavy Trucks and Buses	95	Very High
Heavy Construction	96	Very High
Logging Truck	97	Very High
Railroad	98	Very High
Vibratory (Sonic) Pile Driver	101 <sup>3</sup>	Extreme
Impact Pile Driver	101	Extreme

<b>Project Sound Sources</b>	<b>Reported Decibel Level @ 50 ft.</b>	<b>Relative Noise Level <sup>2</sup></b>
Guardrail Installation and Pile Driving	105	Extreme
23 ft Detonation Cord, on surface	106	Extreme
Track Hoe	106	Extreme
Helicopter S-61 (large, single rotor, loaded)	112	Extreme
Rock Blast	112	Extreme
12 ft Detonation Cord, buried	112	Extreme
Exterior Cone Blast w/ sand bags	120	Extreme
Jet Overflight	136	Extreme
Exterior Cone Blast (obstructed)	127	Extreme
Treetop Blast	137	Extreme

<sup>1</sup> Most values in this table are derived from U.S. Department of Transportation. FHA. 2017. Construction Noise Handbook. Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors.

<sup>2</sup> Relative Noise Level: a general, subjective ranking of relative noise levels created by the sources considered here, when used for analysis of relative noise effects on species.

<sup>3</sup> Equipment decibel level has been revised from the 2003 guidance with data provided from U.S. Department of Transportation (2017)

**APPENDIX C: Assessment Site Locations**

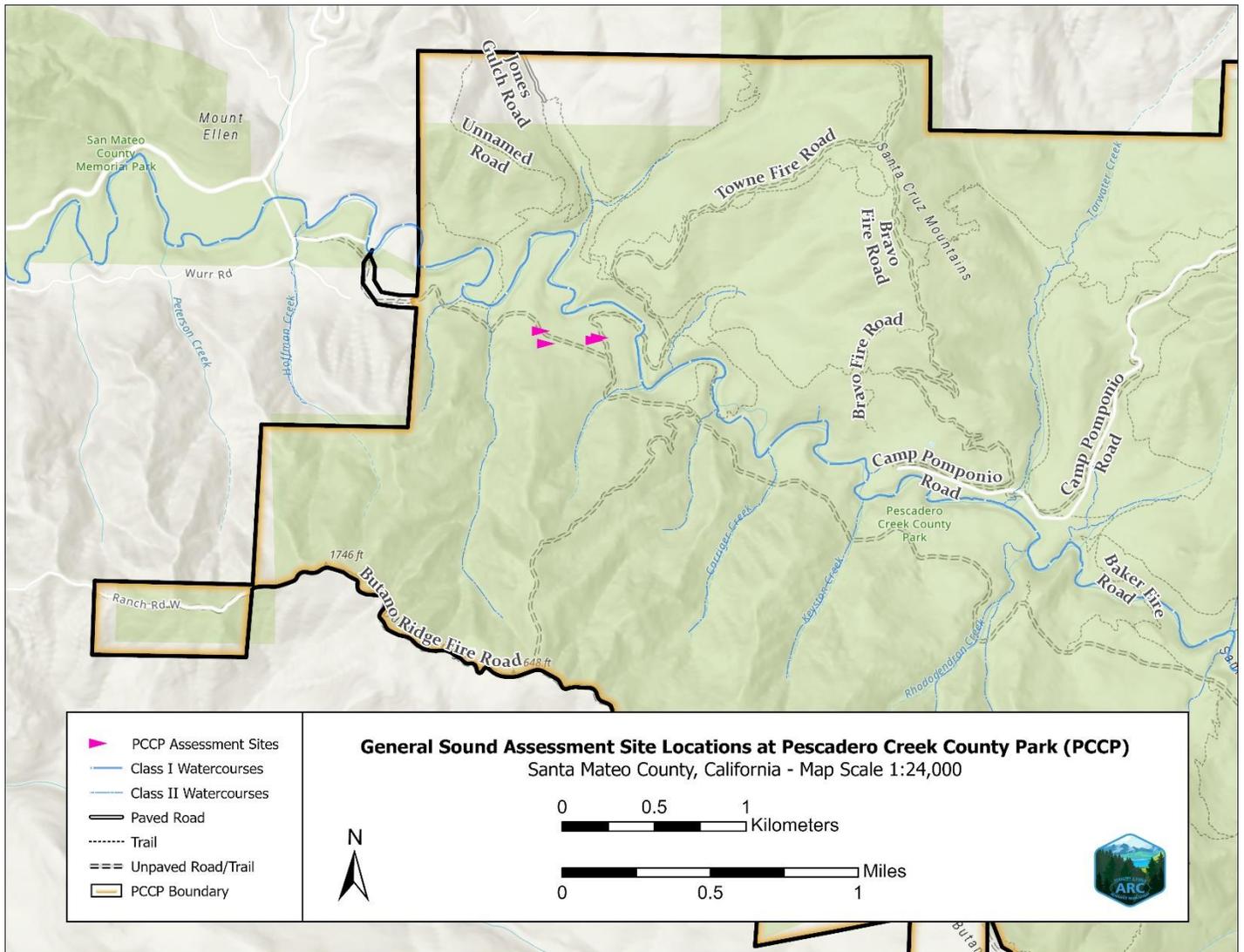


Figure 38 Approximate Assessment Site Locations in PCCP; Map Not To Scale

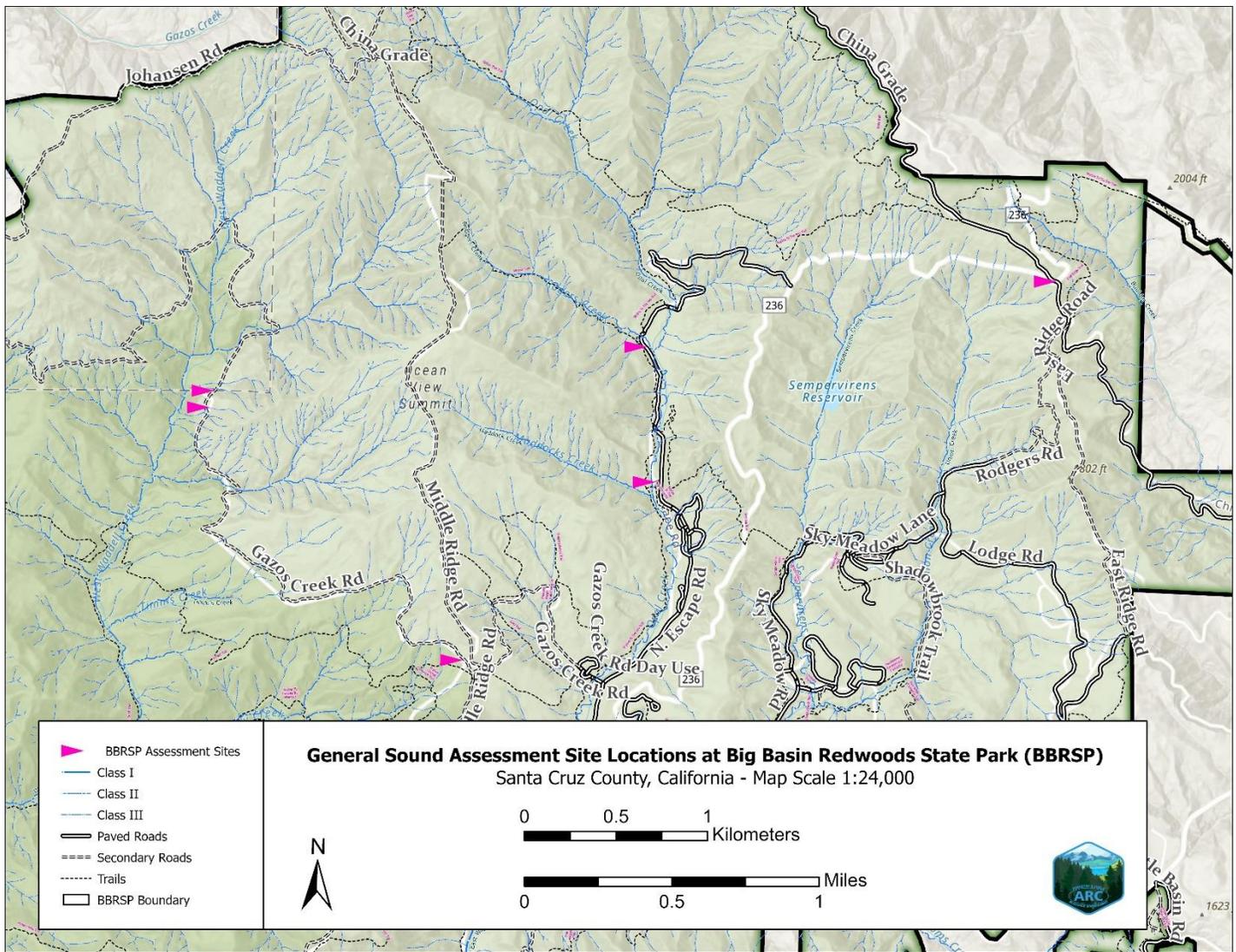


Figure 39 Approximate Assessment Site Locations in BBRSP; Map Not To Scale



**APPENDIX I: AVOIDANCE MEASURE RECOMMENDATIONS FOR  
MARBLED MURRELETS IN THE SANTA CRUZ MOUNTAINS  
FOLLOWING THE CZU LIGHTNING COMPLEX**

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## **Avoidance Measure Recommendations for Marbled Murrelets in the Santa Cruz Mountains Following the CZU Lightning Complex**

AUGUST 2022

*Prepared by:*

**California State Parks  
Santa Cruz District**

Portia Halbert  
Senior Environmental Scientist



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## Introduction

Federally threatened and state endangered marbled murrelets (murrelet) nest in the large wide branches found in old growth redwood and Douglas-fir forests. Beginning in 2006, the US Fish and Wildlife Service (USFWS) issued a memo from the Arcata office that outlined potential impacts to murrelets from human generated noise (USFWS 2020). Since that time, State Parks and other landowners have been using the guidance found in this memo to seasonally restrict noise-generating activities.

In August of 2020, the CZU Lightning Complex Fire (CZU Fire) burned 86,509 acres in the Santa Cruz Mountains (SCM) including nearly 70% of the marbled murrelet breeding habitat. Overnight, marbled murrelets experienced a significant loss of habitat in moderate high and high severity burn areas. This fire, along with other recent megafires in California, led to the Governor funding a Wildfire and Forest Resilience Program (WFRP) to address the fuel build up from nearly 200 years of fire suppression.

With recent and more severe wildfires expected in the face of climate change, there is a need to conduct more restorative forest treatments to benefit murrelets. The operational window to implement these treatments is limited by the guidance in the USFWS memo and seasonal wet weather requirements often bounding operations near murrelet areas to very small windows each year, sometimes only 30 days.

The purpose of the document is to evaluate whether there may be localized differences in marbled murrelet behavior supporting wider operational windows, still providing appropriate avoidance measures for murrelets in low to moderate fire severity areas where habitat still exists during the breeding season. A rationale is presented for adjusting the marbled murrelet season for conducting high decibel activities in proximity to murrelet areas beginning August 5<sup>th</sup>, rather than September 1<sup>st</sup>. Except for Portola State Park to Pescadero Creek County Park marbled murrelet important areas where August 15<sup>th</sup> is appropriate and Gazos Mountain Camp marbled murrelet important areas in Butano State Park where September 1<sup>st</sup> is appropriate; continued survey efforts in these locations will monitor post-CZU Fire behaviors to determine if changes to the operational windows are appropriate. In addition, in areas of low to moderate fire severity where habitat still exists, this document provides a rationale for reducing buffers to 330 feet near occupied or important murrelet areas to allow larger handwork crews and mastication equipment to conduct forest restoration and resiliency treatments greater than normal routine maintenance actions, from March 24<sup>th</sup> to August 5<sup>th</sup>. This basis results from an analysis on the effects of sound on murrelets and recent sound analysis work conducted on San Mateo County Parks and State Parks lands.

The following information examines the results of various survey methods and monitoring efforts in the Santa Cruz Mountains; Audio Visual (AV), Radar, and Acoustic Recording Units (ARU) data, including a summary of information on the effects of noise and a recent sound work conducted to evaluate various decibel levels of equipment against ambient noise levels implementing forest restoration treatments to support the rationale for the proposed recommendations.

## Monitoring

In order to inform options for adjusting the work period, we need to consider what we know about murrelet use of their forest habitat. There are four survey types available to land managers to monitor marbled murrelets: At Sea Surveys, Inland Forest Audio-Visual (AV) Surveys, Radar Surveys, and Audio Recording Units (ARU). Of these four types, At Sea Surveys don't reveal much about forest use, leaving the three survey methods available to examine murrelet's seasonal use of forest habitat.

### *Audio-Visual (AV) Monitoring*

Since 1974, many ground based forest surveys were conducted looking for nests in trees with appropriate limbs and platforms that could house murrelets in the Santa Cruz Mountains, with the first nest for the species discovered in Big Basin State Park. AV surveys have been the primary means of monitoring murrelet use of forest habitat through watching their flight patterns and listening for their sound indicating where possible nesting activities may be occurring.

These surveys have limitations, including significant temporal and spatial variability of murrelet use of the forest, weather challenges (fog or mist), observer bias, auditory bias and other unknown factors. Normally, AV surveys are conducted during July, which is considered the peak of the breeding season. Survey efforts are costly, so there are limited AV surveys after July 31<sup>th</sup>. Because information about murrelet use of the forest late in the season is limited, known monitoring from the Santa Cruz Mountains in August are included in Tables 1 – 7.

This first monitoring example and discussion of survey data includes excerpts taken from Singer & Hamer 1999 in Tables 1, 2, and 3. These show the increase in activity in June and July and the slowing down of the breeding season to minimal detections in early August at Gazos Mountain Camp (Gazos Mtn. Camp).

Table 1 Results of 1999 Early Season AV Surveys, Singer and Hammer – Gazos Mtn. Camp

Date	% Overcast	Number of Detections (# heard-only)	Number of Occupied Behaviors	Number of Single Silent Birds Below Canopy
6/1/99	100	15 (13)	0	0
6/4/99	100	109 (64)	30	7
6/6/99	50-100	32 (16)	12	0
6/7/99	0-50	19 (12)	5	0
6/9/99	0-80	14 (7)	5	0
6/11/99	0-20	17 (5)	7	0
		x = 34.33	x = 9.83	

Table 2 Results of 1998 Mid-season AV Surveys, Singer and Hammer – Gazos Mtn. Camp

Date	% Overcast	Number of Detections (# heard-only)	Number of Occupied Behaviors	Number of Single Silent Birds Below Canopy
7/14/98	0	41 (24)	16	10
7/16/98	0	42 (31)	10	3
7/17/98	20	18 (12)	5	1
7/18/98	0	28 (18)	7	3
7/20/98	100	49 (27)	13	4
7/22/98	100	38 (24)	13	3
		x = 36.00	x = 10.66	x = 4.00

Table 3 Results of 1999 Late Season AV Surveys, Singer and Hammer – Gazos Mtn. Camp

Date	% Overcast	Number of Detections (# heard-only)	Number of Occupied Behaviors	Number of Single Silent Birds Below Canopy
8/12/99	100	7 (6)	1	0
8/13/99	0-95	0 (0)	0	0
8/15/99	100	0 (0)	0	0
8/16/99	100	0 (0)	0	0
8/18/99	100	1 (0)	1	0
8/20/99	0-90	0 (0)	0	0
		x = 1.33	x = 0.33	

A comparison of Tables 1 and 2 shows generally higher numbers of detections in July 1998 than in June 1999, although an exceptionally high number of detections on June 4, 1999 skews the 1999 average upward to approach the 1998 average value (34.3 and 36.0, respectively). These data show that either June or July is better than August for implementation of ground protocol surveys where the objective is to monitor occupied behaviors or other visual and/or auditory behaviors indicative of murrelet nesting in the vicinity.

A comparison of Tables 1 and 3 shows a dramatic decrease in the number of murrelets detected at Gazos Mountain Camp in Butano State Park in the late season compared to the early season. In the June period, murrelets were detected every day with the number of detections ranging from 14 – 109, whereas in August, murrelets were only detected on two days, with 1 and 7 detections recorded. As will be discussed later, there was a similar decrease in the number of radar detections in the Gazos Creek Canyon, a survey location also referred to as Double Low Gazos. This data strongly suggests that most breeding activities had terminated by August 12. Ground surveys from other areas of the Santa Cruz Mountains in previous years also show a decline in inland detections by mid-August (Singer, unpublished data).

Occupied behaviors are recognized as indicators of murrelet nesting in suitable habitat nearby (Pacific Seabird Group; Marbled Murrelet Technical Committee 1994). Occupied behaviors include behaviors such as perching, landing, or attempting to land on branches, flying below tree canopy height, or circling above canopy height. Other than landings, which are rare, the number of single silent birds detected flying below the canopy is arguably the best flight behavior indicator of an active nest nearby. Single birds flying below canopy are often associated with incubation exchanges or feeding visits to a nest (Singer et al 1995). A comparison of Table 2 against Table 1 and 3 shows that an active nest was likely present in July, 1998 due to the amount of occupied behavior and single silent birds below canopy flights ranging from 1-10 on all recorded survey days, but not in June or August of 1999. Note that no single birds were seen in August. These findings suggest that June and July are the best time of year to look for the presence or absence of occupied behaviors related to nesting at Gazos Mountain Camp.

In a second example, surveys documented by Suddjian (Suddjian 2001) from 1991-2001 at Big Basin State Park included only one survey in August, conducted on August 1<sup>st</sup>, 1998, which resulted in 9 detections. In comparison to the 99 other survey mornings, many of which had detections in the 100- 200 range in June and peaking in mid-July, the August 1, 1998 survey was at the very low end of detections. It should be noted that in 1998 detections were on a downward trend with respect to other survey years, the only other survey days with such low detections were in 2001. Additionally on this day in 1998, no fog was present, which is more likely to result in fewer detections than days when fog is present.

Many surveys were conducted between 2001 and 2021 focusing on June and July with few other surveys in August. Surveys by Suddjian from 2003-2009 and State Park AV surveys in the Santa Cruz Mountains from 2014-2021 did not include any surveys in August. One other year with August AV surveys is known and discussed in Table 4 from Klamath Wildlife Consulting who conducted AV surveys from 2010-2012 and several surveys were done in early August 2010. Most sites were surveyed a total of three times concurrently; one time in June, July and August, with the exceptions of Ben Reis in Butano State Park which was not surveyed in August, and four sites were surveyed multiple times in June and July.

Table 4 Results of AV Surveys in 2010

Date	Location, Park	June Detections	July Detections	August Detection s
August 2	Iverson Trail, Portola	31	23, 33, 82	32
	Peters Creek, Portola	18	16, 41, 72	18
	Memorial, Memorial County Park	19	10	4
August 3	Blooms Creek, Big Basin	0	8	0
	Huckleberry Camp, Big Basin	0	1	0
	Sempervirens, Big Basin	0	2	0
August 4	Redwood Meadow, Big Basin	7	37	2
	100 Acre Woods, Big Basin	1	5	0
	Sequoia Flat, Memorial Co. Park	1	8	3
August 5	Little Butano, Butano	42	122	22
	Girl Scout Camp, Butano	8	7, 9, 14, 2, 6	2

Tables 1-4 show August AV surveys mostly resulted in notably fewer detections. These numbers primarily show that the peak of the murrelet season is in July and is tapering off in early August or sooner, where the highest recorded August detections occurred on August 2, 2010 and August 5, 2010 with 32 and 22 detections respectively (Table 4) and the next highest detections following August 5<sup>th</sup> occurred on August 12, 1999 with 7 detections (Table 3). In two of the more active sites at Portola State Park we see this trend continue, with a similar number of detections into early August as detected in June (Table 4).

Parks will continue to use AV surveys to inform management during the busy peak season in July. However, it is still cost-prohibitive to add surveys to August. Additionally, the PSG Survey Protocol is currently in revision and any changes to it, during the time of this document's life, will be adopted.

## Radars Monitoring

Several years of radar work conducted by Singer and Hamer (1999) document murrelet movements into and out of habitat. Several sites were monitored most years from 1998 – 2010. By 2001 it was determined that radar monitoring would best be done in June or July because of the apparent rise of Coefficient of Variation values in August associated with generally lower detections of all types. Therefore, only 1998-2001 include any surveys in August; 1998 and 1999 results are shown in Table 5 and 6. Again, in comparison to AV monitoring, radar monitoring shows significant drops in detections in August. Radar units can be advantageous because they can detect silent birds in low light or dense fog over a larger area than AV surveys. Additionally, radar units can record flight information, such as direction, speed, and behaviors.

*Table 5 Results of 1999 radar surveys for marbled murrelets at Double Low Gazos, also called Gazos Creek Canyon. Values for the mean (x), standard deviation (s.d.), and coefficient of variation (C.V.) are given at the end of the August values in each column.*

Date	% Overcast	Number of Detections	In-bound Detections	Out-bound Detections	Other Detections
June 1999					
6/8/99	45 – 85	33	15	18	0
6/9/99	100	34	17	15	2
August 1999					
8/10/99	100	7	1	4	2
8/11/99 <sup>1</sup>	100	10	4	2	4
8/12/99	100	9	1	4	4
8/13/99	0 – 5	10	2	8	0
8/15/99	100	1	0	0	1
8/17/99	100	5	2	3	0
8/19/99	100	9	3	4	2
8/21/99	75	8	1	5	2
		x = 7.38 s.d. = 2.05 C.V. = 0.28	x = 1.75 s.d. = 1.28 C.V. = 0.73	x = 3.75 s.d. = 2.31 C.V. = 0.62	

<sup>1</sup> Twelve minutes of survey period lost due to rain

Table 6 shows the results of nine radar surveys conducted at other locations in 1999 and 1998 to collecting detection values for other nearby canyons to compare with Gazos Creek Canyon (Table 5).

*Table 6 Results of radar surveys at other canyon locations in proximity to Gazos Creek Canyon (1998-1999)*

Date	Location	% Overcast	Number of Detections
July 1998			
7/18/98	Waddell Creek	0	31
7/19/98	White House Cyn. #1	100	14
7/23/98	White House Cyn. #1	100	7
June 1999			
6/11/99	Pescadero Creek #1	100	22
6/12/99	White House Cyn. #2	40	8
6/13/99	Big Butano Creek	100	21
6/14/99	Waddell Creek	100	52
August 1999			
8/16/99	Pescadero Creek #2	100	2
8/20/99	Waddell Creek	0	10

Table 7 shows five radar surveys conducted at other sites in 2000 collecting detection values for other nearby canyons to compare with Gazos Creek Canyon results from 1999 and 1998 (Table 5). The value at Station Pescadero Creek #2 for mid-August shows the decrease in the number of detections for this area by mid-August, again indicating significant drops in detections in August.

*Table 7 Results of radar surveys for marbled murrelets at other locations in the Santa Cruz Mountains, 2000, compared to detections recorded at these sites in 1998 and 1999*

Station	Location	2000 Total Detections and (Date)	Prior Year Detections and (Date)
Hill 621	Cloverdale Ranch	47 (7/12/00)	28 (7/14/98)
			23 (7/17/98)
Pescadero Creek #2	Dearborn Park	74 (7/21/00)	2 (8/16/99)
Big Butano	Butano Canyon	55 (7/19/00)	21 (6/13/99)
Little Butano	Butano State Park	24 (7/20/00)	27 (7/21/98)
White House Cyn. #1	Cascade Ranch S.P.	12 (7/22/00)	14 (7/19/98)
			7 (7/23/98)

In combining August detections from Table 5 and 6 from various survey locations, the average number of radar detections between August 10, 1999 and August 21, 1999 is approximately 7.1. In comparison, June 1999 averaged approximately 28.3 radar detections at various locations (Table 5 and 6) and July 2000 averaged approximately 42.4 radar detections at various locations (Table 7). Overall, Tables 1-7 predominantly indicate significant drops in detections resulting from AV and radar surveys, and likely breeding behavior, at the beginning of August in many locations and early August in areas like Gazos Mountain Camp (Table 3).

Although not from the Santa Cruz Mountains, it is worth noting the research conducted by Sanzenbacher et al. (2014) looking at year-round flights using marine radar at three high use sites in Northern California (n = 78 mornings). Murrelet passage rates were relatively low in winter (11%-47% of summer rates), increased in spring, peaked during the summer breeding period (late April-July) and were lowest during the fall molt period adding parallel consideration that there is a significant drop off activity in August in other locations in California.

## ARU Monitoring

Lastly, surveys can be conducted through autonomous Acoustic Recording Units (ARU). Borker et al. (2015) tested their use as a cost-effective way to detect the presence of marbled murrelets at inland sites, and to provide comparable metrics on the relative rates of acoustic activity at a large scale. Specifically, they compared the results of traditional AV counts by human observers to data from automated acoustic surveys at sites in Big Basin and Butano State Parks. Analysis of the data showed that automated surveys detected murrelet calls at all of the sites where human AV surveys also detected them. On average acoustic sensors detected fewer calls per morning than human observers stationed at the same survey sites, but the detection rate between the two methods was significantly correlated (i.e. acoustic sensors detected more calls where people counted more murrelets and vice versa). In addition, the study suggested that automated surveys could improve the statistical power of monitoring efforts by reducing several sources of sampling error common in traditional audio-visual surveys such as low sample size, high sampling variability, and observer bias. Table 8 shows the year and number of ARU units deployed.

*Table 8 Year ARU's deployed, number of ARU's deployed, and Notes*

<b>YEAR</b>	<b># ARU</b>	<b>Notes</b>
2010	6	Borker's initial sensor research
2017	3	--
2018	3	--
2019	3	Minor software issues
2020	3	Significant software challenges not all mornings recorded correctly
2021	12	Four ARUs did not record, and minor software issues present

Figure 1 below shows Borker's 2010 ARU data expanded in graph form. Graphed ARU results depicted by the thick black line show the mean call rate per minute, by day, for murrelets during peak calling period  $\pm 30$  minutes from sunrise. The black triangles indicate AV survey efforts. All of Borker's results indicate a significant drop in murrelet activity before August or in early August again represented by Gazos Mountain Camp. Borker's ARU deployment occurred at the following locations: Gazos Mountain Camp (GMCA), Girl Scouts Creek (GSCR), Huckleberry Camp (HUCK), 100-Acre Woods (HUND), Little Butano (LBUT), Redwood Meadow (RDMD), and Sempervirens Camp (SEMP).

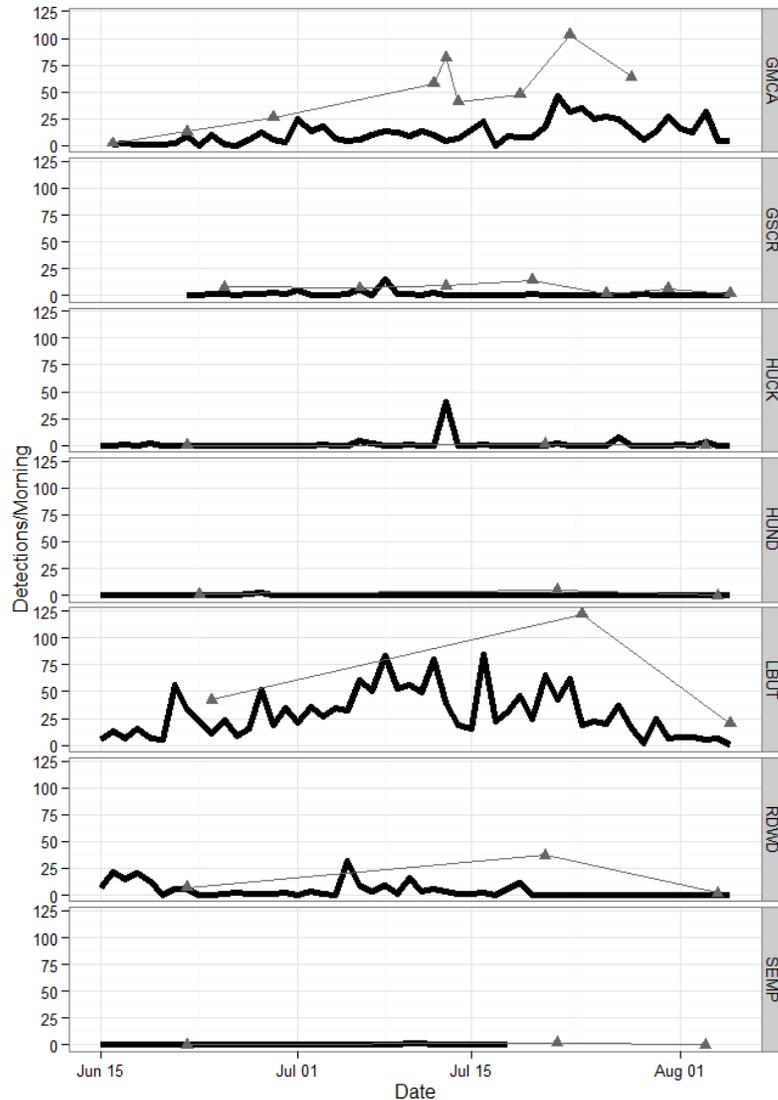


Figure 1 Borker's 2010 deployments of ARU's at different locations in the Santa Cruz Mountains

Figure 2 shows State Parks results from 2017 showing no detections after August 1<sup>st</sup> at two of the sites. Gazos Mountain Camp again having some detections in August consistent with Borker's 2010 ARU data from Figure 1.

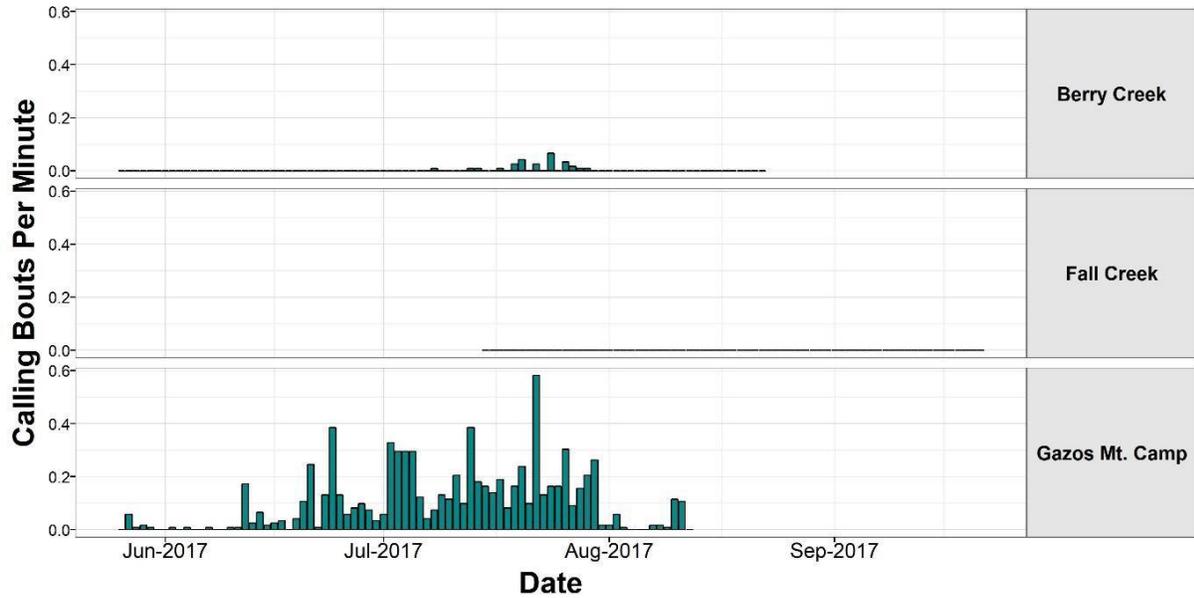


Figure 2 ARU – 2017 Calling Bouts per Minute at Berry Creek, Fall Creek, and the Gazos Mt. Camp

Figure 3 shows State Parks results from 2018, two ARUs show no calls after August 1<sup>st</sup>. Gazos Mountain Camp continues to have call detections into August.

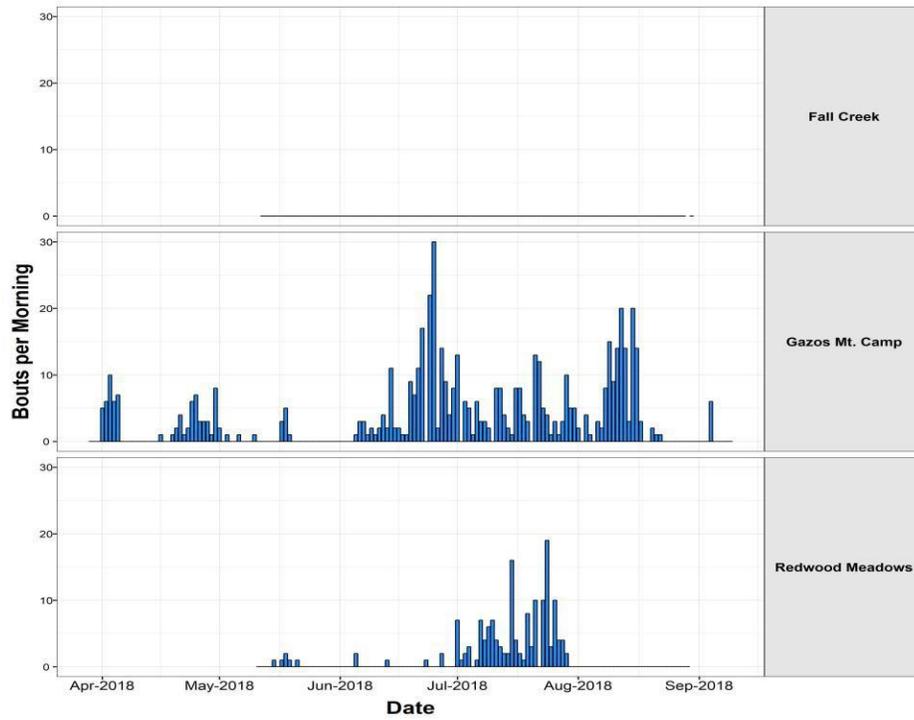


Figure 3 ARU - 2018 Calling Bouts per Minute at Fall Creek, Gazos Mt. Camp, and Redwood Meadows

Figure 4 shows State Parks results from 2019, two ARUs show no calls after August 1<sup>st</sup>. Gazos Mountain Camp continues to have calls after August 1<sup>st</sup>.

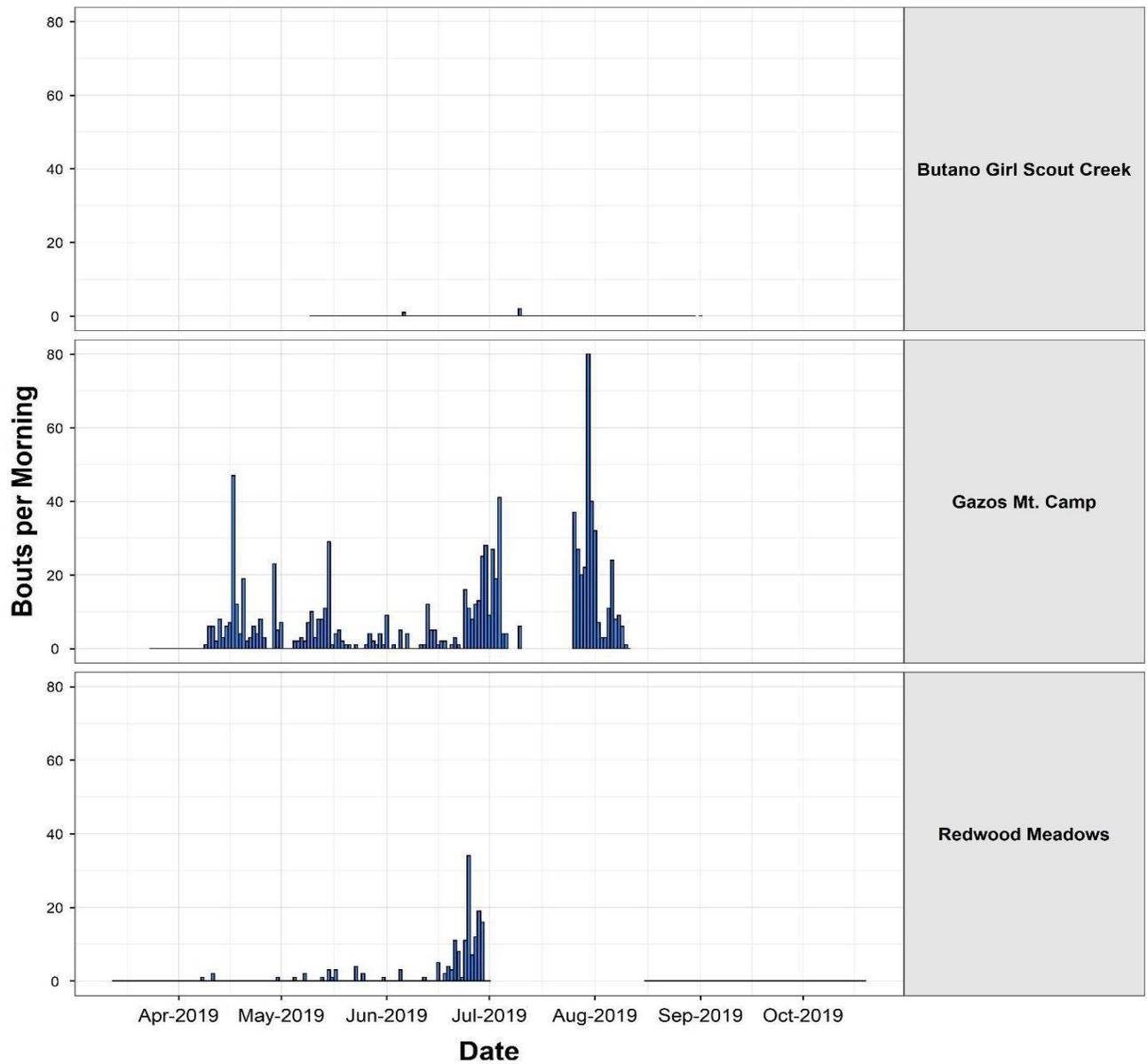


Figure 4 ARU – 2019 Calling Bouts per Minute at Butano Girl Scout Creek, Gazos Mt. Camp, and Redwood Meadows

Figure 5 shows State Park results from 2020, two of the sites have no calls after August 1<sup>st</sup> and Gazos Mountain Camp had no calls after approximately August 1<sup>st</sup>. Note that breaks in the line on the X- axis represent days that the ARUs began to experience issues with not recording on some days. Solid lines on the X-axis with no Y-axis variation represent days that the ARU recorded but did not have detections.

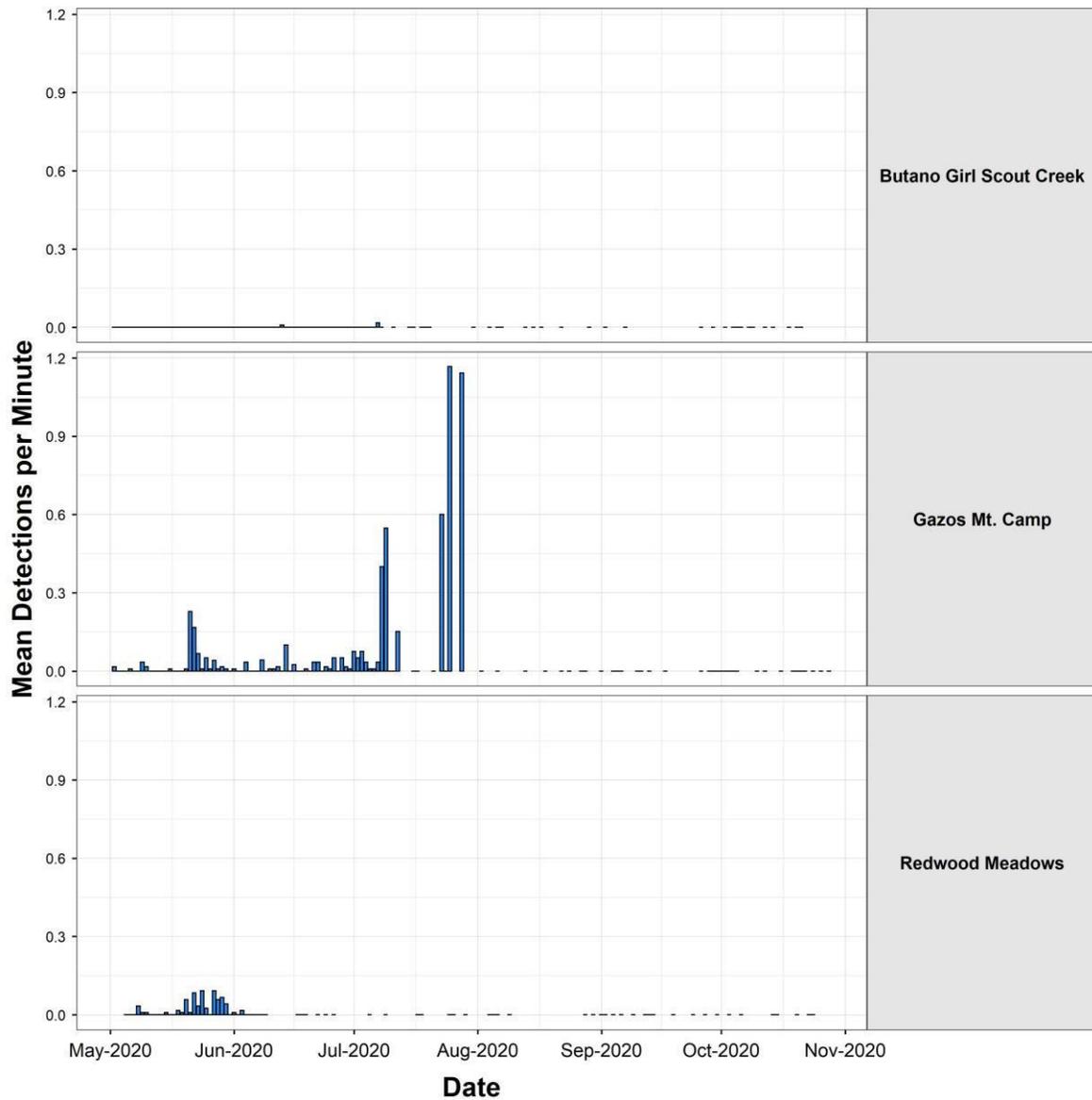


Figure 5 ARU – 2020 Calling Bouts per Minute at Butano Girl Scout Creek, Gazos Mt. Camp, and Redwood Meadows

Figure 6 shows State Park results from 2021 (post-CZU Fire) at eight locations showing almost no detections after August 1<sup>st</sup> including the Gazos Mountain Camp.

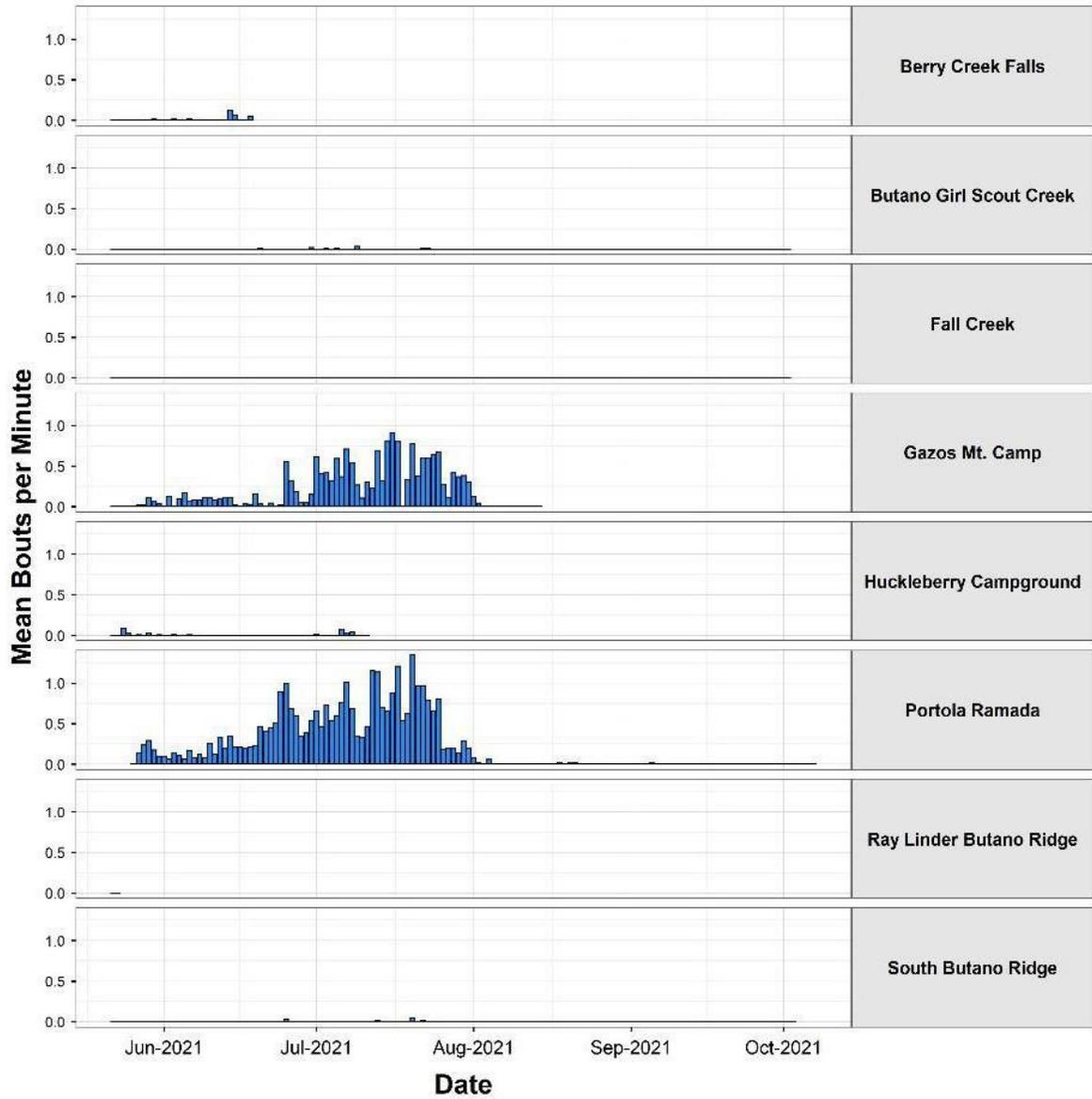


Figure 6 ARU – 2021 Calling Bouts per Minute at Berry Creek Falls, Butano Girl Scout Creek, Fall Creek, Gazos Mt. Camp, Huckleberry Campground, Portola Ramada, Ray Linder Butano Bridge, and South Butano Ridge

Figure 7 shows San Mateo County Parks ARU data in 2021 (post-CZU Fire) with results showing similar patterns as the State Park sites, two locations had no detections in August and one location had some detections in early August only.

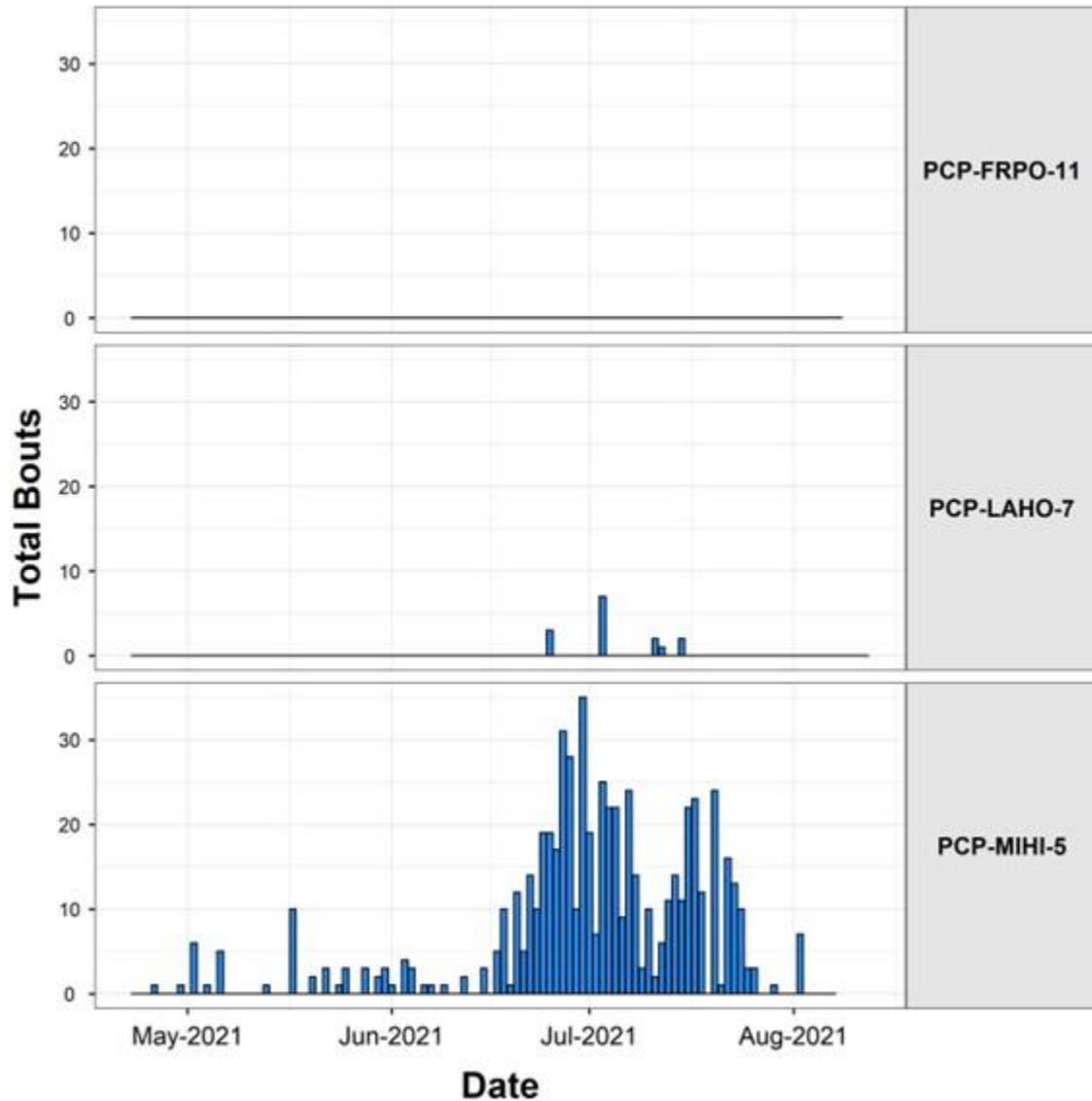


Figure 7 ARU – 2021 San Mateo County Parks Calling Bouts per Minute PCP-FRPO-11 (Rhododendron Creek), PCP-LAHO-7 (Camp Jones Gulch), PCP-MIHI-5 (Tarwater Creek)

Another additional set of ARU data cited here comes from Forester Nadia Hamey, from Hamey Woods, working with Save the Redwoods League in Peters Creek (adjacent to Portola State Park) and at the Cascade Ranch indicating that all three sites show drops to zero for murrelet activity by the beginning of August (Hamey 2020).

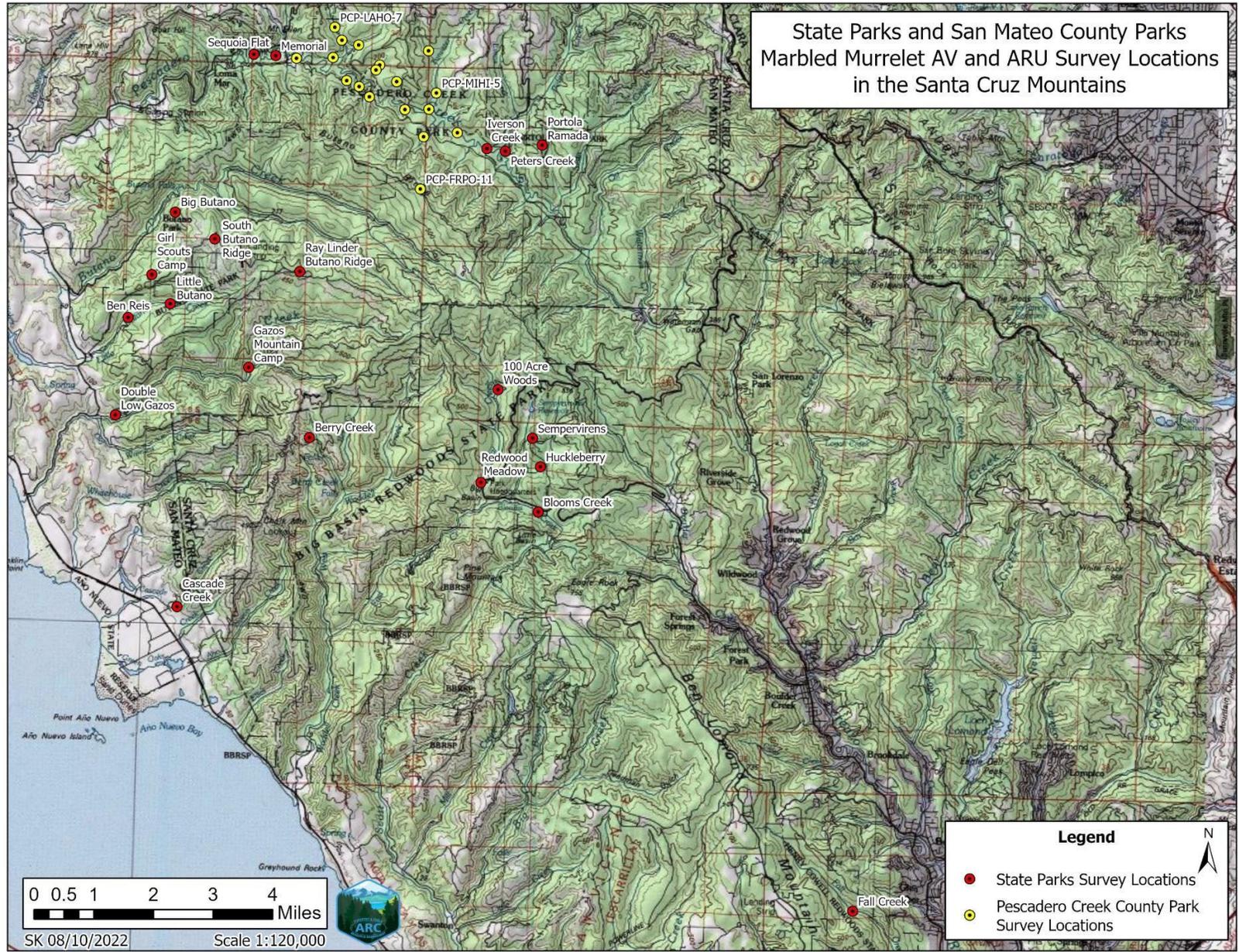
## ARU Data Summary

In summary, the results from 2010, 2017, 2018, and 2021 in State Parks, 2021 in San Mateo County Parks, and Hamey Woods 2020 in Peters Creek show a notable drop in activity at the end of July. With the exception of Gazos Mountain Camp, which had quite a bit of calling activity through mid- August in 2018 but appear to notably drop in 2020 and 2021. It should be recognized 2019 and 2020 showed inconsistencies due to software related issues for State Park ARU's. There were periods of higher call detection during the late July-August period of 2019 at Gazos Mountain Camp as well. From this ARU data, Matthew McCowen, principal ARU researcher says "that vocalizations typically peak between mid-June and August 1, but that detections can continue into mid-late August at high activity sites." With this in mind, it would be appropriate to restrict noise producing management actions around these high activity sites like Gazos Mountain Camp into August during the breeding season

The culmination of data from AV, Radar, and ARU among the different entities provided here are likely the most inclusive data available for inland movements of marbled murrelet for the Santa Cruz Mountains. They represent the best available data set and indicate that most locations would avoid impacts to marbled murrelet with high decibel activities starting after August 5<sup>th</sup>, except for marbled murrelet important areas within Portola State Park and Pescadero Creek County Park where activities could begin on August 15<sup>th</sup> and marbled murrelet important areas within Gazos Mountain Camp where activities could begin on September 1<sup>st</sup>.

ARU information will likely be the best monitoring tool in August going forward given the prohibitive cost for AV monitoring during this low use time period. Parks will continue to use ARUs to monitor through August at many different locations throughout the range in areas of interest.

# AV and ARU Survey Stations Location Map



## Grounded Fledglings and Chicks

There have been 63 documented instances of nesting in the Santa Cruz Mountains, 21 nests, 6 eggshells, 2 chicks, and 35 grounded fledglings (LMP, 2017). Although findings are incidental it can be useful to consider when murrelet fledglings and chicks have been found on the forest floor. Below is a chart (Figure 1) of the nesting chronology of marbled murrelets based on 30 grounded fledglings in the Santa Cruz Mountains. For grounded fledglings, the date of discovery is assumed to be within one day of the fledge date, and the egg-laying date is assumed to be 60 days prior<sup>2</sup> (LMP, 2017). Of these 35 grounded fledglings 37% have been found after August 5<sup>th</sup>.

This section is quoted from the LMP:

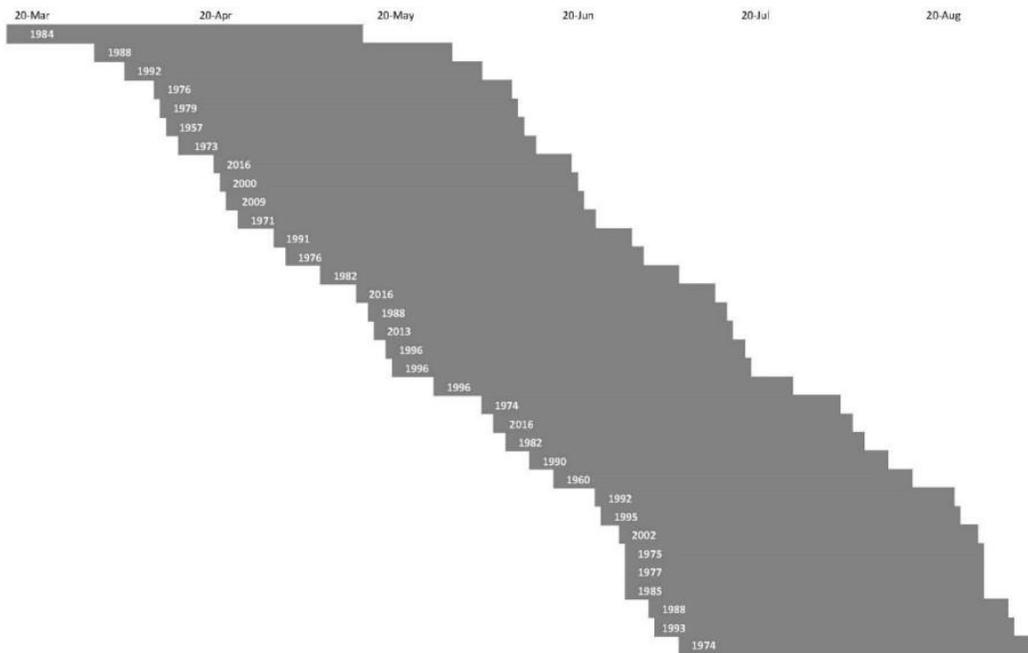
*“However it is unlikely that a pair would wait until July to lay their first egg and initiate nesting. It is more likely that murrelets start nesting in late March or April and that the late fledgling birds are the result of a replacement egg laid after the failure of the first nest.*

*Replacement laying, i.e. laying of a new egg after the first fails, is common in other parts of the murrelets range (McFarlane Tranquililla et al. 2003) and is believed to be common in the Santa Cruz Mountains as well (Peery and Henry 2010) However, research by Hébert et al (2003) found it to be less common in northern California. It is also important to recognize that late fledglings are probably the product of replacement eggs (they hatched from an egg that was laid after an earlier nesting attempt failed; Hébert et al. 2003). In many other Alcids, the success of replacement eggs is poor (e.g. common murre, Golightly and Schneider 2016). Data from Hébert et al. (2003) indicated that survival to fledging was low for re-nesting attempts by marbled murrelets (overall 89% of re-nest attempts failed and 92% of re-nest attempts failed in the best reproductive year). Most of these nests failed in the incubation stage. The likelihood of failure in replacement eggs illustrates the problem of extrapolation of a fledge date for determination of the outer extent of the nesting period. Thus, for purposes of avoiding noise impacts to nesting, September 1 could be appropriate as the end of the nesting period in California.”*

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<sup>2</sup> The breeding season is defined by the earliest known nesting and latest known fledging dates. Data shows that nesting begins as early as March 18 and the last fledging occurs in mid-September. This nesting season is similar to that found elsewhere in the southern half of the murrelet’s range (McShane et al. 2004) and largely falls within the period given in the Pacific Seabird Group forest survey protocol of March 24 to September 15 (Evans Mack 2003).

Figure 8. Nesting Chronology of Marbled Murrelets by Grounded Fledglings (LMP, 2017)



## Noise

When considering mammals or birds that are threatened or endangered, understanding and avoiding disturbing events is important. Marbled murrelets nest high in old growth trees where there are few ground predators and visual cues of a predator approach are limited; consequently, sound is likely the major stimulus causing disturbance at the nest (with the possible exception of corvids which could produce both an auditory and visual stimulus as they approached a nest).

Noise has been described as undesirable sound (Crocker 1998) and an ongoing terrestrial threat to marbled murrelets (McShane et al. 2004). Effective management of this species requires consideration of noise as a source of disturbance during nesting. Further, noise can be considered to be a component of the animal's habitat because noise can compromise communication and reproduction, as well as influence the potential for predation. Noise can cause a decrease in the assessment of habitat quality, especially if noise is persistent in that environment.

### *Timing of Noise Restrictions*

Marbled murrelets are very difficult to observe and species-specific studies of noise impact have been limited, and sometimes impossible to conduct. Clear causal relationships between noise and potential impact or injury (e.g. reduced reproductive success, increased risk of predation) have not been established. Clearly, flushing should be considered harmful. Despite the absence of causal studies on marbled murrelets, events that cause flushing cannot be considered as the only harmful noises.

Formulation of protective strategies for marbled murrelets requires that assessments consider all information about murrelet life history, as well as the responses to disturbance identified in studies of other seabirds.

The following is quoted from the LMP (2017).

*“The risk of noise impact can be reduced by timing loud noise-producing events near murrelet nests to times when the birds are least vulnerable. This would be especially important during incubation, but also the time of day during chick feeding when fish deliveries might potentially be disrupted. Because the USFWS (2006) was considering spotted owl habitat in the same noise analyses, their considerations for restrictions on noise generation did not fully distinguish all nuances specific to marbled murrelet biology that differ from other species.*

*Specifically, the timing of how murrelets use the forest is important to providing flexibility to the imposition of restrictions. However, for murrelets the potential impacts from noise generation vary with time of day, phase of the nesting season, and time of year and may not require the same types of restrictions at all times. Thus, it may not be reasonable to apply a single set of restrictions or noise mitigations across all times of day and throughout the nesting season. The following section discusses potential alterations of the present noise restrictions that could be considered to ensure protection to murrelets while also providing regulatory flexibility.”*

#### *Marbled Murrelet Response to Noise*

*“Marbled murrelets and their nests are difficult to observe because the nests are so high in the trees and the adults fly in and out for incubation exchanges only during the very early morning hours. To overcome this difficulty, Hébert and Golightly (2006) used radio telemetry and video techniques in RNSP to systematically assess the behavioral and reproductive response of marbled murrelets to noise associated with human trail-use and distances of nests from recreational trails in the park. Here, visual and auditory stimuli could not be separated, but presumably marbled murrelet responses were most likely associated with noise.”*

*“Video was used to record murrelet behavior coincident with human activity on the trails. No murrelets were observed to flush when trails were used by various-sized groups of people. In the same investigation, Hébert and Golightly (2006) also experimentally examined changes in behavior associated with noise generated from operating chainsaws; they examined both the behavioral responses of incubating adults, as well as chicks at the nest. It was apparent that individual murrelets recognized the chainsaw noise as an alteration in their environment. At 65-75 dB measured 25m (82 feet) distant from the source and at the base of the tree, approximately 40-50 m (131-164 feet) from the nest, the noise was 20-35 dB above background in that forest. Murrelets rested less during the time that the saw was running and displayed an increase in behaviors that could be interpreted as vigilance. However, these behavior changes were subtle and appeared to preserve the cryptic manner in which murrelets behave at the nest; see below. Moreover, no murrelets flushed and all sat quiescent in the nest during their chain saw exposure events. Neither chronic nor impulsive noise was tested in this study.”*

### *Daily Variation in Noise Vulnerability*

Noise has significant potential to negatively impact murrelet behavior and reproduction when murrelets fly inland to visit nests, make exchanges with their mate during incubation, or feed chicks at nests. During the nesting season, the period from approximately 1 hour before sunrise until 1.5 hours after sunrise should be considered a particularly vulnerable time and moderately loud and/or high- intensity impulsive noise production from anthropogenic sources should be restricted.

Additionally, in California murrelets may fly inland in the late afternoon (1 hour before sunset; see Hébert and Golightly 2006). The late afternoon/evening flights are associated with feeding chicks at the nest (empirically observed evening flights were not detected prior to May 22 but can continue until the end of nesting) and there is a similar need to avoid loud or impulsive noise during this period.

During all daylight hours throughout the nesting season, noises that could cause flushing should be avoided (especially very loud or impulsive noises). Besides very loud or impulsive noises, the difference between the ambient background level and the noise generated by a project is another consideration for the potential to cause harm. For noise generated from a project during daylight hours, Hébert and Golightly (2006) found that noise about 30-35 dB above background did not produce flushing. Consequently, short periods of noise (eg.: such as using a chainsaw or power blower) that is less than 30-35 dB above background (measured from the nest or potential nest tree) would likely have minimal impact and thus be tolerable during most daylight hours (outside the 1.5 hours after sunrise and the hour before sunset). Likewise, noise that is consistent in amplitude, duration, and frequency with the existing sources of noise at the site, even if somewhat louder than usual background, would be unlikely in causing stress to the nest. Conversely, noise that is suddenly injected into the environment may be more likely to cause a response that may be deleterious.

## General Sound Assessment and Action Generated Noise Analysis within Huddart County Park, Pescadero Creek County Park, and Big Basin Redwoods State Park

The following excerpts were sourced from a general operational sound assessment conducted by Auten Resource Consulting at various county and state parks properties undergoing restorative vegetation management projects in the Santa Cruz Mountains. Various equipment typically utilized for landscape level, forest health fuels reduction treatments within the region was assessed for sound output levels at various buffer distances.

*“A general sound level field assessment was conducted over three days in June of 2022 by Auten Resource Consulting at various locations within San Mateo County Parks and California State Parks properties across the Santa Cruz Mountains. The intent of this exercise was to develop a broad dataset containing decibel (dB) reading recorded within different settings and environments for the purpose of observing how those readings compare with corresponding sound levels described in available literature (Estimating Auditory Effects of*

*Auditory and Visual Disturbance of Northern Spotted Owl and Marbled Murrelet in Northwestern California, 2006, 2020 USFWS).*”

**Operational Noise**

Below, averaged results of the general assessment are compiled based on the type of equipment as well as the specific ranges at which the sound source was measured. The dB values listed are averages sourced from larger datasets for listed each scenario.

*“Table 9 from the general sound assessment provides a summary of noise levels recorded during active equipment operations. Specific equipment types were assessed for sound at variable ranges to develop a reference scale for machinery that may be used during similar vegetation treatment projects. These values are approximate and are averages taken from the broader datasets for each setting/equipment type.*

Operations Assessment		
Equipment	Distance from Equipment (ft)	dB Average
CAT 299D Skid steer mower	165	59.5
	300	52.1
	500	49.0
Link-Belt 145 X4 excavator	120	65.8
	165	59.6
	300	52.0
	500	45.3
Stihl MS 261 chainsaw	165	62.6
	250	57.9
	300	55.9
	500	50.5
John Deere 135G excavator	50	57.7
	100	55.1
	165	46.2
	300	44.2
John Deere 650K XLT Dozer	50	68.7
	165	56.4
Handwork/Felling	50	83.7
	165	73.3
	300	62.7
	500	54.6

*Table 9 Operations Assessment Sound Level Summary Results by Equipment Type*

Predominantly, operational sound level readings did not vary substantially within each dataset, producing a generally representative average for each equipment type. Figure 8 provides a graph of recorded averages developed from actual readings as well as projected averages along an approximate trendline for each dataset. The plotted points on Figure 8 represent the dB averages developed from physical data while the associated trendline for each equipment type provides general, projected averages at measurement distances where actual data was not available.

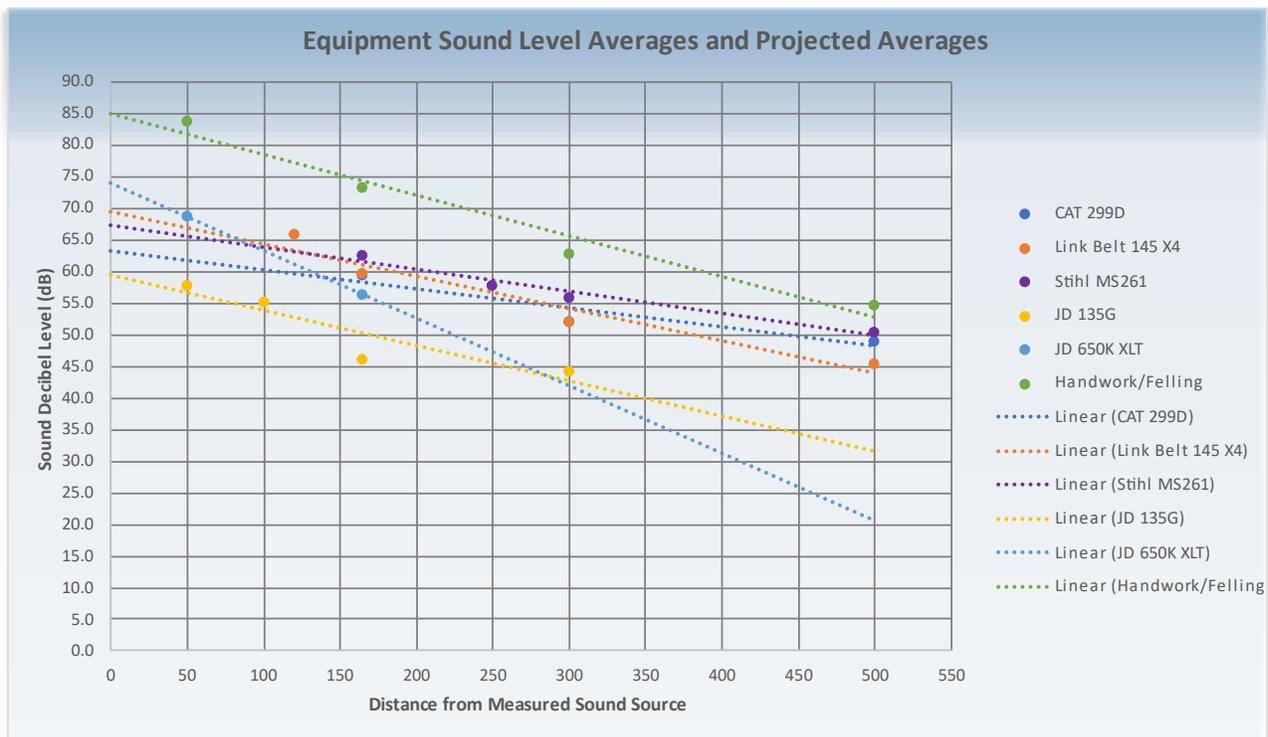


Figure 9 Equipment Sound Level Averages and Projected Averages by Source Type

The maximum recorded sound levels captured during the operational noise assessment were primarily the product of handwork and tree felling along Opal Creek in Big Basin Redwoods State Park. Crews utilized three (3) active chainsaws and hand equipment to fell trees near North Escape Road where noise levels were recorded at various ranges. Generally, this activity produced noise levels approximately 20-35 dB above the other measured equipment, on average.

*The lowest general sound levels captured during the operational noise assessment were sourced from the John Deere 135G excavator (JD 135G) equipped with a standard bucket. This machine was primarily conducting earthmoving activities and digging during a culvert replacement project. This project also utilized a John Deere 650K XLT dozer (JD 650K) to mobilize and transport fill material. At the time of the assessment, only 50-foot and 165-foot measurements were taken for the JD 650K due to opportunity constraints. Sound measurements for this equipment type were recorded from the road with very minimal to no obstruction between the meter and the machinery.*

*The Link-Belt 145 X4 excavator, which is similar in operating weight and net power output to the JD 135G, produced moderate noise levels when compared to the other types of measured equipment. The Link-Belt was fitted with a masticating/brush mower head which was used for general vegetation treatment and small to mid-size tree removal, generally trees primarily along roads and trails. Generally, this unit when equipped with a masticating head produces noise approximately 10 dB above what the JD 135G produces, depending on the factors and use dynamics. A Caterpillar 299D skid steer dozer was onsite with the Link-Belt 145 and was fitted with a drum-style brush mower head primarily for understory fuels reduction work off of roads. Additional uses for this equipment type are providing access into treatment units, reducing woody debris piles, and higher precision treatment mobility around sensitive resources or tightly spaced areas.*

*The chart in Figure 9 provides an approximate scalar reference for sound sources and their associated noise levels on active project sites within the region. Exact values may be subject to factors not included or evaluated in this general study. For the purpose of this assessment, average dB levels and projections based on those averages were used to develop the results described above.*

*The results of this sound analysis indicate that the mechanized equipment described in this report, which is typical for landscape scale vegetation treatment projects in the Santa Cruz Mountains (forest restoration treatments utilizing handwork crews and mastication equipment), operates at Low – Moderate sound levels. Handwork and felling conducted by a fully outfitted crew produced the only sound levels above 70 dB when measured at 50 feet. Additionally, it is expected that sound levels will decrease at greater distances from the source. Mechanized equipment noise measured at 165 feet produced sound levels between 45 – 65 dB, while the same equipment assessed at 300 feet produced sound levels between 43 – 57 dB.”*

Information and data gathered from this assessment provides a general reference for sound outputs produced by equipment types likely used to accomplish forest restoration and resiliency treatments in proximity to known or suitable marbled murrelet habitat. Variabilities in equipment type, decibel levels, and overall project generated noise are determined on a site-specific basis for these project types.

## Summary

The old growth forests of the Santa Cruz Mountains were protected because people loved and wanted to preserve their charismatic large trees. At that time, no one knew that they were also protecting the nesting place of an obscure seabird. The threat they focused on was old growth logging, today, the threat to these trees and murrelets is extreme fire behavior and other effects of climate change, similar to what occurred during the 2020 CZU Lightning Complex Fire. Without proactive forest restoration treatments, extreme fire behavior and climate change will continue to be a threat to the survival of both the old trees and the seabird. This habitat loss from future fires is a possibility we cannot ignore, and inaction is not an option. It's not a matter of if murrelet habitat will burn but *when* and *how intensely*?

There is still much unknown about exactly how and when marbled murrelets use their habitat. However, the survey results summarized point to a significant decrease in forest habitat use in early to mid-August. The localized marbled murrelet behavioral data outlined in this report are supportive of wider operational windows; April 1 – August 5 are dates that better reflect known time of use based on AV and ARU surveys, except for the marbled murrelet important areas within Portola State Park and Pescadero Creek County Park or Gazos Mountain Camp where September 1<sup>st</sup> is appropriate. Based on this timing of use, timing of forest management activities can be adjusted to occur based on their proximity to existing old growth habitat. In addition, the data presented in the Noise section, based on the USFWS 2006, 2020 auditory effects document, indicate that certain activities and equipment can likely operate closer than initially assumed.

## Recommendations

Recommendations are locally applicable to Santa Cruz District State Parks and San Mateo County Park lands including Big Basin Redwoods State Park, Portola Redwoods State Park, Butano State Park, Pescadero Creek County Park, Memorial County Park and Sam McDonald County Park.

The following recommended Best Management Practices consider the recorded localized marbled murrelet behaviors analyzed in this report, the scale and impact of the CZU Fire to marbled murrelet habitat, and the urgency to minimize the threat of further loss of murrelet habitat as a result of extreme wildfires and climate change through proactive forest management:

1. **Operational Window:** High decibel work in proximity or within areas identified as murrelet habitat, occupied or important habitat areas in the Santa Cruz Mountains may begin on August 5<sup>th</sup> and continue to March 24<sup>th</sup>, except for the following conditions:
  - a. At sites that are known as prime unburned (pre-CZU Fire) habitat for marbled murrelets, such as marbled murrelet important areas within Pescadero Creek County Park and Portola State Park, or marbled murrelet important areas within Gazos Mountain Camp in Butano State Park, avoid working until August 15<sup>th</sup> and September 1<sup>st</sup>, respectively, unless new AV or ARU data suggests different dates when murrelets nest in these areas.
  - b. High decibel work may occur year around in areas of the CZU Fire that burned at moderate-high and high severities (<https://sig-gis.com/czu-lightning-complex-map/>) within the CZU Fire where murrelet habitat was significantly compromised or destroyed.
2. **Working Hours:** Do not work during the dawn and dusk period in areas identified as murrelet habitat, occupied or important habitat areas that experienced low or moderate burn severity. Work from 1.5 hours after sunrise to 1 hour before sunset between March 24<sup>th</sup> – August 5<sup>th</sup>, or March 24<sup>th</sup> – August 15<sup>th</sup> in marbled murrelet important areas within Pescadero Creek County Park and Portola Redwoods State Park, and March 24<sup>th</sup> – September 1<sup>st</sup> within marbled murrelet important areas in Gazos Mountain Camp.
3. **Noise Restrictions:** Noise restrictions should be in place that address any chronic noise production or new noise that is 30-35 dB above background. These noises should be carefully evaluated, and minimized to the extent possible.
  - a. **Habitat Buffer:** Sound analysis work and data indicates that in areas of low to moderate fire severity, where areas identified as murrelet habitat, occupied or important habitat areas in the Santa Cruz Mountains still exists,

buffers can be reduced to 330 feet to allow larger handwork crews and mastication equipment to conduct forest restoration and resiliency treatments greater than normal routine maintenance actions and park use, from March 24<sup>th</sup> to August 5<sup>th</sup>, or March 24<sup>th</sup> – August 15<sup>th</sup> within marbled murrelet important areas in Pescadero Creek County Park and Portola State Park and March 24<sup>th</sup> – September 1<sup>st</sup> within marbled murrelet important areas in Gazos Mountain Camp.

4. <sup>3</sup> Recommendations are locally applicable to Santa Cruz District State Parks and San Mateo County Park lands including Big Basin Redwoods State Park, Portola Redwoods State Park, Butano State Park, Pescadero Creek County Park, Memorial County Park and Sam McDonald County Park.
5. **Strategic Planning:** Time forestry work to occur as far from murrelet habitat in the July timeframe and work towards murrelet habitat.
6. **Continued Monitoring:** AV and ARU monitoring will continue in areas where these recommendations are being followed to monitor changes in murrelet behavior supporting adaptive management strategies as needed to protect the species. Survey data will be shared with Agencies as it is available post season to adjust work windows based on new information.

## Lifespan

This document is intended to serve as a guidance document for the next 10 years and if still of use will be updated in 2033.

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