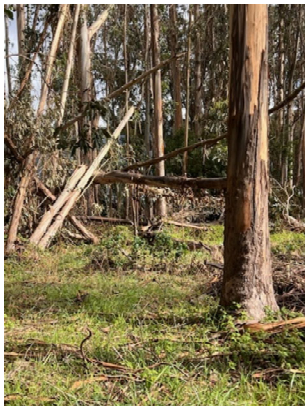


Biological Site Assessment

Bolinas Eucalyptus Project

Marin County, California



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May 2024
(Updated July 2024)

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EXECUTIVE SUMMARY

This report details the regulatory background, methods, results, and recommendations of a Biological Site Assessment (BSA) for the proposed removal of a blue gum grove located at Mesa Road and Olema-Bolinas Road, Bolinas, Marin County, California. WRA, Inc. conducted field surveys and assessments on April 1 and June 17, 2022. The Project Area is composed of a mix of developed areas (roads, residences, pathways) and a blue gum grove.

As noted, the Project Area contains developed areas, a blue gum grove, an ephemeral stream, a seasonal wetland, and a perennial pond. The blue gum grove provides habitat for Monarch butterfly (*Danaus Plexippus*). Therefore, despite being composed of invasive species, according to the Marin County LCP, this stand may be considered an Environmentally Sensitive Habitat Area (ESHA).

This blue gum grove is severely degraded through age and infestation and poses a significant hazard to human safety. Additionally, the grove supports overwintering monarch butterfly, but its decline and likely eventual collapse will virtually eliminate this roosting habitat. The Proposed Project is the complete removal of this blue gum grove followed by native plant restoration to provide native habitat that may be utilized for a variety of species including monarch butterfly. Measures have been developed to ensure mitigation, through restoration, for loss of monarch butterfly habitat. Areas of tree removal will be subsequently revegetated with native plant species, including plants that are beneficial to monarch butterflies.

Similarly, the stream, wetland, and pond constitute ESHA. These aquatic resources will be avoided by the Proposed Project; protective measures are provided to ensure that these features will not be impacted.

A protocol-level special-status plant survey resulted in negative detections for special-status plants. Therefore, the Proposed Project will not incur an impact to such.

Several special-status wildlife species have the potential to occur and use, to varying degrees, resources within the Project Area. Standard best management practices have been developed and incorporated into the Proposed Project to ensure no impacts to these species if such are present.

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Definitions

Study Area: The area throughout which the assessment was performed, i.e., the subject parcels plus portions of public roads, totaling 17.4 acres.

Project Area: The area encompassing the Proposed Project; the area evaluated for potential direct impacts to sensitive biological resources, totaling 12.7 acres.

List of Abbreviations & Acronyms

BGEPA	Bald and Golden Eagle Protection Act
BIOS	Biogeographic Information and Observation System
BRRS	Biological Resources Reconnaissance Survey
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CECP	California Essential Connectivity Project
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
County	Marin County
Corps	U.S. Army Corps of Engineers
CSRL	California Soils Resources Lab
CTS	California Tiger Salamander
CWA	Clean Water Act
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESA	(Federal) Endangered Species Act
MSFMA	Magnuson-Stevens Fishery Conservation & Management Act
MBTA	Migratory Bird Treaty Act
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OHWM	Ordinary High Water Mark
Rank	California Rare Plant Ranks
RWQCB	Regional Water Quality Control Board
SSC	Species of Special Concern
SFP	State Fully Protected Species
SWRCB	State Water Resource Control Board
TOB	Top of Bank
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WBWG	Western Bat Working Group
WRA	WRA, Inc.

1.0 INTRODUCTION

On April 1 and June 17, 2022, WRA conducted a biological site assessment (BSA) at the site of a proposed removal of a blue gum grove that has become decadent and experiencing profound senescence located across several properties along Mesa Road, Bolinas, Marin County, California (Study Area; Appendix A). On August 15, 2023, WRA conducted a follow up site assessment targeting monarch butterfly overwintering habitat. The purpose of this assessment is: (1) to gather information necessary to complete a review of biological resources adequate for use for the California Environmental Quality Act (CEQA), to determine whether the property supports any sensitive habitats or species, and (2), if applicable, to assess potential impacts to any sensitive natural resources as required by the Marin County Community Development Agency, Planning Division. The Study Area includes the entirety of three adjacent parcels (APN: 193-030-25; -41; -61) and a portion of a fourth parcel (APN: 193-030-38).

This report describes the results of the site visit for which the Study Area was assessed concerning: (1) the presence of suitable habitat and the potential on-site occurrence for regionally-known special-status plant and wildlife species, and (2) the approximate location and extent of any environmentally sensitive habitat areas (ESHAs), including wetlands, streams and riparian areas which may be subject to regulation under the California Coastal Act. The property is located within the Coastal Zone and is regulated under the Marin County Local Coastal Program (Marin County 1979; LCP) in Unit I Area.

The Proposed Project is the complete removal of a blue gum grove located at the corner of Mesa Road and Olema-Bolinas Road. The stand of non-native, invasive trees is decadent and consequently poses a fire hazard and falling hazard. Furthermore, this stand provides overwintering roost habitat for monarch butterfly; the grove's eventual collapse may eliminate this roosting habitat. Following the removal of the blue gum grove, the area will be replanted in native plants that provide high quality habitat for a suite of native wildlife species including monarch butterfly. The non-profit community organization, Bolinas Eucalyptus Project (BEP), is the Project Proponent.

2.0 REGULATORY BACKGROUND

This report is intended to facilitate conformance of the Proposed Project with the standards outlined in the Marin County Code and General Plan. In addition to the requirements of Marin County, the Proposed Project may also be subject to several federal and state regulations designed to protect sensitive natural resources. Full analysis of these requirements in the context of the Project is addressed herein.

2.1 Federal and State Regulatory Setting

2.1.1 Sensitive Land Cover Types

Land cover types are herein defined as those areas of a particular vegetation type, soil or bedrock formation, aquatic features, and/or other distinct phenomenon. Typically, land cover types have identifiable boundaries that can be delineated based on changes in plant assemblages, soil or rock types, soil surface or near-surface hydroperiod, anthropogenic or natural disturbance, topography, elevation, etc. Many land cover types are not considered sensitive or otherwise protected under the environmental regulations discussed here. However, these land cover types typically provide essential ecological and biological functions for plants and wildlife, including, frequently, special-status species. Those land cover types that are considered or protected under one or more environmental regulations are discussed below.

Waters of the United States: The United States Army Corps of Engineers (Corps) regulates “Waters of the United States” under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined in the Code of Federal Regulations (CFR) as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated at a sufficient depth and for a sufficient duration to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as “other waters” and are often characterized by an ordinary high water mark (OHWM). Other waters, for example, generally include lakes, rivers, and streams. The placement of fill material into Waters of the United States generally requires an individual or nationwide permit from the Corps under Section 404 of the CWA.

Waters of the State: The term “Waters of the State” is defined by the Porter-Cologne Act as “any surface water or groundwater, including saline waters, within the boundaries of the state.” The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope and has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes “isolated” wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a project does not require a federal permit but does involve dredge or fill activities that may result in a discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

Streams, Lakes, and Riparian Habitat: Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by CDFW under Sections 1600-1616 of California Fish and Game Code (CFG). Alterations to or work within or adjacent to streambeds or lakes generally require a 1602

Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). In addition, the term “stream” can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). “Riparian” is defined as “on, or pertaining to, the banks of a stream.” Riparian vegetation is defined as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

Sensitive Natural Communities: Sensitive natural communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as “threatened” or “very threatened” (CDFG 2010, CDFW 2018a) and keeps records of their occurrences in its California Natural Diversity Database (CNDDDB; CDFW 2018a). CNDDDB vegetation alliances are ranked 1 through 5 based on NatureServe’s (2018) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G).

2.1.2 Special-status Species

Plants: Special-status plants include taxa that have been listed as endangered or threatened, or are formal candidates for such listing, under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA). The California Native Plant Protection Act (CNPPA) lists 64 “rare” or “endangered” and prevents “take”, with few exceptions, of these species. Plant species on the California Native Plant Society (CNPS) Rare and Endangered Plant Inventory (Inventory) with California Rare Plant Ranks (Rank) of 1, 2, and 3 are also considered special-status plant species and must be considered under CEQA. Rank 4 species are typically only afforded protection under CEQA when such species are particularly unique to the locale (e.g., range limit, low abundance/low frequency, limited habitat) or are otherwise considered locally rare. A description of the CNPS Ranks is provided below in Appendices B and C.

Wildlife: As with plants, special-status wildlife includes species/taxa that have been listed or are formal candidates for such under ESA and/or CESA. The federal Bald and Golden Eagle Protection Act provides relatively broad protections to both of North America’s eagle species (bald [*Haliaeetus leucocephalus*] and golden eagle [*Aquila chrysaetos*]) that in some regards are like those provided by ESA. The CFGC designates some species as Fully Protected (SFP), which indicates that “take” of that species cannot be authorized through a state permit. Additionally, CDFW Species of Special Concern (species that face extirpation in California if current population and habitat trends continue) are given special consideration under CEQA, and are therefore considered special-status species. In addition to regulations for special-status species, most native

birds in the United States, including non-status species, have baseline legal protections under the Migratory Bird Treaty Act of 1918 and CFGC, i.e., sections 3503, 3503.5 and 3513. Under these laws/codes, the intentional harm or collection of adult birds as well as the intentional collection or destruction of active nests, eggs, and young is illegal. For bat species, the Western Bat Working Group (WBWG) designates conservation status for species of bats, and those with a high or medium-high priority are typically given special consideration under CEQA.

Critical Habitat, Essential Fish Habitat, and Wildlife Corridors: Critical habitat is a term defined in the ESA as a specific and formally designated geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. Note that designated critical habitat areas that are currently unoccupied by the species but which are deemed necessary for the species' recovery are also protected by the prohibition against adverse modification.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) provides for conservation and management of fishery resources in the U.S. This Act establishes a national program intended to prevent overfishing, rebuild overfished stocks, ensure conservation, and facilitate long-term protection through the establishment of Essential Fish Habitat (EFH). EFH consists of aquatic areas that contain habitat essential to the long-term survival and health of fisheries, which may include the water column, certain bottom types, vegetation (e.g. eelgrass (*Zostera* spp.)), or complex structures such as oyster beds. Any federal agency that authorizes, funds, or undertakes action that may adversely affect EFH is required to consult with NMFS.

Movement and migratory corridors for native wildlife (including aquatic corridors) as well as wildlife nursery sites are given special consideration under CEQA.

2.2 Marin County Regulatory Setting

In Marin County, a sensitive resource includes "jurisdictional wetlands, occurrences of special-status species, occurrences of sensitive natural communities, wildlife nurseries and nesting areas, and wildlife movement corridors. The County development review process typically requires a site assessment by qualified professionals to confirm whether any sensitive resources could be affected . . ." Furthermore, The California Coastal Act (CCA) defines environmentally sensitive habitat area (ESHA) under Section 30107.5 and protected under section 30240 and include wetlands, rivers, streams and lakes, and riparian areas. For the purposes of this report, WRA has taken into consideration any areas that may meet the definition of any ESHA defined by the CCA, listed in the *Statewide Interpretive Guidelines for Identifying and Mapping Wetlands and Other Wet Environmentally Sensitive Habitat Areas* ("California Coastal Commission guidelines", CCC 1981), or the Marin County Local Coastal Program (LCP) (Marin County 1979).

The CCA defines an ESHA as follows:

"Environmentally sensitive habitat area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments. "

The CCC Guidelines discuss the various definitions for specific types of ESHAs, including wetlands, streams and riparian areas. Many of these definitions are synonymous with the definitions described above. Additional definitions are provided below.

Coastal Act Wetlands

The Coastal Act defines wetlands as:

"Wetland means land within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens".

(Public Resources Code § 30121)

CCC Administrative Regulations (Section 13577 (b)) provide a more explicit definition:

"Wetlands are lands where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent or drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salt or other substance in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deepwater habitats."

The Coastal Act defines the upland limit of wetlands as:

- (1) the boundary between land with predominantly hydrophytic cover and land with predominantly mesophytic or xerophytic cover;*
- (2) the boundary between soil that is predominantly hydric and soil that is predominantly non-hydric; or*
- (3) in the case of wetlands without vegetation or soil, the boundary between land that is flooded or saturated at some time each year and land that is not."*

Coastal Act Streams and Rivers

The Marin County LCP provides special protections for USGS blue-line streams, and establishes buffers to protect streams from the impacts of adjacent uses including development impacts from construction and post-construction activities within the LCP Unit II Area. Stream buffers are defined by the LCP as: "the area covered by riparian vegetation on both sides of the stream and the area 50 feet landward from the edge of the riparian vegetation." The LCP also states that in no case shall the stream buffer be less than 100 feet in width, on either side of the stream, as measured from the top of the stream banks."

Coastal Act Riparian Habitats

While riparian vegetation is not defined specifically in the California Coastal Act, it is defined by the LCP as the stream itself and the riparian vegetation growing adjacent to it. Common plant genera associated with this vegetation type in Unit II of the Coastal Zone within Marin County include maple (*Acer* spp.), alder (*Alnus* spp.), ash (*Fraxinus* spp.), and willow (*Salix* spp.). For the purposes of determination of status under the Coastal Act, we define riparian habitat as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG 1994). This definition is synonymous with the CDFW definition described above.

Marin County Stream Conservation Areas: In Marin County, a Stream Conservation Area (SCA) is designated along all natural watercourses supporting riparian vegetation for a length of 100 feet or more. The SCA consists of the watercourse itself between the tops of the banks and a strip of land extending laterally outward from the top of both banks. For those ephemeral streams that do not meet these criteria, a minimum 20-foot development setback shall be required. Development activities that may occur within a SCA are closely regulated by the County and require consideration of impacts of proposed developments on species and habitats during the environmental review process.

Marin County Wetland Conservation Areas: In Marin County, a Wetland Conservation Area (WCA) is designated around all Corps jurisdictional wetlands. The WCA consists of the wetland itself and a strip of land extending laterally outward from the wetland for a distance of 100 feet or as deemed appropriate by a qualified biologist to avoid impacts and protect the wetland. Development activities that may occur within a WCA are closely regulated by the County and require consideration of impacts of proposed developments on species and habitats during the environmental review process.

3.0 ENVIRONMENTAL SETTING

The approximately 17.8-acre Study Area consists of four adjoining parcels and a sliver of adjacent lands (Appendix A). It is in western Marin County, approximately 0.25 aerial mile northwest of central Bolinas and three miles west northwest of Stinson Beach. It is situated on the southern tip of Point Reyes Peninsula on the Bolinas Headland. Detailed descriptions of the local setting are below.

3.1 Topography and Soils

The overall topography of the Study Area gently- to moderately-sloped, ranging from approximately 35 to 185 feet above sea level. According to the *Soil Survey of Marin County* (USDA 1985) and as shown in Figure A-2 (Appendix A), the Study Area is underlain by two soil mapping units: Palomarin-Wittenberg complex, 30 to 50 percent slopes and Olompali loam, 2 to 9 percent slopes. The parent soil series of the Study Area’s mapping units are summarized below.

Olompali Series: This series consists of deep loam soils formed in alluvium derived from igneous, metamorphic, and sedimentary rock located on marine terraces at elevations ranging from 50 to 800 feet (USDA 1985, CSRL 2024). These soils are considered hydric, and are somewhat poorly drained, with medium to rapid runoff, and very slow permeability (USDA 1985, USDA 2014). Native and naturalized vegetation includes annual grasses and forbs with scattered shrubs, and typical land uses are predominantly rangeland, watershed, and wildlife habitat (USDA 1985).

Palomarin Series: This series consists of deep fine loam soils formed in residuum weathered from sandstone and shale situated on the backslopes of upland hills at elevations ranging from 500 to 1,300 feet (USDA 1985, CSRL 2024). These soils are not considered hydric, and are well-drained with medium runoff, and moderate permeability (USDA 1985, USDA 2014). Native and naturalized vegetation include Douglas fir (*Pseudotsuga menziesii*), tanoak (*Notholithocarpus densiflorus*), California bay (*Umbellularia californica*), evergreen huckleberry (*Vaccinium ovatum*), and a mix of grasses and forbs, while predominant land uses include recreation, wildlife habitat, and watershed protection (USDA 1985).

Wittenberg Series: This series consists of deep loamy soils formed in residuum weathered from sandstone and shale situated on backslopes of upland hills at elevations ranging from 500 to 1,300 feet (USDA 1985, CSRL 2024). These soils are not considered hydric, are well-drained, with medium runoff, and moderately rapid permeability (USDA 1985, USDA 2014). Native and naturalized vegetation include Douglas fir (*Pseudotsuga menziesii*), tanoak (*Notholithocarpus densiflorus*), California bay (*Umbellularia californica*), evergreen huckleberry (*Vaccinium ovatum*), and a mix of ferns, grasses, and forbs; predominant land uses include recreation, wildlife habitat, and watershed protection (USDA 1985).

3.2 Climate and Hydrology

The Study Area is located within the maritime fog zone of Marin County where summer temperatures are buffeted by fog, and fog drip contributes to annual rainfall totals. Winter “tule” fog is common in the Study Area, and summer “coastal” fog emerges with increased interior temperatures. The average annual maximum temperature of Point Reyes Lighthouse (CA047027) is 61.0 degrees Fahrenheit, while the average annual minimum temperature is 54.1 degrees Fahrenheit (USDA 2024). At Bolinas, precipitation falls as rain with an annual average of 32 inches (BCPUD 2024).

The local watershed is Bolinas Lagoon-Bolinas Bay (HUC 12: 1805000050403) and the regional watershed is Frontal Pacific Ocean (HUC 8: 18050005). There are no mapped blue-line streams or other aquatic features in the Study Area according to the Bolinas 7.5-minute quadrangle (USGS 2018). Likewise, there are no aquatic resources mapped in the National Wetland Inventory (NWI; USFWS 2024a) or the California Aquatic Resource Inventory (CARI; SFEI 2024). Hydrologic sources in the site are direct precipitation and overland sheet flow that appears to be drain and/or runoff quickly.

3.3 Land Cover and Land Use

The Study Area is predominantly undeveloped dense canopied woodland, with a portion of existing development and openings in the canopy. The developed areas in the Study Area include single-family residences, outbuildings, Mesa Road, Olema-Bolinas Road, and public pathways. The vegetation is dominated by non-native plants known from coastal habitats and residential developments; detailed plant community descriptions are included in Section 5.1 below, and all observed plants are included in Appendix B. Regional land uses include rural residential, livestock grazing, commercial tourism, and fisheries/aquaculture (Google Earth 2024). Historically, land uses in the region were open rangeland of larger ranches, rural residential, and fisheries. There is no history of intensive agriculture, quarrying, mining, or timbering in the Study Area (Historic Aerials 2024).

4.0 ASSESSMENT METHODS

Prior to the site visit, WRA biologists reviewed the following literature and performed database searches to assess the potential for sensitive natural communities (e.g., wetlands) and special-status species (e.g., endangered plants):

- *Soil Survey of Marin County, California* (USDA 1985)
- Bolinas 7.5-minute quadrangle (USGS 2018)
- Contemporary aerial photographs (Google Earth 2024)
- Historical aerial photographs (Historical Aerials 2024)
- National Wetlands Inventory (USFWS 2024a)
- California Aquatic Resources Inventory (SFEI 2024)
- California Natural Diversity Database (CNDDDB, CDFW 2024a)
- California Native Plant Society Electronic Inventory (CNPS 2024a)
- Consortium of California Herbaria (CCH 2024)
- USFWS List of Federal Endangered and Threatened Species (USFWS 2024b)
- eBird Online Database (eBird 2024)
- CDFW Publication, *California Bird Species of Special Concern in California* (Shuford and Gardali 2008)
- CDFW and University of California Press publication *California Amphibian and Reptile Species of Special Concern* (Thomson et al. 2016)
- *The Marin County Breeding Bird Atlas* (Shuford 1993)
- *A Field Guide to Western Reptiles and Amphibians* (Stebbins 2003)
- *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009)
- *A Manual of California Vegetation Online* (CNPS 2024b)
- *Preliminary Descriptions of the Terrestrial Natural Communities* (Holland 1986)
- *California Natural Community List* (CDFW 2018a)

Database searches (i.e., CNDDDB, CNPS) focused on the Inverness, San Geronimo, Novato, Double Point, Bolinas, San Rafael, and Point Bonita USGS 7.5-minute quadrangles for special-status

plants. The special-status wildlife evaluation was based on database searches for the entirety of Marin County.

Following the remote assessment, a botanist with 40-hour Corps wetland delineation and wildlife biologist training traversed the entire Study Area on foot to document: (1) land cover types (e.g., terrestrial communities, aquatic resources), (2) if and what type of aquatic natural communities (e.g., wetlands) are present, (3) existing conditions and to determine if such provide suitable habitat for any special-status plant or wildlife species, and (4) if special-status species are present¹.

4.1 Land Cover Types

4.1.1 Terrestrial Land Cover Types

Terrestrial land cover types were mapped across the entire Subject Parcel, but they were only evaluated to determine if such areas have the potential to support special-status plants or wildlife within the Study Area. In most instances, communities are delineated based on distinct shifts in plant assemblage (vegetation) and follow the *California Natural Community List* (CDFW 2018a), *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), and *A Manual of California Vegetation, Online Edition* (CNPS 2024b). In some cases, it may be necessary to identify variants of community types or to describe non-vegetated areas that are not described in the literature; should an undescribed variant be used, it will be noted in the description. Vegetation alliances (natural communities) with a CDFW Rank of 1 through 3 (globally critically imperiled (S1/G1), imperiled (S2/G2), or vulnerable (S3/G3), were evaluated as sensitive as part of this evaluation.² Additionally, any sensitive natural communities as described in the Marin County LCP or General Plan were considered.

4.1.2 Aquatic Resources

Aquatic resources include Waters of the U.S., Waters of the State, and Streams, Lakes, and Riparian Habitat as defined in the CWA, Porter-Cologne Act, and CFGC, respectively. Marin County mandates setbacks from these aquatic resources, and therefore requires mapping of the outward extent of such features. This site assessment does not constitute a formal wetland delineation; however, the surveys looked for superficial indicators of wetlands such as hydrophytic vegetation (i.e., plant communities dominated by wetland species), evidence of inundation or flowing water, saturated soils and seepage, and topographic depressions/swales. If sample points were taken, WRA followed the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps 2008).

If streams potentially jurisdictional under the CWA and/or the CFGC are noted on a site, they are delineated using a mix of surveyed topography data, high resolution aerial photographs, and a sub-meter GPS unit. The OHWM would be used to determine the extent of potential Section 404

¹ Due to the timing of the assessment, it may or may not constitute protocol-level species surveys; see Section 4.2 if the site assessment would constitute a formal or protocol-level species survey.

² Ranking of CDFW List of Vegetation Alliances is based on NatureServe Rankings (NatureServe 2024).

jurisdiction, while the top-of-bank would be used to determine the extent of CFGC Section 1602 and 401. Streams with associated woody vegetation were assessed to determine if these areas would be considered riparian habitat by the CDFW following *A Field Guide to Lake and Streambed Alteration Agreements, Section 1600-1607, California Fish and Game Code* (CDFG 1994).

4.2 Special-status Species

4.2.1 General Assessment

Potential occurrence of special-status species in the Study Area was evaluated by first determining which special-status species occur in the greater vicinity through a literature and database review. Database searches for known occurrences of special-status species focused on the 7.5-minute USGS quadrangles mentioned above for special-status plants and the entirety of Marin County for special-status wildlife.

A preliminary site visit was made on April 1, 2022 to evaluate the presence of suitable habitat for special-status species. Suitable habitat conditions are based on the physical and biological conditions of the site, as well as the professional expertise of the investigating biologists. The potential for each special-status species to occur in the Study Area was then determined according to the following criteria:

- **No Potential.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- **Unlikely.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- **Moderate Potential.** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present.** Species is observed on the site or has been recorded (i.e. CNDDDB, other reports) on the site in the recent past.

If a more thorough assessment was warranted, a targeted or protocol-level assessment or survey was conducted or recommended as a future study. Methods for the assessments are described below. If a special-status species was observed during the site visit, its presence was recorded and discussed below in Section 5.2.

4.2.2 Special-status Plants

To determine the presence or absence of special-status plant species, focused surveys were conducted within Study Area on April 1 and June 17, 2022. The surveys correspond to the period sufficient to observe and identify those special-status plants determined to have the potential to

occur. The field surveys were conducted by botanists familiar with the flora of Marin and surrounding counties. The surveys were performed in accordance with guidelines described by resource experts and agencies (CNPS 2001, CDFW 2018b, USFWS 1996). Plants were identified using *The Jepson Manual, 2nd Edition* (Baldwin et. al. 2012), Jepson Flora Project (eFlora 2024), and/or the *Marin Flora* (Howell et al. 2007) to the taxonomic level necessary to determine if they were sensitive. Plant names follow those of Jepson Flora Project (eFlora 2024), unless otherwise noted.

4.2.3 Special-status Wildlife

A general wildlife assessment was performed on April 1, 2022. This assessment consisted of traversing the entirety of the Study Area. Habitat elements required or associated with certain species (e.g., California red-legged frog) or species groups (e.g., bats, anadromous fish) were searched for and noted. Such habitat elements include, but are not limited to: plant assemblages and vegetation structure; stream depth, width, hydro-period, slope, and bed-and-bank structure; rock outcrops, caves, cliffs, overhangs, and substrate texture and rock content; history of site alteration and contemporary disturbances; etc. An additional monarch overwintering habitat assessment was performed on August 15, 2023, to examine characteristics of the documented overwintering site and surrounding trees.

4.2.4 Critical Habitat, Essential Fish Habitat, and Wildlife Corridors

Prior to the site visit the USFWS Critical Habitat Mapper (USFWS 2024b) and the NMFS Essential Fish Habitat Mapper (NMFS 2024) were queried to determine if critical habitat for any species or EFH, respectively, occurs within the Study Area. To account for potential impacts to wildlife movement/migratory corridors, biologists reviewed maps from the California Essential Connectivity Project (CECP) by Caltrans (2010) and CDFW Biogeographic Information and Observation System (BIOS) (CDFW 2024b). The CECP maps both 1) “Natural Landscape Blocks,” or discrete areas of mostly natural land covers that support biodiversity, and 2) “Essential Connectivity Areas” that provide ecological connectivity between the former. Additionally, aerial imagery (Google 2024) for the local area was referenced to assess if local core habitat areas were present within or connected to the Study Area. This assessment was refined based on observations of on-site physical and/or biological conditions.

5.0 ASSESSMENT RESULTS

5.1 Land Cover Types

Land cover types observed by WRA within the Study Area are shown in Figure A-3, and land covers overlain with the Project’s limits of disturbance in Figure A-4 (Appendix A). Three land cover types are present: developed/blue gum grove, ephemeral stream, and seasonal wetland.

5.1.1 Terrestrial Land Cover Types

Developed Area/Blue Gum Grove (*Eucalyptus globulus* Semi-Natural Stands). CDFW Rank: None; ESHA: Potential/Variable. Within the Study Area, the developed areas are composed of Mesa Road, Olema-Bolinas Road, single-family residences, outbuildings, and a public-access pathway. These developed areas are within a blue gum grove. Blue gum groves are known throughout cismontane California, particularly the Coast Ranges, Transverse Ranges, and Sierra Nevada Foothills (CNPS 2024b, Sawyer et al. 2009). The majority of these groves were intentionally planted in the 19th and 20th centuries for shelterbelts, woodlots, and timber resources (Sawyer et al. 2009).

The vegetation and soils are highly altered due to the development. The overstory is dominated by blue gum (*Eucalyptus globulus*). The understory is relatively open and composed of a mix of shrubs and herbs including French broom (*Genista monspessulana*), silver wattle (*Acacia dealbata*), toyon (*Heteromeles arbutifolia*), poison oak (*Toxicodendron diversilobum*), California coffeeberry (*Frangula californica*), three-corner leek (*Allium triquetrum*), English ivy (*Hedera helix*), broadleaf forget-me-not (*Myosotis latifolia*), rip-gut brome (*Bromus diandrus*), and harding grass (*Phalaris aquatica*). The developed area/blue gum grove totals 17.41 acres in the Study Area.

This grove was evaluated once in 2021 and twice in 2023 for stand health and hazard severity (Julin 2023, Gaman 2023, Anderson 2021). The stand appears to have emerged in the early 20th Century based on tree rings of downed roadside tree, with the stand currently hosting two age cohorts (Gaman 2023). All three reports (Appendix F) note a significant infestation of Australian tortoise beetle (ATB; *Trachymela sloanei*) that is compromising the health of the blue gum trees. ATB are considered a significant pest in California threatening the health of blue gum and other eucalyptus stands (UC-IPM 2024). These beetles feed on blue gum leaves resulting in trees' inability to develop healthy wood and root mass, as well as close wounds provide conduits for other pests (Julin 2023, UC-IPM 2024).

A full stand inventory conducted in 2023 (Gaman) noted that there are 413 living trees with a diameter at breast height (DBH) greater than 19 inches, of which 399 are blue gums (*Eucalyptus globulus*). Only 27 percent of these trees were deemed in "good" health, while the remaining 73 percent were deemed either "fair" or "poor" (Gaman 2023). Additionally, winter storms in 2023 blew down 24 to 28 trees increasing wind corridors which further exacerbates the potential for further wind throw (Gaman 2023, Julin 2023). Approximately 69 percent of the trees pose a hazard to a "target" (i.e., road, trail, residence); however, the remaining 31 percent, despite have no target hazard, have the potential to strike other trees effectively damaging and possibly even toppling those trees (Gaman 2023).

Similarly, WRA biologists noted that the stand does not appear to be naturally regenerating, canopy has been severely diminished in biomass (i.e., loss of leaves), and most of the trees show signs of stress from age and/or infestation.

5.1.2 Aquatic Resources

Seasonal Wetland – Italian Rye Grass Grassland (*Festuca perennis* Herbaceous Alliance). Waters of the State. CDFW Rank: None. Seasonal wetlands are known from a variety of topographic positions and soil types where surface waters collect and flows are reduced, or subsurface waters approach the soil surface as a rising water table or a seep. In the Study Area, one seasonal wetland occupies 0.08 acre as a seasonal swale/depression; this swale is situated with the proposed Project Area.

The vegetation is dominated by hydrophytes including Italian rye grass (*Festuca perennis*), common velvet grass (*Holcus lanatus*), and Mediterranean barley (*Hordeum marinum*). The soils were not saturated during either site visit, but evident redoximorphic features of oxidized iron. Indicators of wetland hydrology were lacking which may be due to an extended drought of 2020 through 2022. Because two wetland parameters (vegetation and soil) are clearly evident, this feature would be considered an ESHA under the LCP/CCA and a WCA under Marin County policy. If wetland hydrology is lacking due to drought and would be evident under ordinary circumstances, the feature would be considered jurisdictional under the Porter Cologne Act; however, because it is isolated without a direct surface connection to a Traditional Navigable Water it would not be considered jurisdictional under the CWA.

Ephemeral Stream. Waters of the State. CDFW Rank: None. The Study Area contains one ephemeral stream situated in the southern portion of the Study Area. The stream flows are ephemeral flowing only during and immediately following substantial rainfall. The bed-and-bank is a mix of finer sediments, with occasional cobble and gravel. Riparian vegetation is absent along the stream. This stream is likely jurisdictional under the Porter Cologne Act, Section 1602 of CFGC, and an ESHA under the LCP/CCA. However, the ephemeral flows and lack of riparian vegetation suggests that it would not qualify for a SCA under Marin County policy. Likewise, because it is isolated without a direct surface connection to a Traditional Navigable Water it would not be considered jurisdictional under the CWA.

Perennial Pond. Waters of the State. CDFW Rank: None. The Study Area contains portions of several perennial ponds on the southern and western edges. These ponds contains a clear OHWM and an emergent wetland fringe. Species in this fringe include arroyo willow (*Salix lasiolepis*), dense sedge (*Carex densa*), tall flatsedge (*Cyperus eragrostis*), tule (*Schoenoplectus acutus*), and common cattail (*Typha latifolia*). Four of these five features are managed ponds by the Bolinas Community Public Utility District (BCPUD), while the five (southernmost) feature ostensibly was created agricultural purposes. The southernmost feature is likely to be considered jurisdictional under the Porter Cologne Act, Section 1600 of the CFGC, and an ESHA under the LCP/CCA; therefore, it is considered a sensitive aquatic resource. Because it is isolated without a direct surface connection to a Traditional Navigable Water it would not be considered jurisdictional under the CWA. The four BCPUD ponds are unlikely to be considered jurisdictional due to their created and managed nature.

5.2 Special-status Species

5.2.1 Special-status Plant Species

Based upon a review of the resource databases listed in Section 4.0, 100 special-status plant species have been documented in the vicinity of the Study Area. As outlined in Appendix C, three of these plants have the potential to occur in the Study Area. The remaining 97 special-status plants documented from the greater vicinity are unlikely or have no potential to occur for one or more of the following:

- Hydrologic conditions (e.g., tidal, riverine) necessary to support the special-status plant species are not present in the Study Area
- Edaphic (soil) conditions (e.g., volcanic tuff, serpentine) necessary to support the special-status plant species are not present in the Study Area
- Topographic conditions (e.g., north-facing slope, montane) necessary to support the special-status plant species are not present in the Study Area
- Unique pH conditions (e.g., alkali scalds, acidic bogs) necessary to support the special-status plant species are not present in the Study Area
- Associated natural communities (e.g., interior chaparral, tidal marsh) necessary to support the special-status plant species are not present in the Study Area
- The Study Area is geographically isolated (e.g. below elevation, coastal environ) from the documented range of the special-status plant species
- Land use history and contemporary management (e.g., absence of mowing or grazing) has degraded the localized habitat necessary to support the special-status plant species

WRA biologists conducted several site visits during a period sufficient to identify all three special-status plant species with the potential to occur within the Study Area, but none were observed during protocol-level rare plant surveys conducted in April and June 2022. These three plants are detailed below.

White hayfield tarplant (*Hemizonia congesta* ssp. *congesta*). CRPR 1B. Moderate Potential (Not Observed). White hayfield tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from April to November. It typically occurs in grassy areas and fallow fields in coastal scrub, and valley and foothill grassland at elevations ranging from 65 to 1,840 feet (CDFW 2024, CNPS 2024a). Associated species include coast live oak (*Quercus agrifolia*), white hyacinth (*Triteleia hyacinthina*), Italian rye grass (*Festuca perennis*), little rattlesnake grass (*Briza minor*), pennyroyal (*Mentha pulegium*), and spiny-fruited buttercup (*Ranunculus muricatus*) (CDFW 2024, personal observation 2016, 2022).

Harlequin lotus (*Hosackia gracilis*). CRPR 4. Moderate Potential (Not Observed). Harlequin lotus is a perennial forb in the pea family (Fabaceae) that blooms from March to July. It typically occurs in wetlands or ditches in broadleaf upland forest, coastal scrub, closed-cone coniferous forest, cismontane woodland, coastal prairie, meadow and seep, marsh and swamp, North Coast coniferous forest, and valley and foothill grassland habitat at elevations ranging from 0 to 2,275 feet (CNPS 2024a). This species has a wetland indicator status of facultative wetland (FACW) for the Arid West and Western Mountains, Valleys,

and Coast regions (Lichvar 2016). Associated species include tinker's penny (*Hypericum anagalloides*), blue-eyed grass (*Sisyrinchium bellum*), golden-eyed grass (*S. californicum*), bird's-foot trefoil (*Lotus corniculatus*), common velvet grass (*Holcus lanatus*), California oat grass (*Danthonia californica*), and silver hair grass (*Aira caryophyllea*) (personal observation 2013, 2014, 2015, 2022).

Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*). CRPR. Moderate Potential (Not Observed). Gairdner's yampah is a perennial forb in the carrot family (Apiaceae) that blooms from June to October. It typically occurs in vernal mesic areas within broadleaf upland forest, chaparral, coastal prairie, valley and foothill grassland, and vernal pool habitat at elevations ranging from 0 to 1,985 feet (CNPS 2024a, Baldwin et al. 2012). This species is a facultative (FAC) plant (Lichvar et al. 2016), and is known from vernal pool habitat in some regions of California, but is generalist in others (VPA?) (Keeler-Wolf et al. 1998). Associated species are not reported in the literature.

5.2.2 Special-status Wildlife Species

A total of 56 special-status wildlife species have been documented in Marin County (CDFW 2024a). 10 of these have the potential to occur in the Study Area. The remaining 46 species are unlikely or have no potential to occur due to one or more of the following reasons:

- Aquatic habitats (e.g., rivers, estuaries, ponds) necessary to support the special-status wildlife species are not present in the Study Area
- Vegetation habitats (e.g., coast redwood forest, coastal prairie, emergent marsh) that provide nesting and/or foraging resources necessary support the special-status wildlife species are not present in the Study Area
- Physical structures and vegetation (e.g., mines/caves, riparian forest) necessary to provide nesting, cover, and/or foraging habitat to support the special-status wildlife species are not present in the Study Area
- Host plants (e.g., dog violet, harlequin lotus) necessary to provide larval and nectar resources for the special-status wildlife species are not present in the Study Area
- The Study Area is outside (e.g., north of, west of) of the special-status wildlife species documented nesting range

Those species with the potential to occur in the Study Area are detailed below.

Pallid bat (*Antrozous pallidus*). CDFW Species of Special Concern, WBWG High Priority. Moderate Potential (Presence Unknown). The pallid bat is widely distributed throughout western North America and occurs in several habitats ranging from rocky arid deserts to grasslands, and into higher elevation coniferous forests. Roosts are typically in rock crevices, tree hollows, mines, caves, and a variety of man-made structures, including vacant and occupied buildings. Tree roosting has been documented within snags and basal hollows of conifers, and within bole cavities in oak trees. Pallid bats are primarily insectivorous, feeding on large prey that is usually taken on the ground but sometimes in flight. Prey items include arthropods such as scorpions, ground crickets, and cicadas (WBWG 2024). Trees within the Study Area may contain cavities or snags suitable for

roosting by this species, and there are CNDDDB occurrences in the vicinity (CDFW 2024a). A targeted bat habitat assessment was not performed under this biological assessment.

Great egret (*Ardea alba*). CDFW Protected Rookery Sites. Moderate Potential (Presence Unknown). Great egrets feed and rest in fresh, and saline emergent wetlands, along the margins of estuaries, lakes, and slow-moving streams, on mudflats and salt ponds, and in irrigated croplands and pastures. The birds primarily forage for fishes, amphibians, snakes, snails, crustaceans, insects, and small mammals (Palmer 1962). Nests in large trees, and roosts in trees (Grinnell and Miller 1944, Cogswell 1977). In northern California, common year-round resident in coastal lowlands, coastal valleys, and the Central Valley. A targeted bird survey was not performed under this biological assessment. The Study Area's blue gum grove has not been documented as a nesting or rookery site for this species (CDFW 2024a, eBird 2024).

Great blue heron (*Ardea herodias*). CDFW Protected Rookery Sites. Moderate Potential (Presence Unknown). Feeds mostly in slow moving or calm freshwater, also along seacoasts. Occasionally in surf and fields. Nests in trees, bushes, on ground and artificial structures, usually near water (Butler 1992). A targeted bird survey was not performed under this biological assessment. The Study Area's blue gum grove has not been documented as a nesting or rookery site for this species (CDFW 2024a, eBird 2024).

Long-eared owl (*Asio otus*). CDFW Species of Special Concern. Moderate Potential (Presence Unknown). This generally uncommon species is resident throughout much of California outside of the Central Valley. Long-eared owls breed in a variety of woodland and forest habitats, including coniferous, oak and riparian, as well as planted tree groves. Nearby open habitats with small mammal populations, such as grasslands, meadows, and marshes, are also required for foraging. Breeding typically relies on the presence of old nests made by similar-sized birds including hawks and crows (Shuford and Gardali 2008). Communal roosting often occurs during the winter. A targeted bird survey was not performed under this biological assessment.

Snowy egret (*Egretta thula*). CDFW Protected Rookery Sites. Moderate Potential (Presence Unknown). The snowy egret is widespread along shores of fresh and saline emergent wetlands, ponds, slow-moving rivers, irrigation ditches, and fields. This species feeds on small fish, crustaceans, and large insects. Colonial nesting occurs in low trees or wetland vegetation, sometimes in mixed colonies of wading birds. A targeted bird survey was not performed under this biological assessment. The Study Area's blue gum grove has not been documented as a nesting or rookery site for this species (CDFW 2024a, eBird 2024).

White-tailed kite (*Elanus leucurus*). BGEPA; State Fully Protected Species. Moderate Potential (Presence Unknown). White-tailed kites are resident in open to semi-open habitats throughout the lower elevations of California, including grasslands, savannahs, woodlands, agricultural areas, and wetlands. Vegetative structure and prey availability seem to be more important habitat elements than associations with specific plants or vegetative communities (Dunk 1995). Nests are constructed mostly of twigs and placed in trees, often at habitat edges. Nest trees are highly variable in size, structure, and

immediate surroundings, ranging from shrubs to trees greater than 150 feet tall (Dunk 1995). This species preys upon a variety of small mammals, as well as other vertebrates and invertebrates. The Study Area provides suitable year-round habitat for white-tailed kites, including stands of oaks for nesting and open areas in proximity for foraging. This species was not observed; however, a bird survey was not performed during this assessment.

Bald eagle (*Haliaeetus leucocephalus*). State Endangered, CDFW Fully Protected Species. High Potential. The bald eagle occurs primarily as a winter visitor but also as a year-round (breeding) resident throughout most of California. Habitat is somewhat variable, but the species is usually strongly associated with larger bodies of water including lakes, reservoirs, major river systems, estuaries, and the ocean. Breeding occurs primarily in forested areas near water bodies; wintering habitat is more general, though water is usually present. The huge nests are typically built in the upper portions of large, live trees that provide dominant views of surrounding areas (Buehler 2000). Bald eagles are highly opportunistic foragers; fishes and waterfowl are usually favored, but a variety of live prey and carrion are consumed. A single individual was observed soaring over the Study Area during the April site visit; however, nests within the Study Area were not observed during the assessment.

Western pond turtle (*Emys marmorata*). CDFW Species of Special Concern. Moderate Potential (Presence Unknown). The western pond turtle is the only freshwater turtle native to most of California. This species is highly aquatic, typically inhabiting perennial waters including lakes, ponds/reservoirs, rivers, streams, and canals that provide submerged cover and suitable exposed basking structures such as rocks, logs, and mats of emergent vegetation. Nesting usually occurs in spring to early summer, with eggs hatching in the fall; nests are excavated in upland areas with friable soil, usually on unshaded slopes within approximately 300 feet of water (Thomson et al. 2016). Hatchlings require shallow water with relatively dense emergent and aquatic vegetation to provide forage, usually aquatic invertebrates (Thomson et al. 2016). There were no observations of this species during the site visits; however, a protocol-level survey was not performed during this assessment.

California red-legged frog (*Rana draytonii*). Federal Threatened, CDFW Species of Special Concern. Moderate Potential (Presence Unknown). California red-legged frog (CRLF) is dependent on suitable aquatic, aestivation, and upland habitat. During periods of wet weather, starting with the first rainfall in late fall, red-legged frogs disperse away from their estivation sites to seek suitable breeding habitat. Aquatic and breeding habitat is characterized by dense, shrubby, riparian vegetation and deep, still, or slow-moving water. Breeding occurs between late November and late April. CRLF estivate (period of inactivity) during the dry months in small mammal burrows, moist leaf litter, incised stream channels, and large cracks in the bottom of dried ponds in the instances where perennial aquatic habitat is absent. CRLF has a moderate potential to utilize the on-site and adjacent ponds for breeding and the adjacent uplands. There were no observations of this species during the site visits; however, a protocol-level survey was not performed during this assessment.

Monarch butterfly (*Danaus plexippus*). Federal Candidate, CDFW Protected Roost Sites. High Potential (Present). This large, showy butterfly is found throughout the United States, southern Canada, and Central America. It also occurs in parts of South America and other continents. In North America, this species spends spring and summer months breeding and foraging across much of its range. The monarch butterfly generally uses milkweed (*Asclepias* spp.) for both breeding and nectaring, although nectar may also be obtained from a variety of additional plant species. From August to October, monarchs will migrate thousands of miles to winter roost sites located along the California coast and central Mexico. At roost sites, monarchs will congregate in thousands or millions on a tree or group of trees (Opler et al. 2011). Western monarchs prefer overwintering habitat comprised of a relatively dense grove of trees with some understory, located near water and nectar sources and protected from the wind by topographic landforms or trees (Sakai and Calvert 1991). Winter roost sites are often on south, southwest, or west facing slopes which may provide more favorable temperature regimes and wind protection (Leong et al. 2004). Due to their abundance within the monarch overwintering zone, and their ability to produce the specific microclimate conditions required for overwintering, monarchs typically utilize groves of blue gum and red gum (*E. camaldulensis*) (Griffiths and Villablanca 2015, Pelton et al. 2016). However, monarchs disproportionately prefer to overwinter on native trees, relative to their abundance at overwintering sites (Griffiths and Villablanca 2015). Native trees utilized by overwintering monarchs include Monterey pine (*Pinus radiata*), and Monterey cypress (*Hesperocyparis macrocarpa*), western sycamore (*Platanus racemosa*), coast redwood (*Sequoia sempervirens*), and coast live oak (*Quercus agrifolia*) (Pelton et al. 2016). Monarch butterflies typically arrive in mid-October to overwintering sites along the California coast and remain until late February or March (Pelton et al. 2016).

The CNDDDB indicates that a monarch roost site has been documented within the Study Area (CDFW 2024). This site has been monitored by the Xerces Society for Invertebrate Conservation (Xerces Society), which has designated it as Bolinas Sewage Facility (Site 2915) (Xerces 2024). Approximately 1,500 individuals were detected at this roost site during a 2000 survey, although few to no monarchs have been observed within Site 2915 during most survey years since (Xerces 2024). In recent years, significant numbers of overwintering monarchs were observed in 2017 (410), 2022 (432), and 2023 (1,265) (Xerces 2024).

A habitat assessment of the Bolinas peninsula, conducted by Dr. Stu Weiss, concludes that roost sites on the peninsula act as a “meta-roost,” in which monarchs disperse when conditions are unfavorable, then relocate to a different roost a few days later (Weiss 2024). The hypothesis that the peninsula is a transient stopover for overwintering monarchs is not supported due to the lack of observations north or south of the peninsula (Weiss 2024). Although lower numbers of monarchs are observed later in the season (i.e. January), this is typical for monarch aggregations due to attrition and emigration rather than evidence of directional migration to larger overwintering colonies further south (Weiss 2024). The monarch roost site within the Study Area should therefore be considered overwintering habitat for monarch butterflies.

5.2.3 Critical Habitat, Essential Fish Habitat, and Wildlife Corridors

The Study Area does not contain any designated Critical Habitat (USFWS 2024b, NMFS 2024) or Essential Fish Habitat (NMFS 2024). The Study Area is not within a designated wildlife corridor (CalTrans 2010). The site is located within a much larger tract of a mixed rural residential portion of Marin County. At a localized scale the Study Area provides connectivity between lightly developed lands, primarily in the form of rural residences with wooded land covers capable of hosting a variety of wildlife species. Due to the rural nature and large lot size of the surrounding parcels, potential corridor functions among the surrounding lands and the Study Area would remain intact.

6.0 PROJECT ANALYSIS

The Project Proponent is proposing to remove the entire blue gum grove, known as Zone 5, located at the intersection of Mesa Road and Olema-Bolinas Road in Bolinas, Marin County (Appendix A). This grove is decadent and poses a significant hazard to the community. Mesa Road is one of two public roads accessing the residences on the Bolinas Mesa, and the community is concerned about the substantial hazard that Zone 5 stand poses through direct strikes, road closure, and/or fire hazard. As noted in Section 5.1 and included in Appendix F, the Zone 5 stand has been evaluated by several arborists and a professional registered forester between 2021 and 2023, and each concurs that the stand is in poor health and not regenerating naturally, which consequently increases the hazard potential (Julin 2023, Gaman 2023, Anderson 2021).

There are several sensitive biological resources (ESHA) within or have the potential to be within the Zone 5 stand (Section 5). Projects that propose construction less within or near ESHA must provide information that indicates a lesser buffer distance will not have a significant adverse impact on the habitat. Given the location of the Project Area is within less than 100 feet of aquatic resource ESHAs, a buffer zone analysis is required. This assessment is presented below in Table 1.

Table 1. Aquatic ESHA Reduced Buffer Zone Justification

Measures Considered to Reduce Aquatic ESHA Buffer Areas	
Zoning Code	Assessment
a. Retrofitting existing improvements or implementing new measures to reduce the rate or volume of stormwater run-off and improve the quality of stormwater run-off (e.g., use of permeable “hardscape” materials and landscape or site features designed to capture, absorb and filter stormwater; etc.)	Not applicable
b. Elimination of on-site invasive species;	The Proposed Project is the removal of the non-native, invasive blue gum (<i>Eucalyptus globulus</i>). Native species will be planted following the removal of the blue gum grove; plants appropriate for wetland edges may be incorporated into the post-project restoration efforts.

Measures Considered to Reduce Aquatic ESHA Buffer Areas	
Zoning Code	Assessment
<i>c. Increasing native vegetation cover (e.g., expand continuous vegetation cover, reduce turf areas, provide native groundcover, shrubs and trees, etc.)</i>	Restoration plantings and seedings of native species will occur after the completion of tree removal. The plant palette will be composed of plants known from the Bolinas area and seed and plant stock will be sourced locally to maintain genetic integrity; plants appropriate for wetland edges may be incorporated into the post-project restoration efforts.
<i>d. Reduction in water consumption for irrigation (e.g., use of drought-tolerant landscaping or high efficiency irrigation systems, etc.); and</i>	Blue gum (<i>Eucalyptus globulus</i>) and related species are noted for their high water consumption and locally reducing groundwater recharge (UC-IPM 2014). Their removal followed by native species (drought-tolerant) will likely increase groundwater recharge across the site, particularly in low-lying areas such as the ephemeral stream and seasonal wetland locations.
<i>e. Other measures that reduce overall similar site-related environmental impacts.</i>	Best management practices (BMP) will be deployed to protect the aquatic resources on-site. See Section 7.

Table 2. Terrestrial ESHA Reduced Buffer Zone Justification

Criteria for Establishing Buffer Areas	
Zoning Code	Assessment
<i>a. Sensitivity of the ESHA to disturbance;</i>	Removal of blue gum eucalyptus trees will alter the microclimate conditions required by overwintering monarch butterflies. The Proposed Project will therefore result in the removal of monarch overwintering habitat, which is considered an ESHA. However, due to the age and health of the stand, the quality of overwintering habitat for monarchs is in rapid decline. In the absence of intervention, overwintering habitat for monarchs would naturally disappear as the stand ages and trees are blown down. Restoration plantings and seedings of native species will occur after the completion of tree removal to improve the ecological value of the area for monarchs and other native species.
<i>b. Habitat requirements of the ESHA, including the migratory patterns of affected species and tendency to return each season to the same nest site or breeding colony;</i>	<p>Monarchs require groves of trees that produce the appropriate microclimate conditions during their overwintering period, which extends roughly from mid-October to March. These microclimate conditions are overwhelmingly produced by groves of blue gum or red gum eucalyptus trees. Other overwintering habitat requirements include: a source of water, and nectar plants that bloom during the overwintering period. Monarchs tend to utilize the same overwintering sites between years, although not all established overwintering sites are utilized each year. It is unknown whether monarchs will utilize newly created overwintering habitat. Restoration plantings and seedings of native species will occur after the completion of tree removal to improve the ecological value of the area for monarchs and other native species.</p> <p>The Bolinas area contains numerous stands of trees (including blue gum groves) of similar size and structure that provide alternative nesting/roosting substrate for migratory birds, including special-status birds, and provide maternity roost habitat for bats.</p>

Criteria for Establishing Buffer Areas	
Zoning Code	Assessment
	Western pond turtle and California red-legged frog could migrate through the blue gum grove; however, it does not provide higher quality upland habitat than those other areas surrounding nearby aquatic habitat for these species (i.e., ponds)
c. Topography of the site	Not applicable.
d. Movement of stormwater	Not applicable.
e. Permeability of the soils and depth to water table	Not applicable.
f. Vegetation present;	The vegetation is dominated by the non-native, invasive blue gum (<i>Eucalyptus globulus</i>). Native species are present but will be avoided to the greatest extent feasible. Restoration plantings and seedings of native species will occur after the completion of tree removal to restore overwintering habitat.
g. Unique site conditions	Blue gum eucalyptus trees that will be removed as part of the Proposed Project are in poor health and at risk of failure. Without intervention, the suitability of the Study Area for overwintering monarchs will decrease as the stand senesces and ultimately becomes unsuitable. Likewise, the stand could experience catastrophic failure through windthrow or wildfire. Restoration plantings and seedings of native species will occur after the completion of tree removal to improve value as habitat.
h. Whether vegetative, natural topographic, or built features (e.g., roads, structures) provide a physical barrier between the proposed development and the ESHA;	Not applicable.
i. The likelihood of increased human activity and disturbance resulting from the project relative to existing development.	Not applicable.

7.0 PROJECT RECOMMENDATIONS

The following are general recommendations to protect the Study Area’s overall biological integrity:

- Tree removal during the dry season and/or dry periods: April 16 through October 14 (as defined in the Marin County Municipal Code); if a rain event occurs with a predicted result of one inch over a 24-hour period occurs during the construction phase. More restrictive seasonal work windows may be necessary depending on biological resources present at the time of construction (see below).
- Delineate the ephemeral stream, seasonal wetland, and perennial pond with pin flags, flagged stakes, or equivalently high-visibility demarcation to prevent construction personnel from laying down equipment or materials within this buffer.
- Provide worker educational awareness program (WEAP) training to all personnel for all sensitive biological resources that are on-site or could be on-site.

- All equipment and materials will be stored or laid down on existing hardscaped areas (i.e., concrete, asphalt, compacted gravel) where/when feasible. In the instance that equipment and/or materials need to be laid down outside of hardscaped areas, they should be 100 feet or greater from on-site aquatic resources (see below; Appendix A). Spill prevention kits will be on-site and deployed in the instance of any liquid spill.

7.1 Land Cover Types

7.1.1 Terrestrial Land Cover Types

The Study Area contains a blue gum grove, which currently acts as overwintering habitat for monarch butterflies. Within the Study Area (designated Site 2915 by the Xerces Society), monarchs roost within a bowl-shaped grove of trees on a southwest-facing slope, which includes blue gum, coast live oak, and toyon (M. Monroe, personal communication, August 18, 2023). This grove borders an open, grassy clearing to the south; on the other side of the clearing, a dense row of silver wattle may provide wind shelter to the overwintering site. Although blue gum trees to the north, east, and west of the overwintering grove may not directly be utilized by monarchs, they provide wind shelter to the overwintering grove. Trees as far as 100 meters away may act as wind breaks that affect the microclimate conditions within the utilized portion of the overwintering grove (Weiss 1998). Monarchs have also been observed utilizing blue gum groves in the western portion of the Study Area as a dispersal corridor (M. Monroe, personal communication, August 18, 2023).

The Bolinas Peninsula acts as a “meta-roost” site for overwintering monarchs, which move between established roost sites. None of the roost sites in Bolinas appear to have suitable microclimate conditions for monarchs for the entire overwintering period (Weiss 2024). Based on the observed patterns of occupancy throughout the overwintering period, it appears that monarchs aggregate at roost sites when conditions are suitable, scatter across Bolinas when conditions become unfavorable, and re-aggregate when conditions at roost sites are suitable again (Weiss 2024). This cycle repeats itself several times throughout the overwintering period (Weiss 2024). An alternative hypothesis is that overwintering sites in this region are “transitional,” or typically support overwintering monarchs earlier in the season but are abandoned when the local climate becomes unfavorable due to strong winds, high precipitation, and/or cold temperatures (Leong et al. 2004). However, this hypothesis is not supported for the Bolinas peninsula, due to the lack of observations north or south of the peninsula (Weiss 2024). Furthermore, even transitional overwintering sites provide important temporary refuge to overwintering monarchs before they migrate to “climax” overwintering sites to the south, and they can even host monarchs for the entire overwintering season if conditions remain favorable (Leong et al. 2004). Since 2004, four roost sites that have been utilized by monarchs on the Peninsula: the Bolinas Sewage Facility (Site 2915); Purple Gate (Site 2899), located approximately 1 mile west of the Study Area; Juniper & Kale (Site 3227), located approximately 1 mile southwest of the Study Area; Alder Road (Site 2912), located approximately 1 mile west of the Study Area; and Mesa Road (Site 2913), located approximately 1 mile west of the Study Area (Xerces 2024). Prior to 2004, Terrace Ave (Site 2901) also hosted large numbers of overwintering monarchs, but no monarchs have been observed at this site in recent years. From 1997 to 2017, Sites 2899, 3227, and 2912 have hosted approximately 10,000 monarchs one or more years, but these sites are not consistently utilized each year (Xerces

2024). The number of monarchs observed at these three sites has been declining since at least 2017 (Xerces 2024). Overwintering monarchs have only been recorded at Site 2913 in 2022, when 29 monarchs were observed at this site (Xerces 2024). In 2023, 3,327 monarchs were observed overwintering on the Bolinas Peninsula (Xerces 2024). Site 2915 therefore hosted approximately 38 percent of the overwintering monarchs observed on the Bolinas Peninsula in 2023 (Xerces 2024), making it a significant roost site.

The suitability of monarch overwintering habitat is in decline throughout the western monarch overwintering range (Campbell 2022). This is also the case on the Bolinas Peninsula, where roost sites are primarily composed of aging trees in danger of falling during storm events. During the August 15, 2023 monarch habitat assessment, it was observed that at least one of the blue gum trees documented to host overwintering monarchs had been felled by winter storms in 2022/2023. In January 2023, a series of atmospheric rivers blew down 24 blue gum trees north, east, and west of the area utilized by overwintering monarchs (Gammon 2022). An arborist report of the Study Area determined that only 27 percent of trees are currently in “good” condition, indicating that the entire stand is in poor health (Gammon 2023). The condition of overwintering habitat within the Study Area is therefore poor, and in jeopardy of becoming unsuitable overwintering habitat in the foreseeable future in the absence of any corrective action. In the winter of 2024, additional storm events blew down additional approximately 60 additional trees (Ainsley, pers. comm), particularly at the northern and southern ends of the site. In the absence of any intervention, the rapid loss of trees due to declining stand health, is anticipated to render the site unsuitable as habitat for overwintering monarchs in the near future.

Provision C-BIO-10 (Roosting and Nesting Habitat) of the Marin County Local Coastal Plan prohibits the alteration or removal of groves of trees that provide colonial nesting and roosting habitat for monarch butterflies, except when trees pose a threat to life or property. Due to the presence of overwintering monarchs, the blue gum grove within the Study Area is considered an ESHA. However, the quality of overwintering habitat within the Study Area is currently in decline due to the poor health of the grove, and the site is not expected to remain suitable as overwintering habitat as trees continue to blow down during storm events. The following recommendations are recommended to reduce impacts to monarch overwintering habitat:

Recommendation 1: County Approval

The Proposed Project involves the removal of blue gum trees that provide habitat for overwintering monarch butterflies. Removal of these trees will alter the physical properties of the grove and render habitat temporarily unsuitable for monarch butterflies. Due to the nature of the Proposed Project, it is not feasible to create a buffer between monarch overwintering habitat. However, these trees are in poor condition and present a threat to life and property. Removal of these trees may therefore qualify for an exemption from the prohibition for tree removal in monarch overwintering habitat. Prior to the removal of any vegetation, approval should be obtained from Marin County.

Recommendation 2: Coastal Habitat Restoration Plan

In the winter of 2023/2024, Dr. Stu Weiss of Creekside Science assessed the structure of monarch overwintering habitat within the Study Area. Dr. Weiss concluded that the quality of overwintering habitat within the Study Area is currently poor, and due to the stand's deterioration, it is unsustainable as monarch overwintering habitat (Weiss 2024). Dr. Weiss concurs with the recommendation of removal of the stand and recommends enhancement and management of monarch overwintering habitat elsewhere within the Bolinas Peninsula. Restoration of monarch overwintering habitat is outside of the scope of this Proposed Project; however, following tree removal, the Study Area will be restored to enhance monarch habitat.

Following the removal of blue gum eucalyptus trees, native plantings and seedings will occur immediately following the removal of the trees, throughout the entire removed grove. A Coastal Habitat Restoration Plan (CHRP), which will take the quality of monarch habitat into consideration, will be developed. Revegetation of the site should incorporate guidance from local monarch overwintering habitat experts, such as Dr. Weiss and Xerces Society staff. Some general guidelines for revegetation include the following:

- The understory should include nectar plants that bloom during the overwintering period (mid-October to March).
- Coast live oak, which has been documented to host overwintering monarchs, will be planted within the Study Area. Approximately 700 native trees will be replanted in the Study Area, to create oak woodland and oak savannah habitat.
- Dr. Weiss suggests that Douglas fir (*Pseudotsuga menziesii*) trees may be planted to replace the Northern and Eastern wind shelters, currently provided by blue gum trees, to the overwintering site (Weiss 2024). Planting of these trees, along with enhancements to provide wind shelter to the south, could potentially preserve overwintering habitat at the site (Weiss 2024). However, Douglass fir may not be feasible given the human safety concerns.

Native plantings and seedings should occur immediately following the removal of the trees and should be throughout the entire removed grove. The CHRP will include flexible landscape designs that take advantage of what species are available at the time of implementation.

The CHRP will include a review of the Proposed Project and attendant impacts; the existing conditions of the proposed mitigation site; the implementation plan (i.e., plantings, seedings, weed removal/reduction); proposed success criteria; monitoring methods and schedule; potential maintenance activities; and monitoring report structure and schedule.

Currently, it is anticipated that mitigation would consist of planting and seeding of locally native plants. Appendix F includes a Conceptual Restoration Plan developed by H.T. Harvey and Associates (2023) which illustrates approximated types and locations of restored habitats that will serve as mitigation. Proposed habitat types by H.T. Harvey include oak savanna/grassland, oak woodland, coastal scrub, pollinator prairie, willow thicket, and wet

meadow. These restored habitats will eventually provide high quality, native roosting habitat and pollination resources for overwintering monarch butterflies.

Table 2 provides a sample plant palette for the mitigation planting and seeding; the final plant palette would be determined during the drafting of the CHRP. All plants will be native to the Marin Coast, and all attempts will be made to acquire plant and seed materials from local sources to preserve local genetic integrity. Prior to the plantings and seedings, the proposed mitigation site will be prepared through a variety of mechanical means, such as disking, weed-whipping, hand-pulling, mowing, etc. Irrigation, mulch, and protection measures may necessarily be deployed to prevent herbivory and ensure establishment of the plantings. Annual monitoring will be conducted under the supervision of a qualified biologist³ to document the development and growth of the mitigation plantings/seedings and provide management recommendations to correct any deficiencies in plant survival. The CHRP will provide greater detail of implementation methods, timing, planting density, seeding rates, etc.

Table 3. Sample Native Plant Palette for Mitigation Plantings/Seedings*

Scientific Name	Common Name	Life Form	Implementation
Recommended Trees			
<i>Quercus agrifolia</i>	coast live oak	evergreen tree	container planting/acorns
<i>Pinus muricata</i>	bishop pine	evergreen tree	container planting/cones
<i>Pinus contorta</i> ssp. <i>contorta</i>	shore pine	evergreen tree	container planting/cones
<i>Pseudotsuga menziesii</i> *	Douglas fir	evergreen tree	container planting/cones
<i>Umbellularia californica</i>	California bay	evergreen tree	container planting
Recommended Shrubs			
<i>Baccharis pilularis</i>	coyote brush	evergreen shrub	container planting/broadcast seeding
<i>Ceanothus thyrsiflorus</i>	blue blossom	evergreen shrub	container planting
<i>Diplacus aurantiacus</i>	sticky monkey	evergreen shrub	container planting
<i>Frangula californica</i>	California coffeeberry	evergreen shrub	container planting
<i>Garrya elliptica</i>	coast silktassel	evergreen shrub	container planting
<i>Lonicera involucrata</i>	twinberry	evergreen shrub	container planting
<i>Lupinus albifrons</i>	silver lupine	evergreen shrub	container planting
Recommended Herbs			
<i>Bromus carinatus</i>	California brome	perennial graminoid	broadcast seeding
<i>Elymus glaucus</i>	blue wild	perennial graminoid	broadcast seeding
<i>Stipa pulchra</i>	purple needlegrass	perennial graminoid	broadcast seeding
<i>Achillea millefolium</i>	common yarrow	perennial forb	broadcast seeding
<i>Eschscholzia californica</i>	California poppy	perennial forb	broadcast seeding
<i>Iris douglasiana</i>	Douglas iris	perennial forb	broadcast seeding

³ Surveying/monitoring may be conducted by the local community as a citizen-science program in conjunction with a qualified biologist to ensure mitigation goals in the CHRP are being met.

Scientific Name	Common Name	Life Form	Implementation
<i>Sisyrinchium bellum</i>	blue-eyed grass	perennial forb	broadcast seeding

*All species subject to change in the final Coastal Habitat Restoration Plan

7.1.2 Aquatic Resources

The Study Area contains a seasonal wetland, an ephemeral stream, and a perennial pond in the southern portion. These features are considered ESHA and therefore merit a protective buffer. The only construction activities occurring within this buffer are blue gum removal and subsequent native species plantings. These features fall within the boundaries of the Proposed Project, with trees situated adjacent to each. The removal of such trees will likely increase groundwater recharge which in turn could improve hydrologic conditions and functional uplift for the on-site aquatic resources (UC-IPM 2014). The following recommendations are forwarded to protect these aquatic resources.

Recommendation 3: Best Management Practices

The literal extent of these features will be delineated and demarcated with high-visible construction fencing. All construction staff will be made aware of these features, and its status as a protected habitat.

No equipment or materials will be laid down within these three features or construction fencing barrier. All materials will be stored on existing hardscaped areas or, if laid down on existing vegetation, will only be laid down in those areas scheduled for tree removal. Spill prevention devices will be readily available during construction and utilized for all toxic liquids/materials including but not limited to gasoline, diesel, motor oil, solvents, paints, and herbicides. These materials should be stored 100 feet or greater from the three aquatic features though they may necessarily require use within 100 feet of the features.

Sediment migration and erosion control measures will be deployed on the perimeter of these features to ensure their continued functioning and water quality. Such barriers may include weed-free hay bales, weed-free straw waddles, silt fencing, and/or a combination of these materials. Regular inspection of the barriers will be deployed and immediate remedies of damaged or compromised areas of the barriers.

All construction will occur during the dry season (May 15 through October 15) and should be suspended during unseasonable rainfalls of greater than one-half inch over a 24-hour period, all activities will cease for 24 hours after perceptible rain ceases.

7.2 Special-status Species

7.2.1 Special-status Plants

The Study Area does not support special-status plants; therefore, no further actions are recommended for such.

7.2.2 Special-status Wildlife

The Study Area has the potential to support 10 special-status wildlife: pallid bat (*Antrozous pallidus*); great egret (*Ardea alba*); great blue heron (*Ardea herodias*); long-eared owl (*Asio otus*); snowy egret (*Egretta thula*); white-tailed kite (*Elanus leucurus*); bald eagle (*Haliaeetus leucocephalus*); western pond turtle (*Emys marmorata*); California red-legged frog (*Rana draytonii*); and monarch butterfly (*Danaus plexippus*). The following recommendations are forwarded to protect these special-status species.

Bat Species: One special-status bat has the potential to occur within the Study Area (pallid bat). Removal of trees during the bat maternity season (generally, April through August) could impact bat breeding and potentially result in the take of bats. Because a targeted bat habitat assessment was not conducted as part of this biological assessment, pre-construction surveys for bat habitat and recommendations for tree removal to avoid impacts to bat species are provided below.

Recommendation 4: Bat Habitat Surveys

Tree removal should be conducted from September through March, outside of the general bat maternity season. If removal during this period is not feasible, it is recommended that a bat habitat assessment and survey effort (the latter if needed) be performed by a qualified biologist prior to demolition to determine if bats are present in the buildings. If no suitable roosting habitat for bats is found, then no further study is warranted.

If special-status bat species or bat maternity roosts are detected, then roosts should be avoided until the end of the maternity roosting season. If this avoidance is not feasible, appropriate species- and roost-specific mitigation measures should be developed in consultation with CDFW. Irrespective of time of year, demolition should remain on the ground for at least 24 hours prior to chipping, off-site removal, or other processing to allow any bats present within the felled structure to escape.

All Bird Species (including non-special-status): In addition to the special-status birds discussed above, a variety of non-status bird species with baseline protections under the MBTA and CFGC may use vegetation, particularly trees, within the Project Area for nesting. Pre-construction surveys are recommended to ensure that the implementation of the Proposed Project would not impact any nesting birds.

Recommendation 5: Bird Surveys

Prior to vegetation alteration/removal and initial ground disturbance occur from August 16 to January 31, outside of the general bird nesting season. If activities during this time are not feasible, a pre-construction nesting bird survey should be performed by a qualified biologist no more than 14 days prior to the initiation of tree removal or ground disturbance is recommended. The survey should cover the Project Area (including tree removal areas) and surrounding areas within 500 feet. If active bird nests are found during the survey, an appropriate no-disturbance buffer should be established by the qualified biologist. Once it is determined that the young have fledged (left the nest) or the nest otherwise becomes

inactive (e.g., due to predation), the buffer may be lifted, and work may be initiated within the buffer.

Western Pond Turtle: Western pond turtles have the potential to occur in the perennial pond as well as other ponds on BCPUD land. Proposed Project activities will avoid the pond and its immediate shoreline (including basking substrates), reducing the risk of harm to adult pond turtles. However, ground disturbance within the Project Area has the potential to impact turtle nests in the substrate, and adult turtles and/or hatchlings moving to/from the pond to upland areas. To avoid any potential impacts to nesting activities of this species, the following measures are provided.

Recommendation 6: A presence/absence survey for the site is recommended prior to April 1 (see below) in the year when tree removal is planned. The survey should be performed by a qualified biologist using suitable methods, i.e., surveying the pond and its shorelines on a sunny day from suitable distant vantage points as to limit potential disturbance to turtles and increase the chances of detection of any are present. Alternately, presence of the species within the pond may simply be assumed with no survey performed.

If the species is observed on-site or presence is assumed, exclusion fence should be installed during the wet season (prior to April 1) around the boundary of the disturbance area in such a manner as to preclude turtles from entering ground disturbance areas with suitable nesting habitat. The fencing should have a minimum height above ground of 24 inches, the bottom of the fence buried to a minimum depth of 4 inches. Erosion control fencing (silt fencing) may serve as the exclusion fence if it meets the requirements above. The location of the fencing should be approved by a qualified biologist prior to installation, and inspected by the biologist after installation to ensure that it is effective. The fencing should remain installed until on-site mechanized equipment is no longer necessary or used for the Proposed Project.

Prior to the initiation of work, a WEAP should be provided by the qualified biologist to all personnel that will be present at the site during ground disturbance and related activities. The WEAP should include information regarding the identification and identification of western pond turtle (including photographs), the potential for occurrence within work areas, the purpose of the exclusion fencing and importance of maintaining it, and specific measures being implemented to avoid impacts (which will include halting all ground disturbance and immediately alerting the qualified biologist if western pond turtle is observed in work areas over the course of the work).

California Red-legged Frog: California red-legged frog (CRLF; *Rana draytonii*), is a federal-listed species that has potential to occur in the Project Area. Unless a permit for “take” is issued by the United States Fish and Wildlife Service (USFWS), pursuant to Section 7 or Section 10 of the federal Endangered Species Act (ESA), the species must be avoided. Take, as defined under the ESA is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The following avoidance measures are recommended to avoid CRLF during project activities:

Recommendation 7: To avoid CRLF during Project activities, work will only be conducted between the dates of June 1 and October 15. Work will also not occur during days with forecasted probability of rainfall of greater than 40 percent, during rain, or within 72 hours of a rain event. All work will be conducted during daylight hours; no nightwork will be conducted.

Within 48 hours of commencement of ground disturbing and vegetation removal activities, it is recommended that a qualified biologist should conduct a survey of the work area to determine if CRLF are present. If no CRLF are present, work can commence in observation of the following additional measures. If CRLF are detected, the areas where they are detected should be avoided by at least 200 feet.

Immediately prior to commencement of ground disturbing and vegetation removing activities, a qualified biologist should survey the work area for the presence of CRLF. This may include the biologist directing crewmembers to remove any ground debris or vegetation that could conceal CRLF. Any detected CRLF should be avoided by 200 feet and be allowed to leave the site on their own volition. CRLF cannot be moved without authorization from USFWS and as such, if CRLF are detected, any occupied areas must be avoided until the CRLF has left the area.

Throughout ground-disturbing activities, vegetation removal or any other activity that could result in the harm of a CRLF, it is recommended that a qualified biological monitor should be present to observe Project activities to substantiate that no CRLF have been taken because of the Project. The onsite monitor will also conduct surveys of areas immediately before they are entered to ensure that no undetected CRLF are in the work area.

If at any time a CRLF is taken or is likely to be taken by Project activities, all work will stop and not be resumed the USFWS will be consulted about next steps.

As noted in the general recommendations above, prior to the start of work, all workers will receive WEAP training from a qualified biologist. This training will describe the protected status of CRLF, its habits and ecology, and methods for identification and penalties for “take”.

Monarch Butterfly: The monarch is currently a federal candidate species. The USFWS plans to review this species in 2024 if the listing is still warranted. As a federal candidate species, the monarch does not currently receive any protections under FESA. However, overwintering habitat is considered an ESHA within the Coastal Zone. CDFW can also regulate monarch overwintering sites if a Lake or Streambed Alteration Agreement is required for a project that has the potential to impact overwintering sites. Recommendations 1 and 2 above are designed to minimize impacts to monarch overwintering habitat.

7.2.3 Wildlife Movement

There is no Critical Habitat, Essential Fish Habitat, or regional migratory corridors that will be impacted from the Proposed Project. The removal of trees is in and of itself unlikely to result in any significant impacts to local wildlife movement. Preservation of portions of the Study Area's open habitats will also allow for continued localized movement of wildlife. No further actions are recommended for Critical Habitat, Essential Fish Habitat, or wildlife corridors.

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Appendix A

Figures



Path: C:\Users\Arthur\Desktop\GIS\320000\320149\Fig A-1_Location (1).mxd

Sources: National Geographic, WRA | Prepared By: Arthur, 3/25/2024

Figure A-1. Study Area Location

Bolinas Eucalyptus Project - Zone 5
Marin County, CA

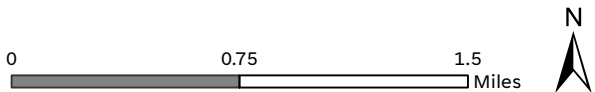




Figure A-2. Soil Mapping Units

Bolinas Eucalyptus Project - Zone 5
Marin County, CA

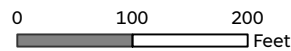
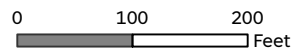




Figure A-3. Land Cover & ESHA Setbacks

Bolinas Eucalyptus Project - Zone 5
Marin County, CA

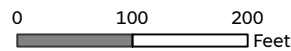




Sources: DigitalGlobe 2016 Aerial, WRA | Prepared By: Arthur, 3/29/2024

Figure A-4. Project Area

Bolinas Eucalyptus Project - Zone 5
Marin County, CA



Appendix B

Species Observed in the Study Area

Table B-1. Plant species observed in the Study Area: April 1 and June 17, 2022

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR ³
Adoxaceae	<i>Sambucus racemosa</i>	red elderberry	deciduous shrub	native	--	--	FAC
Agavaceae	<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	common soap plant	perennial forb	native	--	--	NL
Alliaceae	<i>Allium triquetrum</i>	three-corner leek	perennial forb	non-native	--	assessed	NL
Anacardiaceae	<i>Toxicodendron diversilobum</i>	poison oak	deciduous shrub	native	--	--	FACU
Apiaceae	<i>Conium maculatum</i>	poison hemlock	perennial forb	non-native	--	moderate	FACW
Apiaceae	<i>Foeniculum vulgare</i>	fennel	perennial forb	non-native	--	high	NL
Apiaceae	<i>Heracleum maximum</i>	common cowparsnip	perennial forb	native	--	--	FACW
Apiaceae	<i>Sanicula crassicaulis</i>	Pacific sanicle	perennial forb	native	--	--	NL
Apiaceae	<i>Torilis arvensis</i>	hedge parsley	annual forb	non-native	--	moderate	NL
Apocynaceae	<i>Vinca major</i>	bigleaf periwinkle	perennial forb	non-native	--	moderate	NL
Araceae	<i>Zantedeschia aethiopica</i>	calla lily	perennial forb	non-native	--	limited	OBL
Araliaceae	<i>Hedera helix</i>	English ivy	evergreen vine	non-native	--	high	NL
Asteraceae	<i>Artemisia californica</i>	Coast sagebrush	evergreen shrub	native	--	--	NL
Asteraceae	<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush	evergreen shrub	native	--	--	NL
Asteraceae	<i>Bellis perennis</i>	English lawn daisy	perennial forb	non-native	--	assessed	NL
Asteraceae	<i>Carduus pycnocephalus</i>	Italian thistle	annual forb	non-native	--	moderate	NL
Asteraceae	<i>Delairea odorata</i>	Cape ivy	perennial forb	non-native	--	high	FAC
Asteraceae	<i>Helminthotheca echioides</i>	bristly ox-tongue	perennial forb	non-native	--	limited	FAC
Asteraceae	<i>Hypochaeris radicata</i>	rough cat's-ear	perennial forb	non-native	--	moderate	FACU
Asteraceae	<i>Leucanthemum vulgare</i>	ox-eye daisy	perennial forb	non-native	--	moderate	UPL
Asteraceae	<i>Matricaria discoidea</i>	pineapple weed	annual forb	native	--	--	FACU
Asteraceae	<i>Senecio jacobaea</i>	stinking willie	perennial forb	non-native	--	limited	FACU
Asteraceae	<i>Soliva sessilis</i>	field burweed	annual forb	non-native	--	--	FACU
Asteraceae	<i>Sonchus asper</i> ssp. <i>asper</i>	prickly sow thistle	annual forb	non-native	--	assessed	FAC
Asteraceae	<i>Sonchus oleraceus</i>	common sow thistle	annual forb	non-native	--	--	NL
Asteraceae	<i>Symphotrichum chilense</i>	Pacific aster	perennial forb	native	--	--	FAC

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR ³
Asteraceae	<i>Taraxacum officinale</i>	common dandelion	perennial forb	non-native	--	assessed	FACU
Betulaceae	<i>Corylus cornuta ssp. californica</i>	California hazelnut	deciduous shrub	native	--	--	FACU
Boraginaceae	<i>Echium candicans</i>	Pride-of-Madeira	evergreen shrub	non-native	--	--	NL
Boraginaceae	<i>Myosotis latifolia</i>	broadleaf forget-me-not	perennial forb	non-native	--	limited	NL
Brassicaceae	<i>Raphanus sativus</i>	wild radish	perennial forb	non-native	--	limited	NL
Caprifoliaceae	<i>Lonicera hispidula</i>	pink honeysuckle	evergreen shrub	native	--	--	FACU
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese honeysuckle	evergreen shrub	non-native	--	--	FACU
Caryophyllaceae	<i>Cerastium glomeratum</i>	mouse-ear chickweed	annual forb	non-native	--	--	UPL
Caryophyllaceae	<i>Stellaria media</i>	common chickweed	annual forb	non-native	--	--	FACU
Cupressaceae	<i>Hesperocyparis macrocarpa</i>	Monterey cypress	evergreen tree	native	--	--	NL
Cupressaceae	<i>Sequoia sempervirens</i>	coast redwood	evergreen tree	native	--	--	NL
Cyperaceae	<i>Carex densa</i>	dense sedge	perennial graminoid	native	--	--	OBL
Cyperaceae	<i>Cyperus eragrostis</i>	tall flat-sedge	perennial graminoid	native	--	--	FACW
Cyperaceae	<i>Schoenoplectus acutus</i>	tule	perennial graminoid	native	--	--	OBL
Dennstaedtiaceae	<i>Pteridium aquilinum var. pubescens</i>	bracken fern	perennial fern	native	--	--	FACU
Euphorbiaceae	<i>Euphorbia peplus</i>	petty spurge	annual forb	non-native	--	--	NL
Fabaceae	<i>Acacia dealbata</i>	silver wattle	evergreen tree	non-native	--	moderate	NL
Fabaceae	<i>Cytisus scoparius</i>	Scotch broom	evergreen shrub	non-native	--	high	NL
Fabaceae	<i>Genista monspessulana</i>	French broom	evergreen shrub	non-native	--	high	NL
Fabaceae	<i>Lathyrus latifolius</i>	perennial pea	perennial forb	non-native	--	--	NL
Fabaceae	<i>Lotus corniculatus</i>	bird's-foot trefoil	perennial forb	non-native	--	assessed	FAC
Fabaceae	<i>Medicago arabica</i>	spotted burclover	annual forb	non-native	--	--	NL
Fabaceae	<i>Medicago polymorpha</i>	bur medic	annual forb	non-native	--	limited	FACU
Fabaceae	<i>Trifolium repens</i>	white clover	perennial forb	non-native	--	--	FACU
Fabaceae	<i>Trifolium subterraneum</i>	subterranean clover	annual forb	non-native	--	--	NL
Fabaceae	<i>Vicia sativa</i>	garden vetch	annual forb	non-native	--	--	FACU
Fabaceae	<i>Vicia villosa</i>	woolly-pod vetch	annual forb	non-native	--	--	NL

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR ³
Fagaceae	<i>Quercus agrifolia</i>	coast live oak	evergreen tree	native	--	--	NL
Geraniaceae	<i>Erodium cicutarium</i>	redstem stork's bill	annual forb	non-native	--	limited	NL
Geraniaceae	<i>Geranium dissectum</i>	cutleaf geranium	annual forb	non-native	--	moderate	NL
Geraniaceae	<i>Geranium molle</i>	woodland geranium	perennial forb	non-native	--	assessed	NL
Geraniaceae	<i>Geranium robertianum</i>	Robert's geranium	annual forb	non-native	--	assessed	NL
Hypericaceae	<i>Hypericum perforatum</i>	Klamath weed	perennial forb	non-native	--	moderate	FACU
Iridaceae	<i>Iris douglasiana</i>	Douglas' iris	perennial forb	native	--	--	NL
Iridaceae	<i>Sisyrinchium bellum</i>	blue-eyed grass	perennial forb	native	--	--	FACW
Juncaceae	<i>Juncus effusus</i> ssp. <i>pacificus</i>	Pacific rush	perennial graminoid	native	--	--	FACW
Juncaceae	<i>Juncus mexicanus</i>	Mexican rush	perennial graminoid	native	--	--	FACW
Juncaceae	<i>Juncus patens</i>	common rush	perennial graminoid	native	--	--	FACW
Linaceae	<i>Linum bienne</i>	pale flax	annual forb	non-native	--	--	NL
Malvaceae	<i>Malva nicaeensis</i>	bull mallow	annual forb	non-native	--	--	NL
Montiaceae	<i>Claytonia perfoliata</i>	miner's lettuce	annual forb	native	--	--	FAC
Myrsinaceae	<i>Lysimachia arvensis</i>	scarlet pimpernel	annual forb	non-native	--	--	NL
Myrtaceae	<i>Eucalyptus globulus</i>	blue gum	evergreen tree	non-native	--	moderate	NL
Oxalidaceae	<i>Oxalis pes-caprae</i>	Bermuda buttercup	perennial forb	non-native	--	moderate	NL
Papaveraceae	<i>Eschscholzia californica</i>	California poppy	perennial forb	native	--	--	NL
Papaveraceae	<i>Fumaria capreolata</i>	white ramping fumitory	perennial forb	non-native	--	--	NL
Pinaceae	<i>Pinus radiata</i>	Monterey pine	evergreen tree	native	--	limited	NL
Pinaceae	<i>Pseudotsuga menziesii</i>	Douglas fir	evergreen tree	native	--	--	FACU
Plantaginaceae	<i>Plantago lanceolata</i>	English plantain	perennial forb	non-native	--	limited	FAC
Poaceae	<i>Agrostis capillaris</i>	colonial bentgrass	perennial graminoid	non-native	--	--	FAC
Poaceae	<i>Anthoxanthum odoratum</i>	sweet vernalgrass	perennial graminoid	non-native	--	moderate	FAC
Poaceae	<i>Avena barbata</i>	wild oat	annual graminoid	non-native	--	moderate	NL
Poaceae	<i>Briza maxima</i>	big rattlesnake grass	annual graminoid	non-native	--	limited	NL
Poaceae	<i>Bromus catharticus</i>	Chilean brome	perennial graminoid	non-native	--	--	NL

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR ³
Poaceae	<i>Bromus diandrus</i>	rip-gut brome	annual graminoid	non-native	--	moderate	NL
Poaceae	<i>Bromus hordeaceus</i>	soft chess	annual graminoid	non-native	--	limited	FACU
Poaceae	<i>Dactylis glomerata</i>	orchard grass	perennial graminoid	non-native	--	limited	FACU
Poaceae	<i>Ehrharta erecta</i>	panic veldtgrass	perennial graminoid	non-native	--	moderate	NL
Poaceae	<i>Festuca arundinacea</i>	tall fescue	perennial graminoid	non-native	--	moderate	FACU
Poaceae	<i>Festuca californica</i>	California fescue	perennial graminoid	native	--	--	FACU
Poaceae	<i>Festuca perennis</i>	Italian rye grass	annual graminoid	non-native	--	moderate	FAC
Poaceae	<i>Holcus lanatus</i>	common velvet grass	perennial graminoid	non-native	--	moderate	FAC
Poaceae	<i>Hordeum brachyantherum</i>	meadow barley	perennial graminoid	native	--	--	FACW
Poaceae	<i>Hordeum murinum</i>	mouse barley	annual graminoid	non-native	--	moderate	FAC
Poaceae	<i>Phalaris aquatica</i>	harding grass	perennial graminoid	non-native	--	moderate	FACU
Polygonaceae	<i>Rumex acetosella</i>	sheep sorrel	perennial forb	non-native	--	moderate	FACU
Polygonaceae	<i>Rumex crispus</i>	curly dock	perennial forb	non-native	--	limited	FAC
Polygonaceae	<i>Rumex pulcher</i>	fiddle dock	perennial forb	non-native	--	--	FAC
Rhamnaceae	<i>Ceanothus thyrsiflorus</i>	Carmel ceanothus	evergreen shrub	native	--	--	NL
Rhamnaceae	<i>Frangula californica</i>	California coffeeberry	evergreen shrub	native	--	--	NL
Rosaceae	<i>Cotoneaster franchetii</i>	orange cotoneaster	evergreen shrub	non-native	--	moderate	NL
Rosaceae	<i>Fragaria vesca</i>	woodland strawberry	perennial forb	native	--	--	UPL
Rosaceae	<i>Heteromeles arbutifolia</i>	toyon	evergreen shrub	native	--	--	NL
Rosaceae	<i>Prunus cerasifera</i>	cherry plum	deciduous tree	non-native	--	limited	NL
Rosaceae	<i>Rosa rubiginosa</i>	eglantine rose	evergreen shrub	non-native	--	--	UPL
Rosaceae	<i>Rubus armeniacus</i>	Himalayan blackberry	evergreen shrub	non-native	--	high	FAC
Rosaceae	<i>Rubus ursinus</i>	California blackberry	evergreen shrub	native	--	--	FACU
Rubiaceae	<i>Galium aparine</i>	common bedstraw	annual forb	native	--	--	FACU
Salicaceae	<i>Salix lasiolepis</i>	arroyo willow	deciduous tree	native	--	--	FACW
Sapindaceae	<i>Aesculus californica</i>	California buckeye	deciduous tree	native	--	--	NL
Scrophulariaceae	<i>Scrophularia californica</i>	bee plant	perennial forb	native	--	--	FAC

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR ³
Tropaeolaceae	<i>Tropaeolum majus</i>	nasturtium	annual vine	non-native	--	assessed	NL
Typhaceae	<i>Typha latifolia</i>	common cattail	perennial forb	native	--	--	OBL

All species identified using the *Jepson Manual, 2nd Edition* (Baldwin et al. 2012), *The Jepson Flora Project* (eFlora 2024), and *Marin Flora* (Howell et al. 2007); nomenclature follows *The Jepson Flora Project* (eFlora 2024) unless otherwise noted

Sp.: “species”, intended to indicate that the observer was confident in the identity of the genus but uncertain which species

Cf.: “confer” or “compared with”, intended to indicate a species appeared to the observer to be specific, but was not identified based on diagnostic characters

¹Rare Status: The CNPS Inventory of Rare and Endangered Plants (CNPS 2024a)

FE:	Federal Endangered
FT:	Federal Threatened
SE:	State Endangered
ST:	State Threatened
SR:	State Rare
CRPR 1A:	Plants presumed extirpated in California and either rare or extinct elsewhere
CRPR 1B:	Plants rare, threatened, or endangered in California and elsewhere
CRPR 2A:	Plants presumed extirpated in California, but more common elsewhere
CRPR 2B:	Plants rare, threatened, or endangered in California, but more common elsewhere
CRPR 3:	Plants about which we need more information – a review list
CRPR 4:	Plants of limited distribution – a watch list

²Invasive Status: California Invasive Plant Inventory (Cal-IPC 2006)

High:	Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.
Moderate:	Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited moderate distribution ecologically
Limited:	Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically
Assessed:	Assessed by Cal-IPC and determined to not be an existing current threat

³Wetland Status: National List of Plant Species that Occur in Wetlands, Arid West Region (Corps 2022)

OBL:	Almost always a hydrophyte, rarely in uplands
FACW:	Usually a hydrophyte, but occasionally found in uplands
FAC:	Commonly either a hydrophyte or non-hydrophyte
FACU:	Occasionally a hydrophyte, but usually found in uplands
UPL:	Rarely a hydrophyte, almost always in uplands
NL:	Rarely a hydrophyte, almost always in uplands
NI:	No information; not factored during wetland delineation

Table B-2. Wildlife species observed in and around the Study Area: April 1 and June 17, 2022

SCIENTIFIC NAME	COMMON NAME
Mammals	
<i>Odocoileus hemionus columbianus</i>	black-tailed deer
Birds	
<i>Agelaius phoeniceus</i>	red-winged blackbird
<i>Aphelocoma californica</i>	western scrub jay
<i>Branta canadensis</i>	Canada goose
<i>Buteo jamaicensis</i>	red-tailed hawk
<i>Callipepla californica</i>	California quail
<i>Calypte anna</i>	Anna's hummingbird
<i>Cathartes aura</i>	turkey vulture
<i>Chamaea fasciata</i>	wrentit
<i>Corvus brachyrhynchos</i>	American crow
<i>Cyanocitta stelleri</i>	Stellar's jay
<i>Euphagus cyanocephalus</i>	Brewer's blackbird
<i>Haliaeetus leucocephalus</i>	bald eagle
<i>Junco hyemalis</i>	dark-eyed junco
<i>Melospiza melodia</i>	song sparrow
<i>Melospiza crissalis</i>	California towhee
<i>Pipilo maculatus</i>	spotted towhee
<i>Poecile rufescens</i>	chestnut-backed chickadee
<i>Spinus psaltria</i>	lesser goldfinch
<i>Sturnus vulgaris</i>	European starling
<i>Tachycineta bicolor</i>	tree swallow
<i>Turdus migratorius</i>	American robin
<i>Zonotrichia leucophrys</i>	white-crowned sparrow
Reptiles and Amphibians	
<i>Sceloporus occidentalis</i>	western fence lizard
Invertebrates	
<i>Danaus plexippus</i>	monarch butterfly

Appendix C

Potential for Special-status Species to Occur in the Study Area

Table C. Potential for Special-status Species to Occur in the Study Area. List compiled from the CDFW BIOS database (CDFW 2024a), USFWS IPaC Report (USFWS 2024), and CNPS Electronic Inventory (CNPS 2024a) searches. For plants, the Inverness, San Geronimo, Novato, Double Point, Bolinas, San Rafael, and Point Bonita USGS 7.5' quadrangles were included in the search. For wildlife, the entirety of Marin County was considered.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
PLANTS				
<i>Abronia umbellata</i> var. <i>breviflora</i> pink sand-verbena	CRPR 1B	Coastal dunes, coastal strand; located on foredunes and interdunes with sparse cover. Elevation range: 0 – 35 feet. Blooms: June – October.	No Potential. The Study Area does not contain dune or beach (strand) habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Agrostis blasdalei</i> Blasdale's bentgrass	CRPR 1B	Coastal dunes, coastal bluff scrub, coastal prairie; on sandy or gravelly soil near exposed rock; often in nutrient-poor soil. Elevation range: 15 – 490 feet. Blooms: May – July.	No Potential. The Study Area does not contain coastal scrub, prairie, or dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Allium peninsulare</i> var. <i>franciscanum</i> Franciscan onion	CRPR 1B	Cismontane woodland, valley and foothill grassland; on clay substrate, often derived from serpentine. Elevation range 170 – 985 feet. Blooms: May – June.	No Potential. The Study Area does not contain native woodland or grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Alopecurus aequalis</i> var. <i>sonomensis</i> Sonoma alopecurus	FE; CRPR 1B	Freshwater marshes and swamps, riparian scrub; closely associated with other wetland species. Elevation range: 15 – 1200 feet. Blooms: May – July.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Amorpha californica</i> var. <i>napensis</i> Napa false indigo	CRPR 1B	Openings in broadleaf upland forest, chaparral, cismontane woodland. Elevation range: 395 – 6560 feet. Blooms: April – July.	No Potential. The Study Area does not contain native woodland or chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Amsinckia lunaris</i> bent-flowered fiddleneck	CRPR 1B	Cismontane woodland, valley and foothill grassland, coastal bluff scrub; located on gravelly substrates, frequently derived from serpentine. Elevation range: 10 – 1625 feet. Blooms: March – June.	No Potential. The Study Area does not contain native woodland, scrub, or grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Arabis blepharophylla</i> coast rock cress	CRPR 4	Broadleaf upland forest, coastal bluff scrub, coastal prairie, coastal scrub; located on rocky sites, often on coastal bluffs. Elevation range: 10 – 3575 feet. Blooms: February – May.	No Potential. The Study Area does not contain forest or coastal scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Arctostaphylos densiflora</i> Vine Hill manzanita	SE; CRPR 1B	Chaparral; on acidic marine sands, typically the Goldridge sandy loam series and Sebastopol sandy loam series derived from sandstone. Elevation range: 50 – 100 feet. Blooms: February – April.	No Potential. The Study Area does not contain chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Arctostaphylos montana</i> ssp. <i>montana</i> Mt. Tamalpais manzanita	CRPR 1B	Chaparral, valley and foothill grassland; on rocky serpentine slopes in scrub and grassland. Elevation range: 520 – 2470 feet. Blooms: February – April.	No Potential. The Study Area does not contain chaparral or grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Arctostaphylos virgata</i> Marin manzanita	CRPR 1B	Broadleaf upland forest, closed-cone coniferous forest, chaparral, North Coast coniferous forest; on sandstone and granitic substrates. Elevation range: 195 – 2275 feet. Blooms: January – March.	No Potential. The Study Area does not contain native forest or chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Aspidotis Carlotta-halliae</i> Carlotta Hall's lace fern	CRPR 4	Chaparral, cismontane woodland; typically located in rock crevices and outcrops of serpentine. Elevation range: 325 – 4550 feet.	No Potential. The Study Area does not contain native woodland or chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Astragalus breweri</i> Brewer's milk-vetch	CRPR 4	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland; located on open, gravelly serpentine or volcanic substrate. Elevation range: 290 – 2375 feet. Blooms: April – June.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Astragalus nuttallii</i> var. <i>nuttallii</i> Nuttall's milk-vetch	CRPR 4	Coastal bluff scrub, coastal dunes. Elevation range: 10 – 390 feet. Blooms: January – November.	No Potential. The Study Area does not contain coastal scrub or dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Astragalus pycnostachyus</i> var. <i>pycnostachyus</i> coastal marsh milk-vetch	CRPR 1B	Coastal dunes, coastal scrub, coastal salt marshes; mesic sites in dunes, along streams, and marshes. Elevation range: 0 – 100 feet. Blooms: April – October.	No Potential. The Study Area does not contain coastal dune, scrub, or marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Calamagrostis crassiglumis</i> Thurber's reed grass	CRPR 2B	Mesic areas within coastal scrub, freshwater marshes and swamps; typically in marshy swales surrounded by scrub or grassland. Elevation range: 10 – 45 feet. Blooms: May – July.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Calamagrostis ophitidis</i> serpentine reed grass	CRPR 4	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland; located in openings, often north-facing, underlain by rocky serpentine substrate. Elevation range: 290 – 3465 feet. Blooms: April – July.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Calandrinia breweri</i> Brewer's Calandrinia	CRPR 4	Chaparral, coastal scrub; located on sandy or loamy substrate in areas often recently disturbed or burned. Elevation range: 30 – 3965 feet. Blooms: March – June.	No Potential. The Study Area does not contain chaparral or coastal scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Calochortus umbellatus</i> Oakland star tulip	CRPR 4	Broadleaf upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland; often located on serpentine substrate. Elevation range: 325 – 2275 feet. Blooms: March – May.	No Potential. The Study Area does not contain forest, native woodland, or chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Calochortus uniflorus</i> pink star-tulip	CRPR 4	Coastal prairie, coastal scrub, meadows and seeps, North Coast coniferous forest. Elevation range: 30 – 3480 feet. Blooms: April – June.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Calystegia collina</i> ssp. <i>oxyphylla</i> Mt. Saint Helena morning-glory	CRPR 4	Chaparral; located on serpentine barrens, slopes, and hillsides. Elevation range: 815 – 3315 feet. Blooms: April – June.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Calystegia purpurata</i> ssp. <i>saxicola</i> coastal bluff morning-glory	CRPR 1B	Coastal dunes, coastal scrub. Elevation range: 10 – 105 feet. Blooms: May – September.	No Potential. The Study Area does not contain coastal dune or coastal scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Cardamine angulata</i> seaside bittercress	CRPR 2B	North Coast coniferous forest, lower montane coniferous forest; located in wet areas and along streambanks. Elevation range: 210 – 2975 feet. Blooms: March – July.	No Potential. The Study Area does not contain coniferous forest habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Carex comosa</i> bristly sedge	CRPR 2B	Typically on lake and pond margins in coastal prairie, marshes and swamps, valley and foothill grassland. Elevation range: 0 – 425 feet. Blooms: May – September.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Carex lyngbyei</i> Lyngbye's sedge	CRPR 2B	Freshwater and brackish marshes and swamps. Elevation range: 0 – 35 feet. Blooms: May – August.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Castilleja affinis</i> var. <i>neglecta</i> Tiburon paintbrush	FE; ST; CRPR 1B	Valley and foothill grassland; located in grassy, open areas and rock outcrops underlain by serpentine substrate. Elevation range: 195 – 1300 feet. Blooms: April – June.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Castilleja ambigua</i> var. <i>ambigua</i> Johnny-nip	CRPR 4	Coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, vernal pool margins. Elevation range: 0 – 1415 feet. Blooms: March – August.	Unlikely. The Study Area does not contain intact coastal prairie or similar habitats to support this species.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Castilleja ambigua</i> var. <i>humboldtiensis</i> Humboldt Bay owl's-clover	CRPR 1B	Coastal salt marsh; in coastal areas associated with marsh vegetation. Elevation range: 0 – 10 feet. Blooms: April – August.	No Potential. The Study Area does not contain coastal marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Ceanothus decornutus</i> Nicasio ceanothus	CRPR 1B	Chaparral; associated with maritime chaparral species, located on rocky clay derived from serpentine. Elevation range: 760 – 945 feet. Blooms: March – May.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Ceanothus gloriosus</i> var. <i>exaltatus</i> glory bush	CRPR 4	Chaparral; typically located within maritime influence. Elevation range: 95 – 1985 feet. Blooms: March – June, sometimes August.	No Potential. The Study Area does not contain maritime chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Ceanothus gloriosus</i> var. <i>gloriosus</i> Point Reyes ceanothus	CRPR 4	Coastal bluff scrub, closed-cone coniferous forest, coastal dunes, coastal scrub/sandy. Elevation ranges from 20 – 1710 feet. Blooms: March – May.	No Potential. The Study Area does not contain coniferous forest, coastal scrub, or coastal dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Ceanothus gloriosus</i> var. <i>porrectus</i> Mt. Vision ceanothus	CRPR 1B	Closed-cone coniferous forest, coastal prairie, coastal scrub, valley and foothill grassland; low shrub in a variety of habitats in Point Reyes; located on sandy soils. Elevation range: 80 – 1000 feet. Blooms: February – May.	No Potential. The Study Area does not contain coniferous forest, coastal scrub, coastal scrub, or extensive coastal grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Ceanothus masonii</i> Mason's ceanothus	SR, CRPR 1B	Chaparral; located on serpentine ridges and slopes in chaparral or transitional zones. Elevation range: 745 – 1625 feet. Blooms: March – April.	No Potential. The Study Area does not contain chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Ceanothus pinetorum</i> Kern ceanothus	CRPR 4	Lower montane coniferous forest, subalpine forest, upper montane coniferous forest; located on rocky areas of granitic rock. Elevation range: 5200 – 8925 feet. Blooms: May – July.	No Potential. The Study Area does not contain coniferous forest habitat to support this species. Additionally, reports of this species from Marin County are likely erroneous.	Not Present. No further actions are recommended for this species.
<i>Chloropyron maritimum</i> ssp. <i>palustre</i> Point Reyes bird's-beak	CRPR 1B	Coastal salt marshes; located in low-growing saltgrass and pickleweed mats. Elevation range: 0 – 35 feet. Blooms: June – October.	No Potential. The Study Area does not contain coastal marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Chorizanthe cuspidata</i> var. <i>cuspidata</i> San Francisco Bay spineflower	CRPR 1B	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub; located on sandy substrates of terraces and slopes. Elevation range: 10 – 700 feet. Blooms: April – August.	No Potential. The Study Area does not contain coastal scrub, coastal dune, or coastal prairie habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water hemlock	CRPR 2B	Coastal freshwater and brackish marshes. Elevation range: 0 – 650 feet. Blooms: July – September.	No Potential. The Study Area does not contain marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Cirsium andrewsii</i> Franciscan thistle	CRPR 1B	Coastal bluff scrub, broadleaf upland forest, coastal scrub; sometimes located along serpentine seeps. Elevation range: 0 – 490 feet. Blooms: March – July.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Cirsium hydrophilum</i> var. <i>vaseyi</i> Mt. Tamalpais thistle	CRPR 1B	Broadleaf upland forest, chaparral; located on streams and serpentine seeps in woodland and scrub habitat. Elevation range: 780 – 2015 feet. Blooms: May – August.	No Potential. The Study Area does not contain native forest or chaparral habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Cistanthe maritima</i> seaside Cistanthe	CRPR 4	Coastal bluff scrub, coastal scrub, valley and foothill grassland; situated on sandy substrates. Elevation range: 15 – 975 feet. Blooms: sometimes February, March – June, sometimes August.	No Potential. The Study Area does not contain coastal scrub or extensive coastal grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Collinsia corymbosa</i> round-headed Chinese houses	CRPR 1B	Coastal dunes, coastal prairie. Elevation range: 0 – 65 feet. Blooms: April – June.	No Potential. The Study Area does not contain coastal dune or coastal prairie habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Cypripedium californicum</i> California lady's-slipper	CRPR 4	Bogs and fens, lower montane coniferous forest; situated at seeps and along streambanks, typically serpentine; serpentine indicator: BE. Elevation range: 2750 – 9020 feet. Blooms: April – August, sometimes September.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Dichondra occidentalis</i> western dichondra	CRPR 4	Chaparral, coastal scrub, cismontane woodland, valley and foothill grassland; located in rocky areas. Elevation range: 165 – 1640 feet. Blooms: sometimes January, March – July.	No Potential. The Study Area does not contain native woodland, chaparral, coastal scrub, or extensive coastal grassland to support this species.	Not Present. No further actions are recommended for this species.
<i>Dirca occidentalis</i> western leatherwood	CRPR 1B	Broadleaf upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, North Coast coniferous forest, riparian forest, riparian woodland; located on brushy, mesic slopes in woodland and forest. Elevation range: 165 – 1285 feet. Blooms: January – April.	No Potential. The Study Area does not contain coniferous forest, native woodland, chaparral, or riparian forest/scrub habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Eastwoodiella californica</i> swamp harebell	CRPR 1B	Bogs and fens, closed-cone coniferous forest, coastal prairie, meadows and seeps, freshwater marshes and swamps, North Coast coniferous forest; in mesic sites in forested and grassland habitat. Elevation range: 1 – 405 feet. Blooms: June – October.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Elymus californicus</i> California bottle-brush grass	CRPR 4	Broadleaf upland forest, cismontane woodland, North Coast coniferous forest, riparian woodland; located in mesic areas. Elevation range: 50 – 1530 feet. Blooms: May – August, sometimes November.	Unlikely. The Study Area does not contain native woodland or forest habitat to support this species.	Presumed Absent. No further actions are recommended for this species.
<i>Entosthodon kochii</i> Koch's cord moss	CRPR 1B	Cismontane woodland, valley and foothill grassland; located on river banks, may be on serpentine. Elevation range: 585 – 3250 feet.	No Potential. The Study Area does not contain riverine or perennial stream habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Erigeron biolettii</i> Streamside daisy	CRPR 3	Broadleaf upland forest, cismontane woodland, North Coast coniferous forest; on rocky, mesic. Elevation range: 95 – 3610 feet. Blooms: June – October.	No Potential. The Study Area does not contain coniferous forest, native forest, or native woodland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Eriogonum luteolum var. caninum</i> Tiburon buckwheat	CRPR 1B	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland; located on sandy to gravelly serpentine; serpentine indicator: SE. Elevation range: 0 – 2100 feet. Blooms: May – September.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Erysimum concinnum</i> bluff wallflower	CRPR 1B	Coastal bluff scrub, coastal scrub, coastal dunes; situated on sandy substrate. Elevation range: 0 – 605 feet. Blooms: February – July.	No Potential. The Study Area does not contain coastal dune or coastal scrub habitat to support this species.	No Potential. The Study Area does not contain coastal dune habitat to support this species.
<i>Erysimum franciscanum</i> San Francisco wallflower	CRPR 4	Maritime chaparral, coastal dunes, coastal scrub, valley and foothill grassland; typically located on serpentine or volcanic substrate, often on roadsides. Elevation range: 0 – 1790 feet. Blooms: March – June.	No Potential. The Study Area does not contain coastal dune, coastal scrub, or maritime chaparral habitat to support this species.	No Potential. The Study Area does not contain coastal dune habitat to support this species.
<i>Fritillaria lanceolata</i> var. <i>tristulis</i> Marin checker lily	CRPR 1B	Coastal bluff scrub, coastal scrub, coastal prairie; observed in canyons, riparian areas, and rock outcrops; often located on serpentine substrate. Elevation range: 45 – 490 feet. Blooms: February – May.	No Potential. The Study Area does not contain coastal prairie or coastal scrub habitat to support this species.	No Potential. The Study Area does not contain coastal dune habitat to support this species.
<i>Fritillaria liliacea</i> fragrant fritillary	CRPR 1B	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland; located in grassy sites underlain by clay, typically derived from volcanics or serpentine. Elevation range: 10 – 1335 feet. Blooms: February – April.	No Potential. The Study Area does not contain coastal scrub, coastal prairie, or rocky, clay soil grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Gilia capitata</i> ssp. <i>chamissonis</i> blue coast gilia	CRPR 1B	Coastal dunes, coastal scrub. Elevation range: 5 – 600 feet. Blooms: April – July.	No Potential. The Study Area does not contain coastal dune or coastal scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Gilia capitata</i> ssp. <i>tomentosa</i> woolly-headed gilia	CRPR 1B	Coastal bluff scrub; rocky outcrops on the coast. Elevation range: 15 – 155 feet. Blooms: May – July.	No Potential. The Study Area does not contain coastal scrub habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Gilia millefoliata</i> dark-eyed gilia	CRPR 1B	Coastal dune. Elevation range: 5 – 100 feet. Blooms: April – July.	No Potential. The Study Area does not contain coastal dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Grindelia hirsutula</i> var. <i>maritima</i> San Francisco gumplant	CRPR 1B	Coastal scrub, coastal bluff scrub, valley and foothill grassland; situated on sea bluffs underlain by sand substrate, often derived from serpentine. Elevation range: 45 – 1300 feet. Blooms: June – September.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Helianthella castanea</i> Diablo helianthella	CRPR 1B	Broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland; typically located in oak woodland/chaparral ecotone underlain by rocky, azonal substrates, often in partial shade. Elevation range: 195 – 4225 feet. Blooms: March – June.	No Potential. The Study Area does not contain native woodland or grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Hemizonia congesta</i> ssp. <i>congesta</i> Hayfield tarplant	CRPR 1B	Coastal scrub, valley and foothill grassland. Elevation range: 65 – 1840 feet. Blooms: April – October.	Moderate Potential. The Study Area contains small herbaceous patches that may support this disturbance-tolerant species.	Not Observed. This species was not observed during protocol-level special-status plant surveys in spring/summer 2022.
<i>Hesperovax sparsiflora</i> var. <i>brevifolia</i> short-leaved evax	CRPR 1B	Coastal bluff scrub, coastal dune; located on sandy bluffs and flats near the immediate coastline. Elevation range: 0 – 700 feet. Blooms: March – June.	No Potential. The Study Area does not contain coastal bluff habitats to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Hesperolinon congestum</i> Marin western flax	FT; ST; CRPR 1B	Chaparral, valley and foothill grassland; located on serpentine substrate. Elevation range: 15 – 1205 feet. Blooms: April – July.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Heterantha dubia</i> water star-grass	CRPR 2B	Marshes and swamps; still or slow-moving water, alkaline. Elevation range: 95 – 4905 feet. Blooms: July – October.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT, SE, CRPR 1B	Coastal prairie, coastal scrub, valley and foothill grassland; located on light, sandy to sandy clay substrate; tolerant of non-native herbaceous vegetation. Elevation range: 30 – 715 feet. Blooms: June – October.	No Potential. The Study Area does not contain coastal prairie or similar grassland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Horkelia cuneata</i> var. <i>sericea</i> Kellogg's horkelia	CRPR 1B	Closed-cone coniferous forest, coastal scrub, chaparral; located in openings on relict dunes and coastal sand hills. Elevation range: 30 – 650 feet. Blooms: April – September.	No Potential. The Study Area does not contain coastal bluff habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Horkelia marinensis</i> Point Reyes Horkelia	CRPR 1B	Coastal dunes, coastal prairie, coastal scrub; located on sandy flats and dunes near the coast; in open grassy sites within scrub. Elevation range: 15 – 1140 feet. Blooms: May – September.	No Potential. The Study Area does not contain coastal bluff habitats to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Horkelia tenuiloba</i> thin-lobed horkelia	CRPR 1B	Broadleaf upland forest, coastal scrub, valley and foothill grassland, chaparral; in mesic openings, on sandy substrate. Elevation range: 165 – 1640 feet. Blooms: May – July.	No Potential. The Study Area does not contain native woodland or grassland habitat, nor does it contain acidic sandy substrate to support this species.	Not Present. No further actions are recommended for this species.
<i>Hosackia gracilis</i> harlequin lotus	CRPR 4	Broadleaf upland forest, coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal prairie, coastal scrub, meadows and seeps, marshes and swamps, North Coast coniferous forest, valley and foothill grassland; located in wetlands and roadside ditches. Elevation range: 0 – 2275 feet. Blooms: March – July.	Moderate Potential. The Study Area contains a seasonal wetland that may support this species.	Not Observed. This species was not observed during protocol-level special-status plant surveys in spring/summer 2022.
<i>Iris longipetala</i> coast iris	CRPR 4	Coastal prairie, lower montane coniferous forest, meadows and seeps; located on mesic sites. Elevation range: 0 – 1950 feet. Blooms: March – May.	Unlikely. The Study Area does not contain coastal prairie or similar intact herbaceous habitats to support this species.	Presumed Absent. No further actions are recommended for this species.
<i>Juncus acutus</i> ssp. <i>leopoldii</i> western spiny rush	CRPR 4	Coastal dunes, coastal scrub, meadows and seeps, marshes and swamps; located in mesic to hydric coastal habitats, typically saline or alkaline. Elevation range: 10 – 2955 feet. Blooms: sometimes March, May – June.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Kopsiopsis hookeri</i> small groundcone	CRPR 2B	North Coast coniferous forest; located in open woods, shrublands, generally hosts on salal (<i>Gaultheria shallon</i>). Elevation range: 290 – 2880 feet. Blooms: April – August.	No Potential. The Study Area does not contain native coniferous forest habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Lasthenia californica</i> ssp. <i>macrantha</i> perennial goldfields	CRPR 1B	Coastal bluff scrub, coastal dune, coastal scrub. Elevation range: 15 – 1690 feet. Blooms: January – November.	No Potential. The Study Area does not contain coastal bluff or dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Layia carnosa</i> beach layia	FE, CRPR 1B	Coastal dunes; located in sparsely vegetated semi-stabilized dunes behind fore-dunes. Elevation range: 0 – 195 feet. Blooms: March – July.	No Potential. The Study Area does not contain coastal dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Leptosiphon aureus</i> bristly leptosiphon	CRPR 4	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland; often located on shallow, rocky substrate in foothill positions; typically, low-growing and sparse vegetation; often on edge of chaparral and shrub thickets. Elevation range: 175 – 4875 feet. Blooms: April – July.	No Potential. The Study Area does not contain intact native habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Leptosiphon grandiflorus</i> large-flowered leptosiphon	CRPR 4	Coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, valley and foothill grassland; typically on sandy substrate. Elevation range: 15 – 3965 feet. Blooms: April – August.	No Potential. The Study Area does not contain coastal bluff scrub, forest, or woodland habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Leptosiphon rosaceus</i> rose leptosiphon	CRPR 1B	Coastal bluff scrub; situated on sandy substrates. Elevation range: 0 – 325 feet. Blooms: April – July.	No Potential. The Study Area does not contain coastal bluff scrub habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Lessingia hololeuca</i> woolly-headed lessingia	CRPR 3	Broadleaf upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; typically on clay, serpentine substrate. Elevation range: 3 – 2885 feet. Blooms: April – June.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Lessingia micradenia</i> var. <i>micradenia</i> Tamalpais lessingia	CRPR 1B	Chaparral, valley and foothill grassland; typically located in serpentine grassland or serpentine scrub, often on roadsides. Elevation range: 325 – 1625 feet. Blooms: June – October.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Lilaeopsis masonii</i> Mason’s Lilaeopsis	SR, CRPR 1B	Freshwater and brackish coastal marshes, riparian scrub; located on channel banks in the splash zone on bare mud substrate. Elevation range: 0 – 35 feet. Blooms: April – November.	No Potential. The Study Area does not contain salt or brackish marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Lilium maritimum</i> coast lily	CRPR 1B	Closed-cone coniferous forest, coastal prairie, coastal scrub, broadleaf upland forest, North Coast coniferous forest; typically located on sandy soils, often in raised hummocks or bogs, and roadside ditches. Elevation range: 15 – 1545 feet. Blooms: May – August.	No Potential. The Study Area does not contain native coastal forest habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Microseris paludosa</i> marsh microseris	CRPR 1B	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. Elevation range: 5 – 300 feet. Blooms: April – June.	Unlikely. The Study Area does not contain coastal forest, woodland, or grassland habitat to support this species.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Navarretia rosulata</i> Marin County navarretia	CRPR 1B	Closed-cone coniferous forest, chaparral; located on dry, rocky sites often formed from serpentine. Elevation range: 650 – 2065 feet. Blooms: May – July.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Pentachaeta bellidiflora</i> white-rayed pentachaeta	FE, SE, CRPR 1B	Valley and foothill grassland; located on open, dry rocky slopes and grassy areas, often on substrate derived from serpentine. Elevation range: 110 – 2015 feet. Blooms: March – May.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i> Gairdner's yampah	CRPR 4	Broadleaf upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools; located in vernal mesic sites. Elevation range: 0 – 1985 feet. Blooms: June – October.	Moderate Potential. The Study Area contains seasonal wetland habitat that may support this species.	Not Observed. This species was not observed during protocol-level special-status plant surveys in spring/summer 2022.
<i>Phacelia insularis</i> var. <i>continentis</i> North Coast phacelia	CRPR 1B	Coastal bluff scrub, coastal dunes; located on open maritime bluffs underlain by sandy substrate. Elevation range: 30 – 555 feet. Blooms: March – May.	No Potential. The Study Area does not contain coastal dune habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Plagiobothrys glaber</i> hairless popcornflower	Rank 1A	Meadows and seeps, marshes and swamps; located in coastal salt marshes and alkaline meadows. Elevation range: 45 – 585 feet. Blooms: March – May.	No Potential. The Study Area does not contain salt or brackish marsh habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Pleuropogon hooverianus</i> North coast semaphore grass	ST; CRPR 1B	Broadleaf upland forests, meadows and seeps, freshwater marshes and swamps, North Coast coniferous forest, shaded, wet, and grassy areas in forested habitat. Elevation range: 10 – 635 feet. Blooms May – August.	No Potential. The Study Area does not contain forest habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Pleuropogon refractus</i> nodding semaphore grass	CRPR 4	Lower montane coniferous forest, meadows and seeps, North Coast coniferous forest, riparian forest; located in mesic settings. Elevation range: 0 – 5200 feet. Blooms: March – August.	No Potential. The Study Area does not contain forest or native riparian habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Polemonium carneum</i> Oregon polemonium	CRPR 2B	Coastal prairie, coastal scrub, lower montane coniferous forest. Elevation range: 0 – 5950 feet. Blooms: April – September.	No Potential. The Study Area does not contain coastal prairie or scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Polygonum marinense</i> Marin knotweed	CRPR 3	Salt and brackish coastal marshes. Elevation range: 0 – 35 feet. Blooms: sometimes April, May – August, sometimes October.	No Potential. The Study Area does not contain salt or brackish marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Quercus parvula</i> var. <i>tamalpaisensis</i> Tamalpais oak	Rank 1B	Lower montane coniferous forest; highly restricted to the slopes of Mt. Tamalpais. Elevation range: 325 – 2275 feet. Blooms: March – April.	No Potential. The Study Area does not contain forest habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Ranunculus lobbii</i> Lobb's buttercup	CRPR 4	Cismontane woodland, North Coast coniferous forest, valley and foothill grassland, vernal pools; located in vernal inundated areas (ponds, pools). Elevation range: 45 – 1530 feet. Blooms: February – May.	Unlikely. Although the Study Area contains seasonal wetland habitat, this species requires ponded wetland habitat (i.e., vernal pools) which are not present in the Study Area.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Sagittaria sanfordii</i> Sanford's arrowhead	CRPR 1B	Marshes and swamps; located in assorted shallow freshwater habitats including canals and perennial drainage ditches. Elevation range: 0 – 2115 feet. Blooms: May – October, sometimes November.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Sidalcea calycosa</i> ssp. <i>rhizomata</i> Point Reyes checkerbloom	CRPR 1B	Marshes and swamps; located in freshwater marsh habitat near the coast. Elevation range: 10 – 245 feet. Blooms: April – September.	Unlikely. Although the Study Area contains a seasonal wetland, this species is more closely associated with perennial wetlands and riparian areas.	Presumed Absent. No further actions are recommended for this species.
<i>Sidalcea hickmanii</i> ssp. <i>viridis</i> Marin checkerbloom	CRPR 1B	Chaparral; located on serpentine or volcanic substrate, often located in burns. Elevation range: 160 – 1400 feet. Blooms: May – June.	No Potential. The Study Area does not contain volcanic or serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Silene scouleri</i> ssp. <i>scouleri</i> Scouler's catchfly	CRPR 2B	Coastal bluff scrub, coastal prairie, valley and foothill grassland; situated on rocky slopes and bluffs. Elevation range: 0 – 1950 feet. Blooms: sometimes March – May, typically June – August, sometimes September.	No Potential. The Study Area does not contain coastal grassland or scrub habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Stebbinsoseris decipiens</i> Santa Cruz Stebbinsoseris	CRPR 1B	Broadleaf upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub; located on open, loose or disturbed substrate derived from sandstone, shale, or serpentine. Elevation range: 30 – 1625 feet. Blooms: April – May.	No Potential. The Study Area does not contain forest, chaparral, or coastal grassland habitat to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Streptanthus glandulosus</i> ssp. <i>pulchellus</i> Mt. Tamalpais jewelflower	CRPR 1B	Chaparral, valley and foothill grassland; located on serpentine slopes. Elevation range: 490 – 2600 feet. Blooms: May – August.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Toxicoscordion fontanum</i> marsh Zigadenus	CRPR 4	Chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, marshes and swamps; located in vernal mesic sites underlain by serpentine; serpentine indicator: BE/SI. Elevation range: 45 – 3250 feet. Blooms: April – July.	No Potential. The Study Area does not contain serpentine habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Trifolium amoenum</i> showy rancheria clover	FE; CRPR 1B	Valley and foothill grassland, coastal bluff scrub, swales, open sunny sites, sometimes on serpentine. Elevation range: 15 – 1365 feet. Blooms: April – June.	Unlikely. The Study Area does not contain intact native herbaceous communities to support this species.	Presumed Absent. No further actions are recommended for this species.
<i>Triphysaria floribunda</i> San Francisco owl's-clover	CRPR 1B	Coastal prairie, valley and foothill grassland; located on serpentine and non-serpentine substrate. Elevation range: 30 – 520 feet. Blooms: April – June.	Unlikely. The Study Area does not contain intact native herbaceous communities to support this species.	Presumed Absent. No further actions are recommended for this species.
<i>Triquetrella californica</i> coastal triquetrella	CRPR 1B	Coastal bluff scrub, coastal scrub, valley and foothill grassland; grows within 100 feet of the coastline in scrub and grasslands on open gravel substrates of roads, hillsides, bluffs, and slopes. Elevation range: 30 – 325 feet.	No Potential. The Study Area is not located on the direct coastline.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
WILDLIFE				
Mammals				
<i>Antrozous pallidus</i> pallid bat	SSC, WBWG High	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, forages along river channels. Roost sites include crevices in rocky outcrops and cliffs, caves, mines, trees and various manmade structures such as bridges, barns, and buildings (including occupied buildings). Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Moderate Potential. Large trees within the Study Area provides trees suitable for roosting; there are several CNDDDB occurrences in the greater vicinity (CDFW 2024a). Targeted bat assessment (i.e., close inspection of trees) was not performed during the site visit.	Presence Unknown. Tree removal outside of maternity roosting season or conduct pre-construction roost habitat assessment. See Section 6.0 for details.
<i>Aplodontia rufa phaea</i> Point Reyes mountain beaver	SSC	Known from the coastal areas of Point Reyes. Located in north-facing slopes of hills and gullies with seeps and springs nearby. Areas typically overgrown with vegetation such as sword fern (<i>Polystichum munitum</i>) and thimbleberry (<i>Rubus parviflorus</i>).	No Potential. This species is restricted to native coastal forest, woodland, and scrub habitats with nearby perennial wetlands.	Not Present. No further actions are recommended for this species.
<i>Corynorhinus townsendii townsendii</i> Townsend's western big-eared bat	SSC, WBWG High	Humid coastal regions of northern and central California. Roost in limestone caves, lava tubes, mines, buildings etc. Will only roost in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to disturbance	Unlikely. The Study Area does not contain caves, mines, or buildings suitable for roosting; the on-site barn appeared to be regularly used/occupied.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Enhydra lutris nereis</i> southern sea otter	ST, SFP	Located in near-shore marine environments from Ano Nuevo to Point Sal (possibly as north as Marin County). Requires canopies of giant kelp and bull kelp for rafting and feeding. Prefers rocky substrates with abundant invertebrates for foraging.	No Potential. The Study Area does not contain marine habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Lasiurus cinereus</i> western red bat	WBWG Medium	Migratory and typically solitary, roosting primarily in the foliage of trees and shrubs. Roosts are usually in broadleaf trees including cottonwoods (<i>Populus</i> spp.), sycamores (<i>Platanus</i> spp.), alders (<i>Alnus</i> spp.), and maples (<i>Acer</i> spp.). Maternity season is August through February (breeding, birthing, rearing). Day roosts are commonly in edge habitats adjacent to streams, open fields, orchards, and occasionally urban areas.	Unlikely. The Study Area lacks large, broadleaved trees of the type typically used for roosting (maples, sycamores, etc.).	Presumed Absent. No further actions are recommended for this species.
<i>Reithrodontomys raviventris</i> salt marsh harvest mouse	FE, SE, SFP	Endemic to emergent salt and brackish wetlands of the San Francisco Bay Estuary. Pickleweed marshes are primary habitat; also occurs in various other wetland communities with dense vegetation. Does not burrow, builds loosely organized nests. Requires higher areas for dryland refugia during high tides.	No Potential. The Study Area contains no tidal or brackish marsh and is outside of this species' Marin County range.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Taxidea taxus</i> American badger	SSC	Most abundant in drier open stages of most shrub, woodland, and herbaceous vegetation types. Requires friable soils and open, uncultivated ground. Preys on burrowing rodents.	Unlikely. The Study Area does not contain extensive grassland or open scrub/woodland habitat to support this species.	Presumed Absent. No further actions are recommended for this species.
<i>Zapus trinotatus orarius</i> Point Reyes jumping mouse	SSC	Known from upland areas in Point Reyes. Typically located in upper margins of bunch grass wetlands, as well as coastal scrub, grassland, and meadows. Primarily forages for grass seeds, with some insects and fruits. Builds grass nests above ground, but burrows in winter.	No Potential. This species is highly restricted to coastal wetlands in prairie habitat on the Point Reyes Peninsula.	Not Present. No further actions are recommended for this species.
Birds				
<i>Agelaius tricolor</i> tricolored blackbird	SC (E), SSC	Nearly endemic to California, where it is most numerous in the Central Valley and vicinity. Highly colonial, nesting in dense aggregations over or near freshwater in emergent growth or riparian thickets. Also uses flooded agricultural fields. Abundant insect prey near breeding areas essential.	No Potential. The Study Area does not provide vegetated ponds or emergent marsh suitable for nesting.	Not Present. No further actions are recommended for this species.
<i>Ammodramus savannarum</i> grasshopper sparrow	SSC	Summer resident. Breeds in open grasslands in lowlands and foothills, generally with low- to moderate-height grasses and scattered shrubs. Well-hidden nests are placed on the ground.	No Potential. Suitable grassland cover is not located within the Study Area.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Aquila chrysaetos</i> golden eagle	BGEPA, SFP	Occurs year-round in rolling foothills, mountain areas, sage-juniper flats, and deserts. Cliff-walled canyons provide nesting habitat in most parts of range; also nests in large trees, usually within otherwise open areas.	Unlikely. Although the Study Area contains large trees that could provide substrate for nesting, the frequent human interaction and density of the stand likely precludes nesting.	Presumed Absent. No further actions are recommended for this species.
<i>Ardea alba</i> great egret	no status (breeding sites protected by CDFW)	Year-round resident. Nests colonially or semi-colonially, usually in trees, occasionally on the ground or elevated platforms. Breeding sites usually in close proximity to foraging areas: marshes, lake margins, tidal flats, and rivers. Forages primarily on fishes and other aquatic prey, also smaller terrestrial vertebrates.	Moderate Potential. The Study Area contains large trees within the vicinity of extensive waterbodies to provide nesting/rookery habitat for this species; however, this grove is not a documented rookery/nesting site.	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.
<i>Ardea herodias</i> great blue heron	non-status (breeding sites protected by CDFW)	Year-round resident. Nests colonially or semi-colonially in tall trees and cliffs, also sequestered terrestrial substrates. Breeding sites usually in close proximity to foraging areas: marshes, lake margins, tidal flats, and rivers. Forages primarily on fishes and other aquatic prey, also smaller terrestrial vertebrates.	Moderate Potential. The Study Area contains large trees within the vicinity of extensive waterbodies to provide nesting/rookery habitat for this species; however, this grove is not a documented rookery/nesting site.	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Asio flammeus</i> short-eared owl	SSC	Occurs year-round, but primarily as a winter visitor; breeding very restricted in most of California. Found in open, treeless areas (e.g., marshes, grasslands) with elevated sites for foraging perches and dense herbaceous vegetation for roosting and nesting. Preys mostly on small mammals, particularly voles.	Unlikely. This species is closely associated with open, nearly treeless habitats on the coast of California.	Presumed Absent. No further actions are recommended for this species.
<i>Asio otus</i> long-eared owl	SSC	Occurs year-round in California. Nests in trees in a variety of woodland habitats, including oak and riparian, as well as tree groves. Requires adjacent open land with rodents for foraging, and the presence of old nests of larger birds (hawks, crows, magpies) for breeding.	Moderate Potential. The Study Area contains trees that could provide nesting habitat for this species.	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.
<i>Athene cunicularia</i> burrowing owl	SSC	Year-round resident and winter visitor. Occurs in open, dry grasslands and scrub habitats with low-growing vegetation, perches and abundant mammal burrows. Preys upon insects and small vertebrates. Nests and roosts in old mammal burrows, most commonly those of ground squirrels.	No Potential. The Study Area does not contain open herbaceous habitats to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<p><i>Buteo swainsoni</i> Swainson's hawk</p>	<p>ST</p>	<p>Summer resident in Central Valley and limited portions of the southern California interior. Nests in tree groves and isolated trees in riparian and agricultural areas, including near buildings. Forages in grasslands and scrub habitats as well as agricultural fields, especially alfalfa. Preys on arthropods year-round as well as smaller vertebrates during the breeding season.</p>	<p>Unlikely. This species is known from the Central Valley and SF Baylands.</p>	<p>Presumed Absent. No further actions are recommended for this species.</p>
<p><i>Charadrius alexandrinus nivosus</i> western snowy plover</p>	<p>FT, SSC</p>	<p>Federal listing applies only to the Pacific coastal population. Year-round resident and winter visitor. Occurs on sandy beaches, salt pond levees, and the shores of large alkali lakes. Nests on the ground, requiring sandy, gravelly or friable soils.</p>	<p>No Potential. The Study Area does not contain beaches or other suitable barren habitat near water.</p>	<p>Not Present. No further actions are recommended for this species.</p>
<p><i>Circus cyaneus</i> northern harrier</p>	<p>SSC</p>	<p>Year-round resident and winter visitor. Found in open habitats including grasslands, prairies, marshes and agricultural areas. Nests on the ground in dense vegetation, typically near water or otherwise moist areas. Preys on small vertebrates.</p>	<p>No Potential. The Study Area does not contain open herbaceous habitats to provide nesting and foraging opportunities for this species.</p>	<p>Not Present. No further actions are recommended for this species.</p>

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Contopus cooperi</i> olive-sided flycatcher	SSC	Summer resident. Typical breeding habitat is montane coniferous forests. At lower elevations, also occurs in wooded canyons and mixed forests and woodlands. Often associated with forest edges. Arboreal nest sites located well off the ground.	Unlikely. The Study Area does not contain forest or woodland stands of the type typically used by this species.	Presumed Absent. No further actions are recommended for this species.
<i>Coturnicops noveboracensis</i> yellow rail	SSC	Summer resident in eastern Sierra Nevada in Mono County, breeding in shallow freshwater marshes and wet meadows with dense vegetation. Also a rare winter visitor along the coast and other portions of the state. Extremely cryptic.	No Potential. The Study Area does not contain marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Cypseloides niger</i> black swift	SSC	Summer resident with a fragmented breeding distribution; most occupied areas in California either montane or coastal. Breeds in small colonies on cliffs behind or adjacent to waterfalls, in deep canyons, and sea-bluffs above surf. Forages aerially over wide areas. No modern nesting records in Napa County.	No Potential. The Study Area does not contain waterfalls.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Egretta thula</i> snowy egret	no status (breeding sites protected by CDFW)	Year-round resident. Nests colonially, usually in trees, at times in sequestered beds of dense emergent vegetation (e.g., tules). Rookery sites usually situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes.	Moderate Potential. The Study Area contains large trees within the vicinity of extensive waterbodies to provide nesting/rookery habitat for this species; however, this grove is not a documented rookery/nesting site.	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.
<i>Elanus leucurus</i> white-tailed kite	SFP	Year-round resident in coastal and valley lowlands with scattered trees and large shrubs, including grasslands, marshes and agricultural areas. Nests in trees, of which the type and setting are highly variable. Preys on small mammals and other vertebrates.	Moderate Potential. The Study Area contains trees adjacent to open habitats that could provide nesting substrate for this species.	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.
<i>Falco peregrinus anatum</i> American peregrine falcon	SE, SFP	Year-round resident and winter visitor. Occurs near water, including coastal areas, wetlands, lakes and rivers. Usually nests on sheltered cliffs or tall man-made structures. Preys primarily on waterbirds.	Unlikely. The Study Area does not contain large cliffs or suitable man-made structures for nesting.	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Fratercula cirrhata</i> tufted puffin	SSC	Pelagic and coastal marine. Nests near or along the coast on islands, islets, and (rarely) isolated mainland cliffs. Requires sod or earth into which the birds can burrow, or rocky crevices where friable soil is absent. Forages at sea, primarily for fish.	No Potential. The Study Area does not contain coastal cliffs, bluffs, or sea stacks to support this species.	Not Present. No further actions are recommended for this species.
<i>Geothlypis trichas sinuosa</i> San Francisco (saltmarsh) common yellowthroat	SSC	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	No Potential. No marsh vegetation is present within the Study Area.	Not Present. No further actions are recommended for this species.
<i>Haliaeetus leucocephalus</i> bald eagle	BGEPA, SE, SFP	Occurs year-round in California, but primarily a winter visitor; breeding population is growing. Nests in large trees in the vicinity of larger lakes, reservoirs, and rivers. Wintering habitat somewhat more variable but usually features large concentrations of waterfowl or fish.	High Potential. The Study Area contains large, tall trees that may provide nesting substrate for this species; near major waterbodies to provide foraging opportunities. Nests in the Bolinas area (eBird 2024).	Presence Unknown. Tree removal and other project related disturbances should occur outside of the general nesting season (February 1 through August 31) or conduct pre-construction surveys and avoid any active nests found. See Section 6.0 for details.
<i>Oceanodroma homochroa</i> ashy storm-petrel	SSC	Marine species; nests in rocky crevices on offshore islands and rocks from southern Mendocino County to norther Baja California. Forages over open ocean for invertebrates and larval fishes.	No Potential. The Study Area does not contain coastal cliffs, bluffs, or sea stacks to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Icteria virens</i> yellow-breasted chat	SSC	Summer resident, occurring in riparian areas with an open canopy, very dense understory, and trees for song perches. Nests in thickets of willow (<i>Salix</i> spp.), blackberry (<i>Rubus</i> spp.), and California grape (<i>Vitis californicus</i>).	No Potential. The Study Area does not contain stands of dense riparian understory favored by this species for nesting.	Not Present. No further actions are recommended for this species.
<i>Lanius ludovicianus</i> loggerhead shrike	SSC	Year-round resident in open woodland, grasslands, savannah, and scrub. Prefers areas with sparse shrubs, trees, posts, and other suitable perches for foraging. Preys upon large insects and small vertebrates. Nests are well-concealed in densely-foliaged shrubs or trees.	Unlikely. The Study Area does not contain a mix of wooded and open herbaceous habitats preferred by this species.	Presumed Absent. No further actions are recommended for this species.
<i>Laterallus jamaicensis coturniculus</i> California black rail	ST, SFP	Year-round resident in marshes (saline to freshwater) with dense vegetation within four inches of the ground. Prefers larger, undisturbed marshes that have an extensive upper zone and are close to a major water source. Extremely secretive and cryptic.	No Potential. The Study Area does not contain tidal or brackish marsh.	Not Present. No further actions are recommended for this species.
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	SSC	Year-round resident of tidal marshes along the north side of San Francisco and San Pablo Bays. Typical habitat is dominated by pickleweed (<i>Salicornia</i> spp.), with gumplant (<i>Grindelia</i> spp.) and other shrubs present in the upper zone for nesting. May forage in areas adjacent to marshes.	No Potential. The Study Area contains no tidal or brackish marsh and is outside of this species' limited Marin County range.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Nycticorax nycticorax</i> black-crowned night heron	no status (breeding sites protected by CDFW)	Year-round resident. Nests colonially, usually in trees but also in patches of emergent vegetation. Rookery sites are often on islands and usually located adjacent to foraging areas: margins of lakes and bays.	No Potential. The Study Area does not contain marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Passerculus sandwichensis alaudinus</i> Bryant's savannah sparrow	SSC	Year-round resident associated with the coastal fog belt, primarily between Humboldt and northern Monterey Counties. Occupies low tidally influenced habitats and adjacent areas, including grasslands. Also uses drier, more upland coastal grasslands. Nests near the ground in taller vegetation, including along levees and canals.	No Potential. The Study Area does not contain open, mesic herbaceous habitats to support this species.	Not Present. No further actions are recommended for this species.
<i>Pelecanus occidentalis californicus</i> California brown pelican	SFP	(Nesting colony) colonial nester on coastal islands just outside the surf line. Islands are small to moderate sized to afford protection from ground-dwelling predators.	No Potential. The Study Area does not contain coastal cliffs, bluffs, or sea stacks to support this species.	Not Present. No further actions are recommended for this species.
<i>Progne subis</i> purple martin	SSC	Summer resident. Inhabits woodlands and low-elevation coniferous forests. Nests in old woodpecker cavities and man-made structures (bridges, utility towers). Nest is often located in tall, isolated tree or snag.	Unlikely. Typical mixed or coniferous forest habitat is not present, and this species' Marin County range is restricted to the forested portions around Mount Tamalpais (CDFW 2024a).	Presumed Absent. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Rallus obsoletus obsoletus</i> California Ridgway's (clapper) rail	FE, SE, SFP	Year-round resident in tidal marshes of the San Francisco Bay estuary. Requires tidal sloughs and intertidal mud flats for foraging, and dense marsh vegetation for nesting and cover. Typical habitat features abundant growth of cordgrass and pickleweed. Feeds primarily on mollusks and crustaceans.	No Potential. The Study Area does not contain marsh habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Setophaga petechia brewsteri</i> (Brewster's) yellow warbler	SSC	Summer resident throughout much of California. Breeds in riparian vegetation close to water, including streams and wet meadows. Microhabitat used for nesting is variable, but dense willow growth is typical. Occurs widely on migration.	No Potential. The Study Area does not contain riparian habitat to support this species.	Not Present. No further actions are recommended for this species.
<i>Strix occidentalis caurina</i> northern spotted owl	FT, ST, SSC	Year-round resident in dense, structurally complex forests, primarily those with stands of mature conifers. In Napa County, uses both coniferous and mixed (coniferous-hardwood) forests. Nests on platform-like substrates in the forest canopy, including in tree cavities. Preys on mammals.	No Potential. The Study Area does not contain conifer or mixed broadleaf-conifer forest nor is any present in the immediate vicinity.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
Reptiles and Amphibians				
<i>Dicamptodon ensatus</i> California giant salamander	SSC	Occurs in the north-central Coast Ranges. Moist coniferous and mixed forests are typical habitat; also uses woodland and chaparral. Adults are terrestrial and fossorial, breeding in cold, permanent or semi-permanent streams. Larvae usually remain aquatic for over a year.	No Potential. The Study Area does not contain, nor is it near, perennial or intermittent streams to support this species.	Not Present. No further actions are recommended for this species.
<i>Emys marmorata</i> western pond turtle	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches with aquatic vegetation. Require basking sites such as partially submerged logs, vegetation mats, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	Moderate Potential. The Study Area does not contain aquatic habitats to support this species; however, there are ponds adjacent to the Study Area that may provide such habitat. Incidental visitation (i.e., migration) is possible through the Study Area.	Presence Unknown. Pre-construction surveys. See Section 6.0 for details.
<i>Rana boylei</i> foothill yellow-legged frog	SSC	Found in or near rocky streams in a variety of habitats; highly aquatic. Prefers partially-sunlit, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on invertebrates (aquatic and terrestrial).	No Potential. The Study Area does not contain, nor is it near, perennial or intermittent streams to support this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Rana draytonii</i> California red-legged frog	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense emergent and/or overhanging riparian vegetation. Favors perennial to intermittent ponds, marshes, and stream pools. Requires 11 to 20 weeks of continuous inundation for larval development. Disperses through upland habitats during and after rains.	Moderate Potential. The Study Area does not contain aquatic habitats to support this species; however, there are ponds adjacent to the Study Area that may provide such habitat. Incidental visitation (i.e., migration) is possible through the Study Area.	Presence Unknown. Pre-construction surveys. See Section 6.0 for details.
Fishes				
<i>Acipenser medirostris</i> green sturgeon	FT, SSC	Spawns in the Sacramento River and Klamath Rivers, at temperatures between 8 and 14 degrees Celsius. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	No Potential. The Study Area does not contain brackish or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.
<i>Eucyclogobius newberryi</i> tidewater goby	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches. Requires fairly still but not stagnant water and high oxygen levels.	No Potential. The Study Area does not contain brackish or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.
<i>Lavinia symmetricus</i> ssp. 2 Tomales roach	SSC	Habitat generalist. Found in well aerated perennial and tributaries to Tomales Bay. Feed primarily on algae supplemented with crustaceans and insects.	No Potential. The Study Area does not contain brackish or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<i>Oncorhynchus kisutch</i> coho salmon – central CA coast ESU	FE, SE	Occurs in inland and coastal rivers, and marine waters. Requires beds of loose, silt-free, coarse gravel for spawning. Also requires riparian cover to contribute to cool, well-aerated water. Federal listing applies to populations between Punta Gorda and San Lorenzo River. State listing applies populations south of San Francisco Bay only.	No Potential. The Study Area does not contain suitable anadromous riverine or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.
<i>Oncorhynchus mykiss irideus</i> steelhead - central CA coast DPS	FT	Occurs from the Russian River south to Soquel Creek and Pajaro River. Also in San Francisco and San Pablo Bay Basins. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for 1 or more years before migrating downstream to the ocean.	No Potential. The Study Area does not contain suitable anadromous riverine or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.
<i>Spirinchus thaleichthys</i> longfin smelt	FC, ST, SSC	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15 to 30 ppt, but can be found in completely freshwater to almost pure seawater.	No Potential. The Study Area does not contain riverine or estuarine waters.	No Potential. The Study Area does not contain suitable anadromous or estuarine waters.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
Invertebrates				
<i>Bombus crotchii</i> Crotch bumblebee	SC	Range largely restricted to California. Favors grassland and scrub habitats. Typical of bumblebees, nests are usually constructed underground. Visits a variety of plants.	No Potential. The Study Area is outside of the current range of this species.	Not Present. No further actions are recommended for this species.
<i>Bombus occidentalis</i> western bumblebee	SC	Formerly common throughout much of western North America; populations from southern British Columbia to central California have nearly disappeared (Xerces 2015). Occurs in a wide variety of habitat types. Nests are constructed annually in pre-existing cavities, usually on the ground (e.g., mammal burrows). Many plants are visited and pollinated.	No Potential. The Study Area is outside of the current range of this species.	Not Present. No further actions are recommended for this species.
<i>Danaus plexippus</i> monarch butterfly	FC, roosting sites protected by CDFW	Winter roost sites along the coast from Baja California north to Mendocino County. Roosts are wind-protected tree groves, typically of eucalyptus (<i>Eucalyptus</i> spp.), Monterey cypress (<i>Hesperocyparis macrocarpa</i>), and Monterey pine (<i>Pinus radiata</i>).	High Potential. The Study Area is composed of a large blue gum grove that provides winter roost habitat for this species. The grove is a documented grove site No. 2915 (CDFW 2024a, Xerces 2024).	Present. Several documented occurrences from within the Study Area. See Section 5.0 and 6.0 for details.
<i>Plebejus icarioides missionensis</i> Mission blue butterfly	FE	Known from Twin Peaks and Marin Headlands. Hosts on three perennial lupines (<i>Lupinus variicolor</i> , <i>L. albifrons</i> , <i>L. formosus</i>). Nectars on a variety of flowers.	No Potential. The Study Area does not contain lupines to support the larvae of this species.	Not Present. No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE STUDY AREA	RESULTS AND RECOMMENDATIONS
<p><i>Speyeria zerene myrtleae</i> Myrtle's silverspot butterfly</p>	<p>FE</p>	<p>Inhabits coastal terrace prairie habitat. Larval plant is dog violet (<i>Viola adunca</i>). Historic populations from Russian River to San Mateo County; currently known only from western Marin County and southwestern Sonoma County.</p>	<p>No Potential. The Study Area does not contain dog violet to support the larvae of this species.</p>	<p>Not Present. No further actions are recommended for this species.</p>
<p><i>Syncaris pacifica</i> California freshwater shrimp</p>	<p>FE, SE</p>	<p>Endemic to Marin, Napa, and Sonoma counties. Found in low elevation, low gradient streams where riparian cover is moderate to heavy. Shallow pools away from main stream flow. Winter: undercut banks with exposed roots. Summer: leafy branches touching water.</p>	<p>No Potential. The Study Area does not contain perennial streams to support this species.</p>	<p>Not Present. No further actions are recommended for this species.</p>

***Key to status codes:**

FC	Federal Candidate for Listing
FE	Federal Endangered
BGEPA	Bald and Golden Eagle Protection Act Species
FT	Federal Threatened
SC (E/T)	State Candidate for Listing (Endangered/Threatened)
SE	State Endangered
SFP	State Fully Protected Animal
SR	State Rare
SSC	State Species of Special Concern
ST	State Threatened
CRPR 1A	CNPS CRPR 1A: Plants presumed extinct in California
CRPR 1B	CNPS CRPR 1B: Plants rare, threatened or endangered in California and elsewhere
CRPR 2A	CNPS CRPR 2A: Plants presumed extirpated in California, but more common elsewhere
CRPR 2B	CNPS CRPR 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
CRPR 3	CNPS CRPR 3: Plants about which CNPS needs more information (a review list)
CRPR 4	CNPS CRPR 4: Plants of limited distribution (a watch list)
WBWG	Western Bat Working Group High or Medium-high Priority Species

Potential to Occur:

No Potential: Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

Unlikely: Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

Moderate Potential: Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

High Potential: All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

Results and Recommendations:

Present: Species was observed on the site or has been recorded (i.e. CNDDDB, other reports) on the site recently.

Assumed Present: Species is assumed to be present on-site based on the presence of key habitat components.

Assumed Present without Impact: Species assumed present; however, project activities will not have an impact on the species.

Presumed Absent: Species is presumed to not be present due to a lack of key habitat components.

Not Present: Species is considered not present due to a clear lack of any suitable habitat and/or local range limitations.

Not Observed: Species was not observed during dedicated/formal surveys.

Presence Unknown: Species has the potential to be present, but no dedicated surveys to determine absence/presence were performed.

Appendix D

Representative Photographs



Canopy of the blue gum grove; relatively open and lacking abundant leaves



Understory with invasive French broom (*Genista monspessulana*); creates potential ladder fuel



Damage to leaves from Australian tortoise beetle (*Trachymela sloanei*)



Infestation of English ivy (*Hedera helix*) posing significant threat to blue gum (*Eucalyptus globulus*) individuals



BCPUD ponds adjacent to the Project Area; potential California red-legged frog (*Rana draytonii*) habitat



BCPUD pond in the background with open grassland



Seasonal wetland in the Project Area; best management practices will be deployed to prevent impacts to such



Ephemeral stream in the Project Area; best management practices will be deployed to prevent impacts to such

Appendix E

Supporting Documents (Conceptual Plans & Arborist Reports)

Bolinas Eucalyptus Project Conceptual Restoration Plan

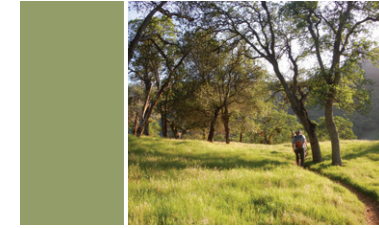
20 November 2023



Habitat Plan



Habitat Types



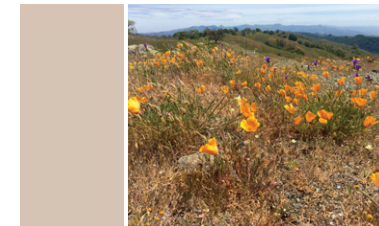
Oak Savanna / Grassland (4 acres)
Widely spaced native oaks with an understory of annual grasses, forbs, and shrubs.



Oak Woodland (3 acres)
Native oaks, California buckeye, toyon, coffeeberry, and other understory plants.



Coastal Scrub (1.7 acres)
Native shrubs.



Pollinator Prairie (0.7 acre)
Dominated by native forbs, nectar producing species, and grasses.



Willow Thicket (0.1 acre)
Arroyo and other native willows. Dependent on appropriate hydrology.



Wetland / Wet Meadow (0.2 acre)
Wetland grasses, rushes, sedges, and forbs. Highly dependent on hydrology and soils.

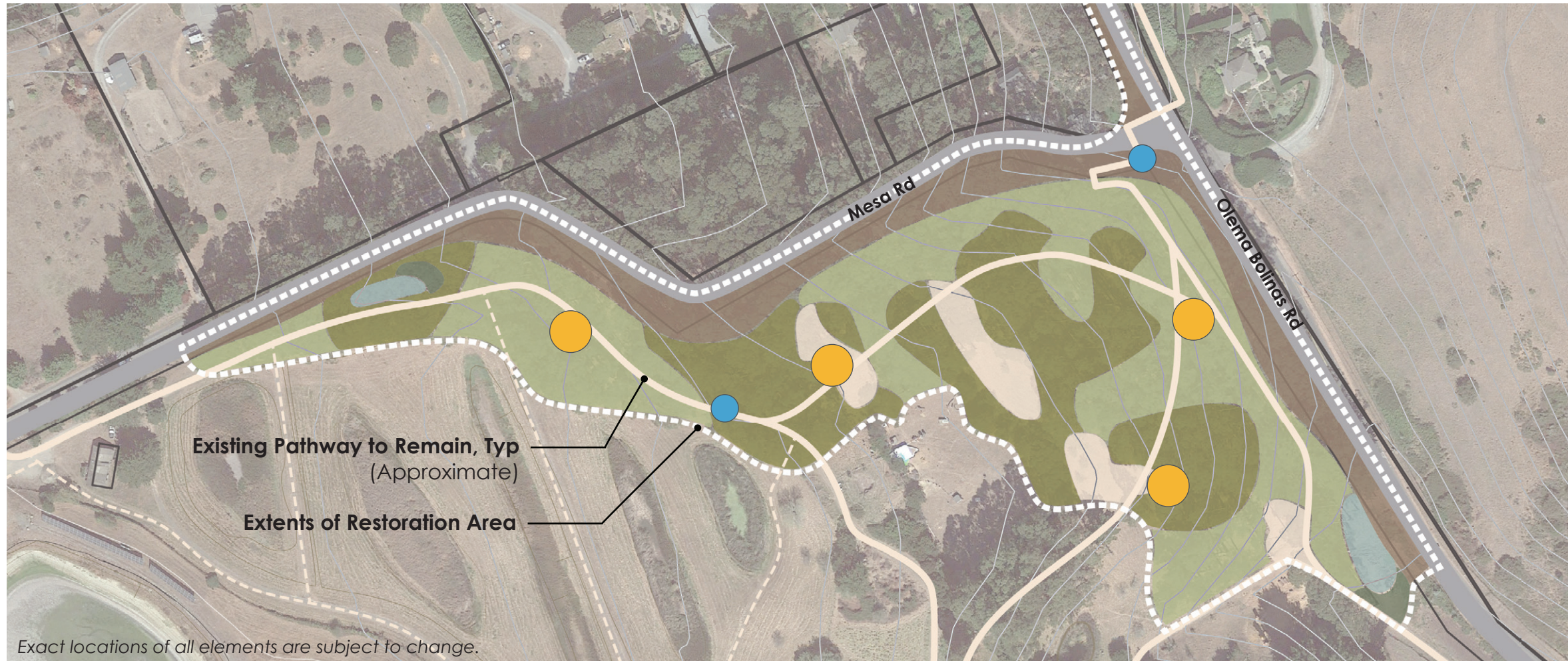


Bolinas Eucalyptus Project Conceptual Restoration Plan



20 November 2023

Site Plan



Proposed Site Features



Pause Points / Seating Areas

Strategically placed nodes throughout the site provide opportunities for users to rest, relax, and take in the sights and sounds of nature. These nodes also offer opportunities to recognize donors and others who made this project possible.



Interpretive and Educational Elements

Signage, art, and other elements explain the project's history and the rationale for the removal of the Eucalyptus stand, and introduce the public to the plants and animals that benefit from the project.



Eucalyptus Re-Use (Throughout the Site)

Material salvaged from the removed Eucalyptus can be re-used to create site furnishings like benches and fences, or mulched and spread throughout the site as a ground covering.



Habitat Features (Locations TBD)

Existing trees may be girdled and left in place as standing snags or felled and placed throughout the site as coarse woody debris. Root balls may be used to create in-stream complexity as part of off-site stream restoration projects (by others).





Tree Removal Plan



Tree Removal and Replacement

Existing Eucalyptus Stand

The Project's Existing Eucalyptus Stand is dominated by blue gum eucalyptus (*Eucalyptus globulus*), but also includes:

- Monterey cypress (*Cupressus macrocarpa*)
- Monterey pine (*Pinus radiata*)
- Coast live oak (*Quercus agrifolia*)
- Douglas fir (*Pseudotsuga menziesii*)
- A stand of Acacia not included in the Tree Inventory.

The Existing Eucalyptus stand includes:

- 413 live trees over 19.5" dbh
- 726 live trees smaller than 19.5" dbh

Tree Replacement Summary

All Eucalyptus trees in the existing Eucalyptus stand will be removed, while nearby stands of Eucalyptus (not shown) will remain in place. Wherever possible, existing native trees and shrubs will be preserved, but some may need to be removed. In total, **1,139 existing trees** were documented within the existing Eucalyptus stand.

The conceptual restoration plan includes planting approximately **700 native trees** in the Oak Woodland and Oak Savanna areas. This replanting effort would allow for a replacement ratio of **one (1) new tree for every 1.6 trees removed**.

Replacement planting would be designed with **fire wise principles** in mind with the goal of limiting the risk of wildfire on the site.

Source for existing tree information: *The Bolinas Eucalyptus Project Inventory: Zone 5*, by Tom Gaman, March 2023.



Bolinas Eucalyptus Project

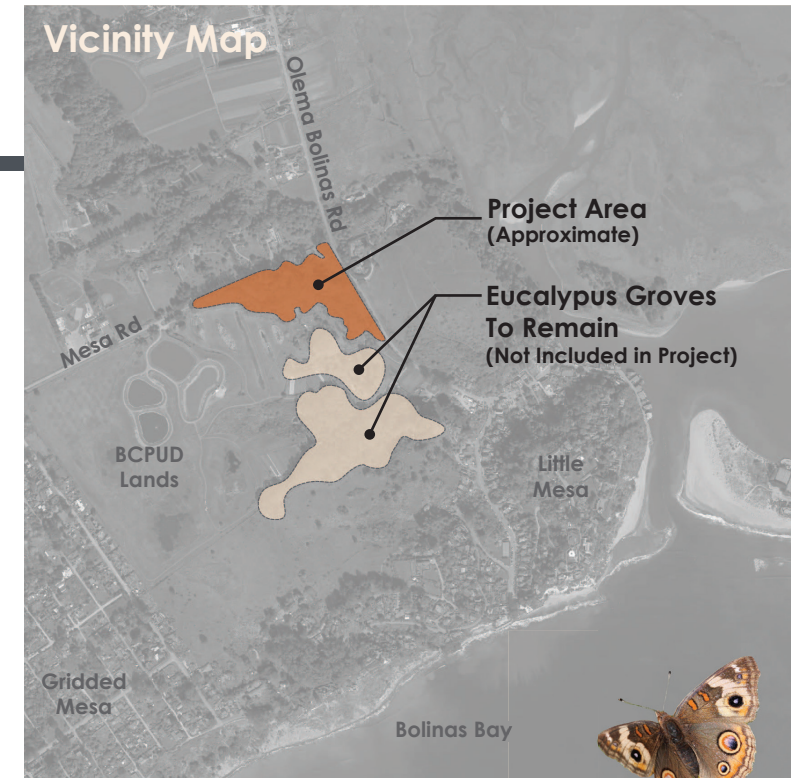
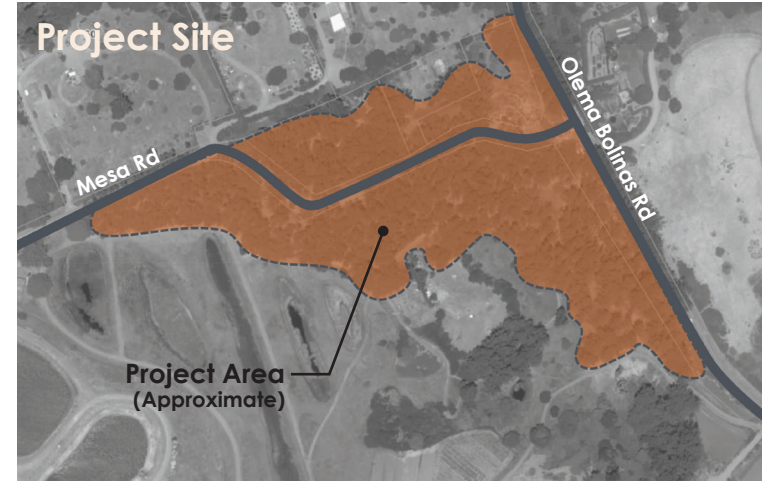


Project Goals

- Eliminate extensive safety hazards along roadways and pathways (including broken treetops, uprooting/falling trees, and fire danger) posed by the declining Eucalyptus grove.
- Ensure reliable and safe emergency access and evacuation routes for Bolinas.
- Enhance habitat for native wildlife, including pollinators, by establishing and maintaining appropriate ecosystems on the project site.
- Create a net benefit to regional monarch habitat.
- Reduce waste by upcycling of lumber removed by the project.
- Remove the long-term financial burden to the community of maintaining a deteriorating Eucalyptus grove.

Project Description

The Bolinas Eucalyptus Project (BEP) is working to address hazards posed to Bolinas residents and visitors by a large declining grove of roadside Eucalyptus near the intersection of Mesa Road and Olema Bolinas Road in Bolinas, California. The aging trees, now massive, are falling at an increasing rate. The project's primary objective is to increase human safety and emergency access along a major thoroughfare and primary evacuation route. Secondary objectives include decreasing hazardous fuel loads, improving the ecological health of the site, and creating benefits for monarch butterflies and other important pollinators.



Safety and emergency access for the community of Bolinas will be improved by removing large ailing Eucalyptus trees from the project area. In addition, the project will restore native ecosystems on the site by planting appropriate native

trees, shrubs, wildflowers, and grasses. This will enhance habitat for native wildlife, including pollinators and birds. Long-term monitoring and adaptive management strategies will ensure the health and success of the restored site.



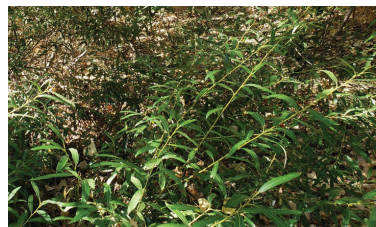
Existing Eucalyptus Grove





Conceptual Cross Section

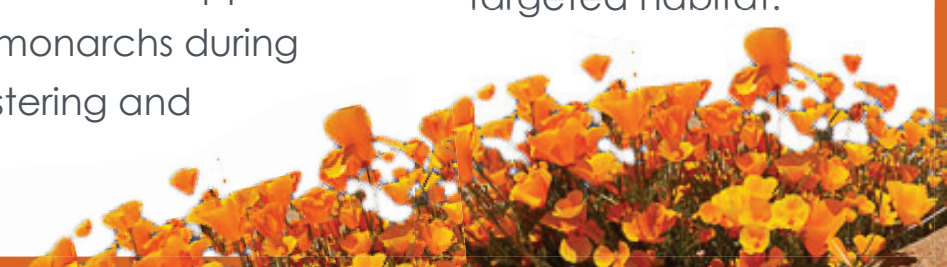
Representative Plant Species



Enhancing Monarch Habitat

The project planting design will focus on enhancing habitat for migratory Monarchs and other pollinators by:

- Including a diversity of early spring, late fall, and winter blooming nectar plants to create food supplies for monarchs during clustering and their southward migration.
- Maximizing the square footage of pollinator targeted habitat.



Resource Upcycling

Wood harvested from removed Eucalyptus trees can be reused for:

- Salmon Habitat Enhancement in Local Creeks
- Dune and Beach Stabilization
- Site Furnishings for the Project
- Flooring (after milling)



Client: Fire Safe Bolinas
Project Location: Intersection of Mesa and Olema Bolinas Roads
Inspection Date: December 30, 2021
Arborist: Ben Anderson



Assignment

Jon Cozzi asked me to assess the stand of blue gum eucalyptus (*Eucalyptus globulus*) trees at the intersection of Mesa and Olema Bolinas Roads and to opine on the general condition and fire risk they pose to the community. I performed a Level 1 limited visual assessment¹ of the trees from the road and the walking trails. I met with Jon Cozzi and Mark Fraser while onsite.

Observations

I assessed the general condition of the stand of eucalyptus trees at the intersection of Mesa and Olema Bolinas Roads (Figure 2). The overstory is pure blue gum eucalyptus. The stand on the south side of Mesa Road is maintained by the Bolinas Public Utility District. In this area, the understory is open and appears to be regularly cleaned of debris. There are scattered groups of native understory plants including coffeeberry (*Frangula californica*) and California blackberry (*Rubus ursinus*), and poison oak (*Toxicodendron diversilobum*). The trees directly adjacent to Mesa Road have Algerian ivy (*Hedera algeriensis*) growing up their trunks. These same trees along Mesa Road have leaf and bark debris piled up to approximately one foot deep at their bases. Fallen foliage displays prolific tortoise shell beetle (*Trachymela solanei*) activity.

When viewed from outside the stand, the canopies appear to have normal vigor, but when viewed from inside the stand, the canopies are generally sparse, and the sky is highly visible through the trees (Figure 1). Many have been topped over the years. They range in size from small trees in the 12-inch diameter range to very large trees with trunk diameters over four feet and are more than 150 feet in height. Several of the smaller trees are standing dead and there is large deadwood in the canopies of the larger trees, some of which targets the road and walking path through the stand.

Most of the trees on the north side of Mesa are on 30 Mesa Road, but also on 20 and 10 Mesa. The trees on 30 appear to be mostly unmaintained, particularly the understory, which is piled deep with leaves and bark debris (Figure 3).

The trees boarder the main entrance to the Bolinas community. Both Mesa and Olema Bolinas Roads have overhead utility lines that are targeted by the subject trees.

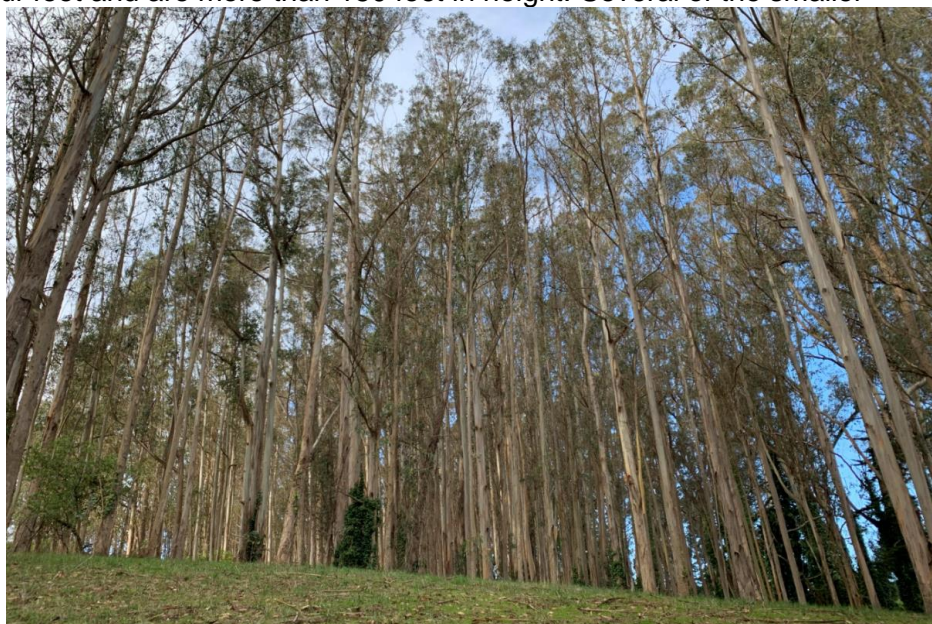


Figure 1. Image of subject stand on BPUD property.

¹ Limited Visual Assessment (Level 1) – a visual assessment from a specified perspective such as a foot, vehicle, or aerial (airborne) patrol of an individual tree or a population of trees near specified targets to identify conditions or obvious defects of concern.

Conclusions

Eucalyptus trees, and blue gum eucalyptus trees in particular, are a very polarizing issue in California land management. They clearly offer a mix of risks and benefits and which outweighs the other is a matter of opinion and personal values. Two key characteristics are generally considered to be true about the species: 1) the bark is highly flammable, both as it sits on the ground and as it hangs on the trunk, and 2) the foliage contains volatile compounds that ignite when in gas form. Due to their immense size, the trees can produce an incredible amount of debris/fuel year-round. The height of the trees and the characteristics of the bark create conditions favorable for windblown embers to spread out away from a burning tree. This stand of trees is typical of the aging stands of eucalyptus found all over California. There is some age diversity, but it is dominated by the large, old, overstory trees.

While the management decisions of a stand are ultimately up to the controlling parties, the questions are the same for all stands: 1) Do we wish to maintain this as a eucalyptus stand in perpetuity, or do we wish to convert it back to native vegetation? Given the current concerns of wildfire and the changing climate, maintaining eucalyptus seems less and less practical. 2) If we wish to convert it, over what timeframe? Total removal of all eucalyptus has a high upfront monetary cost, and the rapid change in the appearance can be hard for many to accept, but this results in a lower per tree cost over time and immediately abates risk. It also accelerates conversion to the desired replacement ecosystem (commonly native). 3) What level of risk are we willing to accept as the stand is converted or maintained? An aging eucalyptus stand will pose greater and greater risks both in terms of annual fuel production and risk of failure. This will result in either greater maintenance costs or greater risk to the public.

Eucalyptus is not meant to reach a late seral stage of old growth like coast redwood. It is adapted to periodic stand replacing fires. In the absence of such a fire, the stand enters an unnatural pattern of decline. I believe this stand is entering this stage, which is likely accelerated by recent droughts and warmer weather. While much work as gone into mitigating the fire hazard associated with this stand, the fact remains that were a fire to reach the stand, it would burn intensely, hindering access/egress, and depending on wind conditions, rain embers down on the community. A failure of a single tree over the road could spark a fire and cut off the primary access to the mesa. It is my professional opinion that the appropriate management for the stand is total removal of all eucalyptus and conversion to a native plant community.

SCOPE OF WORK AND LIMITATIONS

Urban Forestry Associates has no personal or monetary interest in the outcome of this investigation. All observations regarding trees in this report were made by UFA, independently, based on our education and experience. All determinations of health condition, structural condition, or hazard potential of a tree or trees at issue are based on our best professional judgment. The health and hazard assessments in this report are limited by the visual nature of the assessment. Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Since trees are living organisms, conditions are often hidden within the tree and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specific period of time. Likewise, remedial treatments cannot be guaranteed. Trees can be managed but they cannot be controlled. To live near trees is to accept some degree of risk and the only way to eliminate all risk associated with trees is to eliminate all trees.



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Figure 2. Location of subject stand indicated in green. Primary community access (indicated with red arrows) runs through and adjacent to the stand.



Figure 3. Understory at 30 Mesa Road with accumulation of fuels.



Figure 1 Zone 5 PG&E crews repair destruction caused by falling trees along Mesa Road



The Bolinas Eucalyptus Project Inventory: Zone 5

**A REPORT ON THE INVENTORY OF BOLINAS PUBLIC UTILITY DISTRICT AND
ADJOINING TREES IN ZONE 5**

BY TOM GAMAN, REGISTERED PROFESSIONAL FORESTER #1776

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MARCH 2023

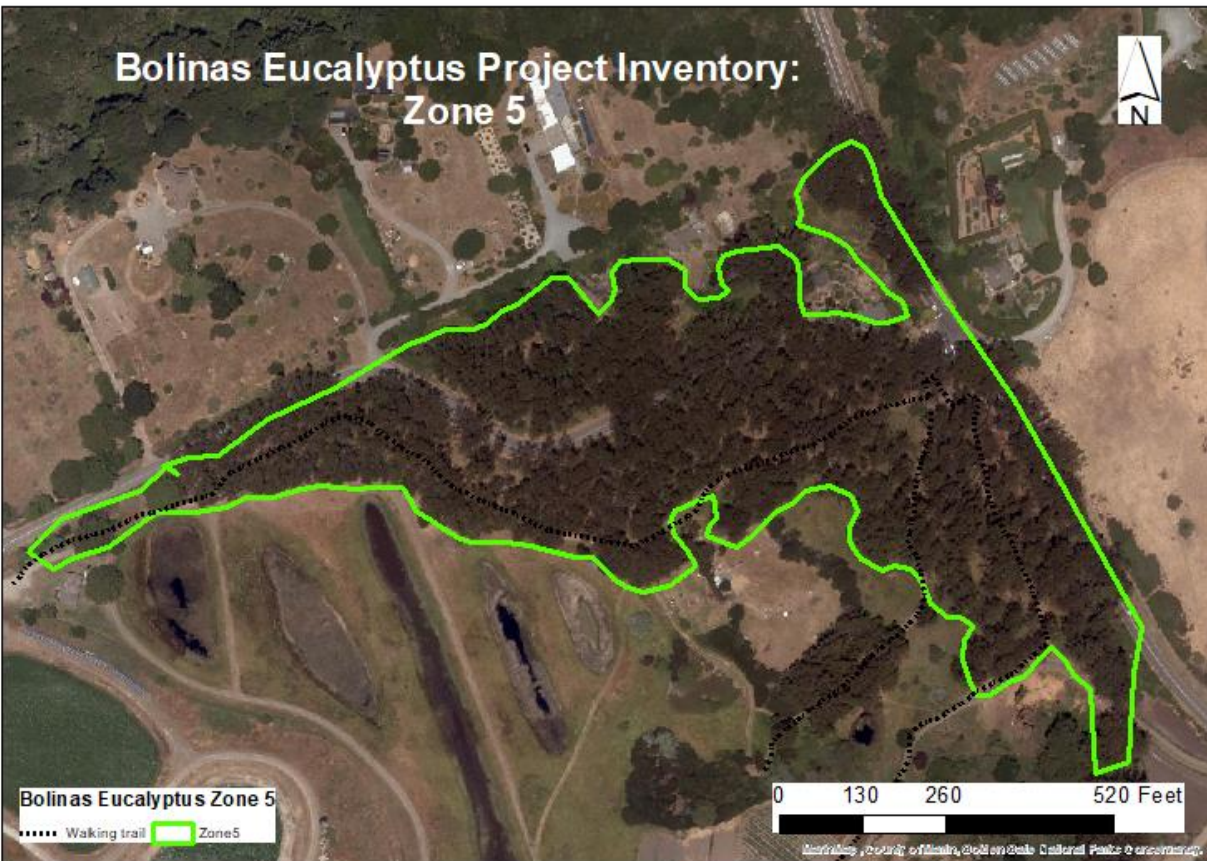


Figure 2 Zone 5 11.9 acres

1. INTRODUCTION

Iconic stands of Tasmanian blue gum (*Eucalyptus globulus*) trees have been a part of California’s cultural heritage since the 1860’s. They were to be the timber solution for a state about to run out of wood (Farmer, 2014). Millions of blue gums were planted throughout the Bay Area. Today Eucalyptus trees are the fading Bay Area tree giants. Stands of Eucalyptus are experiencing decline and tree mortality due to drought, winds, the maturation of over-crowded stands and disease (Dowd 2021).

The Eucalyptus trees in Bolinas are no exception. Blue gum woodlands were planted around 1900 at several locations. The stand known today as “Zone 5” at Mesa Road and Olema-Bolinas Road was most likely established as a windbreak. The trees survived and thrived. They grew rapidly and apparently also sprouted or seeded into adjoining areas that today comprise a pure 11.9 acre stand. Bolinas Public Utility District (BPUD) owns 7.6 acres and another 2.9 acres are owned by adjoining private landowners. The trees overhang the roadway on the remaining 1.4 acres. Roadside trees were topped when quite young and they responded by sprouting vigorously. Those same trees were topped again during the 1960’s. Today Eucalyptus trees

have grown up to 170 feet tall and many are over 60” in diameter at breast height. In 2011 BPUD, cognizant of increasing risks of wildfire and need for safer emergency ingress/egress, thinned and reduced the grove’s woody fuels. This was done by removing the thicket of smaller trees, the understory shed bark, fallen branches, climbing ivy vines, accumulated leaf litter and decomposing wood on the forest floor of its portion of the stand (south of Mesa Road). Meanwhile many backyard Eucalypts on the northern 3 residential parcels have been pruned, thinned or removed, while others are in a wild condition untended for a century by the landowners and residents.

More recently the Bolinas Eucalyptus Project has been calling for the removal of the hazardous trees. The call for removal has become more urgent following the 2023 January chain of atmospheric river events which, over the course of a few days, blew down 24 large trees measuring up to 63” in diameter. Luckily nobody was killed although 2 persons were severely injured in their vehicle when it was crushed by a falling tree. Several vulnerable homes are located nearby and when blue gums blow down, the results can be catastrophic. Another cause for concern is that the popular public walking trails through Zone 5 place users at risk from falling debris.

Recent blow down has apparently also enlarged wind corridors increasing the likelihood of ongoing windthrow. The large old trees are falling, so the call has come from many members of the community to remove the Zone 5 Eucalypts and embark upon a native forest habitat restoration project.

Tree work is extremely expensive and environmental constraints in the coastal zone are many. It makes sense to physically quantify any large vegetation management project as part of the planning process. When the BEP contacted Tom Gaman, a Registered Professional Forester who lives nearby, he recommended, with approval of resident and BEP leader Jon Cozzi, a 100% tree inventory project. Gaman designed an inventory which includes detailed maps, and a count of all trees so the community knows exactly what is there, and where. This report is the analysis of measurement of all the trees. It includes assessment of stand condition, “target” hazards of falling branches on trails, roads and buildings, Monarch observances, analysis of 2023 blowdown, estimation of surface fuels, a calculated figure of total cubic foot volume, biomass with carbon equivalents, online ground and aerial imagery, the base field data, and other information.

2. ZONE 5 LOCATION

The village of Bolinas includes several Eucalyptus stands. The largest is known as Zone 5, an 11.9 acre stand, surrounding the intersection of the Olema-Bolinas Road and Mesa Road and extending along both roads. All residential, commercial and tourist traffic coming and going passes through this intersection, a 3-way stop.

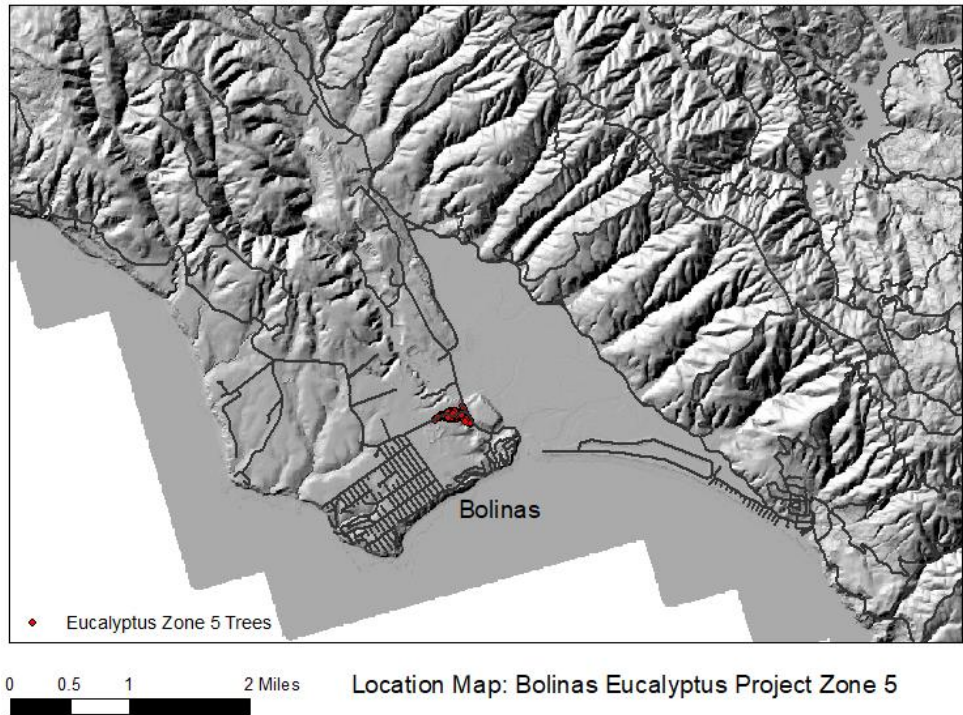


Figure 3 Zone 5 location map

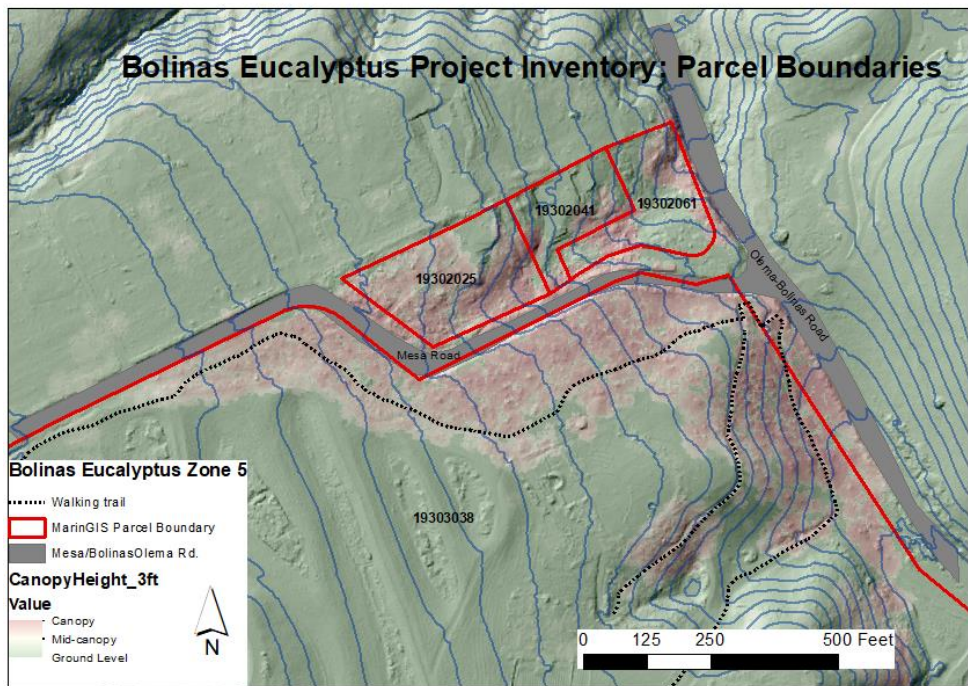


Figure 4 Zone 5 Marin Parcels. The 3 smaller parcels are privately owned, and the large southern parcel belongs to the Bolinas Public Utility District

3. METHODS

This 100% georeferenced inventory of the grove provides necessary baseline planning information. The forester designed the inventory to include measurements and a GPS waypoint for every tree in 20+” diameter-at breast height” (dbh) classes and to provide sufficient georeferencing. Diameter of each of the smaller trees surrounding each 20+ inch larger measure tree, when present, was estimated and the total number of smaller co-located trees was also recorded at each location. Smaller trees were assigned randomized coordinates on a 10x10 meter grid surrounding the applicable nearest larger measure tree so location of each could be approximated and mapped with reasonable accuracy.

Round aluminum 16d nails were used to attach aluminum numbered tags near the base of each measure tree. Prior to field work, each tag and nail was lightly sprayed with brown paint at the office so that tags would blend in well and trail users would not notice them. Each tree was assigned a tag numbered from 00 to 99, and the GPS assigned waypoints of the same number prefixed with a single letter (A through N) to avoid possible confusion of duplicated tree tags. The waypoints were collected using a Garmin Csx60 GPS that, under ideal conditions, is capable of 3- to 5-meter accuracy.

In the field the forester measured each 20”+ diameter class tree with a steel diameter tape and/or a Biltmore stick (which triangulates diameter). The forester used a survey grade Impulse 200 laser with a built-in clinometer to measure a subset of tree heights throughout the grove and estimated the others so that height was recorded for 100% of the measure trees. With a few minor exceptions each tree with 19.5” or greater diameter (20”+ class) is tagged near its base with an aluminum numbered tag. The diameter, height, canopy width, live crown ratio (crown status), condition, position, rot defect, Monarch observations, and potential local hazard target was recorded for each of these “measure” trees. All data variables are listed below:

Table 1: Measure Trees >=19.5" at breast height (20"+ diameter classes)

For measure trees (20+ inches diameter classes) the following data were recorded:

- Grove name
- Date
- Tree Tag #
- Waypoint ID
- Tree Species
- # Stems (of measure tree plus surrounding dbh only count trees)
- DBH1 (in)
- Height (ft)
- % Defect
- Crown Diameter (ft)
- Position
- Condition
- Tree Photo
- Branch/Bole Structure
- Target hazard
- Live Crown Ratio
- Photo Series Fuels (tag 10x)
- Butterfly Use observation
- Notes

It is also important to have an accurate count of the smaller trees but detailed data is not as important. Therefore the smaller trees, as explained above, were counted and attributed with estimated diameter and approximate location.

Table 2 Trees <20" diameter at breast height

For smaller "satellite" trees diameter only was estimated for each tree up to a maximum of 7 trees (including the measure tree (DBH1)).

Species

- DBH2
- DBH3
- DBH4
- DBH5
- DBH6
- DBH7
- Instrument Longitude
- Instrument Latitude

The tabular data items were collected using the smart phone app “GISCloud”. At the end of each field day data were downloaded and imported to Excel and into ArcGIS 10.8.4. The forester also randomly photographed approximately half of the trees measured and GISCloud attached the photo to the applicable tree data set. The individual photographs with accompanying tree numbers are included in the Excel file named “Bollinas_Zone5_photo_report.xlsx” available as an 80 Megabyte download¹.

Given the thousands of data items the GISCloud app served as an excellent tool with which to keep data collection organized and efficient.

MAPPING

Standard GIS mapping tool ArcGIS served to georeference and map all of the Zone 5 trees. Standard topographic contours, LIDAR “Hillshade” raster data, vector data for roads, and NRCS “NAIP Imagery” provide locational context for the maps. In the office the technician digitized the local roadway using the Hillshade model as a base map². Given the dense stand of trees it turned out that the Garmin GPS and the Android smart phone GPS did not in many cases provide the exact location of trees. For example, many roadside trees appeared in the middle of the road. The maps show adjusted locations for many roadside trees to improve mapping accuracy. Within the stand some trees may be mapped outside of the 3-5 meter locational tolerance that the Garmin device had estimated in the field.

BLOWDOWN

During January 2023 severe rainfall and windy weather struck the Northern California coast in the form of a string of 9 “atmospheric river” storms. Over several nights 24 trees in the stand blew down. All trees in the blowdown area were measured after the storm when they were already on the ground. As such, post-storm blow down inventory and standing tree inventory are independent of each other and reported separately here. Please refer to the blowdown section below under “Results”.

¹ Photos, Excel files, aerial video, and maps located for public access at https://drive.google.com/drive/folders/1CV_BGTtmhURdHhslrPEJJqJ9wqpd7PXe?usp=sharing

² See <https://gisopendata.marincounty.org/>

4. RESULTS

THE TREES

The grove at Zone 5 is one of many stands of Tasmanian blue gum (*Eucalyptus globulus*) in the Bolinas area. Based on a ring count of one roadside tree that fell in January 2023, this grove of *Eucalyptus* was planted around 1900. Untended trees within the grove soon spread and developed to dominate 11.9 acres in 2 age groups, “roadside” and “sprouts”. Trees within the grove are largely untended except that some understory fuels and trees up to 8” in diameter were in 2011 thinned from the BPUD parcel to reduce fire hazard, resulting in the clean, open and parklike understory ground cover that is mowed each year and still exists there. Electric and phone wires are strung on poles running along Mesa Road and Olema-Bolinas Road. The trees themselves have long been in competition with each other for sunlight, moisture, and nutrients. The recent drought has also affected the stand. Throughout the stand dead branches are scattered within the crowns of all but those trees (27% of total) assessed as in “Good” condition. In some areas, particularly on the private parcels, English ivy (*Hedera helix*) and Cape ivy (*Delairea odorata*) are covering the ground and clinging to the trees. A few coast live oaks (*Quercus agrifolia*) and even two understory Douglas-fir (*Pseudotsuga menziesii*) trees have survived in less-shaded areas, but the ground understory does not support any other significant native vegetation.

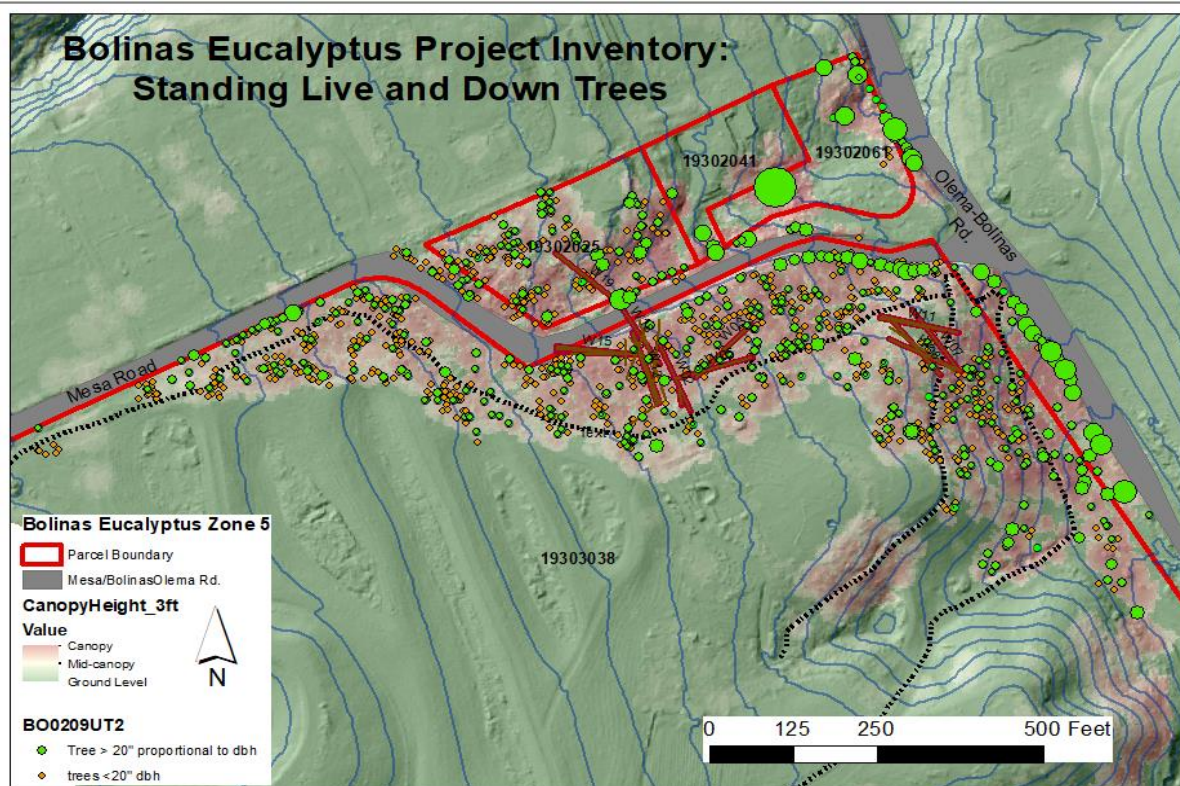


Figure 5 1139 trees. 11.9 acres. The size of each green dot represents relative tree diameter

GPS TREE LOCATION

As noted above the GPS files identified only the approximate locations of each tree. Trees obviously in the incorrect locations, and streetside trees, were checked in the field and, where inadequate, the map locations were manually adjusted accordingly. On-site aluminum tags can be used to confirm tree identity in the field.

THE INVENTORY

Measure trees. Four hundred thirteen (413) live trees over 19.5" dbh were measured and GPS locations were recorded in the field. Detailed data items described above were recorded for each tree. The raw data are included in a file named "linkfile022323.xlsx" and this file is reproduced here in Appendix 5.

Tree Species. Of the large trees measured 399 (95.7%) were blue gum (*E. globulus*), the largest of which is a 140" Eucalyptus (which splits into 4 stems) near a house on the north side of Mesa Road. There were 12 Monterey cypress (*Cupressus macrocarpa*) and 6 Monterey pine (*Pinus radiata*), all of which are located at perimeter of the grove. A very small number of coast live oaks and Douglas-fir are also present at the edges of Zone 5 but none met the threshold for measurement.

Stems by Diameter. Tree diameters were measured to the nearest inch of diameter at breast height (4.5 feet off the ground on the uphill side of the tree) and assigned to diameter classes. For instance, a 19.6" tree is included within the 20" diameter class. There are 413 "Measure"

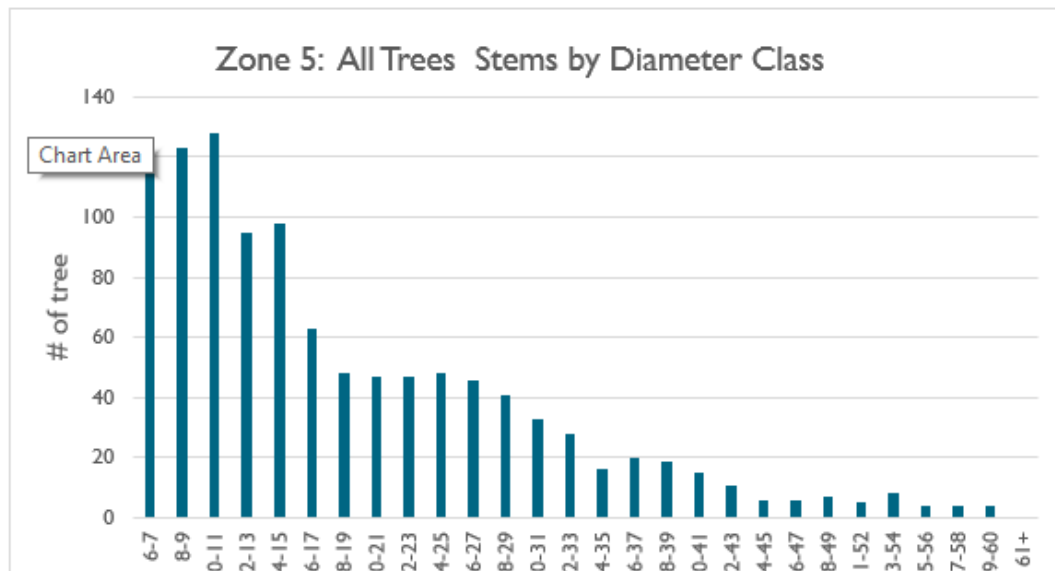


Figure 6 Number of trees by diameter class

trees in the 20" and above diameter classes in Zone 5 and 1139 trees including all trees 6" and larger. Figure 6 shows the number of trees in each 2-inch diameter class grouping.

Height (Ht). Individual “measure” trees were each assigned a measured or estimated height. Smaller trees were assigned heights in the office using a regression equation. Mature tree heights generally varied from 120’ tall to 170’ or more on better sites. Height competition is intense. Many of the smaller trees are almost equal in height to their more robust neighbors. Of the 413 large trees measured the average height was 132’.

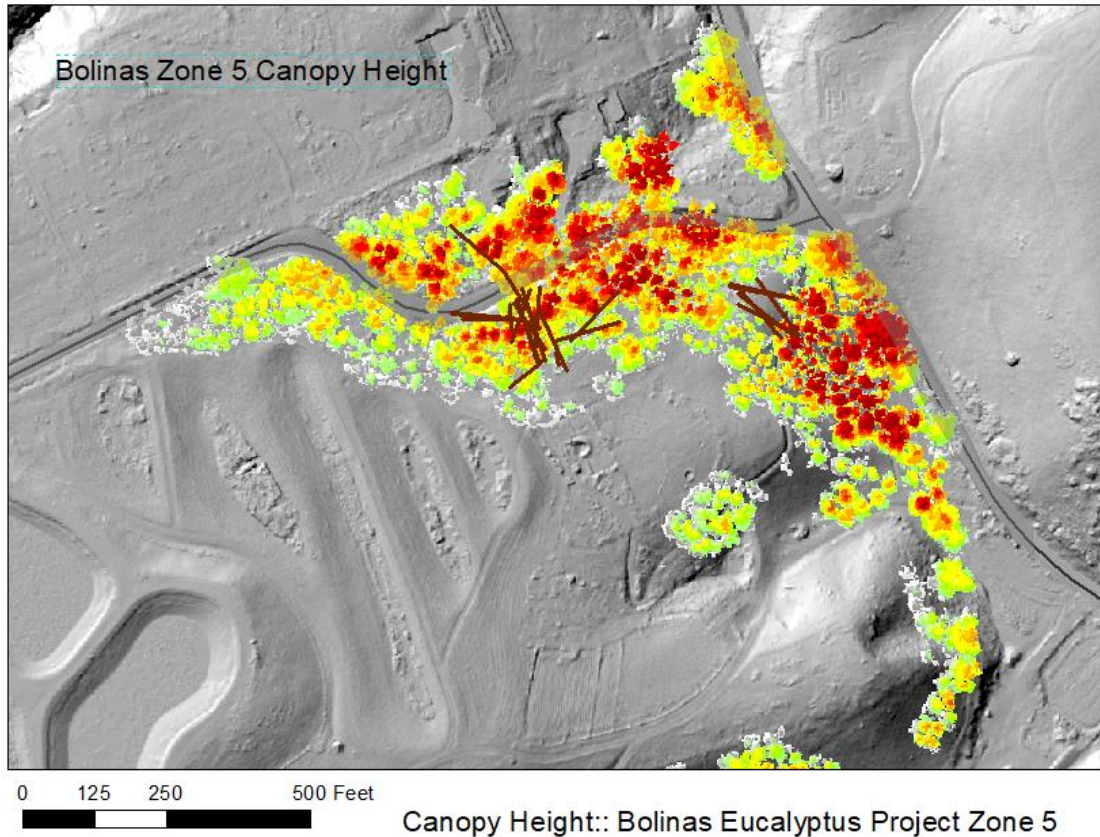


Figure 7 Canopy height: low to tall trees in white, green, yellow, orange and red respectively.

Crown Diameter. Crown width varied dramatically. Open grown trees and dominant trees without significant competition from neighbors had crowns spreading 40 to 60 feet or more. The many tall but smaller-in-diameter trees that are in crown competition with neighbors, and have endured prolonged drought, commonly had live crowns as low as 5 to 10 feet in diameter. The average crown width was 26 feet per ocular estimation of 413 “measure” crowns.

Live Crown Ratio. Live Crown ratio is the percentage of the total tree height which supports green live branching. The value is commonly used in assessing forest health and in modeling predicted future forest conditions. In natural stands in the Sierra and Coast ranges of California healthy trees normally exhibit a live crown ratio of 40% or more. In this stand the average live crown ratio is 24% reflecting intense competition among unhealthy tree crowns struggling for access to sunlight. Dead branches are interspersed with live branching.



Figure 8 Typical view of Zone 5 sparse Eucalyptus crown looking upwards

To further investigate the canopy and crown condition of the trees aerial drone imagery (flown March 1, 2023) vertical aerial photography and video demonstrates the crowded condition, branch mortality, and sparse foliage of the trees. The high-resolution photos and video are viewable online at the link in the footnote on page 7. Note the crowded stem density, sparse crowns and dead branches.

Canopy Closure. An important metric in forest stand assessment is canopy closure. This inventory does include a crown diameter estimate for each large measure tree. When all the trees' crown areas are compiled the large ("measure") tree canopy closure on the 11.9 acres is 55%. Placing a grid over Zone 5 and counting squares reveals a canopy density of 90%. The crowns are mostly non overlapping so this measurement indicates that 700+ trees less than 19.5" in diameter collectively share 35% of the crown space. As such the available canopy area represents insufficient crown availability for the codominant trees in the lower diameter classes. Throughout the inventory it was clear that most such smaller tree crowns are very sparse and most of those trees are severely stressed as a result.



Figure 9 Looking west toward sparse tree tops and crowded canopies at Zone 5. Aerial imagery March 2023.

Position. Each tree is evaluated as to its status relative to neighboring trees. Classifications are Open-grown, Dominant, CoDominant, Intermediate, and Suppressed as defined in the Forest Inventory and Analysis Field Handbook (Appendix 3, USFS 2021); 86% of trees were Dominant or Codominant³

Row Labels	Count of Position
1 Dominant	171
2. Codominant	184
3. Intermediate	48
4. Suppressed	5
5. n/a (broken)	5
Grand Total	413

Structure and Defect. Tree structure was also recorded for “measure” trees. Options were “None”, “Previously topped”, “Falling Branches” and “Shedding Bark” and combinations of these classifications. Fifty-six (56) trees, mostly roadside trees, had clearly been previously topped wherein the top of tree was removed and the live tree had responded by sprouting multiple tops, often leaving a structural wound vulnerable to wind throw, moisture accumulation and subsequent rot or breakage at a weak point. One hundred ninety-six trees had “Falling Branches” which means that there were “top heavy” or fully dead branches in the crown that can unpredictably fail even in calm weather. Nineteen trees had “Shedding Bark”

³ See Appendix 2 US Forest Service 2021 FIA Manual

which could add to the fuel bed and fire hazard, and 156 trees had no structural issues. Many trees had “defect” which means that there are areas where rotten wood or another irregularity is evident. Defect is the percentage of visible wood volume in the stem of the tree suspected to include rotten areas often at risk of breakage that also would not be suitable for carbon storage or forest products. Most trees in the grove are defect free but some exhibited rotten bole or other areas of rot. Overall defect averaged 3.3% by volume. The internal effects of visible structural defects are classically illustrated by Alex Shigo (Shigo 1983) who spent his career investigating rot and woody defect in many species.

Condition. The forester used his experience and judgement to classify each measure tree according to its overall vigor into 3 groups: Good, Fair or Poor. Both “Fair” and “Poor” classifications outnumbered the “Good”. The reason for this is that these mature trees were never thinned and lived long lives in intense competition with one another for light, water and nutrients, and the condition of most reflects those life-long struggles. Also Dowd (2021) reports that Matteo Garbelotto, UC Berkeley Forest Pathologist, found two fungi, *Diaporthe foeniculina* and *Dothiorella viticola*, that seem to be ubiquitous in these trees, and may be negatively impacting Eucalyptus stands here. Voracious leaf chewing Australian tortoise beetles (Family *Chrysomelidae*) are also known to consume vast quantities of tree leaves in this stand of trees (Cozzi, 2023). With only 27% of trees in the “Good” condition group this begs the question of whether it is possible to sustain this fragile overstocked woodland much longer. Thinning is not the answer to improve health as this stand is highly exposed and vulnerable to severe and increasing wind disturbances.

Tree Condition		
Classification	Count of Condition	% of total
Good	112	27.1%
Fair	177	42.7%
Poor	124	30.0%

Number of trees and basal area. There are 413 measure trees, and another 726 smaller trees growing among the larger measure trees. The diameter distribution is shown on Figure 6 above. Basal area is a commonly used forestry metric that describes stand stocking measured as the total combined area of stems at 4.5’ above the ground. For instance, a forest with 400 6” dbh trees per acre has the same basal area ($\sigma \pi \cdot \text{radius squared}$; 78.5 sq. ft./acre in this example) as a stand with 100 12” dbh trees. When added together the trees at Zone 5 account for a basal area of 288 square feet of live growing stem per acre and represent an extremely densely stocked hardwood stand of trees. By comparison using the example above, a well-stocked coast live oak stand has about 80 to 100 square feet of basal area. This means that this area, a native coast live oak woodland, is now supporting about 3 times the woody basal

area of its native condition, and the trees themselves are double the height of the natives, resulting in perhaps as much as 6 times the native biomass stocking by volume.

Biomass and Carbon. Trees in the inventory ranged from 6 inches to 140 inches in diameter at breast height. The overall average diameter is 19.4 inches for 1139 trees. Pillsbury et al. (1989) produced the volume equations for central California coastal Eucalyptus that became the basis for volume calculations. A portion of the Pillsbury report is replicated with tree tables and notes below:

DBH	Total height in feet:														
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
inches	cubic feet														
4	1	1	2	2	3	3	3	4	4	5					
6	2	3	4	5	6	6	7	8	9	10					
8	4	5	6	8	10	11	13	14	16	18	19				
10	6	8	10	12	14	17	19	22	24	27	29	32			
12		11	14	17	20	24	27	30	34	37	41	45	48	52	
14		14	18	23	27	31	36	41	45	50	55	59	64	69	74
16		18	24	29	35	40	46	52	58	64	70	76	82	89	95
18			30	36	43	50	58	65	72	80	87	95	103	111	118
20			36	44	53	61	70	79	88	97	106	116	125	135	144
22			43	53	63	73	84	94	105	116	127	138	150	161	172
24				62	74	86	99	111	124	137	150	163	176	189	203
26				72	86	100	114	129	144	159	174	189	204	220	236
28					99	115	131	148	165	182	200	217	235	253	271
30					112	131	150	169	188	207	227	247	267	287	308
32					127	148	169	190	212	234	256	279	301	324	347
34					142	165	189	213	237	262	287	312	337	363	389
36					158	184	210	237	264	291	319	347	375	404	433
38						203	233	262	292	322	353	384	415	447	479
40						224	256	289	321	355	389	423	457	492	527

NOTES: The equation for this table is: Volume (cubic feet) = 0.0015658 x DBH (in)^{1.86903} x Tot Ht (ft)^{1.13556}.
Data shown are gross cubic foot volumes (outside bark) to a 2-inch top.

Figure 10 From Pillsbury et al. 1989

Heights were not recorded for trees <19.6" dbh. Using Excel the technician calculated the height for each of those trees via linear regression, then used the volume equation for English values (above) to calculate the cubic foot volume (Vol) for each Eucalyptus tree. Altogether, this process accounts for 163,852 net cubic feet of above-ground wood including bark but not branches. At the generally accepted cordwood volume denominator (85 solid cubic feet per cord, not including the airspace in a 128 cubic-foot cord of stacked firewood) the stand contains 1,927 cords of wood.

Tejedor calculated the specific gravity of *Eucalyptus globulus* at 571 kg per metric ton. Volume and carbon were calculated for the Eucalyptus trees only. The biomass of the Zone 5 Eucalyptus trees calculates to be 2,415 metric tons of which 79% is in the large trees. Three hundred ten (310) Eucalyptus "measure" trees, averaging 31" dbh and totaling 1391 metric tons above ground biomass, are located south of Mesa Road on BPUD property. Eighty-One (81) trees averaging 38" dbh, with 522 tons of biomass, are on north side private parcels. There are many

trees among both groups likely located within the county road right of way. Biomass metric tons and carbon dioxide equivalents for above ground Eucalyptus are provided in the table below.

Table 3 Eucalyptus Biomass and Carbon Dioxide Equivalents

Bolinas Zone 5 Eucalyptus Only		
Area	Biomass metric dry tons above ground	CO2 Equivalent metric tons
South of Mesa Road 20"+ measure trees	1,391	2,548
North of Mesa Road 20"+ measure trees	522	956
Grand Total for all Zone 5 Eucalyptus Trees down to 6" dbh	2,415	4,424

Target Hazards. The grove is located at a sensitive area along main roads, near houses, and in an area with popular recreational trails. Tree failures have been dramatic. I assessed the immediate area around each tree for “local target” in the event of failure of branches or breakage of the upper stem. All measure trees were assessed plus 4 individuals that became place markers for smaller trees, which were not assessed for target hazards. Targets further than about 50 feet from each tree were not considered unless tree condition is poor and the tree is leaning in the particular direction of a clear “target”. Overall almost 69% of trees had some local target in the immediate vicinity. Fifty-nine percent of the trees could potentially impact a road or trail.

Row Labels	Count of “Local Target” hazard	% of total
0. None	131	31.4%
1. Road	126	30.2%
2. Trail	120	28.8%
3. Building	40	9.6%

When great weather disturbances happen and Eucalyptus trees fail in the spectacular manner of the trees in this stand, and entire 150’ tall trees and enormous branches collapse without warning, these numbers are not applicable. In such cases every tree is clearly a hazard tree. It

is quite impossible to predict what will happen next, but it is at the same time very clear that this stand of trees at the gateway to Bolinas and Point Reyes National Seashore creates extraordinarily threatening roadside conditions.

Forest Fuels. Eucalypts are known for dropping branches that establish understory fuels and for creating fuel ladders simply by shedding bark, and for their highly combustible fragrant oils in the bark and leaves. The 1991 Oakland fire storm was unstoppable, partially due to blue gums burning out of control. Forest fuels accumulate in the understory and on the ground and, in times of drought when dry autumn winds reduce moisture content of the vegetation to very low levels, Eucalyptus stands pose a serious threat to nearby communities.

As part of the inventory the forester assessed woody forest fuels under most of the measure trees. The quick assessment was completed with the aid of the Wright and Vihnanek photo series which measured the woody ground fuels and classified them for field comparison with a photo series which includes photos of East Bay Eucalyptus stands classified from Low (1) up to High (7) categories.

Forest Ground Woody Fuels

Row Labels	Count of Woody Fuels	Tons per Acre per Wright and Vihanaek
1. EBE1	23	5.27
2. EBE2	91	8.23
3. EBE3	111	9.79
4. EBE4	83	13.43
5. EBE5	33	16.35
6. EBE6	22	13.91
7. HiF03 (estimated)	16	20

In an ideal world where the fuels reported by Wright and Vihnanek correspond perfectly with the conditions viewed in Zone 5 at Bolinas, the forest floor at present would be supporting 11 tons of woody debris per acre, but of course this is just an estimate. The fact remains, however, that the woody fuels on the forest floor vary dramatically over the area encompassed by Zone 5 as shown in the map below. Cognizant of the fire hazard, BPUD did some work in the grove in 2011 and the understory fuels were thinned out. Each year BPUD mows the area under the trees to maintain understory fuels at levels as low as possible. The map below shows the accumulation of fuels to be widely distributed (from low to high) throughout the grove.

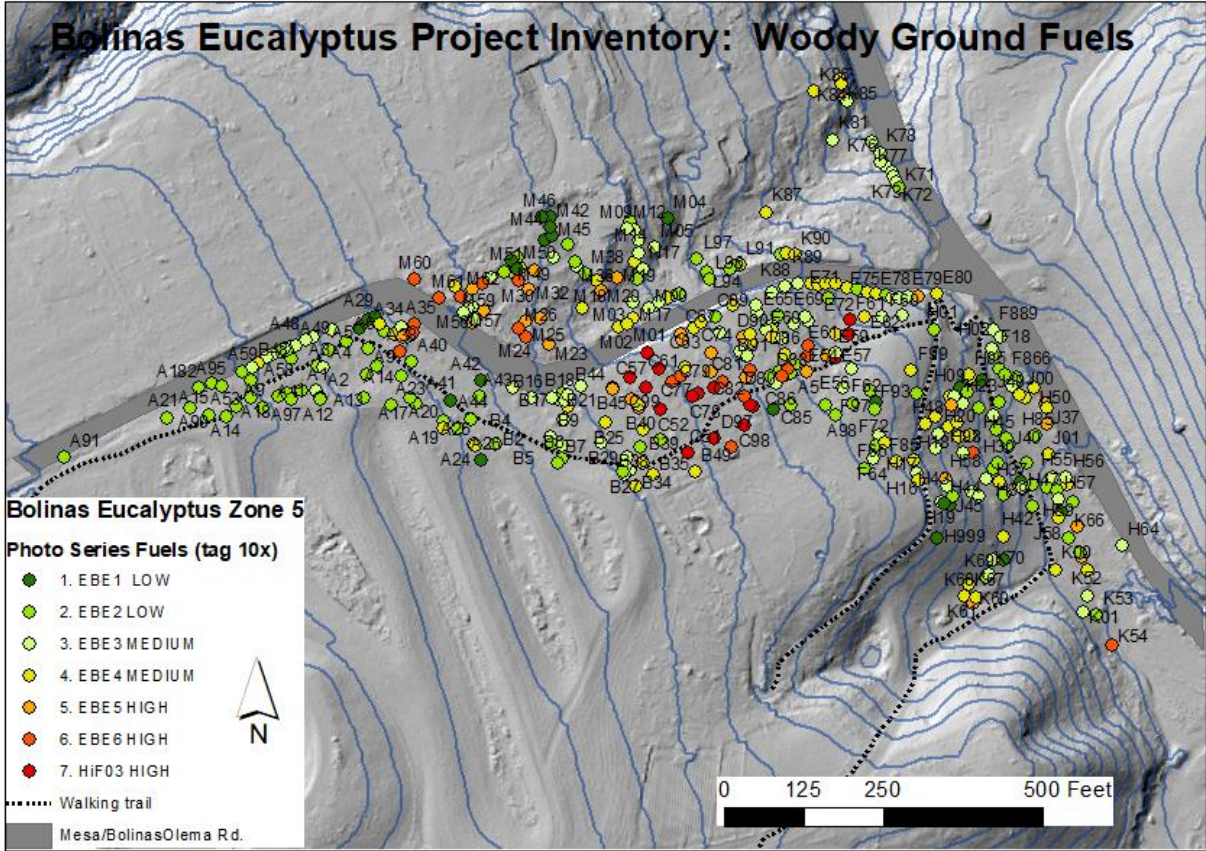


Figure 11 Woody ground fuels (Low in green and High in red)

WINDFALL AND BLOWDOWN TREES, ROOT STRUCTURE

During the January 2023 storm series 24 trees within the grove blew down over several nights. These trees were 14” to 63” in diameter and each had been over 100’ tall. Half of the blown down trees were over 20” in diameter and 5 of them were 30” and larger. Several smaller but tall trees were hit by falling trees. They broke and they fell. A small number of other trees are “leaners”, supported by their neighbors, and they could fall at any time. Aside from the damage to the stand of trees the impacts of the storm included major injuries to 2 persons in a passing vehicle. The forester reviewed the damage to the stand and measured each fallen tree’s diameter, GPS location and direction of fall. Most windfall trees were lying on the ground with azimuth of west to northwest. The exceptions were the very large 63” blue gum that fell across the road, and collateral damage of fallen trees struck by adjacent blown down trees. The elimination of 24 trees created new gaps in the canopy which render residual trees increasingly vulnerable to ongoing blow down. Though most trees that fall are blown down by the south or northerly winds during saturated soils conditions, it does not seem possible to predict which trees will fall next, or in which direction.

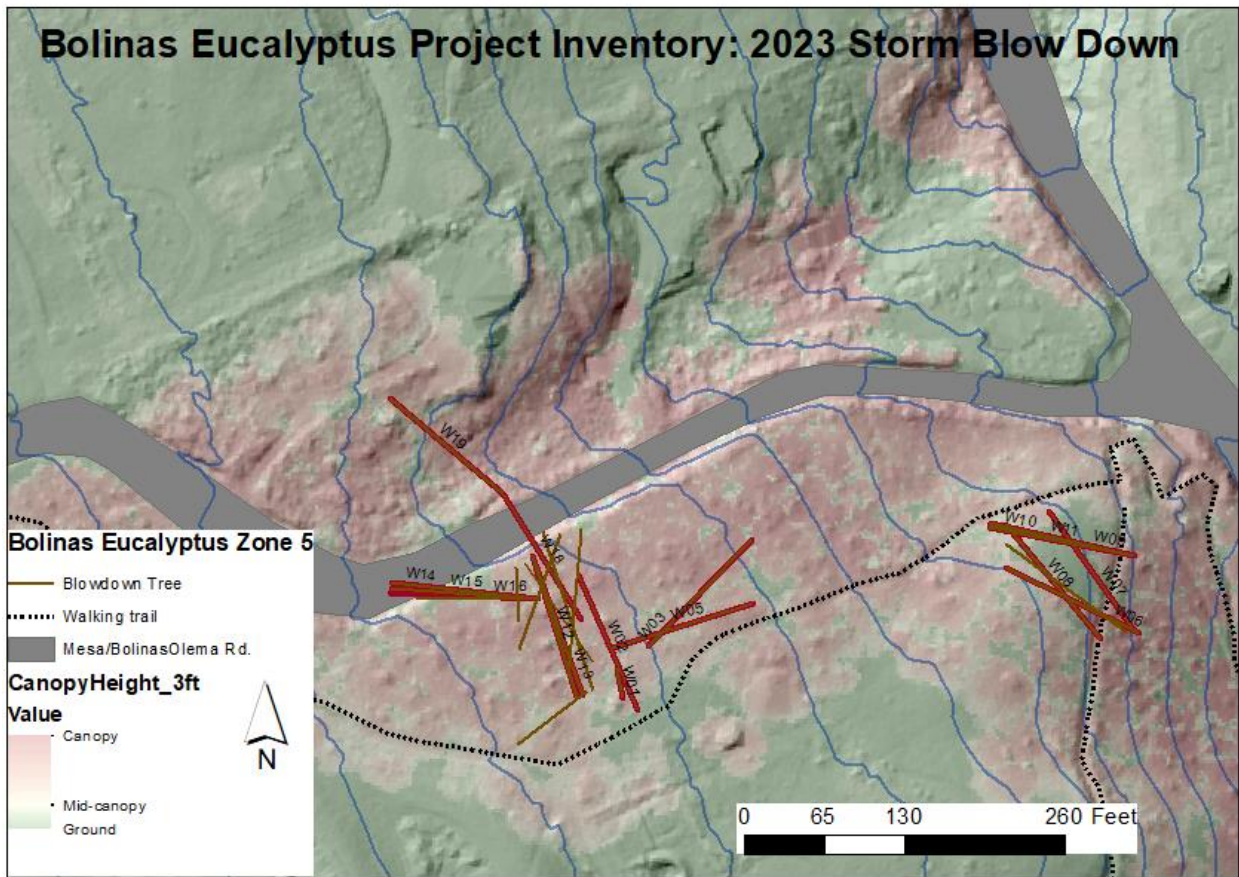


Figure 12 Trees blown down in the January 2023 winds



Figure 13 Some January 2023 wind thrown blown down trees

On March 3, 2023, a month after the January storms another tree, nearby the 63" tree that had fallen earlier, failed during calm clear conditions. Its collapse caused 2 of its neighboring trees also to fall. Those trees and large broken branches descended onto Mesa Road, destroying a power pole and wires, extinguishing electricity service to the local area for some time. PG&E

crews worked day and night (Figure 1). Fortunately, no vehicles were traveling the road as the trees fell. Others were not so lucky. On March 22 falling trees killed 3 persons in separate Bay Area incidents during a “bomb cyclone” event.



Figure 14 Two large trees fell across Mesa Road on March 3, 2023

The photo below shows the ground saturation that occurred shortly after a tree along Mesa Road blew down. The root balls had been consistently anchored each with a large number of 1-2” diameter roots. In Figure 15 the water table had risen to the point that the large tree structure was not supportable given the wet soil conditions, but earlier in the same week, other trees had blown down without a high level of root ball saturation. The trees at Zone 5 today are up to 3 times the height of the native oak woodland trees that most likely occupied the site in pre-European times. This suggests that the soils in the area have not evolved with large, and tall trees that are vulnerable to the high gusts of southerly winds characteristic of Pacific coastal winter storms.



Figure 15 Root ball alongside Mesa Road

MONARCH BUTTERFLY USE

The Monarch butterfly migration occurred during the period of the inventory project and this is a phenomenon of great interest. The forester, accompanied by local butterfly experts, on a single occasion observed four blue gum trees being used by butterflies for roosting or daytime activities. Three of those trees were at the edge of the grove with sunny south-facing exposure, during calm temperate conditions which evidently created a suitable microclimate on that late-autumn day. Campbell (2022) cites many native and non-native host tree species each that “provides a dense and mature canopy”. Over time, use of the Zone 5 stand represents 1.45% of Bolinas Thanksgiving Count Monarch observations over the last 25 years (Xerces, 2023). New Year’s counts conducted from 2018 to 2023 have likewise only produced 22 Monarchs over the 7-year period, or an average of 3 butterflies a year. Given the sparse and deteriorating canopy conditions of this stand, the fact that no Monarch use has been reported at the site for 14 of the past 22 years, and supposing that the Monarchs have been utilizing coastal woodland habitats for many thousands of years, the evidence suggests that a native woodland restoration project could be developed that would enhance future Monarch habitat here.

Monarch butterfly populations and ecology will be covered in detail by the forthcoming WRA biological report.

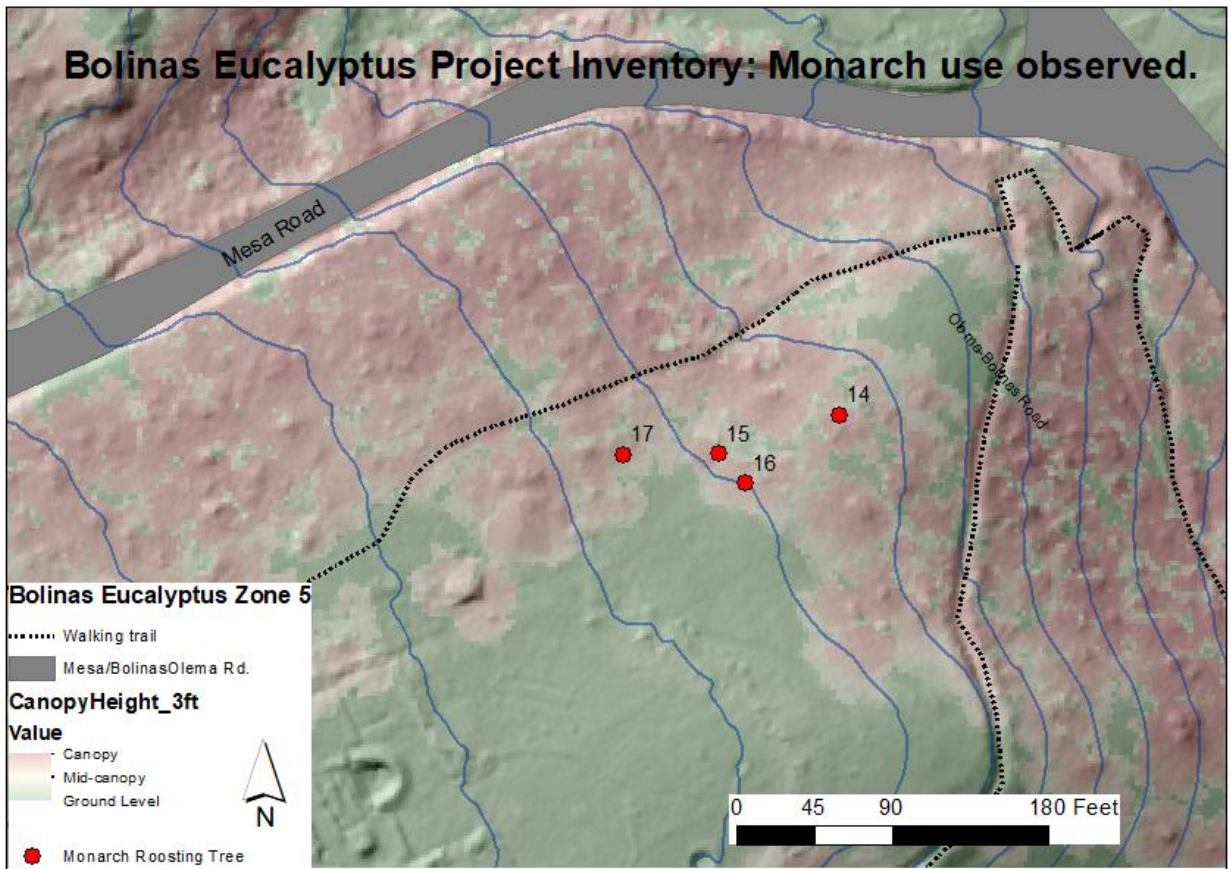


Figure 16 Monarch use observed December 2022

IVY AND INVASIVE PLANTS



Figure 17 Vines of English ivy and Cape ivy climbing trees on a private parcel

There is extensive vine cover of English ivy and Cape Ivy spreading mostly on the northerly parcels. Suffice it to say that the allelopathic nature of Eucalyptus stands effectively eliminates native flora and instead results in fire- and windthrow-prone monocultures that attract hardy invasives such as broom, English Ivy, cape Ivy, and Acacias. Such conditions are common around the Bay Area and they create artificial exotic vegetative conditions that beg for the restoration of oak woodland biodiversity that supports the broad array of native flora and fauna.

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6. APPENDICES

Appendix 1. Digital TREE PHOTO REPORT linkfile021023_photo_report.xlsx Photos, Excel files, and maps located for public access at <https://1drv.ms/u/s!AihFbfiCwtAwgahAx7p5-r4ESYk2VA?e=IjZl91>

Appendix 2. High Resolution MAPS (see below)

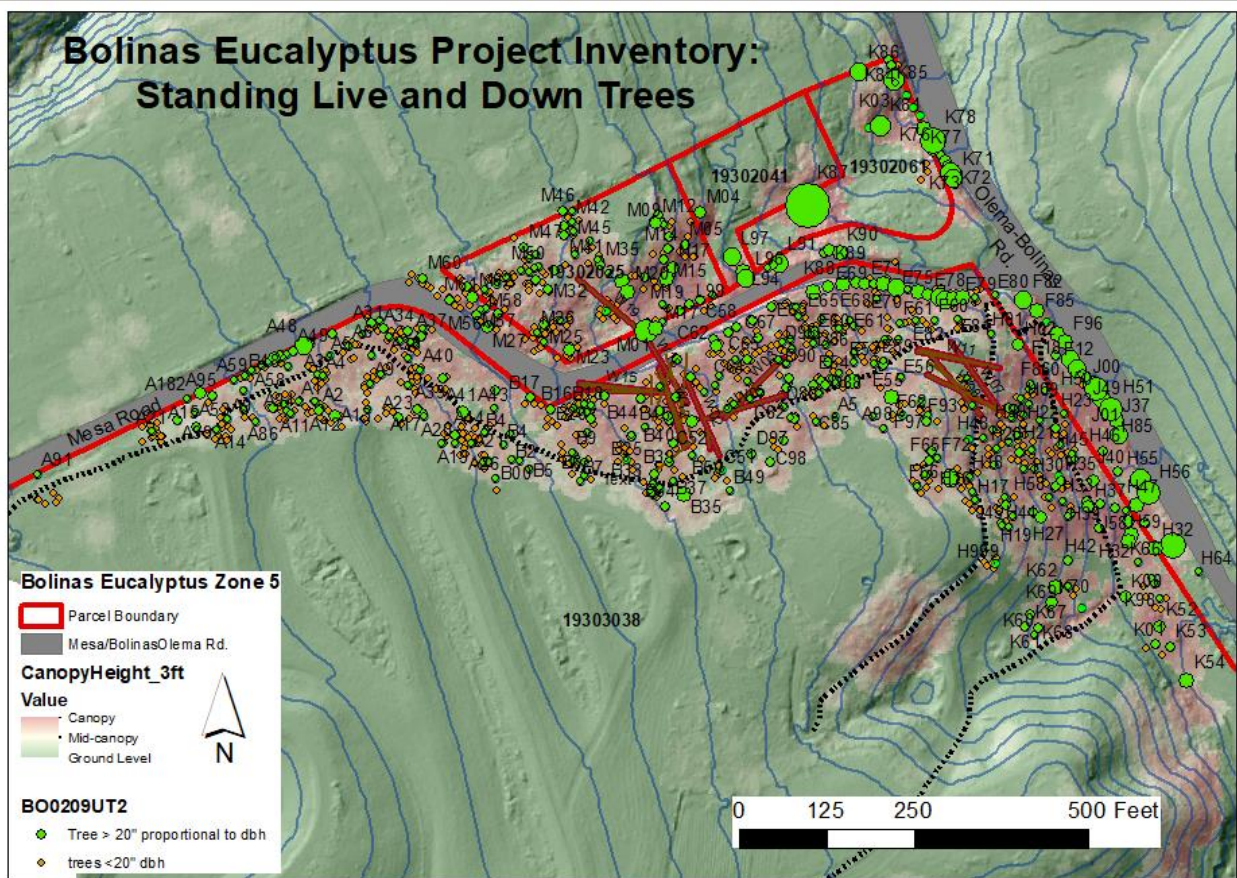


Figure 18 This is Figure 5 with tree numbers included

High Resolution Maps 1 to 3. Please note that these slightly adjusted GPS positions are per Garmin CSX60 capabilities under dense canopy.

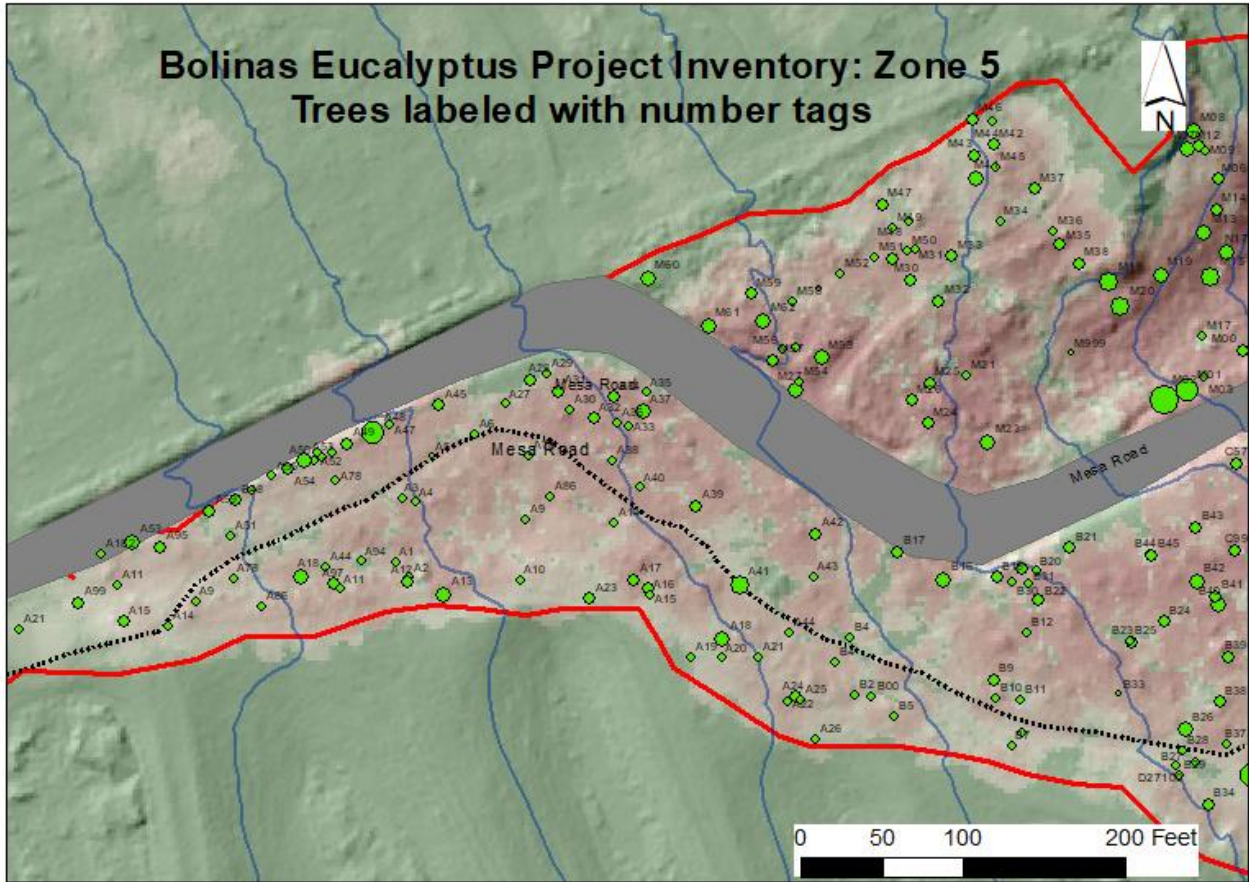


Figure 17 Field Map West

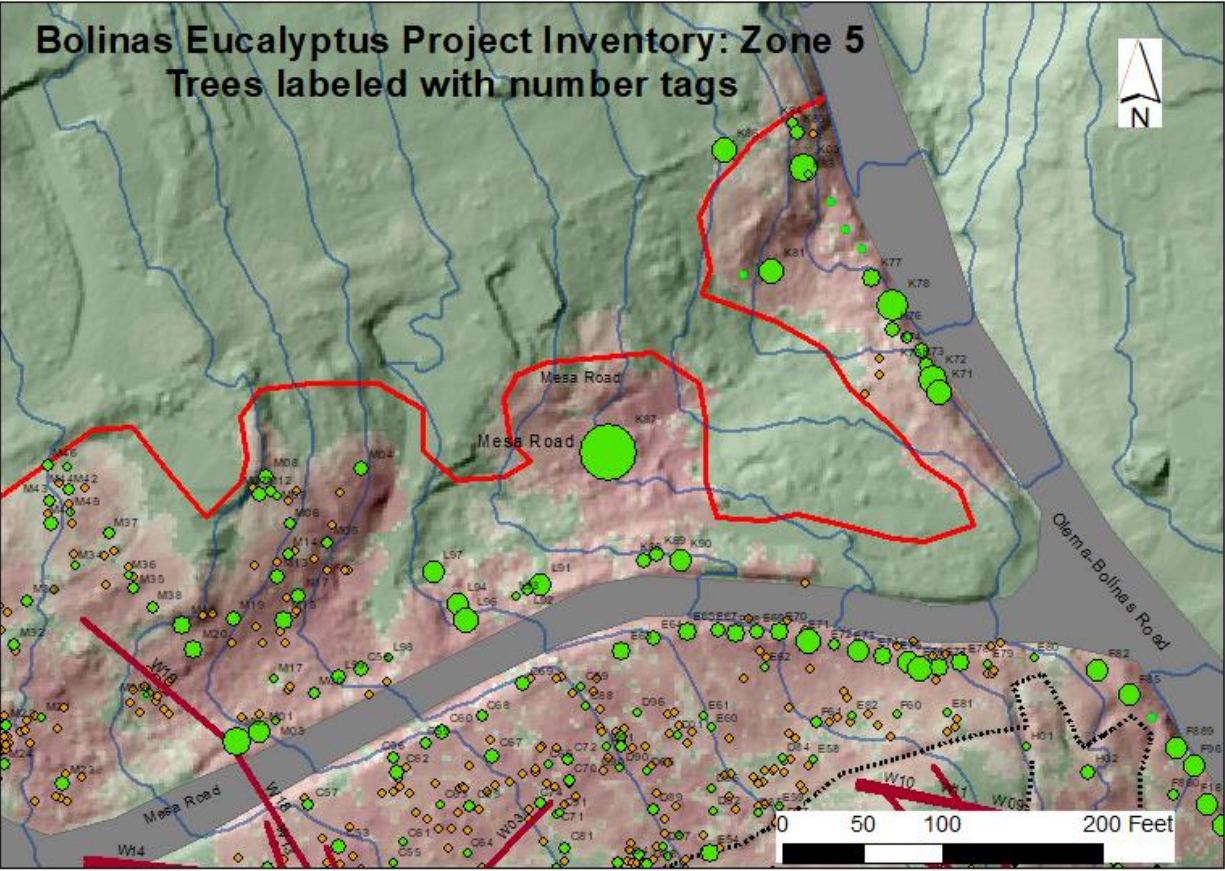


Figure 20 Trees with Tag Numbers Northeast

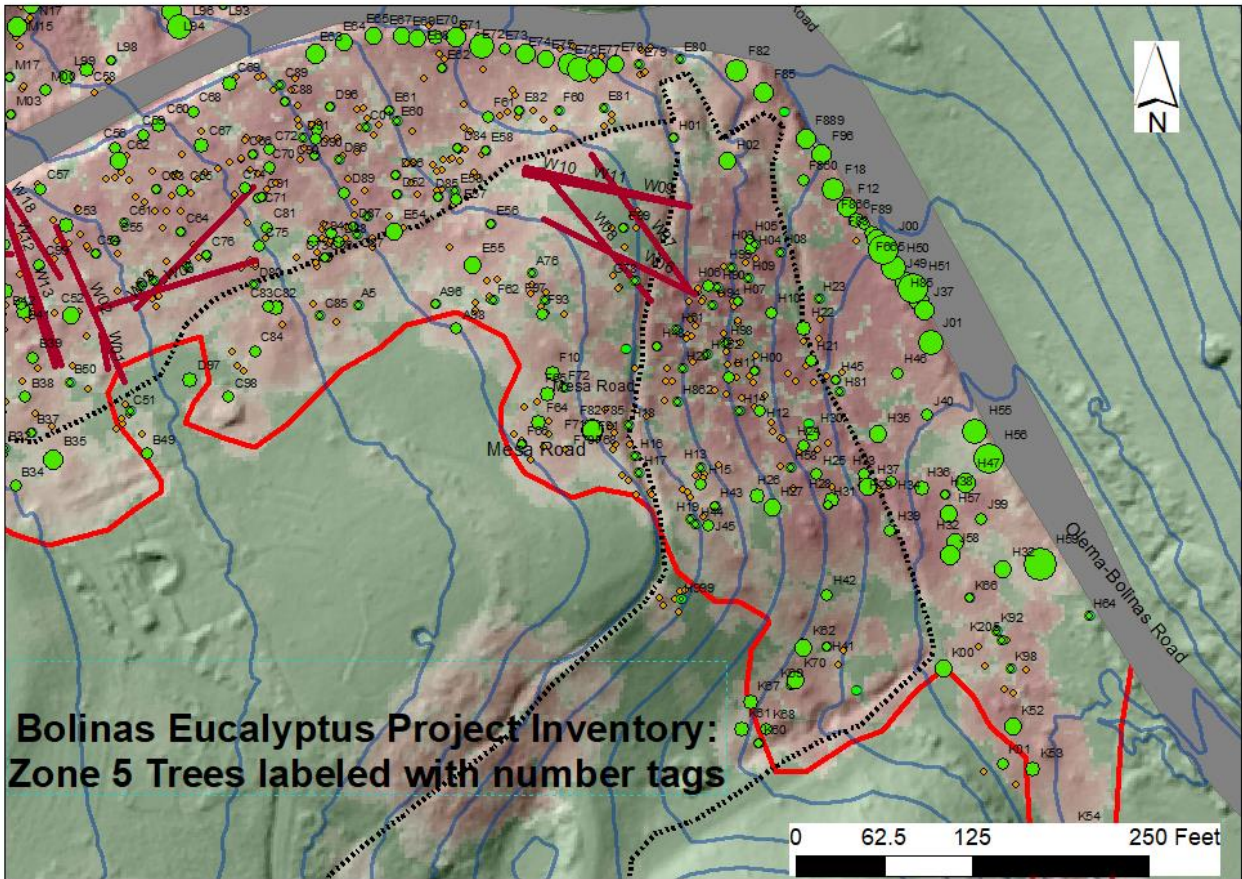


Figure 21 Trees with tag numbers southeast

Appendix 3. This Appendix is included to inform readers on “Crown Class”.

FIELD INSTRUCTIONS
FOR THE ANNUAL INVENTORY OF
CALIFORNIA, OREGON, AND WASHINGTON
2021

When GROWTH SAMPLE TREE = N, the CROWN CLASS from the previous visit will be downloaded. Update this value if there is an obvious error or change.

When Collected:	All live tally trees ≥ 1.0 inch DBH/DRC	
Field width:	1 digit	
Tolerance:	No errors	
Values:	Code	Description
	1	Open Grown – trees with crowns that received full light from above and from all sides throughout most of its life, particularly during its early developmental period.

	2	Dominant – trees with crown extending above the general level of the crown canopy and receiving full light from above and partly from the sides. These trees are taller than the average trees in the stand and their crowns are well developed, but they could be somewhat crowded on the sides. Also, trees whose crowns have received full light from above and from all sides during early development and most of their life. Their crown form or shape appears to be free of influence from neighboring trees.
	3	Co-dominant – trees with crowns at the general level of the crown canopy. Crowns receive full light from above but little direct sunlight penetrates their sides. Usually they have medium-sized crowns and are somewhat crowded from the sides. In stagnated stands, co-dominant trees have small-sized crowns and are crowded on the sides.
	4	Intermediate – trees that are shorter than dominants and co-dominant, but their crowns extend into the canopy of co-dominant and dominant trees. They receive little direct light from above and none from the sides. As a result, intermediate trees usually have small crowns and are very crowded from the sides.
	5	Overtopped – trees with crowns entirely below the general level of the crown canopy that receive no direct sunlight either from above or the sides.

Appendix 4: Photos, Excel files, aerial video, and maps located online for public access at <https://1drv.ms/u/s!AihFbflCwtAwgahAx7p5-r4ESYk2VA?e=ljZl91>

Appendix 5: Inventory Field Data

BOLINAS EUCALYPTUS PROJECT ZONE 5 FIELD DATA

Table with columns: Recno, Street, Date, Tree Tag #, Waypoint, Tree Species, # Stems, DBH (in), Height (ft), % Defect, CrownDian, Position, Condition, Tree Photo, Branch/Bol, Target, hazard, Notes, DBH2, DBH3, DBH4, DBH5, DBH6, Butterfly, DBH7, Latitude, Longitude, Live Crown Photo, Seric ORGWaypoint #.

303 Area 5	1/26/2023	1 J01	Blue Gum	1	60	120	0	30 5. Topped	Poor	http://mdc Previously	1. Road	Heavy debris alongside road at base of eucalyptus trees	9 Unknown	37.91145	-122.69	10 5. EBE5	H85
304 Area 5	1/26/2023	85 H85	Blue Gum	1	52	110	0	10 3. Intermer	Poor	http://mdc Previously	1. Road	3947 mixup fixed tg	9 Unknown	37.91148	-122.69	30 4. EBE4	J49
305 Area 5	1/26/2023	49 J49	Blue Gum	1	48	195	0	50 1 Dominan	Good	http://mdc Previously	1. Road	Create a long road huge branch hanging over trail	9 Unknown	37.91144	-122.69	50 4. EBE4	J37
306 Area 5	1/26/2023	37 J37	Blue Gum	1	48	170	0	50 2. Codomir	Poor	http://mdc Previously	1. Road	Leans over road	9 Unknown	37.91152	-122.69	15 4. EBE4	H50
307 Area 5	1/26/2023	50 H50	Blue Gum	1	61	175	0	20 2. Codomir	Poor	http://mdc Previously	1. Road	Largest tree probably plus is the best	9 Unknown	37.91149	-122.69	30 4. EBE4	J00
308 Area 5	1/26/2023	0 J00	Blue Gum	1	79	190	0	60 1 Dominan	Good	http://mdc None	1. Road		9 Unknown	37.91114	-122.69	80 3. EBE3	H55
309 Area 5	1/26/2023	55 H55	Monterey C	1	67	130	0	75 5. Topped	Poor	http://mdc Previously	1. Road	Five 20-in stems extending from your base	9 Unknown	37.91113	-122.69	50 3. EBE3	H56
310 Area 5	1/26/2023	56 H56	Monterey C	1	72	80	0	35 3. Intermer	Poor	http://mdc Previously	0. None		9 Unknown	37.91104	-122.69	30 3. EBE3	H57
311 Area 5	1/26/2023	57 H57	Monterey C	1	42	80	0	30 5. Topped	Poor	http://mdc Previously	1. Road	Measured height tallets trees	9 Unknown	37.91156	-122.69	50 4. EBE4	Hh50
312 Area 5	1/26/2023	51 H51	Blue Gum	1	75	175	0	60 1 Dominan	Fair	http://mdc Previously	0. None		9 Unknown	37.91096	-122.69	30 4. EBE4	J58
313 Area 5	1/26/2023	58 J58	Monterey C	1	50	95	0	50 3. Intermer	Poor	http://mdc Previously	1. Road	On road seven stems above	9 Unknown	37.91092	-122.69	50 5. EBE5	H59
314 Area 5	1/26/2023	59 H59	Monterey C	1	81	99	10	50 1 Dominan	Poor	http://mdc None	1. Road	Leaning into next tree alongside road hazard	9 Unknown	37.91084	-122.69	20 3. EBE3	H64
315 Area 5	1/26/2023	64 H64	Blue Gum	1	20	100	0	20 2. Codomir	Poor	http://mdc None	0. None	Open grown possibly off property	9 Unknown	37.91041	-122.69	30 6. EBE6	K54
316 Area 5	1/31/2023	54 K54	Blue Gum	1	52	145	0	70 1 Dominan	Good	http://mdc None	0. None	6 6	9 Unknown	37.91079	-122.69	15 5. EBE5	K205
317 Area 5	1/31/2023	205 K205	Blue Gum	3	23	160	0	20 1 Dominan	Good	http://mdc None	0. None		9 Unknown	37.91081	-122.69	2. EBE2	K92
318 Area 5	1/31/2023	92 K92	Blue Gum	1	20	156	0	20 2. Codomir	Good		1. Road	Edge of sta 14 10 11 19	9 Unknown	37.91074	-122.69	20 4. EBE4	K98
319 Area 5	1/31/2023	98 K98	Blue Gum	5	20	155	0	20 2. Codomir	Good	http://mdc None	2. Trail		9 Unknown	37.91074	-122.69	20 4. EBE4	K00
320 Area 5	1/31/2023	0 K00	Blue Gum	1	42	155	0	30 1 Dominan	Good	http://mdc None	0. None	10 10	9 Unknown	37.91055	-122.69	25 3. EBE3	K01
321 Area 5	1/31/2023	1 K01	Blue Gum	3	31	140	0	25 3. Intermer	Good	http://mdc None	2. Trail		9 Unknown	37.91062	-122.69	40 3. EBE3	K52
322 Area 5	1/31/2023	52 K52	Blue Gum	1	42	155	0	60 1 Dominan	Good	http://mdc None	2. Trail	In what area at edge of stand	9 Unknown	37.91054	-122.69	30 2. EBE2	K53
323 Area 5	1/31/2023	53 K53	Blue Gum	1	39	150	0	50 1 Dominan	Good	http://mdc None	2. Trail		9 Unknown	37.91087	-122.69	25 2. EBE2	K66
324 Area 5	1/31/2023	66 K66	Blue Gum	1	24	160	0	25 1 Dominan	Good	http://mdc Falling	Brar 2. Trail		9 Unknown	37.9107	-122.69	30 2. EBE2	K64
325 Area 5	1/31/2023	65 K65	Blue Gum	1	33	160	0	30 1 Dominan	Good	http://mdc Falling	and 2. Trail		9 Unknown	37.91078	-122.69	25 3. EBE3	K62
326 Area 5	1/31/2023	62 K62	Blue Gum	1	46	145	0	20 2. Codomir	Fair	http://mdc Falling	and 2. Trail		9 Unknown	37.91062	-122.69	30 4. EBE4	K61
327 Area 5N	1/31/2023	61 K61	Blue Gum	1	38	160	0	30 2. Codomir	Fair	http://mdc Falling	Brar 2. Trail	Tree leans on adjoining tree remove it	9 Unknown	37.91059	-122.69	25 5. EBE5	K60
328 Area 5	1/31/2023	60 K60	Blue Gum	1	26	100	0	20 3. Intermer	Poor	http://mdc Falling	Brar 2. Trail		9 Unknown	37.91062	-122.69	4. EBE4	K68
329 Area 5	1/31/2023	68 K68	Blue Gum	1	32	150	0	40 2. Codomir	Fair	http://mdc Falling	and 0. None		9 Unknown	37.91067	-122.69	30 4. EBE4	K67
330 Area 5	1/31/2023	67 K67	Blue Gum	1	36	160	0	40 2. Codomir	Fair		Falling Brar 0. None		9 Unknown	37.91071	-122.69	20 2. EBE2	K69
331 Area 5	1/31/2023	69 K69	Blue Gum	1	20	140	0	15 3. Intermer	Fair	http://mdc Shedding	B 0. None		9 Unknown	37.91072	-122.69	30 3. EBE3	K70
332 Area 5N	1/31/2023	70 K70	Blue Gum	1	42	160	0	50 1 Dominan	Good	http://mdc Previously	3. Building	NOTE 82 in 36 26 28	9 Unknown	37.91242	-122.691	25 3. EBE3	K75
333 Area 5N	1/31/2023	75 K75	Blue Gum	4	32	140	0	60 1 Dominan	Fair	http://mdc Previously	3. Building	Tree on road bank also road hazard	9 Unknown	37.91243	-122.691	25 3. EBE3	K74
334 Area 5N	1/31/2023	74 K74	Blue Gum	1	40	130	0	25 2. Codomir	Fair	http://mdc Previously	3. Building	Target also house tree on banking over road	9 Unknown	37.91239	-122.691	50 3. EBE3	K73
335 Area 5N	1/31/2023	73 K73	Blue Gum	1	42	145	0	50 2. Codomir	Fair	http://mdc Previously	3. Building	Target also road tree on banking	9 Unknown	37.91244	-122.691	20 3. EBE3	K72
336 Area 5N	1/31/2023	72 K72	Blue Gum	1	69	150	10	25 2. Codomir	Poor	http://mdc Previously	3. Building	Target also road tree on Bank near junction	9 Unknown	37.91249	-122.691	60 2. EBE2	K71
337 Area 5N	1/31/2023	71 K71	Blue Gum	1	60	130	5	50 1 Dominan	Fair	http://mdc Previously	3. Building	Treon Bank above road also hazard	9 Unknown	37.91249	-122.691	20 3. EBE3	K76
338 Area 5N	1/31/2023	76 K76	Blue Gum	1	40	145	0	25 2. Codomir	Poor	http://mdc Previously	1. Road	Tree on banking above road	9 Unknown	37.91256	-122.691	30 3. EBE3	K77
339 Area 5N	1/31/2023	77 K77	Blue Gum	1	46	150	0	50 1 Dominan	Fair	http://mdc Previously	1. Road	4 stems 36 36 36 and 28	9 Unknown	37.91254	-122.691	50 3. EBE3	K78
340 Area 5N	1/31/2023	78 K78	Blue Gum	1	83	150	0	50 1 Dominan	Fair		Previously 1. Road	On banking next to road	9 Unknown	37.91263	-122.691	30 4. EBE4	G80
341 Area 5N	1/31/2023	80 K80	Blue Gum	1	38	125	0	30 3. Intermer	Poor	http://mdc Falling	and 1. Road		9 Unknown	37.91277	-122.691	45 5. EBE5	K03
342 Area 5N	1/31/2023	3 K03	Blue Gum	1	69	160	0	70 1 Dominan	Good		Falling Brar 1. Road	Almost dead	9 Unknown	37.91276	-122.691	1 3. EBE3	K83
343 Area 5N	1/31/2023	83 K83	Blue Gum	1	27	40	60	1 4. Suppress	Poor	http://mdc Falling	Brar 1. Road	Tree hanging over road	9 Unknown	37.91285	-122.691	20 4. EBE4	K84
344 Area 5N	1/31/2023	84 K84	Blue Gum	1	33	100	0	40 3. Intermer	Poor	http://mdc None	1. Road	Hangs over road	9 Unknown	37.91283	-122.691	25 4. EBE4	K85
345 Area 5N	1/31/2023	85 K85	Blue Gum	2	37	150	0	1 Dominan	Fair	http://mdc Previously	1. Road	Tree at corner of Stand on road	9 Unknown	37.9128	-122.691	50 4. EBE4	K86
346 Area 5N	1/31/2023	86 K86	Blue Gum	1	61	130	0	50 2. Codomir	Poor	http://mdc Falling	Brar 3. Building	Large tree in yard could threaten building in blowdown	9 Unknown	37.91259	-122.691	50 3. EBE3	K81
347 Area 5N	1/31/2023	81 K81	Blue Gum	1	67	160	0	70 1 Dominan	Good	http://mdc None	0. None	Large tree in yard	9 Unknown	37.91259	-122.691	25 2. EBE2	G82
348 Area 5N	1/31/2023	82 K82	Blue Gum	1	61	145	0	50 2. Codomir	Fair	http://mdc Previously	3. Building	P very large tree covered in ivy big rot in center	9 Unknown	37.91217	-122.691	60 4. EBE4	K87
349 Area 5N	1/31/2023	87 K87	Blue Gum	1	140	170	50	70 1 Dominan	Fair	http://mdc Previously	3. Building	Also road hazard	9 Unknown	37.91206	-122.691	20 2. EBE2	K88
350 Area 5N	1/31/2023	88 K88	Blue Gum	1	38	88	10	10 3. Intermer	Poor	http://mdc Previously	3. Building	Hazard also road	9 Unknown	37.91213	-122.691	10 4. EBE4	K89
351 Area 5N	1/31/2023	89 K89	Blue Gum	1	40	88	20	10 3. Intermer	Poor	http://mdc Previously	3. Building	Also road hazard treat a long road	9 Unknown	37.9121	-122.691	20 4. EBE4	K90
352 Area 5N	1/31/2023	90 K90	Blue Gum	1	54	135	0	50 1 Dominan	Fair	http://mdc None	3. Building	Also road hazard	9 Unknown	37.91206	-122.692	25 4. EBE4	L91
353 Area 5N	1/31/2023	91 L91	Blue Gum	1	56	155	0	50 1 Dominan	Good	http://mdc None	1. Road	Covered in vines English ivy	9 Unknown	37.91199	-122.692	10 2. EBE2	L92
354 Area 5N	1/31/2023	92 L92	Blue Gum	1	33	100	0	10 3. Intermer	Poor	http://mdc None	1. Road	In row along road	9 Unknown	37.91201	-122.692	5 2. EBE2	L93
355 Area 5N	1/31/2023	93 L93	Blue Gum	1	27	60	0	5 3. Intermer	Poor	http://mdc Falling	Brar 1. Road	Buildings nearby also	9 Unknown	37.91202	-122.692	35 2. EBE2	L94
356 Area 5N	1/31/2023	94 L94	Blue Gum	1	54	135	0	50 1 Dominan	Fair	http://mdc None	1. Road		9 Unknown	37.91192	-122.692	30 2. EBE2	L96
357 Area 5N	1/31/2023	96 L96	Blue Gum	1	63	130	0	10 2. Codomir	Poor	http://mdc Falling	Brar 1. Road		9 Unknown	37.91208	-122.692	30 2. EBE2	L97
358 Area 5N	1/31/2023	97 L97	Blue Gum	1	57	150	0	55 1 Dominan	Good		Previously 1. Road	Tree Dead top removed	9 Unknown	37.91192	-122.692	1 2. EBE2	L98
359 Area 5N	1/31/2023	98 L98	Blue Gum	1	25	24	50	1 5. Topped	Poor	http://mdc None	0. None	Dead	9 Unknown	37.91193	-122.692	0 3. EBE3	L99
360 Area 5N	1/31/2023	99 L99	Blue Gum	1	37	48	100	0 4. Suppress	Poor	http://mdc Previously	1. Road	Vines galore English ivy	9 Unknown	37.9118	-122.692	10 4. EBE4	
361 Area 5N	2/7/2023	3 M03	Blue Gum	1	26	124	10	20 3. Intermer	Poor	http://mdc Previously	1. Road		9 Unknown	37.91179	-122.692	20 4. EBE4	
362 Area 5N	2/7/2023	2 M02	Blue Gum	1	72	140	0	60 1 Dominan	Good	http://mdc Previously	1. Road	6 6	9 Unknown	37.91181	-122.692	15 4. EBE4	
363 Area 5N	2/7/2023	1 M01	Blue Gum	3	53	140	0	25 2. Codomir	Poor	http://mdc Falling	Brar 1. Road	8 8	9 Unknown	37.91184	-122.692	5 3. EBE3	
364 Area 5N	2/7/2023	0 M00	Blue Gum	3	30	130	0	10 3. Intermer	Poor	http://mdc None	3. Building	Not likely to 16	9 Unknown	37.91226	-122.692	35 1. EBE1	
365 Area 5N	2/7/2023	4 M04	Blue Gum	2	42	160	0	40 1 Dominan	Good	http://mdc None	0. None	10 10 10 12 16 9 Unknownwr 14	37.91213	-122.692	15 3. EBE3		
366 Area 5N	2/7/2023	5 M05	Blue Gum	7	32	160	0	15 2. Codomir	Good	http://mdc None	3. Building	12	9 Unknown	37.91216	-122.692	30 3. EBE3	
367 Area 5N	2/7/2023	6 M06	Blue Gum	2													

378	Area 5N	2/7/2023	20	M20	Blue Gum	1	50	150	0	40	1	Dominan Fair	http://mdc None	1. Road	Clean heav	18	16	6	6	9	Unknowr	6	37.91183	-122.693	10	5.	EBE5	
379	Area 5N	2/7/2023	21	M21	Blue Gum	7	23	140	0	10	2.	Codomir Fair	http://mdc Falling Brar	1. Road		6	12	12	14	6	9	Unknowr	14	37.91172	-122.693	20	5.	EBE5
380	Area 5N	2/7/2023	23	M23	Blue Gum	7	40	150	0	30	1	Dominan Fair	http://mdc Falling Brar	1. Road	Next to wir	6	10	18	17	6	9	Unknowr	6	37.91175	-122.693	15	6.	EBE6
381	Area 5N	2/7/2023	24	M24	Blue Gum	7	29	145	0	20	2.	Codomir Fair	http://mdc Falling Brar	1. Road		16	6	6	14	7	9	Unknowr	14	37.91182	-122.693	30	5.	EBE5
382	Area 5N	2/7/2023	25	M25	Blue Gum	7	33	150	0	30	2.	Codomir Fair	http://mdc Falling Brar	1. Road	Photo is of	6	14	6	6	8	9	Unknowr	14	37.91179	-122.693	20	6.	EBE6
383	Area 5N	2/7/2023	26	M26	Blue Gum	7	29	145	0	20	2.	Codomir Fair	http://mdc Falling Brar	1. Road		10	6	11		9	Unknown		37.91181	-122.693	40	5.	EBE5	
384	Area 5N	2/7/2023	27	M27	Blue Gum	4	40	150	0	50	1	Dominan Fair	http://mdc Falling Brar	1. Road		6	8	6		9	Unknown		37.91203	-122.693	15	5.	EBE5	
385	Area 5N	2/7/2023	29	M29	Blue Gum	4	28	150	0	20	2.	Codomir Poor	http://mdc Falling Brar	1. Road		6	6	10	12	14	9	Unknowr	11	37.91199	-122.693	20	6.	EBE6
386	Area 5N	2/7/2023	30	M30	Blue Gum	7	34	145	0	25	2.	Codomir Fair	http://mdc Falling Brar	1. Road		11				9	Unknown		37.91204	-122.693	20	4.	EBE4	
387	Area 5N	2/7/2023	31	M31	Blue Gum	2	20	160	0	20	2.	Codomir Fair	http://mdc Falling Brar	0. None		11				9	Unknown		37.91196	-122.693	25	5.	EBE5	
388	Area 5N	2/7/2023	32	M32	Blue Gum	2	31	160	0	30	1	Dominan Good	http://mdc None	0. None	Heavy fuels throughout area	6				9	Unknown		37.91202	-122.693	25	5.	EBE5	
389	Area 5N	2/7/2023	33	M33	Blue Gum	1	30	160	0	20	2.	Codomir Fair	http://mdc Previously	' 9. Road ant Triple stem		25	26			9	Unknown		37.91209	-122.693	25	3.	EBE3	
390	Area 5N	2/7/2023	34	M34	Blue Gum	3	24	150	0	40	2.	Codomir Poor	http://mdc Falling Brar	9. Road and Building		16				9	Unknown		37.91205	-122.693	25	3.	EBE3	
391	Area 5N	2/7/2023	35	M35	Blue Gum	2	32	155	0	30	1	Dominan Fair	http://mdc Previously	' 9. Road ant Road is driv		16	8	8	6	9	Unknown		37.91207	-122.693	30	2.	EBE2	
392	Area 5N	2/7/2023	36	M36	Blue Gum	5	27	150	0	40	1	Dominan Poor	http://mdc Previously	' 9. Road and Building						9	Unknown		37.91215	-122.693	30	2.	EBE2	
393	Area 5N	2/7/2023	37	M37	Blue Gum	1	28	150	0	40	1	Dominan Fair	http://mdc Falling Brar	1. Road						9	Unknown		37.91202	-122.692	25	2.	EBE2	
394	Area 5N	2/7/2023	38	M38	Blue Gum	1	28	150	0	25	2.	Codomir Poor	http://mdc None	0. None	Pine beetle damage					9	Unknown		37.91217	-122.693	30	1.	EBE1	
395	Area 5N	2/7/2023	41	M41	Monterey f	1	36	110	0	30	2.	Codomir Poor	http://mdc None	3. Building						9	Unknown		37.9122	-122.693	20			
396	Area 5N	2/7/2023	43	M43	Blue Gum	1	31	115	0	30	2.	Codomir Fair	http://mdc Falling Brar	3. Building						9	Unknown		37.91226	-122.693	20	1.	EBE1	
397	Area 5N	2/7/2023	44	M44	Blue Gum	1	27	100	0	20	2.	Codomir Fair	http://mdc None	3. Building	Three trees	21	22	22		9	Unknown		37.91218	-122.693	25	1.	EBE1	
398	Area 5N	2/7/2023	45	M45	Monterey f	4	27	80	0	25	2.	Codomir Fair	http://mdc Falling Brar	0. None	Dead Monterey pine tree					9	Unknown		37.91226	-122.693	0	1.	EBE1	
399	Area 5N	2/7/2023	46	M46	Monterey f	1	34	85	100	0	2.	Codomir Poor	http://mdc Falling Brar	0. None	Edge of prc	7				9	Unknown		37.91212	-122.693	60			
400	Area 5N	2/7/2023	47	M47	Blue Gum	2	32	81	0	55	1	Dominan Good	http://mdc Falling Brar	1. Road		15				9	Unknown		37.91209	-122.693	20	2.	EBE2	
401	Area 5N	2/7/2023	48	M48	Blue Gum	2	27	122	0	30	2.	Codomir Fair	http://mdc None	9. Road ant Remove Vines			6	6		9	Unknown		37.91204	-122.692	25	3.	EBE3	
402	Area 5N	2/7/2023	17	N17	Blue Gum	3	40	160	0	30	1	Dominan Good	http://mdc Falling Brar	0. None	Near house	10	18	16		9	Unknown		37.91222	-122.693	20	1.	EBE1	
403	Area 5N	2/7/2023	42	M42	Monterey f	4	29	95	0	25	2.	Codomir Fair	http://mdc Falling Brar	1. Road						9	Unknown		37.91208	-122.693	20	1.	EBE1	
404	Area 5N	2/7/2023	49	M49	Blue Gum	1	26	120	0	30	2.	Codomir Fair	http://mdc Falling Brar	0. None		10				9	Unknown		37.91203	-122.693	40	2.	EBE2	
405	Area 5N	2/7/2023	51	M51	Blue Gum	2	26	100	0	40	2.	Codomir Poor	http://mdc Falling Brar	1. Road		10				9	Unknown		37.91204	-122.693	20	1.	EBE1	
406	Area 5N	2/7/2023	50	M50	Blue Gum	2	25	120	0	20	1	Dominan Good	http://mdc None	0. None		13	6	19	7	8	9	Unknowr	6	37.912	-122.693	50	3.	EBE3
407	Area 5N	2/7/2023	52	M52	Blue Gum	7	27	105	0	30	1	Dominan Good	http://mdc None	1. Road		9	8			9	Unknown		37.91186	-122.693	25	5.	EBE5	
408	Area 5N	2/7/2023	53	M53	Blue Gum	3	37	155	0	30	1	Dominan Good	http://mdc None	1. Road						9	Unknown		37.91182	-122.693	10	3.	EBE3	
409	Area 5N	2/7/2023	54	M54	Blue Gum	1	27	135	0	30	2.	Codomir Poor	http://mdc Previously	' 1. Road						9	Unknown		37.91188	-122.693	25	3.	EBE3	
410	Area 5N	2/7/2023	55	M55	Blue Gum	1	27	160	0	15	2.	Codomir Poor	http://mdc Previously	' 1. Road						9	Unknown		37.91187	-122.693	10	3.	EBE3	
411	Area 5N	2/7/2023	56	M56	Blue Gum	1	22	80	20	10	3.	Intermec Poor	http://mdc Previously	' 0. None						9	Unknown		37.91186	-122.693	25	3.	EBE3	
412	Area 5N	2/7/2023	57	M57	Blue Gum	1	35	160	0	35	1	Dominan Fair	http://mdc Falling Brar	0. None		19	17	10	6	10	9	Unknowr	8	37.91196	-122.693	10	5.	EBE5
413	Area 5N	2/7/2023	58	M58	Blue Gum	7	24	150	0	10	1	Dominan Poor	http://mdc Falling Brar	0. None		13				9	Unknown		37.91197	-122.693	25	4.	EBE4	
414	Area 5N	2/7/2023	59	M59	Blue Gum	2	31	120	0	30	2.	Codomir Fair	http://mdc None	0. None	Leans away	14	14	6	10	10	9	Unknowr	6	37.91196	-122.693	25	6.	EBE6
415	Area 5N	2/7/2023	60	M60	Blue Gum	7	36	120	0	30	2.	Codomir Fair	http://mdc None	1. Road		6	6	10	19	6	9	Unknown		37.9119	-122.693	30	6.	EBE6
416	Area 5N	2/7/2023	61	M61	Blue Gum	6	38	150	0	55	1	Dominan Good	http://mdc None	1. Road		16	8	10	10	18	9	Unknowr	10	37.91192	-122.693	30	6.	EBE6
417	Area 5N	2/7/2023	62	M62	Blue Gum	7	41	157	0	35	1	Dominan Good																

3.257282

ARBORIST REPORT

Eucalyptus Hazard Assessment and Management Recommendations Zone 5 Stand at Mesa and Olema Bolinas Roads

Prepared for:
The Bolinas Eucalyptus Project
Bolinas, California

Prepared by:
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ISA Certified Arborist
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ARBORSCIENCE, LLC

June 21, 2023

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EXECUTIVE SUMMARY

The Zone 5 stand of trees is in advanced decline. Tree failures due to broken tree tops, uprooting, and a wildfire will likely block both primary evacuation/emergency access routes, which could result in mass human casualties. This hazardous condition appears to qualify as a public nuisance that could be recognized by the Marin County Board of Supervisors, and then proactively addressed. I recommend that the stand be removed and replaced by a mixed evergreen woodland of coast live oak, California bay, buckeye, and toyon. This will substantially improve public safety and create a long-term sustainable Monarch butterfly habitat.

ASSIGNMENT

The Bolinas Eucalyptus Project hired **ARBORSCIENCE, LLC** to evaluate the condition of and provide management recommendations for a 10.5-acre stand of bluegum eucalyptus (*Eucalyptus globulus*) growing near the intersection of Mesa Road and Olema Bolinas Road in Bolinas. I inspected the subject trees on April 29, 2023 with consideration of the inventory prepared by East-West Forestry Associates¹ and a report by Urban Forestry Associates². I have also provided management advice in the past to the Bolinas Public Utility District (BPUD) and secured Federal funding to reduce fire fuels in this stand.³ I have also evaluated and prioritized treatment of 13 other eucalyptus stands in Bolinas.⁴

BACKGROUND

The subject eucalyptus stand occupies three separate parcels—a portion of the BPUD property (APN: 193-030-38) and three developed private parcels at 10, 20, and 30 Mesa Road (APNs: 193-020-51, 193-020-41, and 193-020-25). The main access to the Bolinas Mesa passes through the stand (Mesa Road) and the main road access to downtown Bolinas (Olema Bolinas Road) borders the east margin of the Zone 5 stand (Figure 1). Both of these roads are primary evacuation routes for Bolinas and provide first-responder access for mutual aid resources from outside Bolinas.

SUBJECT STAND DESCRIPTION

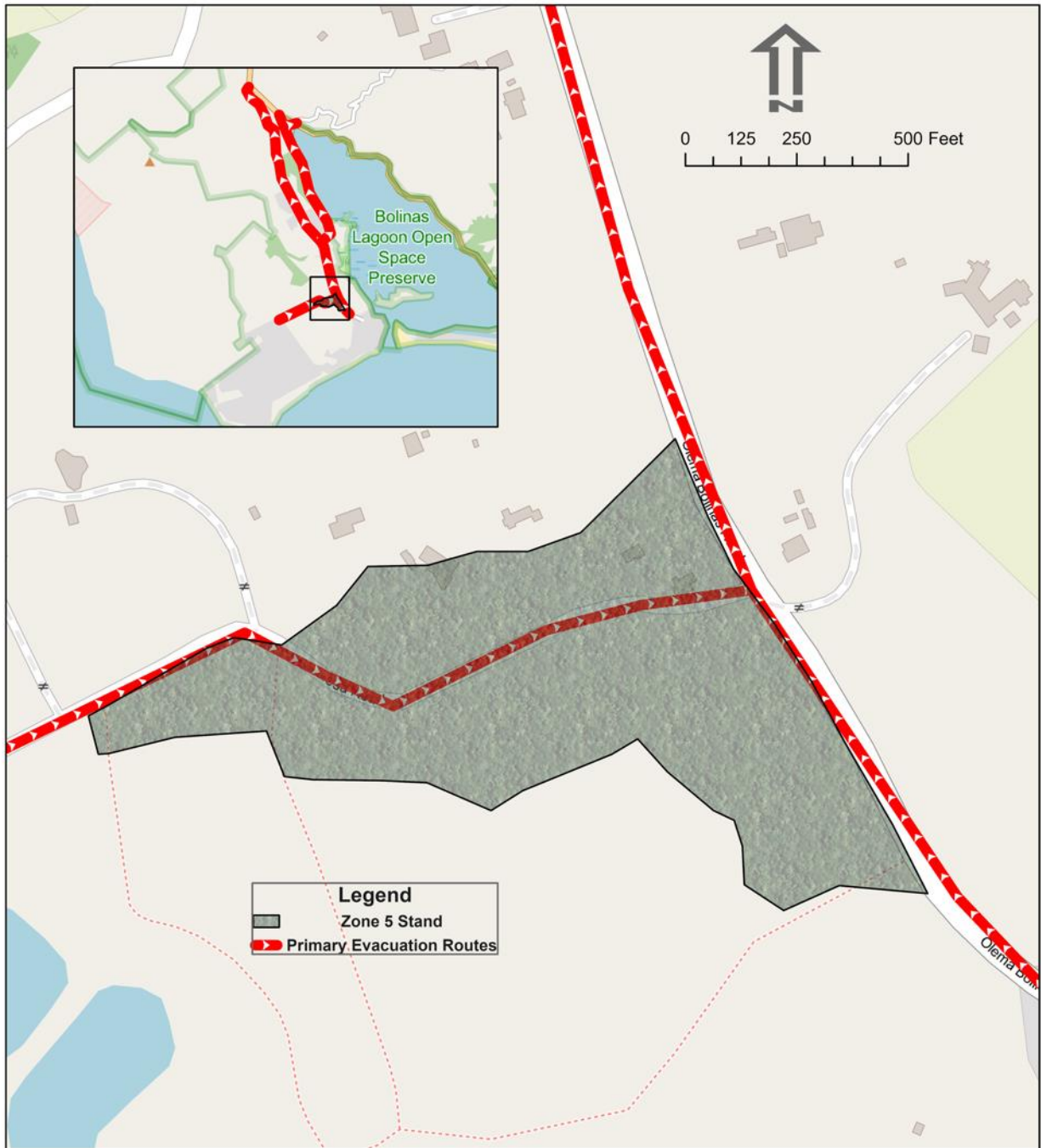
The Zone 5 eucalyptus stand (Figure 1, Page 3) originated in the early 1900s as planted bluegum and cypress trees along the roadsides that generated seed for volunteer trees which advanced into the nearby grasslands. Large trees that grow along the roadways were topped by PG&E in 1964 for utility line clearance. The rest of the stand remained untended until the 2000s when the stand was thinned in 2011 for fire safety purposes—removing smaller understory trees and accumulated forest debris (branches and bark).

¹ The Bolinas Eucalyptus Project Inventory: Zone 5 (March 2023).

² Report by Benjamin Anderson (January 5, 2021).

³ As the Marin County Fire Department Forester and FireSafe Marin President.

⁴ Assessment of 14 Eucalyptus Stands: Locations, Attributes, Fire Hazards, Treatments & Priorities (March 2021)



ARBORSCIENCE, LLC
Sound Tree Advice

Figure 1
Zone 5 Eucalyptus Stand
and Evacuation Routes
Bolinas, California

General Condition of Decline. All of the bluegum eucalyptus in the stand have been heavily defoliated by the Eucalyptus Tortoise Beetles (*Trachymela sloanei*) which have significantly reduced their vigor (Photo 1, below). This defoliation has resulted in decreased capacity to close wounds and develop sufficient wood needed for adequate trunk taper, and is necessary to develop strong root systems for stability and compensate for wood loss due to decay. **The stand is in extremely poor condition and is not naturally regenerating within its existing footprint.**



Roadside Trees. The large trees growing along the roadside have significant structural defects related to topping cuts made by PG&E in 1964 with associated advanced wood decay and weakly attached multiple trunks with included bark that are highly prone to failure (Photo 2, below). **These roadside trees present a high failure risk to both Mesa Road and Olema-Bolinas Road. A strong earthquake would likely cause these weakly attached trunks to fail onto the roads.**



Windthrow. The subject stand is highly unstable due to: (1) its development history (it was not regularly thinned) which created tall trees with insufficient taper, and (2) its proximity to large open areas to west that are used for settling ponds that allow full-force-winds to reach the stand. Nearly half of the trees in the stand have height-to-diameter ratios that exceed 50%, which reflects a highly unstable stand condition (Figure 2). Recent storms toppled 28 trees (Photo 3 below), resulting in multiple closures of Mesa road for days at a time, a crushed vehicle where two young Bolinas residents nearly lost their lives, and a trail system that remains closed 5 months after the first of the storms. **Trees in this stand within falling distance of roads are likely to uproot and block roads, and present high failure risks. Important note:** leaving a portion (remnant island) of this stand for monarch butterfly habitat is inadvisable because these trees do not have the required structure to be stable without surrounding trees, and they will be toppled by normal winds in the area.

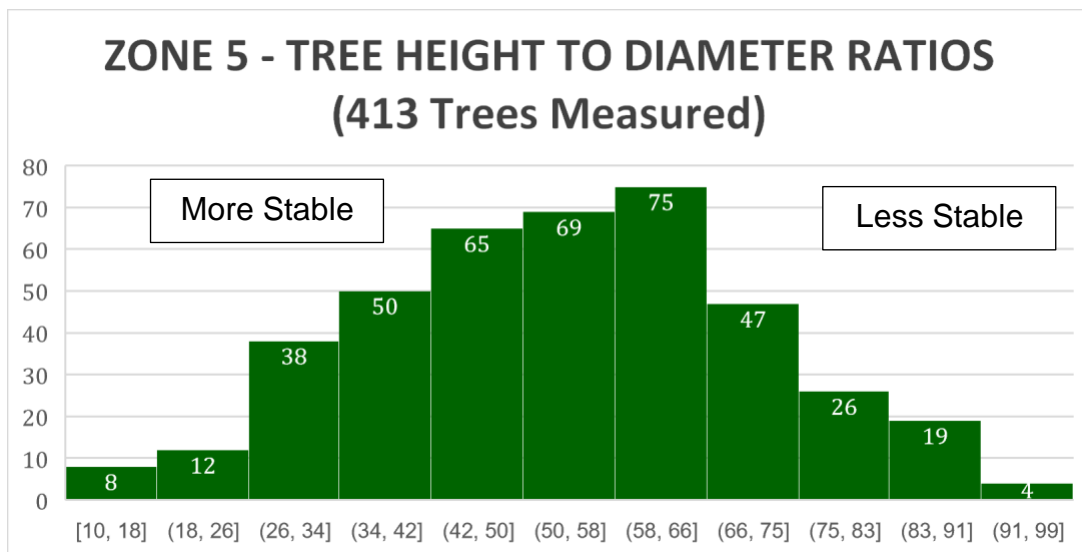


Figure 2. Data for graph from The Bolinas Eucalyptus Project Inventory: Zone 5 (March 2023).



Wildfire Considerations. Bluegum eucalyptus stands create high fire hazards due to dead leaves, bark, and branches that collect in the understory. Tree failures due to uprooting (or trunk failure at old topping cuts) could block road and trails during a wildfire. Their leaves are rich in volatile oils and are often carried far downwind during wildfire incidents to ignite multiple spot fires. Should the Zone 5 stand ignite, both Mesa and Olema Bolinas Roads would likely be impassable to responding emergency resources and to residents of the heavily populated areas of Bolinas. Should these primary evacuation routes be blocked by trunk failures or burning trees from Zone 5, mass human casualties would likely result, as it happened in the 2018 Camp Fire that killed 85 people who were unable to evacuate Paradise.

CONCLUSIONS AND RECOMMENDATIONS

The Zone 5 stand of trees is in advanced decline. Tree failures due to spar failures, uprooting, and a wildfire will likely block primary evacuation/emergency access routes, which could result in mass human casualties. This hazardous condition appears to qualify as a public nuisance that could be recognized by the Marin County Board of Supervisors. I recommend that the stand be replaced by a mixed evergreen woodland of coast live oak, California bay, buckeye, and toyon. This will substantially improve public safety and create a long-term sustainable Monarch butterfly habitat.

Sincerely,

ARBORSCIENCE, LLC

Dr. Kent R. Julin

ISA Certified Arborist #WE-8733A

ISA Tree Risk Assessor Qualified

California Registered Professional Forester #2648

KENT R. JULIN, PH.D.
Registered Professional Forester #2648
ISA Certified Arborist WE-8733A
ISA Tree Risk Assessment Qualified



Areas of Professional Expertise

- ❖ Tree Management Plans
- ❖ Tree Structural Hazard Assessments
- ❖ Vegetation Analysis, Evaluation, and Management
- ❖ Species Selection and Planting Specifications
- ❖ Tree-Protection Plans
- ❖ Tree Appraisal (>1,000 Trees Appraised)
- ❖ Soil Erosion Mitigation and Planning
- ❖ Tree Care Specifications
- ❖ Pest and Disease Diagnosis
- ❖ Forensic Investigation and Expert Witness Testimony
- ❖ View Restoration and Maintenance

Education

Ph.D. Forestry, University of Washington, Seattle 1988
M.S. Forestry, University of Washington, Seattle 1983
B.S. Forest Resources Management, Humboldt State University, Arcata 1981

Professional Experience

2010 – Date	Principal Consulting Arborist and Forester, Arborscience, Woodacre, CA
2006 – 2010	Associate Urban Forester Urban Forestry Associates, San Rafael, CA
1998 – 2013	Marin County Forester Marin County Fire Department, Woodacre, CA
1995 – 1998	Research Forester, Tongass National Forest Plan Revision USDA Pacific Northwest Research Station, Juneau, AK
1989 – 1995	Senior Environmental Scientist, Harding Lawson Associates, Novato

Partial Client List

- ❖ Sausalito, Belvedere, Mill Valley, Corte Madera, Larkspur, Novato, Petaluma
- ❖ Marin County Parks and Open Space and Flood Control Districts
- ❖ BART (San Francisco Bay Area Rapid Transit District)
- ❖ Skyfarm II HOA, DeSilva Island HOA, Old Mill HOA

Initial Assessment of Monarch Butterfly Overwintering Habitat in Bolinas, California:

Stuart B. Weiss
Creekside Science
February 2024



Monarchs sunning at BPUD North Grove, Nov 7 2023. Photo by S.B. Weiss

Introduction and Background

The Bolinas Eucalyptus Project (BEP) has identified major public safety hazards from the grove of blue gum eucalyptus at Mesa Rd. and Olema-Bolinas Rd on Bolinas Public Utility District (BPUD) Lands. The site is also used by monarch butterflies during the overwintering season. This document provides a brief outline of the major issues and proposes alternatives and weighs their feasibility and ability to meet multiple objectives. Because of the urgent nature of decision-making, I am providing my professional opinions on the various issues, with more detailed analyses of the suitability of monarch habitats to follow in a second phase.

The ultimate goal is to secure public safety in the short-term and also provide suitable monarch habitat in the long-term in and near Bolinas.

State of the BPUD North Grove

The professional arborist/forestry reports definitively conclude that this grove is a continuing hazard to public safety, as demonstrated by dozens of treefalls over the past two seasons that blocked the road, took down powerlines, and nearly killed some people. The latest storm in mid-February 2024 downed yet more trees and cut power and access to much of Bolinas for several days. The reports also concluded that the initial establishment of the grove, history of management (or lack thereof), and current structure will lead to continued deterioration of the stand and further treefalls, with positive feedback as thinning increases wind vulnerability, treefalls, and hazards. As such, the only way to mitigate the hazards is complete removal of the grove; partial thinning and removal will only delay the inevitable and maintain the hazardous conditions.

I concur with this assessment – the grove is an immediate urgent hazard to public safety, and its condition and future trajectory makes it unsustainable as monarch habitat. The question then becomes how to accommodate monarch butterfly habitat in Bolinas commensurate with public safety.

Monarch Butterflies in Bolinas

As of 2023-24, Bolinas is the northern range limit of substantial numbers (>1000) of clustering monarchs. Small numbers (100 or fewer) have been observed at sites along the Sonoma Coast where monarchs formerly clustered in larger numbers (in the 1990s and before) when monarchs numbered in the millions in California. The large reductions in western monarch numbers are primarily a function of conditions in the breeding habitats extending from near-coastal California to the Rocky Mountains and north into the Pacific Northwest, as multiple generations of monarchs breed in milkweed stands. How they sort out among the various overwintering groves is a complex process whereby monarchs roost in groves and remain or leave depending on the microclimatic suitability (wind, temperature, and sun), eventually settling on a number of groves that can provide those microclimate conditions.

There are several sites in Bolinas that act as a “meta-colony” of monarchs, in which monarchs move in during the initial migration in October and redistribute themselves among the various discrete sites. As of 2023-24, the sites used by clustering monarchs include:

- 1) BPUD North (Site 2915) – this is the hazardous stand along Mesa Road and is also referred to as “Goat Pen.”

- 2) Other BPUD sites (Site 3163) – south of the hazard stand are several areas where monarchs have clustered in the past and small numbers were observed in 2023-24. These sites include “Toyon” on the south border of BPUD, and a “Bowl” SE of the Toyon site.
- 3) Kale Ave (Site 3227)- the stand of blue gum eucalyptus south of Elm between Kale and Juniper on private land.
- 4) Agate Beach/Alder Vortex (Site 2912) – spread across multiple properties especially southern windbreak trees.
- 5) Purple Gate (Site 2899)
- 6) Mesa Road (Site 2913) – monarchs clustering observed only in 2022

Other sites in Bolinas proper appear to be degraded and unsuitable, notably Terrace Ave (2901), Hawthorne (2917) and Grove and Alder (2900) which do not have counts recorded and are unoccupied by clustering monarchs as far as we know. The full array of counts is in Table 1 below.

Farther afield, Palomarin Trailhead (Site 2904, N of the map) once supported monarchs in the 1990s, but no counts are reported since 1997. The MCI site (2918) and Sites 2916 and 2914 do not have annual counts.

An initial look at these sites using 2023-2024 hemiphotos and 2019 LiDAR data will be presented below. Some ideas for site enhancements are presented as well. But a full analysis of the existing conditions, and detailed suggestions for site enhancements will require future analysis as feasible options become more clear.

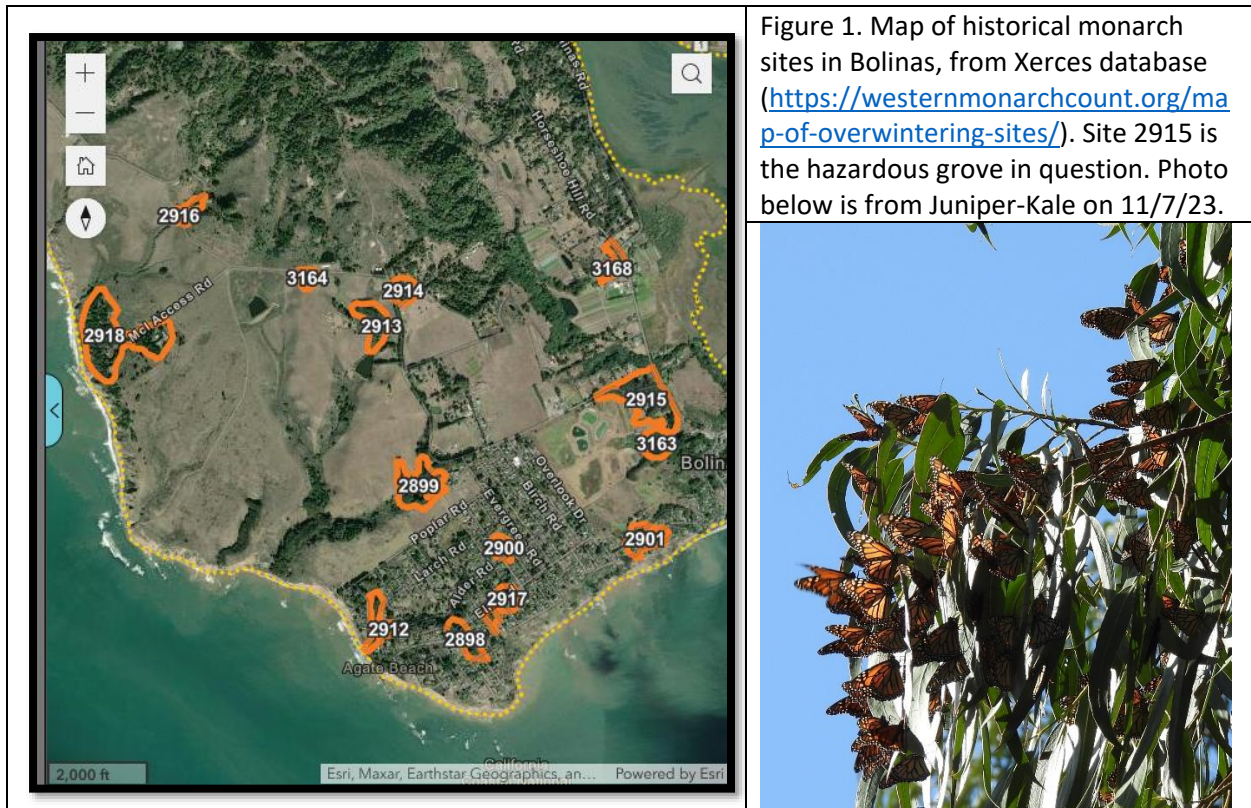


Figure 1. Map of historical monarch sites in Bolinas, from Xerces database (<https://westernmonarchcount.org/map-of-overwintering-sites/>). Site 2915 is the hazardous grove in question. Photo below is from Juniper-Kale on 11/7/23.

Monarchs in Marin and Sonoma Counties 1997-2023

Table 1 has compiled Xerces Thanksgiving Count (TG) data for Marin County sites, and a total for Sonoma and a total for Bolinas. The limitations of the TG Counts are acknowledged (i.e., changing number of sites, sampling idiosyncrasies, illusory precision, etc.) but they are useful for a broad brush look at the overall population and relative contribution of different regions.

Monarch numbers in Bolinas exceeded 15,000 as recently as 2015-2017, with a peak >20,000 in 2015. During this period, they contributed 6-9% of the California total. During the 2020 collapse, Bolinas contributed 7%. In 2021, the overall California population recovered, but the Bay Area numbers remained low, so the contribution dropped to 0.1%. In 2022 and 2023 Bolinas contributed 1.2-1.4%.

The retention rate between Thanksgiving and New Year’s counts (years designated by the Thanksgiving Count) ranged from 2-3% in 2016, 2018, 2019, and 2022 to ~50% in 2017, 2020, and 2021 (Figure 2).

Bolinas is at the northern range limit of overwintering monarchs in California. Sonoma sites have been nearly vacant since 2018, and (even if undercounted by an order of magnitude) do not provide a substantial source of migrants from the north.

SITE ID		2912	2915	2903	3226	2909	2675	3227	2913	2899	2901	2897		
SITE NAME	Sonoma Total	Alder Rd., vortex (Larch, Ocean St)	Bolinas Sewage Facility	Chapman Ravine, Stinson Beach	Charlotte, Muir Beach	Fort Baker, GGNRA	Fort Barry, Marin Headlands (Youth Hostel)	Juniper & Kale, Bolinas	Mesa Road, north of Bolinas	Purple Gate, Bolinas	Terrace Ave., Bolinas	Terwilliger Grove, Muir Beach	Total Bolinas	% of California
1997	6,660			15,500			2,550			12,000		2,100	12,000	1.0%
1998	1,600			4,000		1,600	0			8,050	2,050	500	10,100	1.8%
1999	750			3,000		200	0			1,500	1,000	500	2,500	0.9%
2000	3,206		1,500	15,150		310	0			12,050	2,000	305	15,550	4.0%
2001	7		0	1,000		15	0			3	0	0	3	0.0%
2002	0	2,300	0	2,000		0	0			2,000	0	35	4,300	4.3%
2003	160	10,400	5	2,000		9	0			300	0	54	10,705	4.2%
2004	34	8,880	122	8,050		2,200	0			7,200			16,202	7.9%
2005	0	950		0		0	1			130		365	1,080	0.5%
2006	0	3,520	0	0		550	0			2,600	0		6,120	2.8%
2007	0	1,000		0		0	0			0	0	0	1,000	1.2%
2008	0	390		3		5	0			20	0	0	410	0.3%
2009	0	1,700	0	49		0	0			27	0	0	1,727	3.0%
2010	0	0	0	0		0	0			0	0	0	0	0.0%
2011	600	7,700	0	800		500	0			400	0	0	8,100	3.6%
2012	10	150	0	0		10	5			530	0	0	680	0.5%
2013	5	1,013	0	503		0	0				0	2	1,013	0.5%
2014	8	3	0	2		0	2			0	2	0	5	0.0%
2015	911	4,050	3	8,200	8,000	250	5	10,200		8,000	0	0	22,253	7.6%
2016	50	13,375	0	4,000	1,206	259	0	4,060		1,020	0	0	18,455	6.2%
2017	15	12,360	410	210	414	5	1	4,310		625	1	0	17,706	9.2%
2018	5	1,256	0	1	8	0	0	200		975	0	9	2,431	8.8%
2019	0	200	5	0	0	5	0	113		10	0	0	328	1.1%
2020	7	100	10	5	2	0	0	19		5	0	5	134	7.0%
2021	13	105	10	5	0	25	0	20		0	0	0	135	0.1%
2022	3	1,012	432	56	30	3	0	1,042	29	1,393	0	0	3,908	1.2%
2023	3	925	1265	68		26	0	911	0	220		0	3,327	1.4%

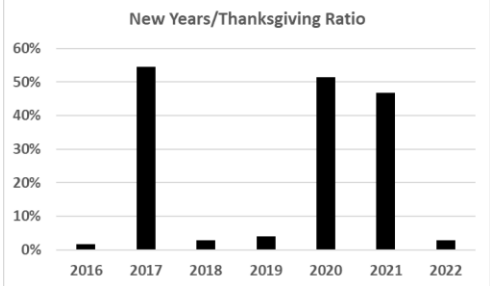


Table 1. Thanksgiving Counts for Marin County and a sum of Sonoma sites, with percentage of California monarchs in Bolinas calculated.

Figure 2. Retention rate between TG and NY counts 2016-2022 (tear designates the TG count year).

Monarch Butterflies in Bolinas 2023-2024

We are fortunate to have a nearly daily record of clustering monarchs in 2023-2024 by Davis Ainley and Janice Tweedy that show some of the dynamics of the meta colony. The stacked area chart graph (Figure 1) shows daily counts at the three major aggregation sites. Because not all sites were surveyed on each day, a second graph (Figure 2) with the maximum weekly counts for Bolinas as a whole smooths over the sampling variability. The third graph shows the weekly maxima at each individual site so that the distribution among sites is apparent.

- 1) The raw daily counts (Figure 2) showed high short-term variability, with peak total counts >2500 butterflies. Some of the low numbers are days when not all the sites were counted, others are when monarchs abandoned sites temporarily.
- 2) All three sites had some clustering monarchs throughout the season. Juniper Kale attracted the most monarchs through late October, and ~50% moved primarily to Alder-Vortex in early November. The numbers at Juniper-Kale declined steadily through the season.
- 3) BPUD supported a small fraction until early-November, but increased to ~50% in November and December.
- 4) Smaller numbers of butterflies (<200) clustered in Bolinas in January.
- 5) On January 27, afternoon observations of dozens of butterflies flying and sunning at Juniper Kale and BPUD indicated that numerous monarchs were still present in Bolinas but were not clustering *en masse*.
- 6) Monarchs were observed flying and resting at other sites on and adjacent to BPUD lands, getting an accurate count is not feasible although there were likely dozens on the wing, and some unknown number resting and undetectable. The presence of some of these butterflies are noted in the Ainley/Tweedy data set. Monarchs are exploring numerous sites during good flight conditions.

Interpretations

Based on my decades of experience with overwintering California monarchs, my interpretation of the monarch occupancy patterns is as follows:

- 1) Bolinas is the farthest north region that supports more than a handful of overwintering monarchs at present.
- 2) In October, monarchs from the North Coast Ranges and Pacific NW migrate in numbers into the Bolinas area and find the various eucalyptus stands in Bolinas. The presence of monarchs in a site attracts more monarchs that are flying by.
- 3) The high variability in overall numbers, and dynamic distribution among sites indicates that none of the three major sites is providing suitable microclimate conditions for season-long clustering.
- 4) The smoothed weekly abundance curve (Figure 4) shows the rise and fall of the entire Bolinas metacolony.
- 5) The lower numbers later in the season (January) are typical for monarch aggregations – attrition and emigration are normal population phenomena.
- 6) The pattern of high numbers, followed by low numbers, and recovery to higher numbers can be interpreted as monarchs leaving sites that are too exposed to wind, scattering across Bolinas,

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and re-aggregating a few days later. This pattern was repeated several times over the season. Scattered monarchs are difficult to observe when roosting.

- 7) An alternative explanation of Bolinas being a stopping point on a directional migration is not supported by observations north and south of Bolinas, such as the very low numbers observed in Sonoma overwintering sites and lack of observations of monarchs on the move outside the overwintering sites.

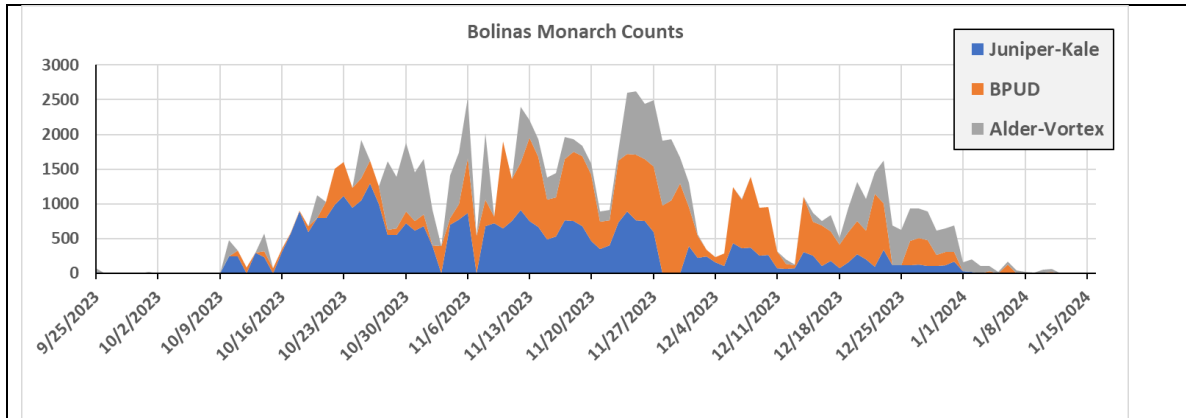


Figure 3. Stacked area daily counts of monarchs at three major sites in Bolinas.

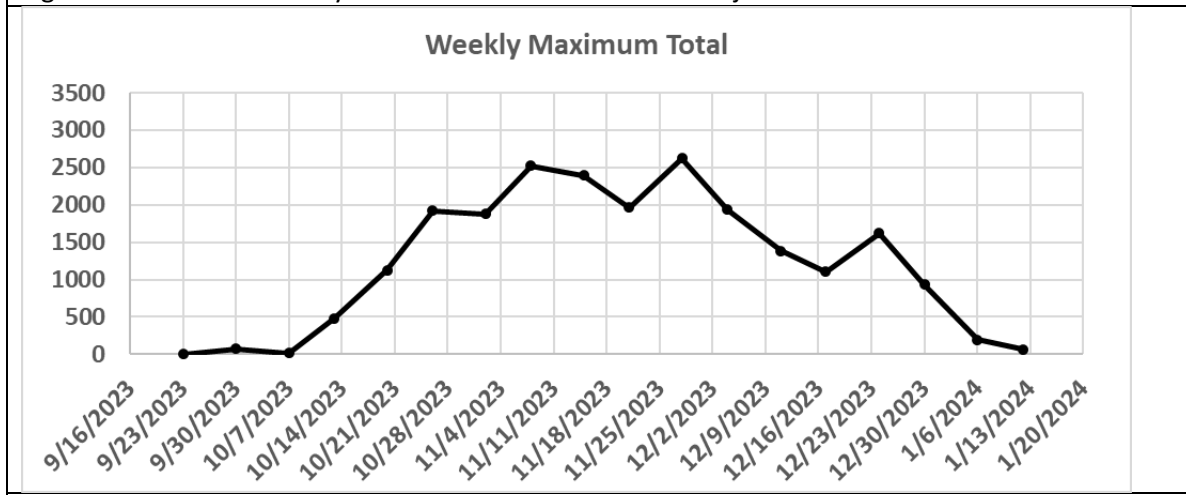
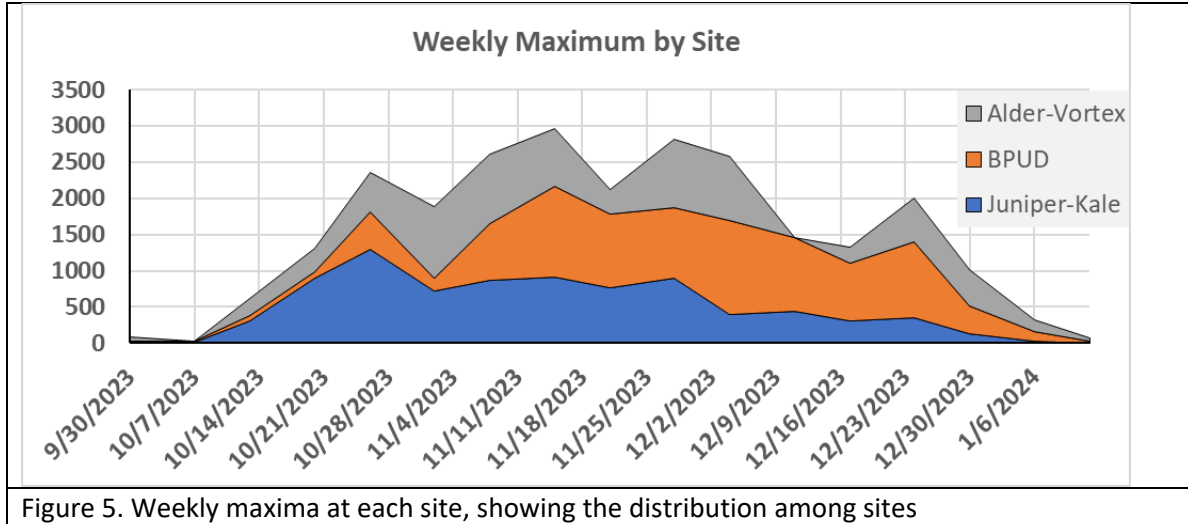
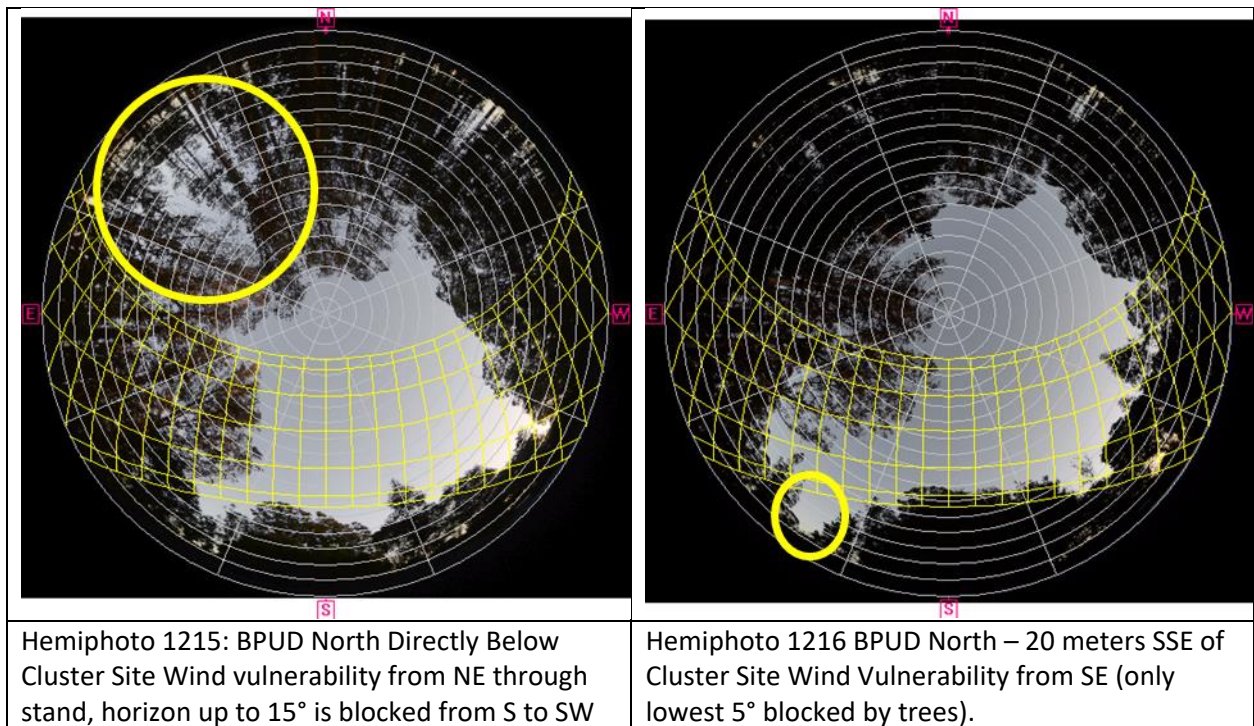


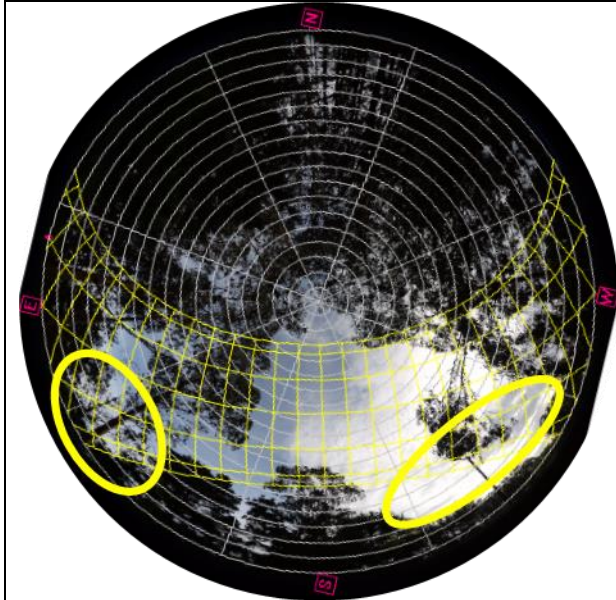
Figure 4. Weekly maximum of sum of three sites, showing the overall progression of the season.



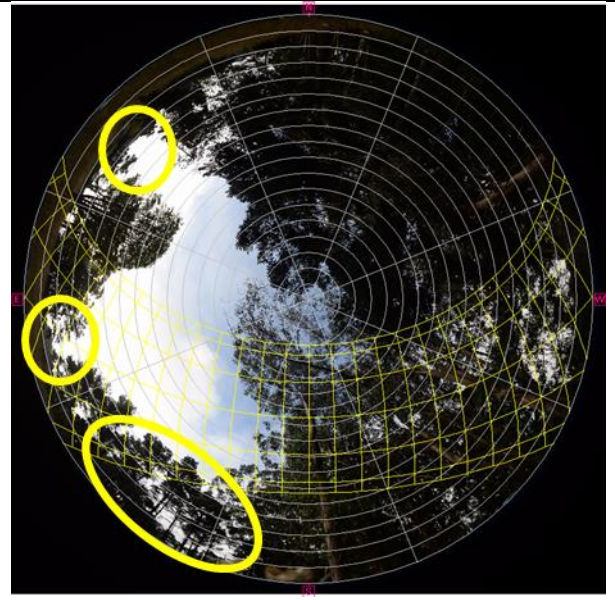
Sample Hemiphotos at each site.

The hemiphotos below show an example from each site, usually a known cluster site, to qualitatively identify wind vulnerabilities where open sky is visible close to the horizon. Note that east and west are reversed from map views because the photos are taken looking up..

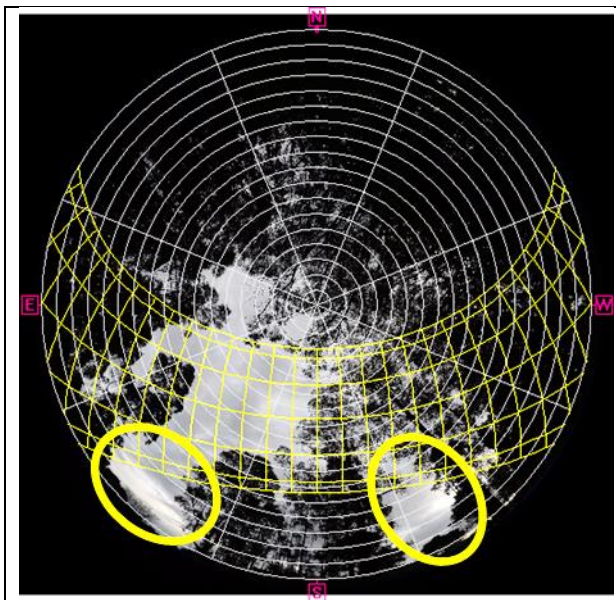




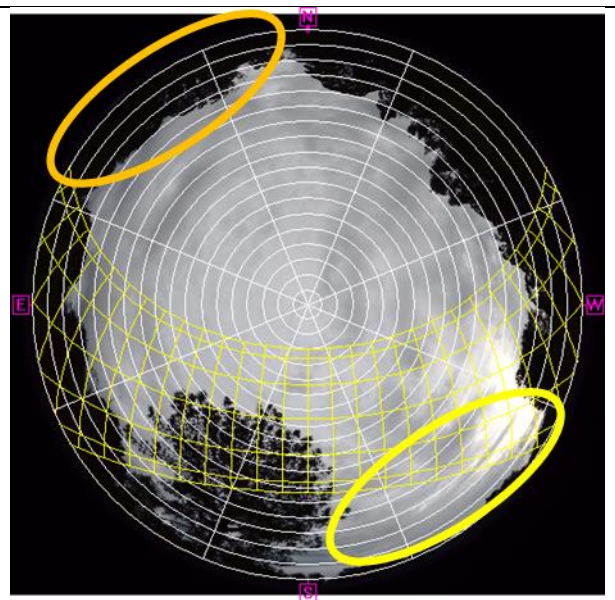
Hemiphoto 1235: Cluster site at Juniper-Kale. Vulnerability from SW, this sector is where PG&E cut a eucalyptus tree that provided wind shelter. Additional wind vulnerability from SSE.



Hemiphoto 1195: Alder-Vortex. Pines with open understories to SE, other wind vulnerabilities from E and NE. The relative directions of gaps varies along the row of cluster trees so short-distance movements can regain wind shelter.



Hemiphoto 1251. Toyon site. Wind vulnerabilities from SE and SW. Resprouting eucalyptus to S allow some dappled sun mid-day near ground, and direct sun at heights..



Hemiphoto 1257. At S edge of Bowl. Large Torrey Pine in SSE foreground. Large gap to SW could be filled with Torrey pines Potential monarch cluster trees in orange ellipse to NE across Bowl.

Potential for Monarch Habitat Enhancements in Bolinas

Because the BPUD North grove is unsustainable as monarch habitat given the demonstrated extreme hazards, looking elsewhere on the Bolinas Peninsula for opportunities to actively manage and enhance monarch overwintering habitats.

The following maps show LiDAR views of three sites, and some potential enhancements. Note that these are exploratory for now, and many issues need to be addressed regarding site ownership, long-term management, and the time lag for tree growth. Here are some initial thoughts to be explored.

BPUD: BPUD and adjacent properties have two sites that attract some monarchs, one of which supports clusters in some years (see photos 1251 and 1257).

BPUD North (Hemiphotos 1215 and 1216): It may be possible to design an aggregation site using Douglas-fir trees to replace N and E wind shelter that is currently provided by the eucalyptus stand. Trees would be planted just S of the existing eucalyptus, well away from the roads and powerlines. New healthy trees would not pose a threat to the trail. Some enhancement of the southerly wind shelter could create a sheltered cove with good sun exposure. Such a grove would take 10-15 years to grow tall enough to function as monarch habitat.

BPUD South: This infrequently used site will not be suitable once the main BPUD North grove is removed and there are no straightforward enhancements.

Toyon: (Hemiphoto 1251) Sealing up the SE and SW gaps at Toyon, while maintaining the thin eucalyptus canopy to the S would establish wind shelter and dappled light. Torrey pines might be ideal, as they thrive in the area and provide dappled light in addition to wind shelter. This site is largely on the parcel adjacent to BPUD (#19303003) and landowner participation would be essential.

Bowl: (Hemiphotos 1257) Planting additional Torrey pines at the S edge in line with the existing tree would establish wind shelter for the eucalyptus trees to the north. This site is entirely on the adjacent parcel (#19303003) and landowner participation would be essential.

The dense stand of eucalyptus and pine on BPUD north of Toyon may have potential with a gap cut to increase sun in the wind-sheltered interior. Such gaps have been cut at three other monarch sites; Monarch Lane in Los Osos, San Luis Obispo County, Andrew Molera State Park in Big Sur, and Point Pinole Regional Shoreline in Richmond.

Juniper-Kale: (Hemiphoto 1235) This site has been degraded by PG&E cutting and trimming trees to protect a powerline, which has opened the site to SW winds. A new row of fast-growing Douglas-fir planted an appropriate distance from the powerline could seal this vulnerability in a decade.

Alder-Vortex (Hemiphoto 1195): This site has some existing wind vulnerabilities that are ameliorated by short distance movements to avoid winds through the gaps. The major short-midterm threat is the loss of the older pines to the SE, some of which have already fallen. One idea is to plant a row of Douglas-fir at an optimal distance from the cluster row to eventually replace the wind shelter. The multiple ownerships of the overall site, including the wind shelter areas, could greatly complicate any management.

Purple Gate: This site once was one of the major sites in Bolinas. It has been opened up by recent removal of trees (2023) to ameliorate hazards and may not be salvageable as monarch habitat.

Mesa Rd. North of Bolinas: This site is just outside the LiDAR analysis footprint (but is within the 2019 LiDAR flight and can be analyzed. The dense stand in the drainage appears to have good wind shelter but may be too dense and dark for monarchs. It would benefit from a detailed LiDAR and hemiphotograph analysis. Numerous nectar plants have been established on the property with assistance from the Xerces Society, and the owner is willing and eager to improve the site for monarchs.

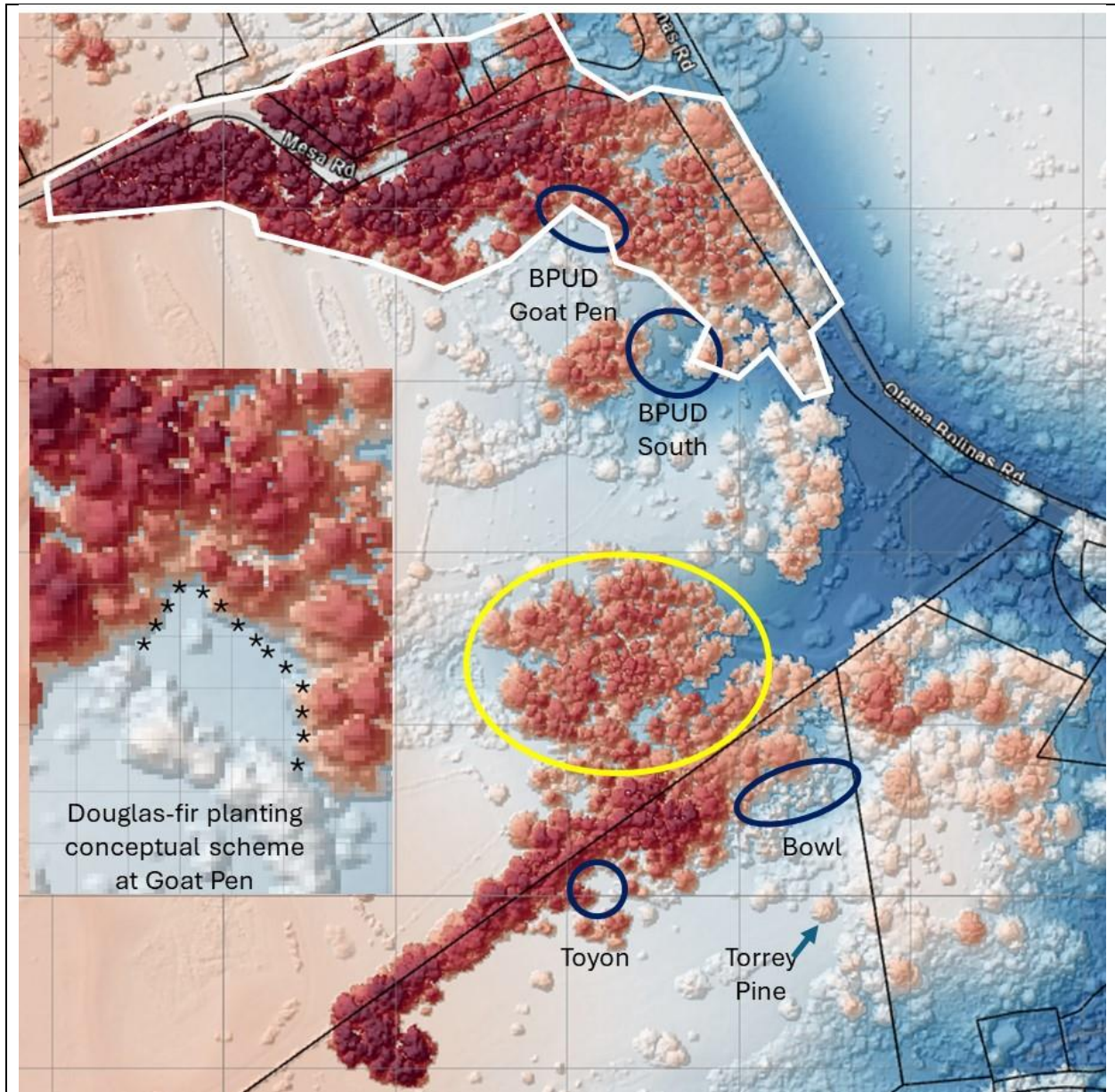
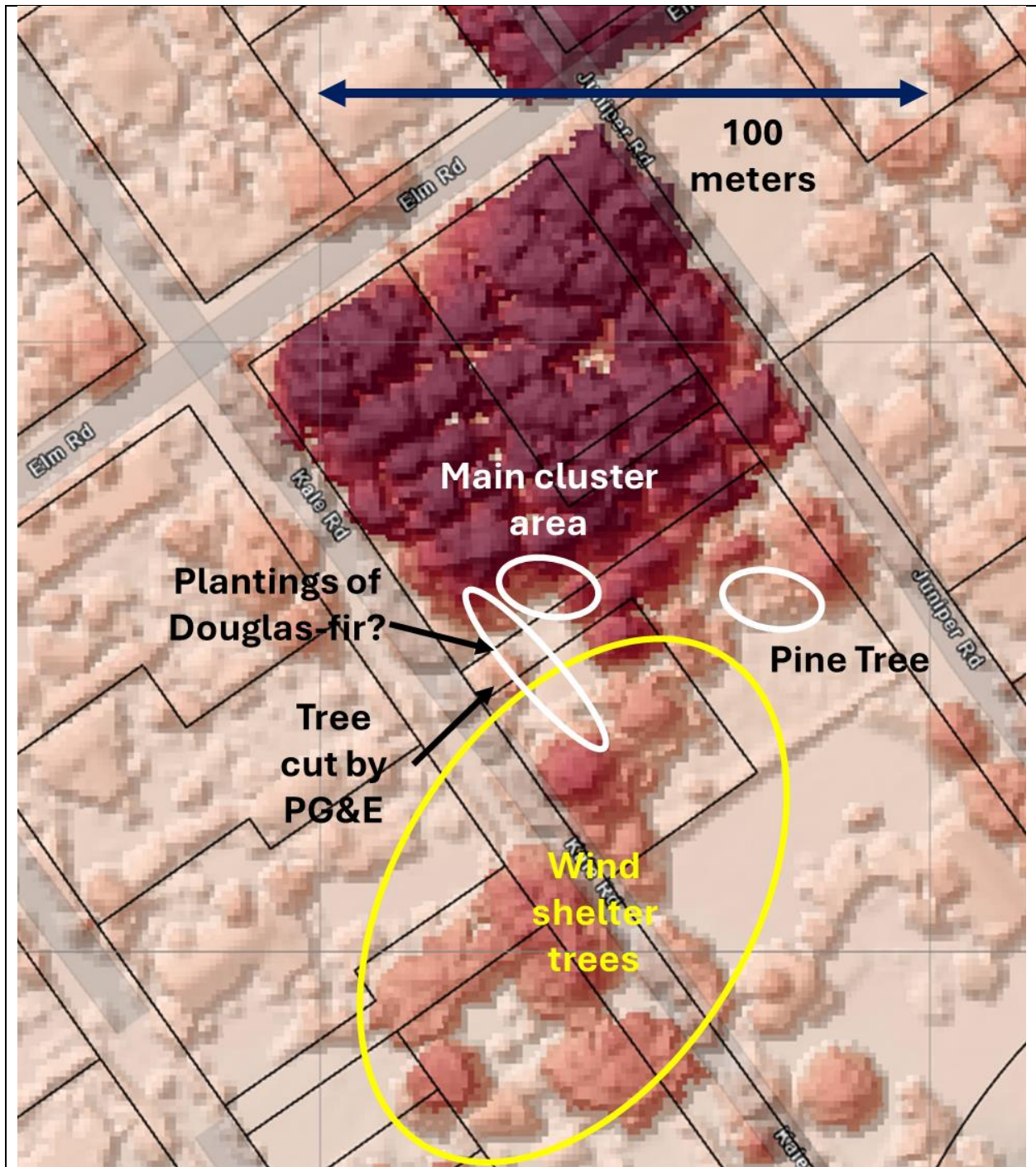
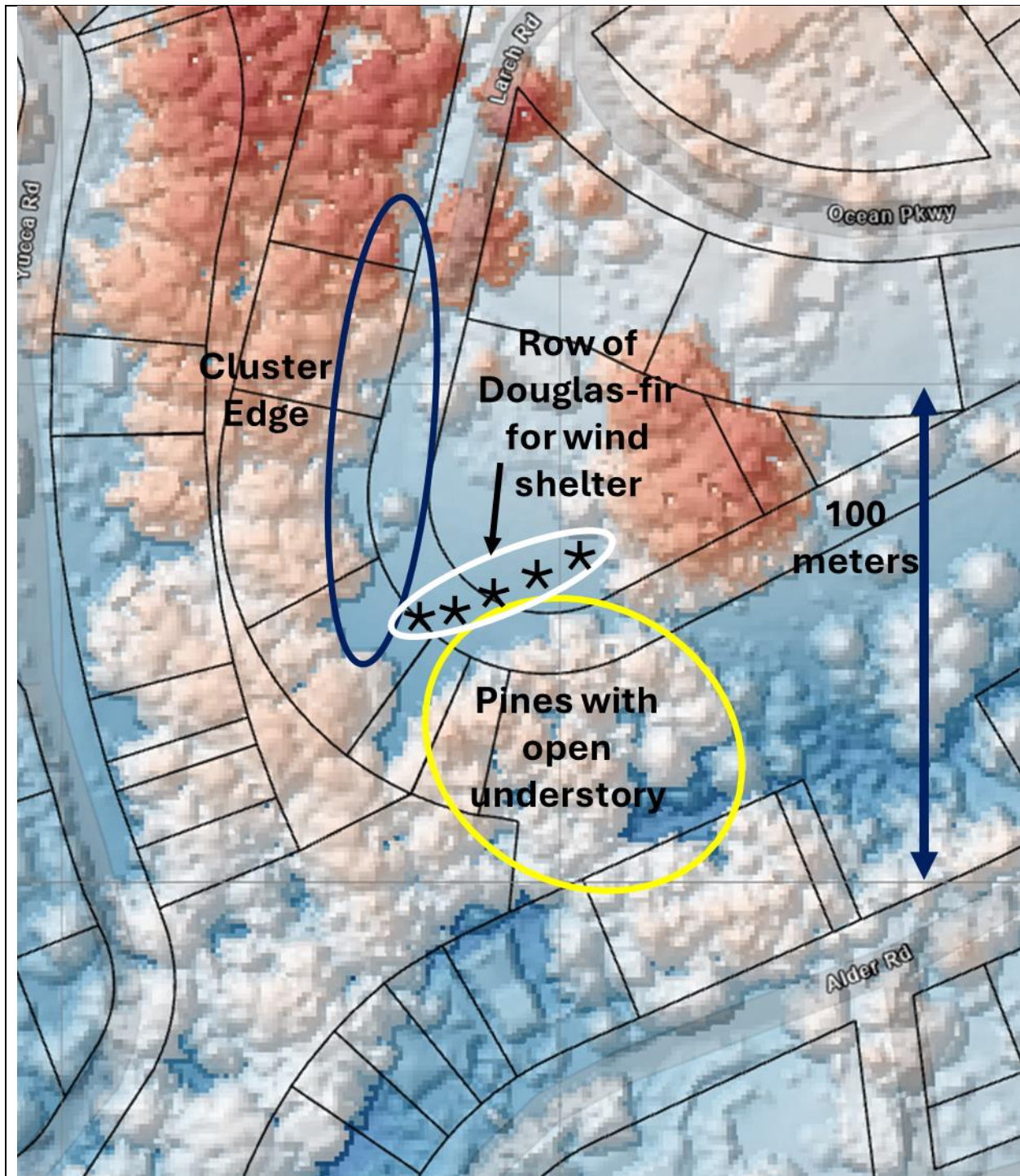


Figure 6. LiDAR map of BPUD area, with monarch sites identified. The white outline is the proposed grove removal. Toyon and Bowl on the adjacent property could provide alternative cluster sites with some additional shelterbelt plantings. The wind-sheltered interior of the grove of trees north of Toyon (yellow oval) does not receive enough sun to support monarchs, but a well-designed gap could be cut. The inset is a conceptual plan for planting Douglas-fir to eventually replace the wind shelter provided by the eucalyptus. A second row could be planted once the eucalyptus have been removed.



LiDAR view of Juniper-Kale. Monarchs cluster on the southern edge of the grove in a protected alcove. They also regularly sun themselves on a pine tree to the east during calm weather. The loss of the eucalyptus trees trimmed/cut by PG&E exposed the cluster area to SW winds. With some selected plantings of fast-growing Douglas-fir the wind shelter could be replaced in about a decade. The trees need to be planted far enough from the powerlines to not interfere. Most of the core site is owned by a single person, but the trees across Kale are on a different parcel.



LIDAR view of Alder-Vortex. Monarchs cluster along the E edge of the dense eucalyptus along a drainage. To the SE of the cluster edge, a stand of older pines has an open understory (see Hemiphoto 1195). One possibility to ameliorate the eventual loss of wind shelter is to establish a row of Douglas-fir in the area indicated (tree spacing and number not to scale) The multiple private parcels will make this a difficult site to manage.



Site # 2913 – Mesa Rd. North of Bolinas. This grove falls outside the current LiDAR analysis extent. The grove has potential – it may be too dense for monarchs, but a detailed microclimate analysis with hemiphotos and LiDARr is warranted. Selective thinning and gap creation may work here. Diverse nectar plants have been established on the property with assistance from Xerces Society, and the landowner is willing to consider monarch habitat improvements.