Draft Saddle Mountain Open Space Preserve
Management Plan
Initial Study and Proposed Mitigated Negative Declaration

Prepared for:

Sonoma County Agricultural Preservation and Open Space District
747 Mendocino Avenue
Santa Rosa, CA 95401

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March 2019

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SONOMA COUNTY

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1 Project Information

1. Project Title	Saddle Mountain Preserve Management Plan
2. Lead Agency Name & Address	Sonoma County Agricultural Preservation + Open Space District 747 Mendocino Avenue, Suite 100, Santa Rosa, CA 95401
3. Contact Person & Information	Monica Delmartini (707) 565-7260
4. Project Location	The Preserve is located in unincorporated Sonoma County northeast of the City of Santa Rosa and east of the intersection of Calistoga and St. Helena Road roads as shown on Figure 1. APNs: 028-390-028, 028-160-080, 028-160-044, and 028-380-008.
5. Project Sponsor's Name & Address	Sonoma County Agricultural Preservation + Open Space District 747 Mendocino Avenue, Suite 100, Santa Rosa, CA 95401
6. General Plan Designation	Resources & Rural Development
7. Zoning	Resources and Rural Development (RRD B6 40), Biotic Habitat and Riparian Corridor (BH RC50/50), Riparian Corridor (RC100/50), and Riparian Corridor and Scenic Resources (RC200/50 SR)
8. Description of Project	The proposed project is to adopt and implement the management activities described in the Saddle Mountain Preserve Management Plan.
9. Surrounding Land Uses & Setting	The area surrounding the Preserve is sparsely populated. Adjacent ownership consists mainly of rural residential lots varying in size from one to hundreds of acres. Developed parcels generally contain single-family residences. Rincon Valley subdivisions, consisting of residential lots within City of Santa Rosa limits, border the southern portion of the property. Some adjacent properties consist of relatively undeveloped forest and grasslands, some are maintained as pasture or range for livestock (horses and/or cows), and a few have been intensively developed for wine-grape production. An equestrian facility at the corner of Calistoga and St. Helena Roads is the only commercial enterprise in the vicinity.
10. Other public Agencies Whose Approval may be Required	See Table 2-7 for a list of the regulatory agencies that may have authority to permit or otherwise authorize project activities.
11. Have California Native American Tribes traditionally and culturally affiliated with the Program Area requested consultation pursuant to Public Resources Code §21080.3.1? If so, has consultation begun?	Yes, after requesting a sacred lands search and receiving a list of contacts from the Native American Heritage Commission (NAHC), the District initiated consultation with the Federated Indians of Graton Rancheria (FIGR), the Tribe traditionally and culturally affiliated with the proposed project area; see discussion in Section 4.18 below.

1.1 Introduction

The property comprising what is now the Saddle Mountain Preserve (Preserve) was considered a prime real estate development location since at least the 1970s. In 1978, the proposed development of a subdivision on the area resulted in the preparation of an Environmental Impact Report. The local community successfully opposed development efforts until July 2003, when final approval was given by Sonoma County to subdivide the property into 29 estate parcels. The Sonoma County Agricultural Preservation and Open Space District (District) then became involved in negotiations to purchase the property and, in January 2006, the Sonoma County Board of Directors adopted resolution #06-0041, approving the fee title purchase of the 960-acre Saddle Mountain property. The State Coastal Conservancy contributed grant funding to assist with the acquisition of the property and to provide funding for a management plan.

The District acquired the Preserve primarily to conserve and protect its natural resources and to contribute to the protection of key properties within the Mark West watershed (District 2012). The Preserve, which is visible from much of the city of Santa Rosa and provides viewsheds for Trione-Annadel and Spring Lake Parks, serves as an important backdrop that contributes to quality of life and community identity in Santa Rosa.

The District developed the Saddle Mountain Preserve Management Plan (Management Plan) to provide direction for the management and preservation of the property's unique natural and cultural resources. The information and guidance provided by the Management Plan would help ensure that management activities effectively conserve native coastal oak woodland, montane hardwood and coniferous forest, native grassland, and mixed chaparral and continue to provide high-quality habitat for a diversity of native wildlife and plants. Utilizing adaptive management principles, the Management Plan would protect the Preserve's populations of sensitive plant species and their habitats, while providing opportunities for research and environmental education.

Development of the Management Plan included public outreach and engagement with stakeholders. A public meeting to solicit feedback on the draft Management Plan was held on February 18, 2015, at the Rincon Valley Library Community Meeting Room.

The District worked collaboratively with a variety of partners, as well as the general public, to develop the Management Plan. With implementation of the Management Plan, the District would continue to collaborate with partners and the public to provide a range of management, research, environmental education, and community stewardship programs on the Preserve.

In order to manage, enhance, and protect the resources within the Preserve, the District proposes to adopt and implement the actions identified in the Management Plan for the Preserve. The location of some proposed management activities are identified in the Management Plan. Potential impacts associated with these management activities are analyzed in greater detail than other, less specific management activities. The site-specific management actions are referred to as "project-level" activities throughout this document. The longer-term management activities without site specificity are called "program-level" throughout the document and are identified to meet long-term management objectives.

The sections below describe the need and objectives of the proposed project as well as the key management activities included in the Management Plan that are the focus of this environmental review.

1.2 California Environmental Quality Act Requirements

Pursuant to Section 15063 of the State California Environmental Quality Act (CEQA) Guidelines (Title 14, California Code of Regulations, Sections 15000 et seq.), an Initial Study is a preliminary environmental analysis that is used by the lead agency as a basis for determining whether an Environmental Impact Report (EIR), a Mitigated Negative Declaration (MND), or a Negative Declaration is required for a project.

The purpose of this Initial Study is to evaluate the potential environmental impacts from implementation of the proposed Management Plan to determine what level of environmental review is appropriate. As shown in Section 3, Determination, of this document, and based on the analysis contained in this Initial Study, it has been determined that the proposed project would not result in any significant impacts that cannot be mitigated to less-than-significant levels. The analysis contained in this Initial Study concludes that the proposed project would result in the following categories of impacts, depending on the environmental resource involved: no impact; less-than-significant impact; or less-than-significant impact with the implementation of project-specific mitigation measures. Therefore, preparation of an MND is appropriate.

The proposed project, for purposes of this environmental document, is the adoption and implementation of the Management Plan. This Draft Initial Study/Proposed MND will be subject to additional CEQA review and documentation if development of specific project activities or if short- or long-term plan development and subsequent management activities trigger new impacts or increase the severity of a previously identified impact.

1.2.1 Public and Agency Review

This Initial Study/Proposed MND will be circulated for public and agency review from April 3 through May 3, 2019. Copies of this document are available for review at the Sonoma County Agricultural Preservation and Open Space District office (747 Mendocino Avenue, Santa Rosa, CA), Rincon Valley Regional Library (6959 Montecito Blvd, Santa Rosa, CA), Central Santa Rosa Library (211 E Street, Santa Rosa CA), and Oakmont Library (6575 Oakmont Drive, Santa Rosa, CA). This document is posted on the District's website: www.sonomaopenspace.org.

Comments on this Initial Study/Proposed MND must be received by 5:00 p.m. on March 8, 2019, and can be sent by regular mail or emailed to:

Sonoma County Agricultural Preservation and Open Space District
747 Mendocino Avenue, Suite 100
Santa Rosa, CA 95401
Attn: Monica Delmartini or Monica.Delmartini@sonoma-county.org

2 Project Description

2.1 Project Location and Setting

As shown in Figure 1, Project Location, the Saddle Mountain Preserve is located in the central Mayacamas Mountains, in unincorporated Sonoma County, California, northeast of the city of Santa Rosa. The Preserve lies just north of the city limits of Santa Rosa and is located in the Mark West Creek and Santa Rosa Creek watersheds in the Russian River Hydrologic Unit. It lies at the intersection of four USGS 7.5' quadrangles: Mark West Springs in the northwest, Calistoga in the northeast, Santa Rosa in the southwest, and Kenwood in the southeast. The site is accessible from Cleland Ranch Road off of Calistoga Road, St. Helena Road, and via an access easement on Plum Ranch Road. Erland Road, another private road, has also been identified as an access point (Bowman Associates 2006).

2.2 Project Goals and Objectives

The purpose of the Management Plan is to provide a comprehensive assessment of the Preserve's conditions and resources and to develop recommendations that would guide the District's management of the property to preserve and enhance the area's biodiversity, ecosystem function, and diverse array of complex California habitat types. The Management Plan identifies the following specific objectives for the Preserve:

- Conserve large stands of contiguous oak woodland in the Mark West Creek watershed;
- Conserve high quality riparian habitat and adjacent uplands and wetlands in the Mark West Creek and Santa Rosa Creek watersheds;
- Protect highly visible open space land with outstanding scenic qualities;
- Manage the Preserve in a manner that minimizes impacts and enhances natural resources; and
- Provide recreational opportunities in close proximity to urban areas that are compatible with the Preserve's conservation purposes.

The Management Plan also identifies two primary conservation challenges that would direct short-term actions on the Preserve:

- Control and remediation of erosion sources with integrated management of sediment delivery to stream and wetland systems and
- Control and prevention of non-native plant species with eradication, where feasible, and long-term reduction of non-native plant coverage elsewhere.

Figure 1. Project Location

2.4 Project Site Characteristics

The Preserve comprises 960 acres on four Sonoma County legal parcels: Assessor's Parcel Numbers (APN) 028-390-028, 028-160-080, 028-160-044, and 028-380-008. All the parcels are zoned Resources and Rural Development (RRD). Elevations in the Preserve range from 760 feet at the property's northwest boundary near St. Helena Road to 1,800 feet in the southeast corner of the property. Vegetation is dominated by grassland (usually a mix of native and exotic species) and oak woodland. Coniferous and riparian forests occur along streams and on the relatively moist, north-facing slopes. The Preserve and its existing infrastructure is illustrated on Figure 2, Saddle Mountain Preserve Base Map.

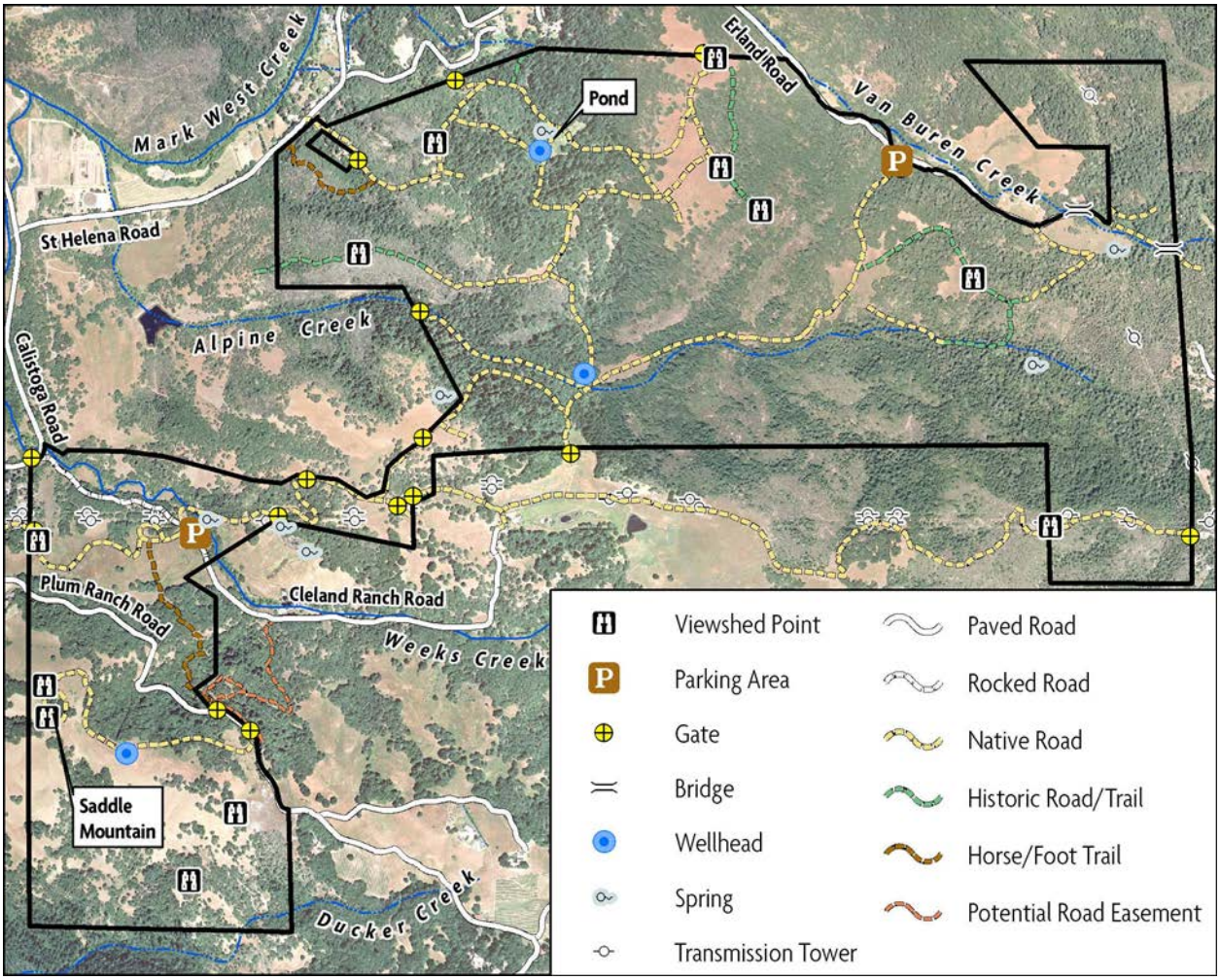


Figure 2. Saddle Mountain Preserve Base Map

2.4.1 Preserve Access

Access onto the Preserve is limited, as the property frontage along public roads is limited to two relatively small areas. There is approximately 500 feet of frontage along Calistoga Road at the junction of Calistoga Road and Cleland Ranch Road. Calistoga Road is a County maintained road and Cleland Ranch Road is private. The other public road frontage is an approximately 500-foot section of St. Helena Road where there is a gravel driveway leading from the public road to a private land holding. The driveway leads to an unimproved, seasonal road that enters the Preserve at the eastern boundary of the private in-holding at or near the property line.

Private road easements provide additional access to the Preserve. Plum Ranch Road, off Calistoga Road, provides access to the southern portion of the Preserve. There is a gated, unimproved, seasonal ranch road on the property off Plum Ranch Road that leads to the summit of Saddle Mountain. Another gated, unimproved, seasonal ranch road is located on the Preserve off Erland Road. PG&E has transmission tower maintenance road easements that provide access the southeastern and southwestern portions of the property. Several private roads and trails provide private access points to the Preserve from neighboring properties.

Local residents access the Preserve via several unauthorized trails off Erland and St. Helena Roads and from adjacent properties. Currently, authorized public access is restricted to District-trained volunteer patrollers and staff- or partner-led outings and workdays. The District provides regular outings, volunteer opportunities, and/or workdays, coordinated either by District staff or with other partner organizations. Visitation is limited primarily to existing ranch roads and informal trails.

Safe public access to the Preserve from existing roadways is limited and is available only from Cleland Ranch Road, which provides access to the southern portion of the property. Cleland Ranch Road is located at a sharp curve on Calistoga Road and limited visibility and dense, fast moving traffic on Calistoga Road make this turnoff unsafe for access by buses or horse trailers.

2.4.2 Infrastructure

Infrastructure on the Preserve is primarily associated with previous land use, including ranching and timber operations. Historic fences from livestock ranching are mostly in disrepair; however, some fencing has been maintained by neighboring property owners who have livestock. The livestock water system has not been maintained and portions of the system have been lost through sale of some of the historic ranch property. There is a developed well that formerly served a trough within the southeastern portion of the property and a developed spring box that formerly provided water to a galvanized cistern off Erland Road in the northeastern portion of the property. There are two capped wells along the road oriented north-south, north of Alpine Creek, which were presumably drilled when a subdivision was being planned for the area prior to purchase for a Preserve. Roads on the Preserve include several private roads that access neighboring properties, including Plum Ranch Road, Erland Road, and Cleland Ranch Road. Plum Ranch Road is paved, while Erland Road and Cleland Ranch Road are graveled. There are several culverts under these roads. There is a network of unimproved seasonal roads in various conditions that formerly served

as logging roads and some of which were later used for ranching operations. Some of these roads are currently overgrown with vegetation and are no longer accessible to vehicular use. Two PG&E transmission line corridors cross over the property and are serviced by seasonal unimproved maintenance roads.

The only structures on the Preserve are a historic hunting cabin, an outhouse, and a cabin or barn in ruins.

2.4.3 Land Uses

Current Land Uses

Land use on the Preserve is currently limited to natural resource management, periodic access by researchers through formal access agreements, and patrolling of the Preserve by District staff, contractors, and volunteers trained by the District. The District also offers approximately four public outings a year, led by entities contracted by the District, as well as approximately six workdays a year, and approximately two trainings a year for people interested in becoming volunteer patrollers on the Preserve. Neighboring residents who live along Erland Road and are trained volunteer patrollers may access the Preserve on horseback.

Illegal activities encountered on the Preserve during the natural resources inventory fieldwork include evidence of marijuana cultivation, water diversion, unauthorized trail construction, and unauthorized herbicide use.

Local residents off Erland Road have reportedly encountered marijuana patches on the property in past years. None were encountered during the 2008 natural resources inventory fieldwork, though irrigation drip lines in disrepair and watering buckets were noted, and a grow site was eradicated in the Alpine Creek watershed in 2017. Marijuana growers clear native vegetation, increased erosion, and introduce fertilizer, pesticides, fencing, guard dogs, illegal campsites, and human waste.

Water diversion pipes were noted in portions of Alpine Creek and Van Buren Creeks on the property. Some of these water diversion lines are no longer functioning and are probably remnants of past marijuana cultivation operations, and have since been removed. Others appear to have been previously used to divert water from the property to private residences along Erland Road.

Ag + Open Space staff and consultants and volunteer patrollers routinely patrol the Preserve for signs of marijuana cultivation activity in coordination with the Sonoma County Sheriff's office and U.S Fish & Wildlife's Marijuana Eradication Task Force. Active sites are eradicated when found by law enforcement personnel, and are cleaned up and restored by Ag + Open Space staff and contractors. Ag + Open Space began aerial surveillance of likely cultivation sites in 2018, and is contemplating additional surveillance measures such as cameras.

Historic Land Uses

Native Americans used the Saddle Mountain area. The Preserve and surrounding area was a likely place for prehistoric occupation, as it has fresh water sources, well-drained soils, and a mosaic of grassland and woodland, which created an environment rich in natural resources. These features suggest that the Preserve may have been utilized for hunting, resource gathering, and day-to-day activities (Barrow and Origer 2008).

Since Europeans arrived, logging, land clearing, importation of livestock, and fire suppression have resulted in major changes in the Preserve's vegetation patterns (Elgar Hill 1978). The land was owned for several generations by the Merner family and known by various names (including Merner Lumber Company, Inc., Progress Lumber Company, Inc., and Merner Land Company, Inc.) (Bowman Associates 2006). Much of the Douglas fir and coast redwood forest has been logged, and multi-stump growth patterns of many of the oak stands indicate the hardwoods were most likely cut decades ago, presumably for fuel wood.

The Preserve was historically used as a livestock ranch (Bush 2008). The original ranch is located in the northeastern section of the southwestern parcel. Livestock grazing and periodic wildfires prevented the establishment and growth of trees in the grasslands of the Preserve (Elgar Hill 1978). Other uses of the land have included timber production.

2.4.4 Geology and Soils

The main geologic units underlying the Preserve are the Franciscan Complex and Sonoma Volcanics. Other parts of the Preserve are composed of Glen Ellen and Merced Formations. The Glen Ellen Formation has been mapped along the northwest edge of the southwestern portion of the Preserve (Giblin Associates 2003, Elgar Hill 1978).

Serpentine soils occur on the Preserve and support serpentine-adapted plant species, some of which are endemic to Sonoma County (Best et al. 1996). Such soils typically have nutrient profiles that include low levels of nitrogen, potassium, phosphorous, and calcium; high levels of magnesium; and imbalances in heavy metals (Kruckberg 1984). Soil map units occurring on the Preserve that include serpentine-derived soils are Montara cobbly clay loam (30 to 75 percent slopes), Raynor-Montara complex (zero to 30 percent slopes), and Yorkville clay loam (30 to 50 percent slopes) (Bush 2008).

2.4.5 Water Resources

Surface Water

The Saddle Mountain Preserve encompasses portions of four creeks (Alpine, Ducker, Van Buren, and Weeks Creeks), as well as several of their unnamed tributaries. They are described below:

- The headwaters of Alpine Creek are located in the Preserve's mountainous northeastern parcel. The Alpine Creek subwatershed encompasses roughly 380 acres (0.59 mi^2, 1.54 km^2) in the central portion of the Preserve, ultimately flowing into a reservoir on an adjacent property. From there, an outlet stream crosses St. Helena Road and drains into Mark West Creek. Springs near the head

of Alpine Creek provide the water source for summertime flow, which was estimated in 2002 at 10 to 20 gallons per minute (Giblin Associates 2003).

- Ducker Creek drains a small area in the far southeastern corner of the southwestern parcel; it flows into the Santa Rosa Creek watershed.
- Van Buren Creek drains roughly 125 acres (0.20 mi^2, 0.51 km^2) of the northeastern portion of the Preserve and flows to the Mark West Creek; it is a seasonal creek (i.e. dry during the summer months with only isolated reaches containing very low perennial flow or remnant pools remaining as refugia for aquatic wildlife).
- The Weeks Creek subwatershed drains approximately 170 acres (0.27 mi^2, 0.69 km^2) in the southern portion of the Preserve. Weeks Creek flows into Mark West Creek just north of the intersection of St. Helena and Calistoga Roads. Weeks Creek is seasonal.

A number of springs were identified within and adjacent to the Preserve during the groundwater assessment (Giblin Associates 2003):

- Two small springs are located near the boundary between the overlying Sonoma Volcanics/Glen Ellen rocks to the north and the Franciscan Complex to the south. One of these springs drains to Weeks Creek; the other has been diverted to flow into a ranch pond on an adjacent property. These springs have relatively low flows that fluctuate seasonally.
- A larger spring is located further to the east where the Sonoma Volcanics and Franciscan Complex meet; this spring historically supplied water for the ranch house on an adjacent property.
- Near the Hunting Cabin, perched water forms a small spring that feeds a small man-made and year-round pond. Additionally a vernal pool is located near the hunting cabin that provides habitat for special-status plant species as well as invasive species.
- A developed spring is located near Erland Road in the northeastern portion of the Preserve.
- In the headwaters of Alpine Creek, a spring flows from serpentine rock providing the majority of late season flow into the creek. In the fall of 2002, seepage from this substantial spring into Alpine Creek was estimated to be 10-15 gallons per minute.

Groundwater

Although the Glen Ellen Formation is an important groundwater source in the Santa Rosa Valley Groundwater Basin, its capacity to produce groundwater within the project area is limited and most of the aquifers are within zones in the Sonoma Volcanics containing open and interconnected fractures (Giblin Associates 2003).

Existing groundwater wells on and adjacent to the Saddle Mountain Preserve are described below:

- The southwest portion of the Preserve contains a primary well located at an elevation of about 1,350 feet (411 m) on a ridge in the southwest portion of the Preserve. Standing water level was at a depth of 430 feet (131 m) when the well was constructed in 1996 and the well was set at a depth of 504 feet (154 m) below the ground surface. It has not been utilized to any significant degree. This well was tested in 2002 and reported to have sufficient capacity to supply water for only a portion of the then-proposed housing development project (Giblin and Associates 2003a).

- The northeast parcel contains two wells; one is about 50 (15 meters) feet north of Alpine Creek in the western portion and the other is 2,300 feet (701 meters) north of the first. These wells draw water from depths ranging from 120 to 340 feet (37-104 meters) deep from fractured volcanic rock.
- Numerous offsite neighboring wells were identified and were reported to be between 200 and 500 feet (61-152 meters) deep and individually provided sufficient water for single-family residential use. The wells were mostly drilled within Franciscan and Volcanic Formations and believed to contain water due to the fracture zones between the two Formations.

2.4.6 Vegetation Communities and Habitat on the Preserve

The Saddle Mountain Preserve contains 16 vegetation communities, as mapped by the Sonoma Vegetation Mapping and LiDAR Program (2017). (This recent countywide mapping is more detailed than the California Department of Fish and Wildlife Habitat Relationships database used at the time of the Management Plan development, which had identified 10 types; the table below shows how these two approaches relate). Vegetation types were corroborated by field reconnaissance conducted by the District in May 2008 and by PCI in 2018. Although distribution of plant life on the Preserve is complex, patterns exist:

- North-facing slopes on the Preserve are predominantly forested while warmer, sunnier south-facing slopes support grassland, oak woodland, and chaparral.
- South of the saddle in the Weeks Creek watershed, vegetation is mostly a mixture of oak woodland and grasslands, while to the north vegetation is dominated by Douglas fir, oaks, and other hardwoods.
- Chaparral is scattered throughout the Preserve, primarily on ridgelines and south-southwest oriented slopes.
- Grassland, including a diversity of remnant native perennial grasses, occurs in fairly large expanses in the southwestern portion of the Preserve and in smaller scattered patches in the northern portion.

The Preserve's vegetation communities are shown on Figure 3, Vegetation Types, and in Table 2-1, Special-status Plants Documented or with Potential to Occur on the Preserve. Habitat conditions, qualities, and management concerns are briefly described in the following sections.

Saddle Mountain Open Space Preserve

Vegetation Types

- Preserve boundary
- Leather oak chaparral
- Chamise chaparral
- Manzanita chaparral
- Coyote brush scrub
- Grassland
- Mesic Chaparral
- Developed
- Sargent cypress forest
- Douglas fir forest
- Mixed oak woodland
- Coast live oak woodland
- Oregon oak woodland
- Black oak woodland
- Valley oak woodland
- Coast redwood forest
- California bay forest
- Wetland

Sensitive vegetation types outlined in white.

0 1,000 2,000

Feet

N

Sources:
Sonoma Veg Map
Imagery - ESRI

Table 2-1. Vegetation Types and Sensitivity

Management Plan Vegetation Type	Sonoma Veg Map Vegetation Type	Rarity Rank[1]	Sensitive?[2]	Acres
Forest and Woodland				***765***
Douglas fir	Redwood forest	G3S3	Y	30
Douglas fir, montane hardwood-conifer	Douglas fir forest	G5S4	N	423
Closed cone pine cypress	Sargent cypress woodland	G3S3	Y	25
Montane riparian, montane hardwood-conifer, coastal oak woodland	California bay forest	G4S3	Y	33
	Black oak forest	G4S4	N	3
	Coast live oak woodland	G5S4	N	109
Coastal oak woodland	Mixed oak forest	G4S4	N	52
	Oregon oak woodland	G4S3	Y	87
	Valley oak woodland	G3S3	Y	4
Shrubland				***75***
Mixed chaparral	Chamise chaparral	G5S5	N	10
	Manzanita chaparral (Hoary, common, and Stanford manzanita)	G3S3	Y	37
	Leather oak chaparral	G4S4	N	15
	Mesic chaparral (Mountain mahogany, scrub oak-chamise chaparral)	G4S4, G5S4	N	5
	Coyote brush scrub	G5S5	N	8
Herbaceous Types and Other				***133***
Annual grassland	Annual and perennial grassland	See text for discussion		131
Wet meadow, freshwater emergent wetland, lacustrine, vernal pool	Freshwater marsh wetlands, vernal pool	varies	Y, based on wetland status and rare plant species	1
	Developed	n/a		0.8
TOTAL				**972**

[1] Rankings from CDFW's Vegetation Classification and Mapping Program. Types ranked G3 S3 or lower are considered to be of priority for protection. "G" indicates conservation priority at the global level, and "S" refers to the state level. 1 = critically imperiled; 2 = imperiled; 3 = vulnerable; 4 = apparently secure; 5 = secure. "?" indicates the need for further study.

[2] Sensitivity based on federal (U.S. Army Corps of Engineers; Section 404), state (CDFW), and local (Sonoma County) guidelines.

Forest and Woodland Vegetation Types

Douglas Fir Forest

Douglas fir forest on Saddle Mountain is dominated by Douglas fir (*Pseudotsuga menziesii*), but also encompasses small stands of coast redwood (*Sequoia sempervirens*) as well as mixed stands including hardwood like madrone (*Arbutus menziesii*). The shrub layer is limited under dense canopy but in more open areas may contain California blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum)*, snowberry (*Symphoricarpos albus*), ceanothus, coffeeberry (*Rhamnus californica*), and hazelnut (*Corylus cornuta* var. *californica*). Saplings of California bay (*Umbellularia californica*), and fir are also abundant. The herbaceous layer is generally limited and dominated by ferns and other shade-tolerant species. In some historically disturbed or logged areas, including along old roads, dense thickets of young firs are present.

Few invasive species are present in these forests on the Preserve, with the exception of a small stand of Himalayan blackberry (*Rubus armeniacus*) and scattered Italian thistle (*Carduus pycnocephalus*) along Erland-Cleland Tie Road. Most of the Douglas fir forest, including the redwood stands, on the Saddle Mountain Preserve has been harvested for timber at least once. Unlike oaks, Douglas firs typically regenerate readily after logging, grow rapidly, and are shade tolerant. Oaks, on the other hand, are more resilient to fire. On the Preserve, in areas capable of supporting both oaks and firs, where logging but not fire has occurred, oak woodland may gradually transition to fir forest.

The Douglas fir forests on the Preserve, and other forest types present, provide suitable habitat for terrestrial birds, mammals, amphibians, and reptiles. Birds represent the most abundant and prominent wildlife taxa within this habitats. Year-round resident birds of the Douglas fir forests include: chestnut-backed chickadee, Steller's and western-scrub jays, American robin, common bushtit, Bewick's wren, California towhee, spotted towhee, band-tailed pigeon, California quail, and dark-eyed junco. Casual winter residents include winter wren, red-breasted sapsucker, ruby-crowned kinglet, varied thrush, and Townsend's warbler. The forests also support suitable foraging and breeding habitat for raptors. The dense forested habitats provide suitable foraging and nesting habitat for special-status northern spotted owl. These remote and relatively unfragmented forests with limited human disturbance are ideal locations for this forest dwelling bird. There is a documented spotted owl sighting on the Preserve and a number of territories documented within the region. Of particular concern for the northern spotted owl is the recent establishment of barred owl in Sonoma County, a species native to eastern North America, but one that has been expanding its range westward. The local effects of the barred owl are not known.

The Preserve's forested habitats, particularly those with dense understories and/or tree cavities, support a variety of mammals, providing escape, cover, and nesting sites. These densely wooded habitats provide protective cover and likely provide key migration corridors for native wildlife. The presence of a large number of vertebrate species may serve as a significant food source for larger predatory mammals such as gray fox, coyote, bobcat, and mountain lion. Some of the most commonly observed mammals include western gray squirrel, dusky-footed woodrat, and black-tailed deer. In addition, bats may forage over the Preserve and roost within crevices and tree hollows within the fir forests. Within the forest floor, woody debris piles and layers of duff provide habitat for amphibians and reptiles.

Douglas fir forest habitat quality on the Preserve is high. The forests are extensive and relatively free of invasives. They include stands of redwoods, a sensitive habitat type. These forests play important roles in carbon sequestration, water and soil protection, and wildlife habitat.

Montane Hardwood-Conifer Forest

Montane hardwood-conifer forest on the Preserve is composed of Douglas fir in the upper canopy with a sub-canopy of mostly evergreen broad-leaved trees including coast live oak (*Quercus agrifolia*), bay, madrone, and black oak (*Q. kelloggii*). The shrub layer is limited but includes poison oak, hazelnut, creambush (*Holodiscus discolor*), California blackberry, and Napa false indigo (*Amorpha californica* var. *napensis*), the latter listed by CNPS as fairly threatened in California (1B.2). Fir and bay seedlings and saplings constitute a significant fraction of the shrub horizon in many areas of the Preserve. Few invasive species are present, with the exception of a small stand of French broom near a population of Napa false indigo along Well Head Road.

Basal fire scars are present on many of the older trees on the Preserve, indicating a long history of wildfire in this habitat with most of the fires being low-intensity ground fires. Because Douglas fir seedlings and saplings are killed by fire, but most hardwood species survive by resprouting, periodic low-intensity fires in mixed forests favor the presence of hardwoods.

As noted above in the Douglas fir section, the forests on the Preserve are an important resource for wildlife. The montane hardwood-conifer forest with its more complex shrub layer and greater plant diversity, provide additional foraging, nesting, and cover opportunities for wildlife. Wildlife species composition across the forest types is likely similar.

Montane hardwood-conifer forest habitat quality on the Preserve is high. The forests support abundant natural regeneration and are diverse both in tree composition and understory. They are relatively free of invasive species. They include stands of California bay, which is considered by CDFW to be a sensitive habitat type although it is common locally. These forests play important roles in carbon sequestration, water and soil protection, and wildlife habitat.

Closed Cone Pine/Cypress Forest

Closed cone pine/cypress habitat on the Preserve is comprised of Sargent cypress (*Cupressus sargentii*) stands on serpentine soil at the eastern edge of the Preserve. The shrub layer is composed of leather oak (*Quercus durata*) and Sonoma ceanothus (*Ceanothus sonomensis*), the latter listed by CNPS as fairly threatened in California (1B.2). This habitat type is considered sensitive.

This habitat is fire dependent: Sargent cypress produce serotinous cones that require the heat of fire to open and release seeds, although cones of some species will gradually open with age, with summer heat, or partially upon maturity. The full sunlight and bare soil present after fire events is conducive to seed germination and results in even-aged, dense stands of the dominant species. In the absence of fire, this habitat is likely to succeed to serpentine chaparral or grassland habitat due to the inability of the dominant

species to reproduce in sufficient numbers to replace senescing[3] individuals without the heat of fire. However, too-frequent fire recurrence (e.g. before the build-up of a canopy seed bank) can lead to stand extinction.

The Sargent cypress habitat on the Preserve is limited in extent and less diverse than the other forest types present. The habitat type does not support the wildlife diversity as other forest types, but it is still an important resource. The cypress forests support wildlife adapted to dry, shrub-dominated habitats. Typical mammal species may include black-tail deer, coyote, and brush rabbit. Representative birds include California quail, Allen's hummingbird, western scrub-jay, bushtit, Bewick's wren, wrentit, spotted towhee, and song sparrow. Snakes and lizards use this drier habitat as well.

Sargent cypress habitat quality on the Preserve is high. Stands on the Preserve support significant native plant biodiversity, including several rare species, and are relatively free of invasive species. Sargent cypress stands also provide carbon sequestration and protection of soil and water in the uniquely challenging environment of serpentine soil. Management concerns in this habitat are protecting rare plant populations, managing fuel loads, and supporting the persistence of vegetation diversity as climate warms and fire regimes change.

Montane Riparian Forest

Montane riparian habitat comprises just two percent of the Preserve; nevertheless, viability in this zone is integral to maintaining high local biodiversity and watershed function. This forest type occurs as a narrow band of deciduous trees with a closed overstory and variable understory along Van Buren, Alpine, and Weeks Creeks. Tree species include big-leaf maple (*Acer macrophyllum*), California bay, coast redwood, white alder (*Alnus rhombifolia*), and Oregon ash (*Fraxinus latifolia*). Understory trees and shrubs may include willow (*Salix* sp.), poison oak, creambush, osoberry (*Oemleria cerasiformis*), California blackberry, and snowberry.

The riparian zone along Alpine Creek is largely devoid of invasive species. The riparian vegetation along the tributary of Ducker Creek on the Preserve contains a limited amount of Himalayan blackberry (*Rubus armeniacus*). Weeks Creek is infested with substantial stands of Spanish broom (*Spartium junceum*) and Himalayan blackberry and lesser amounts of wild plum (*Prunus cerasifera*). Stands of greater periwinkle (*Vinca major*), English ivy (*Hedera helix*), and Himalayan blackberry are located along the reach of Van Buren Creek on the Preserve, adjacent to Erland Road.

Riparian habitats tend to have an exceptionally high value for both aquatic and terrestrial wildlife species. In general, riparian woodlands and stream channels provide nesting opportunities, food, and shelter and may serve as corridors or islands during migration for a variety of fish and wildlife species. Riparian vegetation provides foraging and nesting opportunities for both migrant and resident birds and support a larger number of bird species than any other habitat type in California. Bird species occurring both along

[3] Senescence is the process by which an organism deteriorates with age.

riparian corridors and in adjacent uplands include red-shouldered hawk, California quail, mourning dove, great horned owl, Anna's and Allen's hummingbirds, downy and hairy woodpeckers, western wood-pewee, Pacific-slope flycatcher, tree swallow, Steller's and western-scrub jays, chestnut-backed chickadee, bushtit, Bewick's wren, Swainson's thrush, American robin, wrentit, warbling vireo, orange-crowned, yellow and Wilson's warblers, black-headed grosbeak, spotted towhee, song sparrow, purple finch, and American goldfinch. A few typical mammals of riparian habitats in the region include western gray squirrel, dusky-footed woodrat, northern raccoon, and black-tailed deer. In addition, common bat species may forage over the woodlands and roost within the larger trees.

Terrestrial salamanders (e.g., slender salamander, Ensatina) utilize adjacent woodlands, and aquatic salamanders (e.g., red-bellied, California giant salamander) utilize channels seasonally. The stream channels themselves are important for a variety of aquatic organisms that serve as the food base for larger aquatic species such as macroinvertebrates as well as for terrestrial species. The creeks are an important resource for fish. Steelhead have been documented in the perennial reaches of Alpine Creek and in Weeks Creek, and the larger Mark West Creek watershed supports this species as well as coho salmon. Special-status, stream-dwelling foothill yellow-legged frog have been documented at the edge of the Preserve in Weeks Creek and suitable habitat is present in Alpine Creek. The riparian habitats act as key migration corridors at both a local and regional scale.

Montane riparian habitat quality is high on the Preserve. It occurs in a narrow band due to its position high in the watershed, but is relatively diverse and has low to moderate levels of invasive infestation. It provides important functions of water quality protection and wildlife habitat diversity and movement corridors. It is also especially valuable as climate warms, providing temperature refuge and habitat connectivity. Riparian habitat is considered sensitive. The key management concern in this habitat is invasive species management.

Coastal Oak Woodland

Coastal oak woodland encompasses approximately 20% of the Preserve and includes stands of coast live oak, black oak, Oregon (*Q. garryana*) and valley (*Q. lobata*) oaks as well as mixed stands. Oregon and valley oak woodland are considered sensitive. Evergreen coast live oak woodland and Oregon oak woodland are the most extensive types on the Preserve. Other tree species commonly present include blue oak (*Q. douglasii*) and California bay, and in a number of locations, Douglas fir (*Pseudotsuga menziesii*).

The understory of the oak woodlands on the Preserve varies depending on canopy density but is typically dominated by a mixture of non-native annual grasses and forbs and native poison oak, blue wildrye (*Elymus glaucus*), and ferns. Special-status Napa false indigo occurs in some woodlands in dappled shade. Invasive species--other than the widespread non-native annual grasses and forbs--are limited within the oak woodlands. Oak regeneration is abundant in many locations but limited in the more open stands. Sudden Oak Death (SOD) has been confirmed in several locations throughout the Preserve.

Like the forests, oak woodlands provide suitable habitat for a variety of terrestrial birds, mammals, amphibians, and reptiles. The value of oak woodlands for wildlife is exceptionally high given the presence of native oak trees, which serve as a significant resource for many wildlife species in the form of both food

and shelter. Every aspect of the oak tree is utilized as forage, including acorns, leaves, twigs, pollen, roots, and sap. Perhaps the most widely recognized source of food is the acorn. This high-energy food is used heavily by acorn woodpecker, western-scrub jay, western gray squirrel, and black-tailed deer. Individual trees are also important food storage sites for acorn woodpeckers, which cache acorns for future consumption, particularly in dead and dying oak trees. These snags are prevalent on the Preserve and are also used as nesting cavities. The use of acorns by a number of wildlife species is important for dispersal and colonization of trees. The entire tree from the canopy to the roots is used as shelter; even the layer of detritus around the base is utilized by a number of amphibians and insects. Oak woodlands are typically less densely vegetated on the Preserve; thereby supporting wildlife species that require open areas for movement and foraging.

One wildlife management concern within the oak woodlands is the expansion of wild turkeys in Sonoma County. These birds are part of the range expansion of the Merriam's turkey, a subspecies native to the semi-arid mid- and southwestern U.S. This species was not present in California at the time of European settlement, but has been introduced throughout the state since the 1870s for hunting. The effects of introduced turkeys on native wildlife are not well understood, but this opportunistic omnivore could pose a threat to native wildlife through predation, direct competition, especially for acorns (CDFG 2004). Wild turkeys may use the more open wooded habitats on the Preserve.

Oak woodland habitat quality on the Preserve is high. It is extensive and includes a diversity of oak species. Understory diversity is moderate, with a mixture of native and non-native species. Douglas firs that could eventually shade out oaks are present in some locations, especially in areas of apparent past disturbance, where they form dense thickets. Key management concerns in the oak woodlands on the Preserve are encouraging oak regeneration in more open areas; limiting the spread of SOD by humans; and controlling firs where they are threatening to shade out oaks.

Mixed Chaparral

On Saddle Mountain, mixed chaparral habitat occurs on very shallow, rocky soils with chamise (*Adenostoma fasciculatum)* as the dominant species. Stands of scrub oak (*Quercus berberidifolia*), ceanothus, and manzanita (*Arctostaphylos* spp.) are also present with toyon (*Heteromeles arbutifolia*), California buckeye (*Aesculus californica*), poison oak (*Toxicodendron diversilobum*), stunted bay laurel (*Umbellularia californica*), northern sticky monkeyflower (*Mimulus aurantiacus*), and coffeeberry (*Rhamnus californica*) as associates. Vegetative cover is usually dense, often creating a relatively impenetrable thicket. Herbaceous ground cover is common in young stands but becomes less frequent as stands age. This type also includes several stands of coyote brush, which are establishing in areas previously maintained as grassland when livestock were present. See discussion in the Grassland section below.

Most chaparral types are fire-adapted. Many of the shrubs resprout readily after fire, or have seeds that require fire for germination. Even after prolonged fire-free intervals, other vegetation communities do not replace chaparral. Instead, dominant canopy shrubs are likely to change in response to changes in fire regime (Keeley and Davis 2007). Recovery is rapid after fire; for the first 30 years, shrub cover increases

and canopies begin to overlap and shrubs outcompete herbaceous species. Stands older than 25 to 35 years eventually become senescent with the rate dependent on species composition, slope, aspect, elevation, and soil type. Senescent stands tend to be highly flammable, with a lot of accumulated dead material.

The chaparral on the Preserve is largely free of invasive species, with the exception of a stand of French broom (*Genista monspessulana*) within a serpentine chaparral plant community along the PG&E access road and under a transmission line tower in the far eastern portion of the Preserve.

Chaparral provides habitat for a wide variety of wildlife adapted to shrub-dominated environments. Numerous rodent species inhabit chaparral, and deer and other herbivores make extensive use of it for browse and protective cover. Some small herbivores use chaparral species in fall and winter when grasses are not abundant. Brush rabbits eat twigs, evergreen leaves, and bark from chaparral plants. Shrubs are important to many other mammals (e.g., bobcat, gray fox) as shade during hot weather. Reptiles frequently observed in chaparral include western fence lizard, alligator lizard, and gopher and rattlesnakes. Chaparral provides a variety of resources for birds in the form of seeds, fruits, insects, protection from predators and climate, as well as singing, roosting, and nesting sites. Typical chaparral birds include California quail, Anna's hummingbird, western scrub-jay, bushtit, Bewick's wren, wrentit, California thrasher, spotted towhee, and rufous-crowned sparrow. Rocky outcroppings mixed within chaparral add complexity to the habitat, providing additional foraging and nesting opportunities.

Chaparral habitat quality on the Preserve is high. A diversity of chaparral types are present, including sensitive manzanita-dominated chaparral and other stands on serpentine soils. Multiple rare species have been documented. The Preserve's chaparral stands provide important carbon sequestration, fire resilience, wildlife habitat, soil and water protection, and plant diversity. Key management concerns in this habitat are managing fuel loads and invasive species control along the PG&E access road and in other areas of soil disturbance.

Grassland

Grassland habitat occurs extensively throughout the southwestern portion of the Preserve and in isolated patches in the northeastern portion. Although it is described in the Management Plan as annual grassland, most of the stands on the Preserve have a strong component of native perennial California oatgrass (*Danthonia californica*). This relatively small-statured perennial is often hidden by dense growth of taller non-native annuals, but forms significant cover in many stands. Stands of purple needlegrass (*Stipa pulchra*) are also present, including just uphill of the vernal pool near the hunting cabin. Native blue wild rye is common, especially along ecotones between grassland and woodland. Areas with thin, rocky, or serpentine soils typically have the highest proportion of native perennial grasses. Areas with deeper, clay-rich soils, such as Raynor clay in the southwest, appear to support the highest density of non-native annuals including invasive medusahead (*Elymus caput-medusae*) and yellow starthistle (*Centaurea solstitialis*). These areas may also have supported more livestock use in the past, as they are typically more productive and occur on gentler terrain. However, the native perennials and invasive annuals also

commonly co-occur throughout the Preserve. A stand of the endangered annual forb, Clara Hunt's milkvetch (*Astragalus claranus*), is present in one of the Preserve's grasslands.

Invasive species are a significant concern in the Preserve's grasslands. In addition to yellow starthistle and medusahead, other high-priority invasives include barbed goatgrass *(Aegilops triuncialis*) and fennel (*Foeniculum vulgare*). One non-native, rosy sandcrocus (*Romulea rosea*), is present near a stand of federally listed Clara Hunt's milk vetch and merits control and monitoring. In a few locations, native coyote brush is establishing in grassland. This likely reflects the termination of livestock grazing on the Preserve. Historic clearing of oaks may have occurred in these locations, or grazing pressure may have eliminated scattered stands over time. As a pioneer woody species, coyote brush may facilitate the gradual re-establishment of native oaks in these areas.

Grasslands provide important habitat for wildlife, but many species also require special habitat features (i.e., rocky outcroppings, woody cover, shrubs) and habitat margins to meet their needs. Grasslands provide foraging opportunities for a number of bird species who are attracted to seeds, other plant material, invertebrates, and small vertebrates. Species such as the western bluebird, loggerhead shrike, and Say's phoebe utilize grasslands, especially when there are adequate perches such as fences to forage from. Predatory hawks and owls, including American kestrel and barn owls, frequent these areas as well. Small vertebrates and invertebrates within the habitat are likely to serve as a food source for these birds and other predatory vertebrates. Subterranean foragers, such as Botta's pocket gopher and California mole, commonly occur in grassland habitats, and evidence suggesting their presence was observed. In addition, small mice (e.g., deer and harvest), California vole, black-tailed jackrabbit, coyote, and black-tailed deer are frequently observed. Bat species may also forage over grasslands. Patches of perennial grasses and forbs add to the habitat's complexity and provide additional foraging opportunities. Native butterflies and invertebrates are also abundant.

Grassland habitat quality on the Preserve is moderate to high. Although native grassland stands have not been formally mapped on the Preserve, they occur throughout most of the Preserve, are regionally uncommon, and are considered sensitive by CDFW. However, even in native-dominated stands, invasive species are common. Native grasslands in particular provide important plant and animal habitat diversity, protect soil from erosion, and provide resilience to disturbance from fire. Key concerns in the Preserve's grasslands are protecting native perennial grass stands, protecting the stand of Clara Hunt's milk vetch, and controlling invasive species.

Wetlands and Pond Habitat

Wetlands on the Preserve include wet meadow, freshwater emergent wetland, and a small vernal pool and pond. Together, these comprise approximately one acre. The vernal pool and constructed pond are near the hunting cabin in the northern portion of the Preserve.

Wet meadow habitat on the Preserve occurs in low areas and seeps primarily within grassland settings. Representative plant species include native California oatgrass (*Danthonia californica*) and meadow barley (*Hordeum brachyantherum*), sedges, and rushes. Invasive species are relatively common and include velvet grass (*Holcus lanatus*) and bull thistle (*Cirsium vulgare*).

Freshwater emergent wetlands on the Preserve are similar to the wet meadows but have a greater supply or duration of water. They are associated with seeps, springs, and pool or pond edges. Vegetation is dominated by perennial water-loving plants such as sedges (*Carex* sp.), rushes (*Juncus xiphioides*, *J. patens*, and others), and creeping wildrye (*Elymus triticoides*). Invasive species in this habitat type are primarily within the wetland/upland transition zone and include Himalayan blackberry, Harding grass (*Phalaris aquatica*), velvet grass (*Holcus lanatus*), bull thistle (*Cirsium vulgare*) and pennyroyal (*Mentha pulegium*).

A vernal pool is located near the hunting cabin in the northern portion of the Preserve. Vegetation includes Lobb's buttercup (*Ranunculus lobbii*, CNPS 4.2), as well as popcorn flower, semaphore grass (*Pleuropogon californicus*), and spikerush (*Eleocharis macrostachya*). The invasive plant pennyroyal is well established within the pool, and a small patch of Himalayan blackberry is located adjacent to the pool. A small created pond is nearby. Vegetation along the pond edge is dominated by the non-native lance-leaved water-plantain (*Alisma lanceolatum*), and also includes invasive pennyroyal and the special status plant Lobb's buttercup.

The pond and seasonal wetland provide resources for terrestrial and aquatic wildlife. The pond provides a nearly year-round water supply while the smaller wetland provides habitat during the winter months. These water sources are important breeding grounds for local amphibian populations and aquatic invertebrates. The pond provides suitable breeding habitat for newts and Sierran treefrog, a native frog. Adult Sierran treefrogs were observed at the pond in early October 2018. The pond may support northwestern pond turtle, a special-status species. Persistent aquatic resources with water into late summer are also critical watering holes for local wildlife when other sources have dried up. Many birds (e.g., swallows, Steller's jay, American robin) also rely on pockets of exposed mud within wetlands for construction of all or portions of their nests. Many species of mammals also come to utilize these as a source of drinking water and to prey on aquatic species.

Wetland habitat quality on the Preserve is moderate. The wetlands present are small and support a mixture of non-native and common native plant species. Wetlands do provide important plant and animal habitat diversity, and serve a valuable role in capturing, filtering, and storing water. Key concerns in the Preserve's grasslands are controlling invasive species and climate change stresses.

2.4.7 Special-status Species

The Preserve supports potential habitat for a number of special-status species. Special-status species include plants and animals native to California that are afforded legal protections because they are at risk. These species occur in small isolated populations or in fragmented habitat, show a marked population decline, depend on habitat that has been greatly reduced or is threatened by further loss, or have historical records in the state but no longer persist. These species require careful consideration for resource management actions or land-use changes.

The potential for occurrence of special-status species on Saddle Mountain was determined based on occurrences reported in the California Department of Fish and Wildlife California Natural Diversity

Database (CNDDB), the primary source for special-status plant and animal sighting information in the state (CDFW 2018b, Figure 4) and additional background and literature review. Special-status species with potential to occur on the Preserve were identified based on a comparison of existing habitat and microhabitat conditions with species needs, proximity to reported occurrences, and geographic range of subject species.

2.4.7.1 Plants

Seven special-status plant species have been identified on the Preserve to date, and two others are known to occur in the vicinity of the Preserve. Table 2-2, Special-status Plants Documented or with Potential to Occur on the Preserve, describes the special-status plants identified as having potential to occur on the Preserve; species known to be present or with high potential to occur are highlighted in gray. A complete list of special-status plants associated with the Preserve is presented in Appendix C, including the plant characteristics and potential for the species to occur on the Preserve.

Table 2-2. Special-status Plants Documented or with Potential to Occur on the Preserve

Scientific Name	Common Name	Listing Status[4] USFWS/CDFW/CNPS
Amorpha californica var. napensis	Napa false indigo	--/--/ 1B.2
Anomobrym julaceum	slender silver moss	--/--/2.2
Arctostaphylos canescens ssp. sonomensis	Sonoma canescent manzanita	--/--/ 1B.2
Arctostaphylos stanfordiana ssp. decumbens	Rincon Ridge manzanita	--/--/ 1B.1
Astragalus claranus	Clara Hunt's milk-vetch	FE/ST/ 1B.1
Brodiaea californica var. leptandra	narrow-anthered California brodiaea	--/--/ 1B.2
Calystegia collina ssp. oxyphylla	Mt. Saint Helena morning-glory	--/--/ 4.2
Ceanothus confusus	Rincon Ridge ceanothus	--/--/ 1B.1
Ceanothus divergens	Calistoga ceanothus	--/--/ 1B.2
Ceanothus purpureus	holly-leaved ceanothus	--/--/ 1B.2
Ceanothus sonomensis	Sonoma ceanothus	--/--/ 1B.2
Centromadia parryi ssp. parryi	pappose tarplant	--/--/ 1B.2
Eryngium constancei	Loch Lomond coyote-thistle (=button-celery)	FE/SE/ 1B.1
Fritillaria liliacea	fragrant fritillary	--/--/ 1B.2
Hemizonia congesta ssp. congesta	white seaside tarplant	--/--/ 1B.2

[4] Listing Status: FE-federally listed as endangered, FT-federally listed as threatened, BCC-Bird of Conservation Concern, SE-state listed as endangered, ST-state listed as threatened, Candidate SE-state candidate to be listed as endangered under CESA Candidate ST-state candidate to be listed as threatened under CESA, FP-State of California fully-protected species, SSC-California Species of Special Concern, and WL-Watch List.

Table 2-2. Special-status Plants Documented or with Potential to Occur on the Preserve

Scientific Name	Common Name	Listing Status[4] USFWS/CDFW/CNPS
Layia septentrionalis	Colusa layia	--/--/ 1B.2
Leptosiphon jepsonii	Jepson's leptosiphon	--/--/ 1B.2
Lupinus sericatus	Cobb Mountain lupine	--/--/ 1B.2
Navarretia leucocephala ssp. bakeri	Baker's navarretia	--/--/ 1B.1
Penstemon newberryi var. sonomensis	Sonoma beardtongue	--/--/ 1B.3
Plagiobothrys strictus	Calistoga allocarya (popcorn-flower)	FE/ST/ 1B.1
Ranunculus lobbii	*Lobb's aquatic buttercup*	--/--/4.2
Sidalcea hickmanii spp. napensis	Napa checkerbloom	--/--/ 1B.1
Trifolium hydrophilum	saline clover	--/--/ 1B.2
Triquetrella californica	coastal triquetrella	--/--/ 1B.2
Viburnum ellipticum	oval-leaved viburnum	--/--/ 2.3

2.4.7.2 Animals

Six special-status animal species have been identified on the Preserve to date, and four others are known from nearby. Table 2-3, Special-status Animals Documented or with Potential to Occur on the Preserve, describes all special-status animals identified as having potential to occur on the Preserve; species known to be present or with high potential to occur are highlighted in gray.

Table 2-3. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name	Scientific Name	Listing Status[5] USFWS/ CDFW[6]
California Giant Salamander	*Dicamptodon ensatus*	--/SSC
California Red-legged Frog	*Rana draytonii*	FT/ SSC
Foothill Yellow-legged Frog	*Rana boylii*	--/Candidate ST, SSC
Red-bellied Newt	*Taricha rivularis*	--/SSC
Northwestern Pond Turtle	*Actinemys marmorata*	--/SSC
Sharp-shinned Hawk	*Accipiter striatus*	--/WL (nesting)
Oak Titmouse	*Baeolophus inornatus*	BCC/--
Wrentit	*Chamaea fasciata*	BCC/--
American Peregrine Falcon	*Falco peregrinus anatum*	Delisted, BCC/ Delisted, FP

[5] See footnote from Table 2-2.

[6] California Department of Fish and Wildlife (CDFW). 2018a. Special Animals List – August 2018. Periodic publication.

Table 2-3. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name	Scientific Name	Listing Status[5] USFWS/ CDFW[6]
Nuttall's Woodpecker	*Picoides nuttallii*	BCC/--
Northern Spotted Owl	*Strix occidentalis caurina*	FT/ ST, SSC
Pallid Bat	*Antrozous pallidus*	--/SSC
Townsend's Big-eared Bat	*Corynorhinus townsendii*	--/SSC
San Bruno Elfin Butterfly	*Callophrys mossii bayensis*	FE/--
California Freshwater Shrimp	*Syncaris pacifica*	FE/SE
Coho Salmon – Central California Coast ESU	*Oncorhynchus kisutch*	FE/SE
Steelhead – Central California Coast DPS	*Oncorhynchus mykiss irideus*	FT/--

Saddle Mountain Open Space Preserve

Special-status Species Records in Preserve Vicinity

Preserve boundary

Northern spotted owl observations

0 0.5 1

Miles

N

Sources:
Occurrences - CDFW 2018,
Sonoma Ag + Open Space
Imagery - ESRI

2.4.8 Other Resource Issues

Sudden Oak Death

Sudden Oak Death (SOD) is a plant disease caused by the introduced pathogen *Phytophthora ramorum*. First detected in 1995, the pathogen is hosted by, weakens, and/or kills several oak species as well as a growing list of additional native plant species. Native tree species that are highly susceptible to SOD on the Preserve are tanoak (*Lithocarpus densiflorus*) and coast live oak (*Quercus agrifolia*). California bay serve as key hosts for the disease. Additional susceptible species that occur on the Preserve include madrone, California buckeye (*Aesculus californica*), big-leaf maple, western azelea (*Rhododendron* spp.), manzanita (*Arctostaphylos* spp.), toyon (*Heteromeles arbutifolia*), coffeeberry (*Rhamnus californica*), and honeysuckle (*Lonicera hispidula*). There are several confirmed locations and numerous potential areas of SOD on the Preserve as shown on Figure 5, Documented and Potential Locations of SOD.

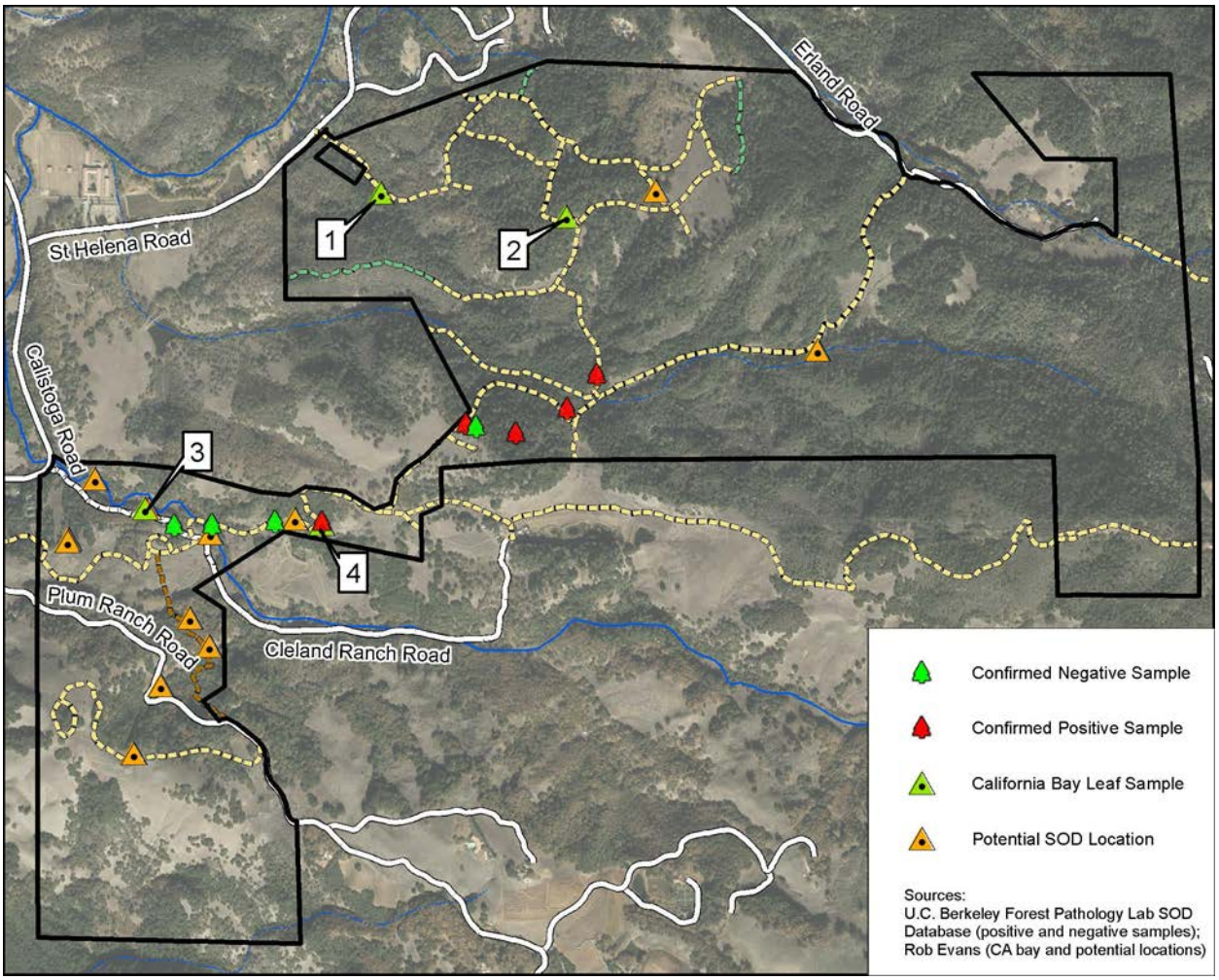


Figure 5. Documented and Potential Locations of Sudden Oak Death

Fire Hazard and Fuels

The Preserve is designated a State Responsibility Area (SRA), where CalFire has legal responsibility for fire protection. The Preserve is in an area of high and very high fire hazard severity (CalFire 2007) and is located within the wildland-urban interface (ABAG 2018). Fuel loads have accumulated throughout many of the Preserve's natural communities. Managing fuel loads within the Preserve and reducing the risk of wildfire is a key management concern for the District.

2.5 Project Components

The Management Plan presents an assessment of the types of resources on the Preserve, their status, and known threats. Having established the status of the resources and known threats to each resource, the District identified areas that required remediation and protection or enhancement actions to address these threats. The objectives, actions, and management regimes described in the Management Plan are designed to address several primary resource management issues on the Preserve. Erosion and sedimentation control, forest and fire management, and invasive plant species management warrant more immediate management actions to address. The Management Plan also addresses other management issues that the District anticipates may pose future threats: Sudden Oak Death, human use management, and preservation of cultural resources.

The following is a discussion of specific management actions proposed for the Preserve. For the full details of how management would be conducted and the thought process leading to these management actions, see Appendix A: Draft Management Plan. The Draft Management Plan may be revised to address public and agency comments received during the CEQA comment period.

2.5.1 Erosion Control and Water Quality Protection

Erosion control and water quality protection activities would be implemented on the Preserve to protect soil and water resources by restoring actively eroding roadways and trails, maintaining and improving native vegetation cover, and avoiding infrastructure development and public access in sensitive habitats.

Roadway Erosion Control Activities

Priority gully and roadway erosion sites throughout the Preserve would be repaired to reduce sediment delivery from chronic erosion of roadways. Proposed roadway erosion control activities are shown in Table 2-4, Proposed Erosion Control Treatments. Erosion control treatments would include culvert installation and replacement, road outsloping, ditch removal, construction of wet crossings and rolling dips, and re-surfacing. Figure 6, Erosion Control Treatment Areas, displays the location of treatment sites throughout the Preserve. Proposed road and trail treatments to protect nearby sensitive features are shown in Table 2-5, Road and Trail Treatments.

Table 2-4. Proposed Erosion Control Treatments

Treatment type			No.	Comments
Site specific treatments	Stream crossing treatments	Armor fill faces	1	Armor the outboard fill face at site #1 using 2 yd3 of riprap.
		Replace culverts	1	Replace an undersized, poorly installed, worn out culvert (Site #24).
		Clean culverts		Clean and maintain the inlet and outlet of the ditch relief culvert (Site #25).
		Trash racks	1	Install a trash rack at culvert inlet (site #24).
		Wet crossing	13	Construct 2 fords (Site #11 and 15) and 11 armored crossings (Site #2, 4, 7, 8, 13, 18, 20, 21, 22, 27, 34) using 80 yd^3 of rock. armor
		Critical dips	1	Install roadway dips to prevent stream diversions (Site #24).
	Other	Soil excavation	18	Excavate and remove a total of 192 yd^3 of sediment (Site #1, 2, 4, 7, 8, 11,13, 15, 18, 20, 21, 22, 24, 26, 27, 31, 33, 34)
Road surface treatments	Road drainage treatments	Rolling dips	93	Install rolling dips to improve road drainage.
		Cross road drains	2	Install cross drains to improve drainage on decommission roads.
		Install ditch relief culvert	3	Install or replace ditch relief culverts to improve road surface drainage.
		Outslope road	16	Outslope road and remove ditch along 8,188 feet of road to improve road surface drainage.
	Roadway surface treatments	Repave roadway	4	Repave a total of 900 ft^2 of road at 1 stream crossing and 3 ditch relief culvert installations.
		Rock armor	3	Add a total of 105 yd^3 of rock to the road surface at 3 rolling dips and 520 feet of road outsloping.
		Upgrade Road Surface		Upgrade roadway surface of approximately 4.9 miles of existing roadway as shown in Table 2-5.
		Roadway Decommissioning		Decommission approximately 1.5 miles of roads currently running through or near sensitive resources as shown in Table 2-5.

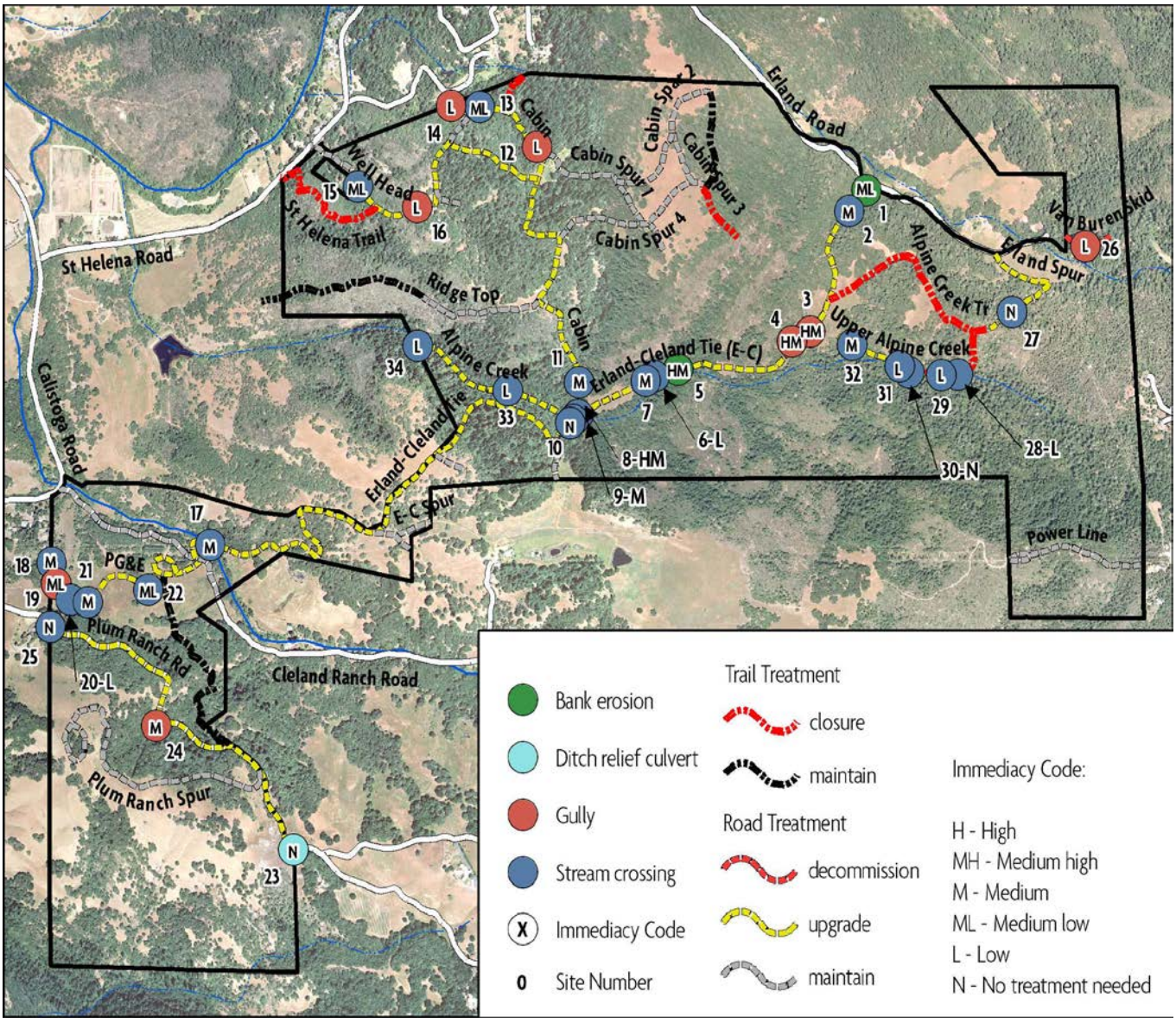


Figure 6. Erosion Control Treatment Areas

Table 2-5. Road and Trail Treatments

Road / trail name	Sensitive Feature	Road sites impacted by sensitive feature buffer zone	Treatment recommendation	Total length (mi)
Alpine Creek Road	Riparian, Napa false indigo	2 stream crossings: Site #33, 34	Closure	0.37
Alpine Creek Trail	Riparian, Napa false indigo	2 stream crossings: Site #28, 29	Closure	0.62
Cabin Road	Riparian, Freshwater Emergent Wetland, Cultural	1 gully: Site #12	Upgrade (0.69 mi), Decommission (0.17 mi)	0.86
Erland-Cleland Tie Road	Riparian, Cultural	6 stream crossings (Site #6, 7, 8, 9, 10, 17) 1 bank erosion (#5)	Upgrade	2.00
Erland Spur Road	Serpentine, Closed Cone Pine-Cypress Sonoma ceanothus	None	Upgrade	0.28
PG&E Road	Serpentine, FEW, Wet Meadow	3 stream crossings (Site #18, 20, 21) 1 gully (Site #19)	Upgrade	0.51
Plum Ranch Road	Serpentine, Cultural, Napa false indigo	1 DRC (Site #23)	Upgrade	0.78
Upper Alpine Creek Road	Riparian	3 stream crossings Site (#30, 31, 32)	No treatment, abandon in place	0.17
Van Buren Skid Road	Riparian	1 gully (Site #26)	No treatment, abandon in place	0.10
Wellhead Road	Napa false indigo	None	Upgrade	0.65

2.5.2 Enhance Plant Communities and Habitats

The Management Plan identifies enhancement activities in riparian, grassland, chaparral, and forest and oak woodland habitats. The District intends to manage riparian habitats to enhance cover for erosion prevention and bank stabilization and to conserve native plant communities and species. Grasslands would be managed to enhance the local diversity of native perennial grasses and native forbs. Chaparral habitats (serpentine chaparral) and northern interior cypress forest would be managed to increase native biodiversity and wildlife habitat. Forest and woodland habitats would be managed for fuel reduction, invasive plant control, and maintenance of appropriate native vegetation assemblages.

Sensitive Habitat Enhancement

The District intends to implement enhancement activities within select sensitive habitats on the Preserve, as shown on Figure 7, Sensitive Habitat Enhancement Areas and Figure 8, Habitat Enhancement Area Zones as discussed below.

- Revegetation and habitat enhancement would be implemented along Weeks Creek in an approximately 1.26 acre area in the western portion of the Preserve, which was previously

disturbed and has been invaded by exotic plants. This area is divided into five zones (Zones A through E) as shown on Figure 8, Habitat Enhancement Area Zones. In Zone A, revegetation would be implemented in order to widen the riparian corridor to 50 feet while leaving much of the adjacent grassland habitat intact. Small open areas in Zones B through E would be revegetated with drought-tolerant native tree species to expand the riparian corridor, provide habitat, and aid in bank stabilization.

- An approximately one-acre area, encompassing Zones F through I on Figure 8, Habitat Enhancement Area Zones, in an upland drainage along PG&E Road would be enhanced to restore disturbed habitat and address erosion and sedimentation. A population of invasive plants (Fuller's teasel) would be removed and the area would be revegetated to provide high-quality habitat and aid in bank stabilization. Brush check dams would be installed along the channel bottom to minimize erosion and sedimentation into Weeks Creek.

- Approximately 11 acres of non-contiguous coast redwood habitat would be enhanced. This acreage is spread throughout the northern and eastern portions of the Preserve, with the largest single area being just under two acres as shown on Figure 7, Sensitive Habitat Enhancement Areas. Coast redwood on the Preserve were historically logged and the redwoods on site currently consist primarily of scattered, sizeable second-growth stands that have stump-sprouted. Small saplings exist between established stands but are threatened by the encroachment of other tree species. Thinning, consisting primarily of removing Douglas fir and bay laurel, would be implemented in these areas to decrease competition and encourage the coast redwood saplings to thrive. Douglas firs and bay laurels would be removed by contractors utilizing chainsaws and hand tools. While prescribed burning (which is a long-term management activity) would be effective at reducing encroaching Douglas fir saplings and seedlings, larger trees would likely survive most prescribed burns. Therefore, when determined to be necessary, some larger Douglas fir and bay laurel would be removed using chainsaws or hand tools if saplings are small enough to be lopped. In the event that prescribed burns are not permitted or not considered a viable option on the Preserve in the long-term, manual methods of Douglas fir removal would be used exclusively to reduce encroachment. Larger Douglas fir trees may also be girdled and an herbicide applied to the cambium layer where the cut was made.

- Approximately 2.17 acres of valley needlegrass grassland would be enhanced. This grassland is currently threatened by the encroachment of coyote brush and a variety of invasive species. Enhancement activities in this area (see Figure 7, Sensitive Habitat Enhancement Areas) would focus on removing these encroaching species and restoring the open character of the grassland. Coyote brush and invasive species removal would be performed by District staff, volunteers, or contractors using hand tools and, if necessary, handheld power tools.

- Native plant communities around the Preserve would be enhanced by controlling invasive plant species and encroaching coyote brush and Douglas fir where appropriate. Invasive species would be monitored, including Himalayan blackberry, velvetgrass, and bull thistle, as these species pose the most aggressive threat to the integrity of the Preserve's grasslands.

- Fuel loading and encroachment of Douglas fir and bay laurel in chaparral habitat would be reduced through mechanical fuels treatment methods such as individual tree removal.

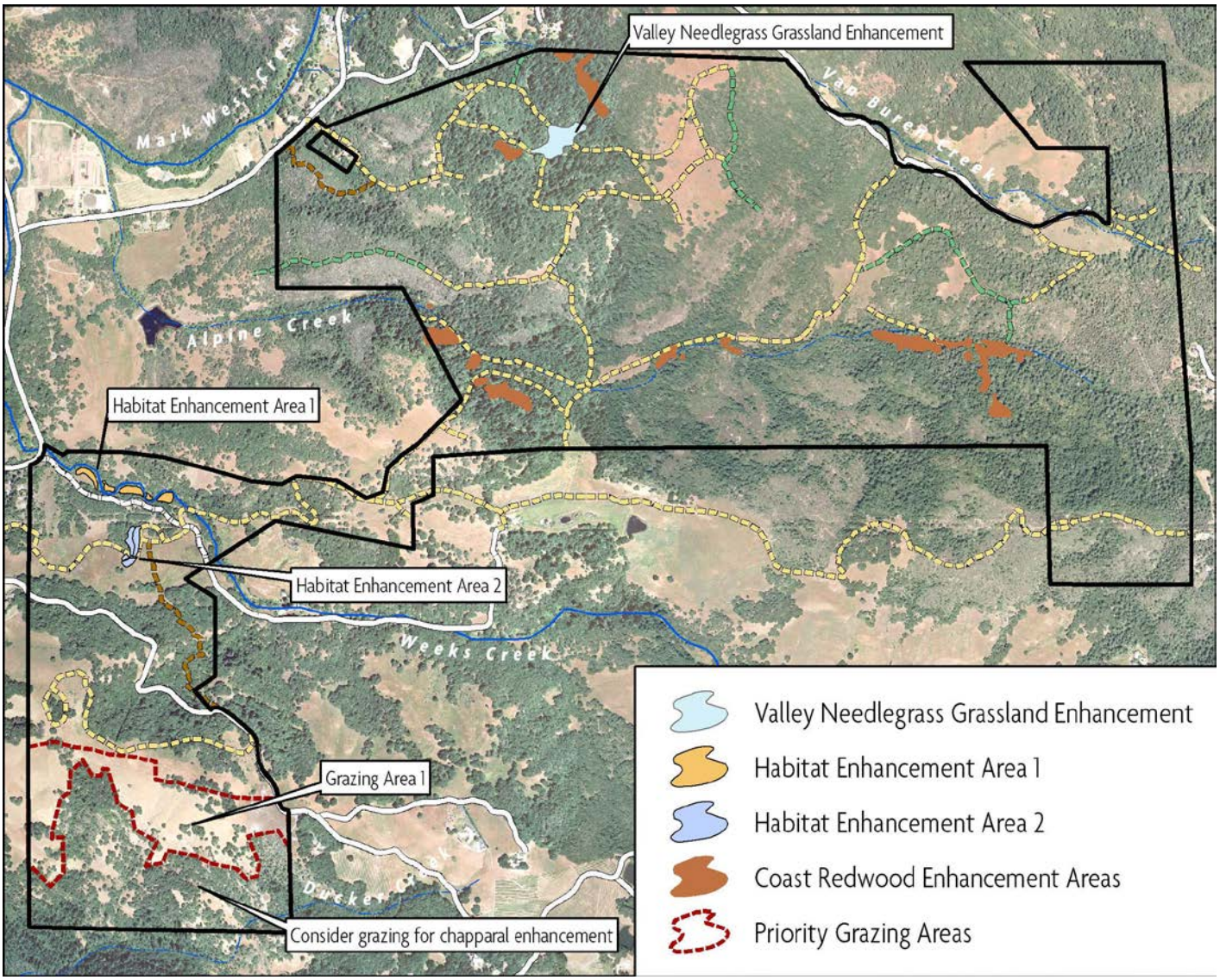


Figure 7. Sensitive Habitat Enhancement Areas

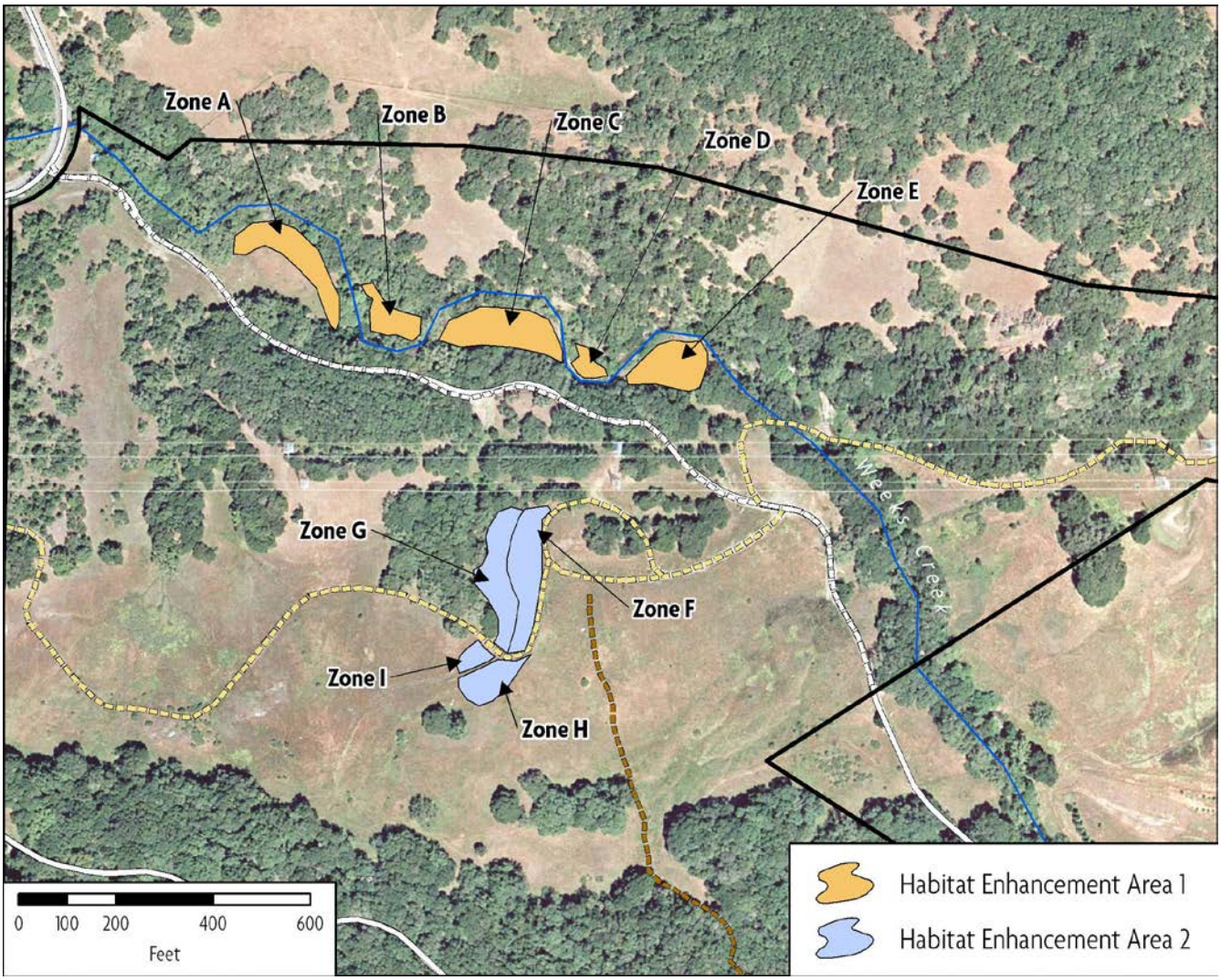


Figure 8. Habitat Enhancement Area Zones

General Forest Thinning and Tree Removal

Habitat enhancement opportunities within the Douglas fir Forest, Mixed Hardwood-Conifer, and Coastal Oak Woodland habitat types on the Preserve include thinning of dense even-aged stands. The District intends to conduct thinning within overcrowded, even-aged Douglas fir and mixed hardwood conifer habitats and along select corridors to establish shaded fuel breaks. To accomplish this, the District would implement the following actions:

- Evaluate vegetation management opportunities across approximately 780 acres of forested habitats, including some areas where coyote brush is encroaching into grasslands as shown on Figure 9, Proposed Fuel Breaks and Maximum Potential Thinning Area. The District would evaluate forest conditions to determine if mechanical treatment is necessary to thin overcrowded, even-aged Douglas fir and mixed hardwood conifer habitats, and along select corridors to establish shaded fuel breaks.

- Prepare a site-specific management program or plan, such as a Forest Management Plan, to guide overall forest management and the potential use of mechanical removal of trees to improve forest health and reduce fire risk. The Forest Management Plan would be developed in cooperation with registered professional foresters, natural resource specialists, ecologists, and/or wildlife biologists to identify and describe the objectives of forest thinning, the specific locations proposed for thinning, the prescription to achieve the desired forest condition, and the target vegetation conditions, including species composition and basal area. The Forest Management Plan, or similar document, would guide fuels treatment following mechanical treatment activities. Thinned trees may be pile burned, chipped on-site, or lopped and scattered to retain material and nutrients within the vegetation community while also reducing fire hazards.

- Secure approval and authorization from CalFire and other resource agencies for the Forest Management Plan or similar document.

- Implement forest management activities using a variety of mechanical treatment methods to accomplish forest thinning and tree removal. Mechanical management techniques may be used to implement forest and grassland management to improve the structure and composition of forest vegetation and decrease fire danger across the Preserve. Mechanical treatments may include targeted mowing in grasslands or mechanical thinning to improve forest conditions and to meet other management objectives across the Preserve. The District may use mowing to manage invasive species in grasslands. Mechanical forest treatments would include thinning and trimming to selectively removing trees from an area to restore stand structure to an ecologically appropriate range, improve species and habitat diversity, reduce ladder fuels, and ensure health and resiliency across the forested landscape.

Shaded Fuel Breaks

A shaded fuel break is a forest management strategy used to facilitate emergency access and establish safe locations for fire suppression activities in areas where natural fire regimes have been suppressed and where combustible vegetation has built up. They provide an opportunity to reduce, modify, and manage fuels along designated corridors to enhance wildland fire protection and to inhibit the spread of wildfire in key areas across the landscape. Shaded fuel breaks are designed to meet the following goals:

- Modify fire behavior by reducing ladder fuels and increasing tree spacing
- Treat ground fuels
- Facilitate fire suppression efforts

By modifying vegetation to reduce the rate of spread and intensity of fire, shaded fuel breaks can provide a defensible location that can be used by firefighters to help suppress oncoming wildfires. Fuels within a shaded fuel break are reduced in volume through thinning or pruning and the fuel breaks are generally constructed to protect both wildlands and neighboring communities and to facilitate safe ingress/egress along travel routes. They are commonly located along ridgelines and/or existing roads where firefighters often implement fire control efforts. The ideal location and design of shaded fuel breaks is determined after considering fuels, topography, weather, exposures, and other constructed or planned

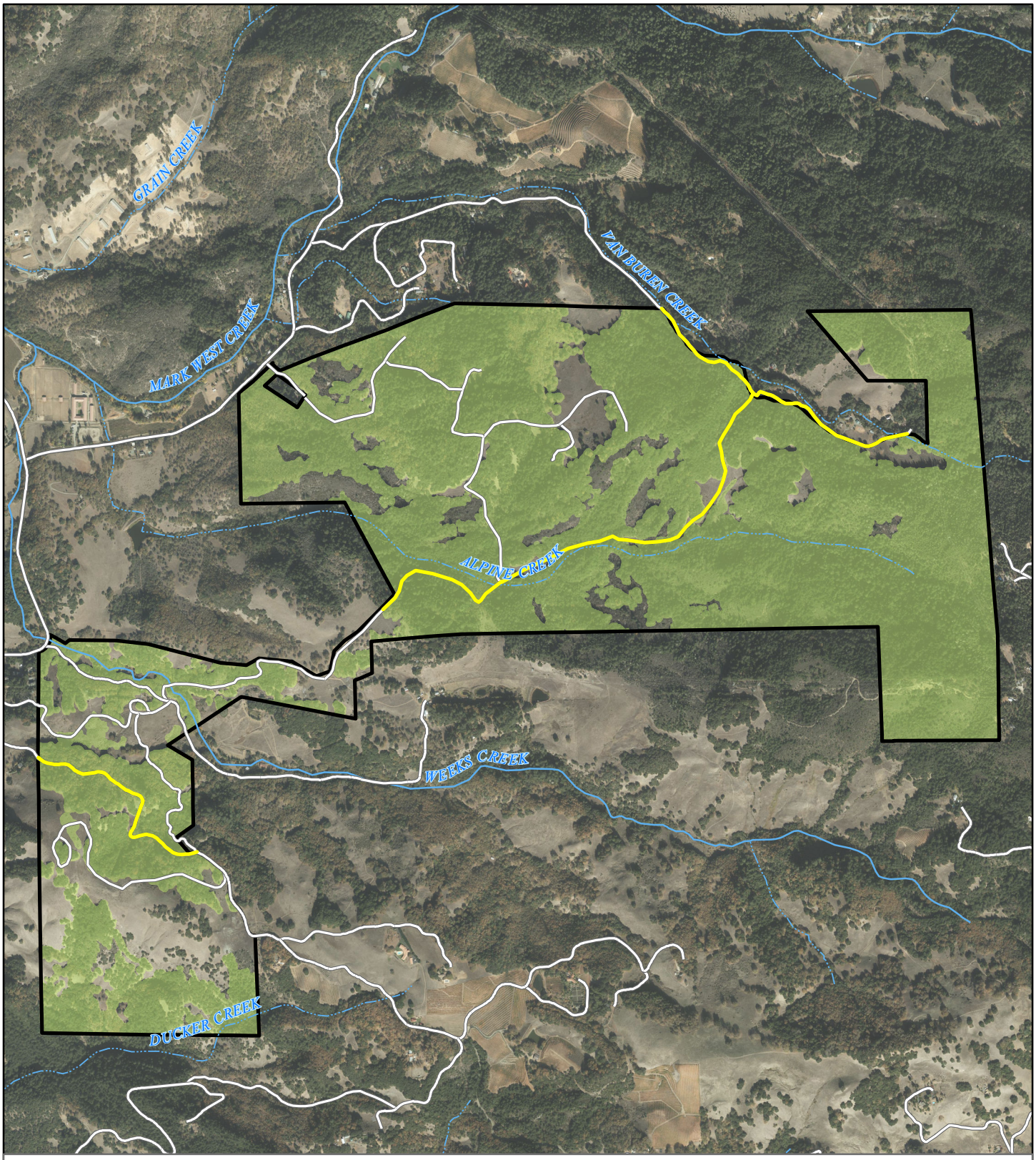
improvements. Soil stabilization, erosion prevention measures, and long-term maintenance requirements are considered during planning and construction phases.

The Management Plan includes identification of three proposed shaded fuel breaks. CalFire and the District have identified the Erland-Cleland Tie Road, property frontage along Erland Road, and a portion of Plum Ranch Road as potential locations for shaded fuel breaks as shown on Figure 9, Proposed Fuel Breaks and Maximum Potential Thinning Area. The shaded fuel break would be implemented as a short-term management activity on the Preserve.

The proposed shaded fuel breaks would be approximately 2.43 miles long in total and approximately 50-200 feet wide. The District would use mechanical thinning and pruning within an approximately 43-acre area to create the shaded fuel break, following a vegetation management prescription developed in conjunction with CalFire or a Registered Professional Forester. Mechanical treatments would be implemented to thin understory vegetation through the removal of shrubs and saplings; trim mature trees to reduce ladder fuels; and, in areas where forest stands are particularly dense, remove trees to open the canopy and reduce ladder fuels. Woody material would be lopped and scattered or chipped and left in place to form a mulch to protect the soil from compaction and erosion. Some larger woody material may be piled and burned on site.

In the long term, the District would re-treat the shaded fuel break every several years as needed to maintain reduced tree and fuel densities.

The District may identify other shaded fuel break locations in the future, as further forest management reviews are conducted.



Saddle Mountain Open Space Preserve

Proposed Fuel Breaks and Maximum Potential Thinning Area

AG + OPEN SPACE
SONOMA COUNTY

Map Date: 12/6/2018
Sources: SCGIS (roads, parcels);
Sonoma County Vegetation Mapping
and LiDAR Program (vegetation);
NASA/UMD/WSI (Oct.2013 imagery).
This map is for illustrative purposes only and is
not intended to be a definitive property description.

N

0 0.225 0.45 Miles

- Proposed Shaded Fuel Break
- Road
- Perennial Stream
- Intermittent Stream
- Area Appropriate for Future Thinning
- Preserve Boundary

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Invasive Plant Management

Some of the Preserve's plant communities are threatened by invasive plants. As noted above, the control and prevention of non-native species is one of the primary conservation challenges guiding management of the Preserve. As a result, the District intends to implement a range of actions to control existing populations of invasive plants species and to prevent the establishment of new invasive species on the Preserve. Focus areas for treatment include riparian zones, wetlands, serpentine chaparral and grasslands, and other grasslands that currently contain invasive plant species, as shown on Figure 10, Invasive Plant Species Treatment Sites below. To meet these objectives, the District would implement the following actions:

- Infestations of invasive plants would be controlled or eradicated to the extent feasible. Table 2-6, Priority Invasive Plant Treatments, lists the known populations of invasive plants on the Preserve that are the highest priority for treatment in the short-term. A variety of methods would be used to control invasive plant populations, including manual removal, application of herbicides, and mechanical control (e.g., mowing, thatch removal, and mechanical removal of entire plants). The exact method used would depend on the target species and the characteristics of the surrounding habitat. Implementation of invasive species management activities would be managed by a qualified ecologist and damage to native plants and habitats would be avoided. Following the removal of invasive plants, disturbed sites would be planted or seeded with appropriate native species. Treatment sites would be monitored on an annual basis to assess the effectiveness of control methods and determine the need for retreatment.

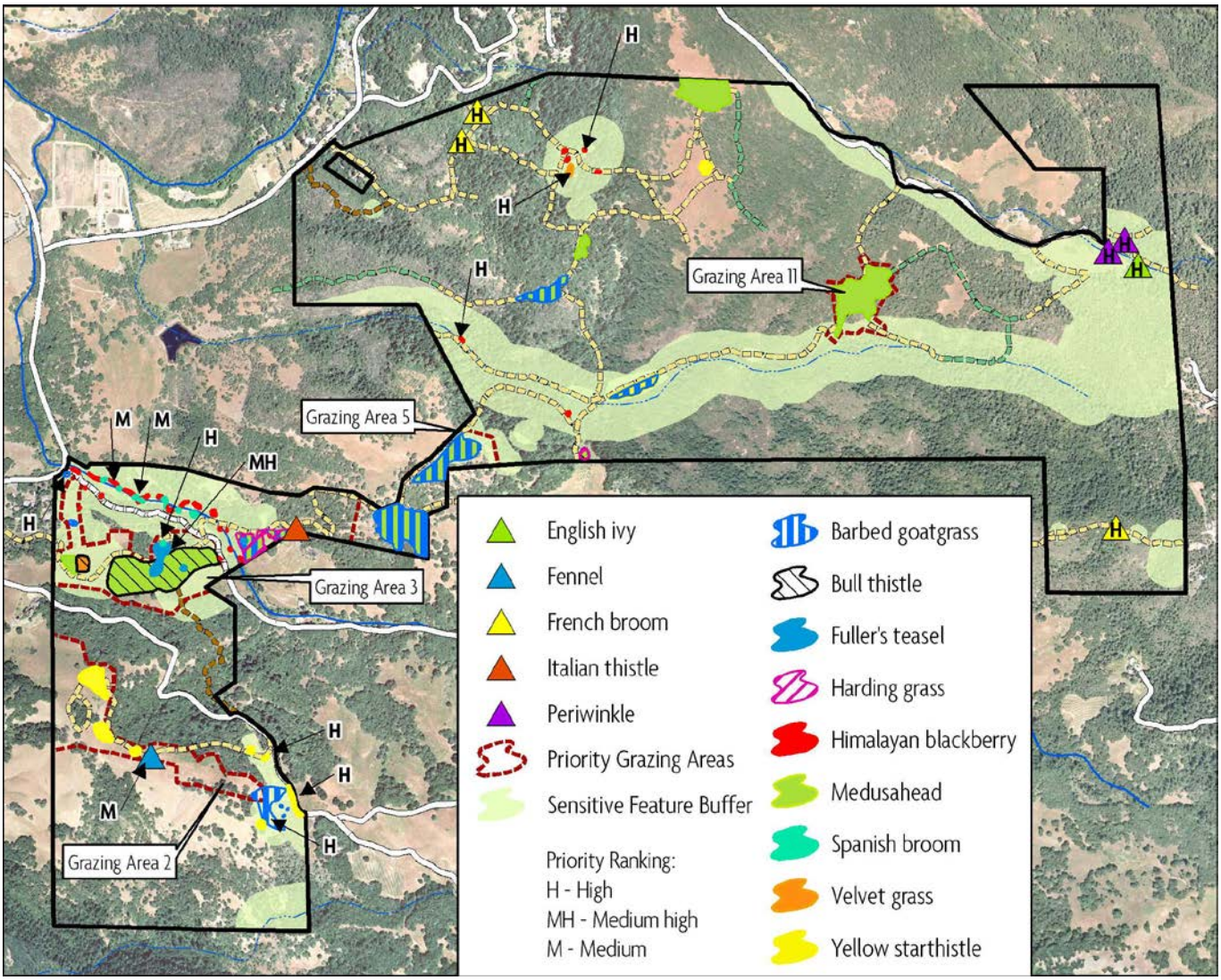


Figure 10. Invasive Plant Species Treatment Sites[7][8]

[7] Sensitive Feature Buffers are further described in Section 2.4.5.

[8] Though Priority Grazing Areas are identified, grazing is not proposed as a management tool in this Management Plan, with the exception of limited goat grazing.

Table 2-6. Priority Invasive Plant Treatments

Invasive Plant Name	Location	Estimated Acreage	Treatment Priority	Target Status	Control Method
Barbed goatgrass *Aegilops triuncialis*	Off Plum Ranch Road	1.74 ac	High	10% decrease in annual areal coverage	Mowing, hand pulling Thatch removal Prescribed fire Imazapic herbicide
	Near entrance to the Preserve off Cleland Ranch Road	3.00 ac			
Bull thistle *Cirsium arvense*	Uphill from the vernal pool near the hunting cabin	0.04 ac	High	100% eradication	Mowing, weed-whacking, hand pulling
English ivy *Hedera helix*	Along Van Buren Creek in the northeast	Less than 0.10 ac	High	100% eradication	Hand pulling, removing vines and roostocks Remove vines from area after pulling
Fennel *Foeniculum vulgare*	Grassland near the "saddle" of Saddle Mountain	Less than 0.10 ac	Medium	100% eradication	Remove with handtools Glyphosate herbicide
French broom *Genista monspessulana*	Tower maintenance road in the southeastern portion of the Preserve	Less than 0.10 ac	High	100% eradication	Hand pull or weed wench when soil is moist Glyphosate herbicide
	Along several old roads east of St. Helena Road near the northern Preserve line	Multiple patches less than 0.10 ac			
Fuller's teasel *Dipsacus sativus*	Near the road on both sides of Weeks Creek	2.00 ac	Medium High	100% eradication	Manual plant removal
Greater periwinkle *Vinca major*	Along Van Buren Creek downstream of English ivy	Multiple patches less than 0.10 ac	High	100% eradication	Manual removal
Himalayan blackberry *Rubus armeniacus*	Along Van Buren Creek	0.23 ac	High	100% eradication	Hand removal of rootstock Mechanical control methods Herbicide
	Along Ducker Creek	0.50 ac			
	By the transmission lines north of Weeks Creek	0.04 ac			
	Near the old hunting cabin in the	0.10 ac			

Invasive Plant Name	Location	Estimated Acreage	Treatment Priority	Target Status	Control Method
	northern portion of the Preserve				
	Uphill from the vernal pool near the hunting cabin	0.03 ac			
	Along Weeks Creek	0.91 ac (total, non-contiguous)			
Pennyroyal *Mentha pulegium*	Near the old hunting cabin in the northern portion of the Preserve	0.03 ac	High	100% eradication	Manual removal
Spanish broom *Spartium junceum*	Along the transmission line service road south of Cleland Ranch Road	Single occurrence	High	100% eradication	Manually operated hand and power tools with minimal soil disturbance Glyphosate
	Along Weeks Creek	0.22 ac (total, non-contiguous)			
Velvet grass *Holcus lanatus*	Uphill from the vernal pool near the hunting cabin	0.29 ac	High	100% eradication	Hand removal Herbicide
Yellow starthistle *Centaurea solstitialis*	Off Plum Ranch Road	5.5 ac	High	10% decrease in annual areal coverage	Mowing, weed whacking Herbicide
Rosy sandcrocus *Romulea rosea*	Near known Clara Hunt's milk vetch population	Small, non-continuous areas	High	100% eradication	Hand removal

- The District would monitor the Preserve for the spread invasive plant species. New occurrences of invasive plant species not currently documented on the Preserve would be considered high priority and controlled and eradicated to the extent feasible. Control methods and procedures for these occurrences would follow those outlined above for managing existing high priority invasive plants.

- Fully established populations of grassland invasive species (e.g., bull thistle, medusahead, barbed goatgrass, hedgehog dogtail, velvet grass, and wild oat) are currently considered low priority, but control measures may be implemented as funding and resources become available. Such populations are low priority because occurrences are widespread and difficult to control through traditional methods, as invasive species are widely interspersed with native species in grasslands on the Preserve. Prescribed fire, described below, may be implemented to control some of these invasive populations, along with the control methods described above.

2.5.3 Prescribed Fire

Prescribed fire can be a valuable management tool both to protect and enhance natural resources and to reduce the risk of catastrophic wildfire. Carefully managed burns can help control invasive species, reduce fuel loads, and promote regeneration of fire-dependent species and maintenance of other desired habitat conditions.

In general, fire has potential to provide the following benefits on the Preserve:

- Forest settings
    - reduce density of juvenile Douglas firs to encourage development of larger individual trees and/or facilitate other species (redwood, oak) to maintain on-site habitat diversity
    - reduce density of surface fuels, ladder fuels, and Douglas firs and other species contributing to high fuel loads that may pose a threat to human infrastructure or safety
    - support natural regeneration of fire-dependent Sargent cypress forest species
- Woodland settings
    - reduce density of juvenile Douglas firs to facilitate oaks and maintain on-site habitat diversity
    - reduce high fuel loads that may pose a threat to human infrastructure or safety
- Shrubland settings
    - support natural regeneration of chaparral species
    - temporarily reduce high fuel loads that may pose a threat to human infrastructure or safety
- Herbaceous settings
    - reduce cover of invasive species and other non-native annuals
    - reduce high fuel loads that may pose a threat to human infrastructure or safety
    - maintain open character of meadows and reduce shrub and tree encroachment and succession

Prescribed Fire for Invasive Species Management

The District intends to use prescribed fire as a management tool to control invasive species within the Preserve's grassland communities. The District anticipates partnering with CalFire and local non-profit programs to host initial, small-scale burns on the Preserve. The District intends to coordinate with CalFire to explore the possibility of participating in CalFire's VMP or Vegetation Treatment Program (VTP). Participation in these programs would provide programmatic-level guidance for utilizing prescribed fire to manage habitat and vegetation on the Preserve, while also providing for further specific planning and resource review for each individual prescribed burn on the Preserve to evaluate potential site-specific impacts and to identify means to reduce or avoid them. However, individual burn unit planning could be implemented even if the District does not enter a VMP or VTP contract with CalFire.

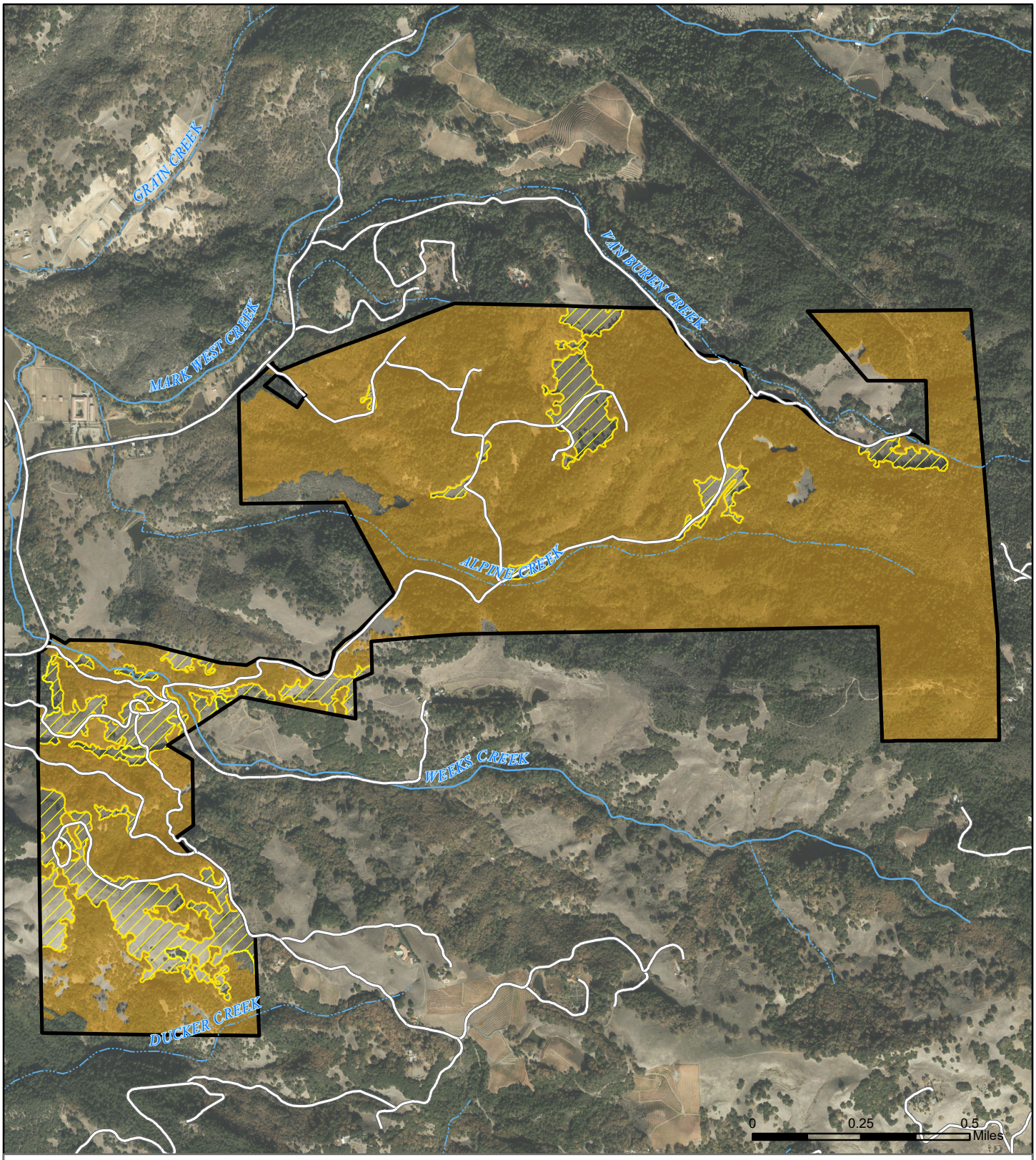
Once prescribed burn units are identified and the District is prepared to implement an individual prescribed burn, a burn plan would be developed for each specific prescribed fire project on the Preserve in coordination with CalFire. The burn plan would be developed by a qualified prescribed fire specialist and would include a description of the burn area, an analysis of the environmental setting and potential impacts, a burn prescription designed to meet treatment objectives, and fire behavior predictions. If a burn were to take place near sensitive resources, the burn plan would be subject to appropriate resource

review, such as consultation with relevant permitting agencies. A search of archival records and pedestrian survey to identify cultural resources, as well as Native American tribal outreach, would be conducted prior to burning. Conditions and environmental protection measures may be included in the burn plan as a result of the site-specific environmental review process. In addition to the burn plan, a smoke management plan would be developed for each prescribed fire project in accordance with Bay Area Air Quality Management District regulations. The required smoke management plan would include emissions estimates, wind prescriptions, identification of smoke-sensitive areas, any necessary mitigations, contingency plans, and public notification and complaint procedures. Finally, a "Go/No Go Checklist" would be developed for each prescribed fire project to confirm that all the conditions necessary for implementing a burn are met. CalFire and qualified fire personnel would conduct burn operations.

After working with Calfire and others to identify conceptual burn units, ideal burn conditions, and the timeframes to achieve prescribed fire objectives, the District would engage with neighboring community members and other stakeholders to share District plans and objectives, solicit input, answer questions, and address potential concerns about proposed burns and smoke management. The District would initiate public outreach months in advance of any proposed burn and would continue coordinating with the public throughout the entire process of burn planning, implementation, and evaluation. Key target audiences would include property owners adjacent to the Preserve, public health officials, local elected officials, and members of the general public. The District would provide the public with information regarding the goals and objectives of the proposed prescribed burn, predicted smoke emissions, and measures to minimize impacts and protect public health. The District would consider public comments in burn planning and smoke management decisions.

Additionally, some burn units may be well suited for educational outings to allow the public to experience both pre- and post-burn conditions, observe post-fire vegetation and fuel response over time, and learn about local fire ecology, ecosystem processes, fire safety, and the use of prescribed fire as a land management tool.

Prescribed fire would be utilized on a small scale within the Preserve's grassland habitats to manage invasive species and restore native grasses. Prescribed fire would specifically be utilized to treat populations of yellow star thistle, medusahead, and barbed goatgrass, which can otherwise be difficult to control through traditional means once well-established within grassland habitats. Figure 11, Maximum Extent of Forest and Grassland Areas for Future Prescribed Fire Planning, shows the grassland and forest areas where prescribed burns could potentially be conducted in the short- and long-term. The grassland areas encompass 117 acres of the total 131 acres of grassland on the Preserve. They represent the maximum spatial extent of grasslands that could be included in future planned burn units, not actual burn units or prescribed fire projects. Not all of these grasslands may be appropriate for prescribed fire use and additional evaluation would be needed for the grasslands to determine if prescribed fire is the correct tool to utilize. The areas mapped in Figure 11 exclude some grassland areas due to characteristics such as the presence of listed vegetation species, difficulty of access, or very small vegetation patch size that would not be economical or efficient to burn, as well as extensive chaparral areas where the District does not plan to introduce fire. Invasive treatment needs, safety, terrain, fuel levels, neighboring



Saddle Mountain Open Space Preserve

Maximum Extent of Forest and Grassland Areas for Future Prescribed Fire Planning

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SONOMA COUNTY

Map Date: 12/6/2018
Sources: SCGIS (roads, parcels);
Sonoma County Vegetation Mapping and LiDAR Program (vegetation);
NASA/UMD/WSI (Oct.2013 imagery).
This map is for illustrative purposes only and is not intended to be a definitive property description.

N

- Road
- Perennial Stream
- Intermittent Stream
- Focus Area for Future Prescribed Fire Analysis and Planning
- Potential Grassland Prescribed Burn Unit
- Preserve Boundary

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properties, smoke dispersal, and other resource considerations would be considered when selecting individual burn areas through further analysis, planning, and consultation with CalFire and community residents. Individual burn units would be small scale and would not exceed approximately 20 acres per unit, although more than one unit may be burned in a single day, if it is efficient and appropriate to do so. Each of these individual prescribed fire projects would be subject to the process described above, with development of specific burn and smoke management plans and associated review.

Individual burn units would be selected from within the mapped areas through further analysis of site-specific conditions, planning, and consultation with neighboring landowners and community residents. As guided by qualified prescribed fire personnel, control lines would be established around individual burn units prior to conducting prescribed fire activities, and may include selective thinning in adjacent forest habitats. Natural firebreaks would be utilized whenever possible. New control lines that result in soil disturbance would be rehabilitated after the burn to restore original soil surface cover, erosion-control measures would be put in place where needed, and disturbed areas would be re-seeded with site-appropriate native species.

Burns in grasslands would ideally be conducted in late May and early June, when weather conditions are suitable and after the seeds for native grasses have dropped, but while the seed heads for barbed goatgrass and medusahead are still ripe but not yet dispersed (Berlemen et al. 2016). While medusahead can be significantly reduced with one burn, fully controlling barbed goatgrass with prescribed fire requires two burns in consecutive years (DiTomaso et al. 2001). However, follow-up control of barbed goatgrass within the Preserve's grasslands may be accomplished with hoeing or hand pulling after the population is substantially reduced by initial burning. Two consecutive years of burning would be most effective for controlling established populations of yellow star thistle in grassland communities.

Reintroduction of Prescribed Fire to Forest, Woodland, and Chaparral Habitat

The District intends to reintroduce prescribed fire to the Preserve's forest and woodland habitats, and, to a limited extent, within small patches of chaparral habitats set within larger forested communities, as a long-term management action. The District will explore the use of prescribed burns to address long-term habitat management needs through the development of a Forest Management Plan or similar document, as discussed above in Section 2.4.2. This long-term plan could include continued burning in grasslands as described above, as well as burns in woody habitats to reduce ladder fuels, control encroachment of undesired species, and promote other desired habitat conditions. Prescribed burning in woody habitats would require additional steps, which will be addressed in the Forest Management Plan. These may include mechanical fuel load reduction prior to burns and greater coordination with neighboring landowners and the public to address smoke concerns, as burning in woody habitats tends to generate more smoke than in grassland.

The Forest Management Plan or similar document would be prepared to guide this expanded prescribed fire program and would include the historic role of fire, weather analysis, suppression, and prevention. This plan would also describe how maintenance of currently proposed and any potential additional shaded fuel breaks would be incorporated into the management of the Preserve.

In addition to short-term burns in the Preserve's grasslands, prescribed fire may be used in the long-term to manage coastal oak woodland, closed-cone pine cypress, Douglas fir, montane hardwood conifer, and other forested habitats, as shown in Figure 11, to meet vegetation and habitat condition objectives. Prescribed burns would be implemented to reduce or eliminate tree encroachment and stimulate seed germination among targeted species within forest and woodland habitats if site-specific evaluation indicates that prescribed burning is a feasible means to achieve treatment objectives. Fire would simultaneously eliminate encroaching trees (larger trees may need to be manually cut or girdled) and stimulate the germination of seeds of desired species to maintain chaparral or Sargent cypress habitats.

The District anticipates that the frequency of prescribed fire projects would fall between once every few years to a likely maximum of twice per year. Exact intervals may vary depending on partnership opportunities and resource availability. Ecological factors, including appropriate fire return intervals for each habitat type and re-treatment timing for invasive species control, would be primary considerations in determining burn frequency. Prescribed burns would be conducted in spring and fall, and potentially during winter if fuel moistures are low enough to carry fire and meet burn objectives. Required pre-burn actions may include construction of a firebreak, establishment of control lines, removal of ladder fuels, and/or thinning of brush as appropriate to reduce fire intensity within burn units and reduce the risk of fire escaping the designated burn unit. Any prescribed burns would be planned in collaboration with and executed by trained fire professionals from CalFire or other qualified agencies and/or consulting fire ecologists. Measures would be taken to monitor for and prevent erosion following burns, as described in Section 2.6.

2.5.4 Native Plant Revegetation

The District would implement native plant revegetation to establish diverse assemblages of native species, improve fish and wildlife habitat, aid in sediment retention, and provide erosion control. Revegetation would be focused on disturbed areas that are not naturally regenerating with native species. The District would revegetate invasive species management areas to help prevent the re-establishment of invasive species and would evaluate the need for revegetation after any grading operation or other ground-disturbing activity. When conducting revegetation activities, the District would source seeds and plants locally.

Revegetation of Riparian and Wetland Habitat

The District would revegetate riparian areas following removal of invasive species, where warranted, to reduce the risk of re-establishment of invasive species and to aid in bank stabilization and erosion control. The invasive removal and erosion control sites would be evaluated by a professional restoration ecologist for erosion potential following vegetation removal. If post-treatment monitoring indicates insufficient natural regeneration of native species within the riparian zone, a revegetation plan would be developed and implemented.

Revegetation of Upland Habitat

Revegetation opportunities in upland habitats on the Preserve are intended to restore areas adversely impacted by prior land use practices, including road-related erosion and clearing of trees and shrubs within the upper riparian zone. The District would implement revegetation activities in conjunction with erosion control activities in upland habitats.

2.5.5 Buffer Zones for Sensitive Features

The District would establish buffer zones around sensitive resources to protect and enhance resources, protect water quality, provide land stability, improve habitat function, and provide wildlife habitat and corridors. Visitor use and modification of the environment would be avoided within the buffer areas, except for implementation of land management and habitat improvement activities. The proposed locations of the buffer zones in the Preserve are shown on Figure 12, and the buffers would be implemented as follows:

- At least 100 feet (30 meters) for terrestrial species and habitats (e.g. Sargent cypress and serpentine areas) and cultural resources
- At least 300 feet (90 meters) around/along riparian zones, vernal pools, and other aquatic habitats

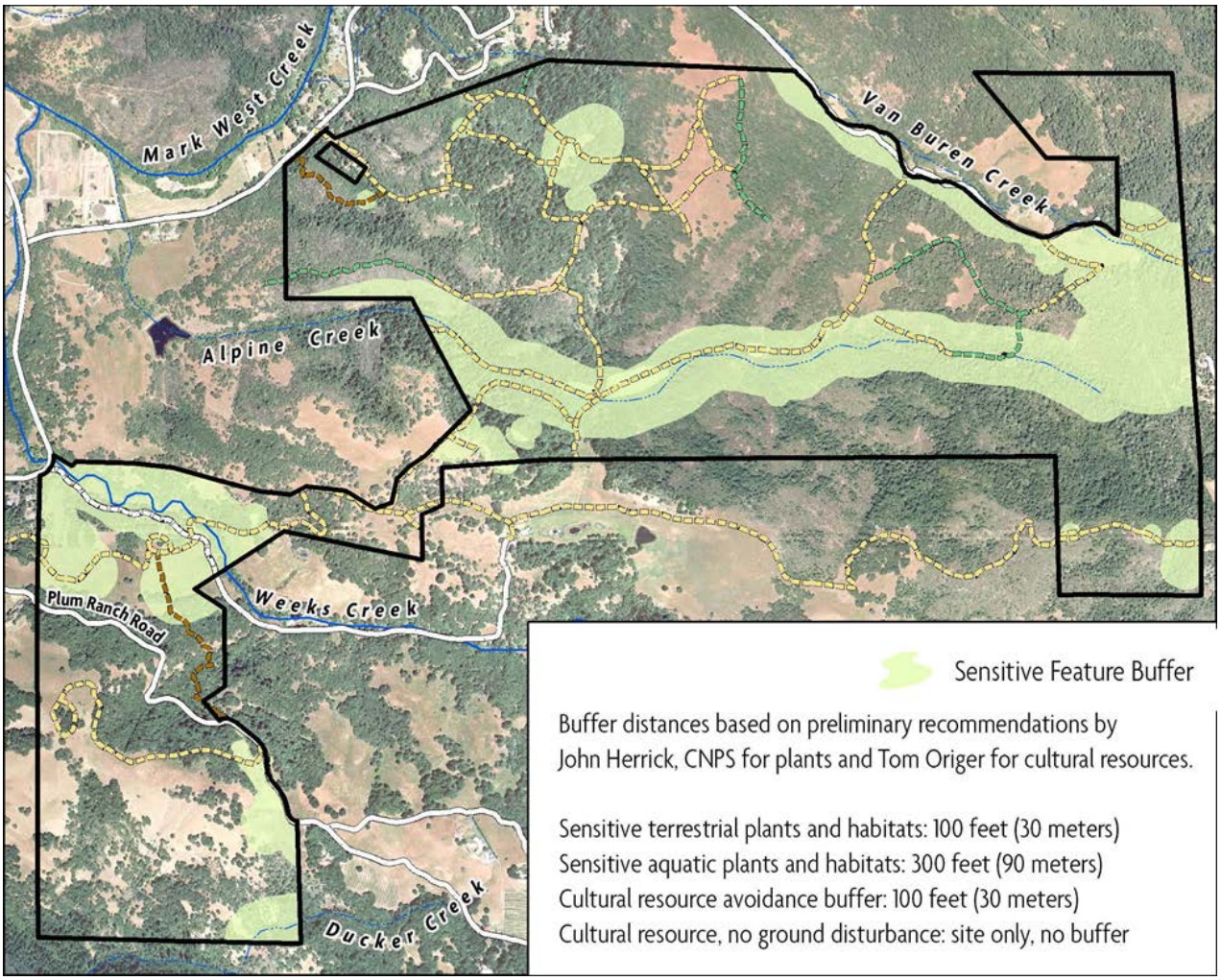

Figure 12. Proposed Buffer Locations

2.5.6 Sudden Oak Death Treatments

The District would proactively prevent the spread of *Phytophthora* pathogens on the Preserve by following the best management practices discussed below:

- Train land managers on symptoms of Sudden Oak Death (SOD). Land managers would be trained in identifying the symptoms of SOD and would monitor the Preserve for signs of SOD as feasible.

- Manage the Preserve for a healthy ecosystem. Forest stand conditions where species vulnerable to SOD are more susceptible to infection would be identified. Figure 5, Documented and Potential Locations of SOD in Section 2.3.8, illustrates the confirmed and potential SOD-impacted areas on the Preserve. The Forest Management Plan, which the District proposes to develop, would include a stand management prescription that would be implemented, where feasible, to increase the spacing between trees of vulnerable species and to reduce immediate contact with known carrier species like California bay. This treatment would be applied in areas where SOD has been

documented and its potential to spread is high due to forest stand conditions, poor circulation, suppressed trees, or high basal area of California bay near vulnerable species.

- Education about SOD. Staff, land managers, contractors, and the general public would be educated on how to prevent the spread of SOD by informing them of the SOD best management practices developed by researchers and regulatory agencies.

- Additional control methods from the California Oak Mortality Task Force website: http://www.suddenoakdeath.org/. Best management practices would be implemented to prevent the spread of Sudden Oak Death to the extent feasible.

Locations for treatment are shown on Figure 5, Documented and Potential Locations of SOD Section 2.3.8.

2.5.7 Preserve Visitors

The District intends to allow limited recreational access on the Preserve that is compatible with preserving the conservation values of the Preserve. Recreation would be allowed on the Preserve only when authorized by permit and when consistent with resource management objectives. Activities that threaten or endanger visitors, the land, or the environment would not be permitted. Public access would be limited primarily to trained volunteers, docent-led outings, environmental education, and planned "Open Space" days. Allowable uses for authorized visitors include hiking, wildlife observation, photography, picnicking, interpretive and educational activities, and botanizing. Equestrian use would be limited to Preserve patrol by trained volunteers.

Allowable Public Access and Uses (By Permit Only)

- Volunteer Patrols would hike or ride trails on horseback to ensure that the site is being used in accordance with the Management Plan. Volunteers would identify any constrained parking conditions, vandalism, fences in need of repair, erosion along trails, adverse conditions to wildlife, environmental, or cultural resources, or any other conditions that warrant District attention.

- Horseback patrol would be prohibited in sensitive habitats and where populations of sensitive plant species have been documented.

- Since the Preserve does not have safe access for horse trailers, equestrian use would be limited to those entering through neighboring properties where safe access is possible and who have completed an orientation and training program provided by District representatives.

- To best protect the Preserve's resources, roads and trails would be open only to hiking and limited horseback riding during those times of year when adverse impacts are limited. Flooded and potentially erosive trails would be closed to public use.

- Dogs would not be allowed on the Preserve in order to prevent trampling of rare or sensitive plants and disturbance to wildlife and habitat.

- Select trail closures may be considered to protect sensitive habitat, sensitive plants and animals, and visitors. Traffic on trails that lead to or pass close to vernal pools would be restricted until the pools dry for the summer.

- Types of future outreach and public engagement on the Preserve could include the development of a docent program, which would be comprised of trained volunteers who are authorized to staff the Preserve on designated days to provide guided tours for hikers.

- The District may also plan and host public "Open Space" days that would offer hikes and tours to the public. Guided tours would be hosted by District staff and partner organizations and would be limited to an appropriate number of visitors, as determined by the District. District staff would identify appropriate parking areas and establish a general route for the tours and outings.

- The District would work with partner agencies and organizations to provide environmental education and interpretive activities on the Preserve. These activities could include classes for school children and a self-guided interpretive trail. Educational activities for school children and other youth groups would be conducted by District partners and would cover topics approved by the District. Educational activities that support Preserve management such as wildlife and botanical surveys, invasive plant removal, and restoration projects would be a priority.

Avoiding Impacts on Sensitive Resources from Public Uses

The District would implement the following measures on the Preserve:

- Limit visitor activities to established trails: The District would encourage use of existing trails to route visitors around or away from sensitive areas (e.g. individual rare plant occurrences, serpentine outcrops, and archaeological sites) to prevent direct trampling of plants and wetlands, avoid flushing wildlife, and discourage collection of artifacts.

- Properly maintain trails: The District would maintain trails to prevent excessive wear and erosion, reducing sediment input into nearby water bodies.

- Limit types of visitor activities: The District would allow only relatively low-impact activities (hiking and limited horseback riding) on the Preserve. Off-road vehicles, biking, hunting, and fishing would be prevented and restrictions enforced.

- Establish buffers to prevent or limit access to particularly sensitive areas: The District would close portions of existing trails (seasonally or permanently) known or suspected to impinge on sensitive resources (e.g. rare plants and habitats, spotted owl nest sites, archaeological sites). If necessary and feasible, the District may erect fenced enclosures around discrete habitats (e.g. vernal pools, serpentine outcrops) to prevent visitors from trampling plants. Visitors would be discouraged from using certain areas when impact potential is high, especially during the rainy winter season.

- Modify visitor behavior: The District would post signs and may construct kiosks to educate visitors about sensitive resources and how to protect them.

- Allow low-impact recreational use research: The District would allow credentialed researchers, scholars, and their students to conduct research on the Preserve. Research subjects that are considered highly appropriate on the Preserve include serpentine plant communities, freshwater wetlands, SOD, grassland management, cultural resources, and other subjects that address management concerns or sensitive habitats. All research must be conducted to minimize impact to the Preserve's natural resources including the removal of equipment used to conduct the research, and data or reports generated through research on the Preserve would be shared with the District and made available to the public. Removal of objects or specimens or other collections will be prohibited unless clearly necessary and in support of the Preserve's conservation purpose. All research must be approved by the District prior to initiation. Approval would be subject to revocation if the research is subsequently determined to be detrimental to Preserve resources or individuals conducting the research fail to act in a manner consistent with District policies.

2.6 Management Action Timeframes

Management actions are assigned time frames for implementation and broken down into short-term (1-5 years), long-term (6+ years), and ongoing. Short-term actions are the highest priority management actions that would be undertaken by the District. Long-term activities would be implemented as funding becomes available and after completion of higher priority actions.

Short-term management actions may begin in the near term and continue to be ongoing as a means to persistently protect resources. Planning for many of the short-term actions is more advanced than for the long-term activities, as they have been identified in current site evaluation studies such as recent road and erosion assessments. The short-term projects are, therefore, evaluated at a site-specific level in this document. The District can implement these actions with little additional environmental evaluation, as the impacts, avoidance, and mitigations are specifically evaluated for these projects.

Long-term actions are those that would begin in six or more years following adoption of the Management Plan and many of these actions may also be ongoing. The majority of the long-term actions are evaluated at a programmatic level throughout this Initial Study/Proposed MND because specific locations, work types, and timing are currently unknown and may require additional planning. Long-term actions would be subject to the same protections and mitigation measures as project-level and ongoing actions.

Table 2-7, Management Plan Actions, Timing, and Level of Analysis below, summarizes the Management Plan actions described in Section 2.4 and lists the timeframe (short-term, long-term, or ongoing) and level of analysis (project or program) for each item.

Table 2-7. Management Plan Actions, Timing, and Level of Analysis

Resource Issue	Recommended Management Activities	Timing	Project/Program Level Analysis
Erosion Control and Water Quality Protection			
Existing Roadway Erosion and Sedimentation	Stream crossing improvements	Short-term	Project
	Roadway drainage improvement	Short-term	Project
	Road surface improvement	Short-term	Project
	Roadway decommissioning	Short-term	Project
	Road closures	Short-term	Project
	Gully repair/bank stabilization	Short-term	Project
Future Roadway Erosion and Sedimentation	Monitor Preserve for future roadway and trail erosion control needs	Ongoing	NA
	Implement erosion control measures as needed	Ongoing	Program
Exposed Soils	Implement a native plant revegetation program to establish diverse plant types and native species, improve fish and wildlife habitat, reduce sedimentation and provide erosion control in disturbed areas that are not naturally regenerating with native species	Short-term	Project
	Revegetate riparian and wetland habitats disturbed during erosion and sediment control activities	Short-term	Project
	Revegetate upland habitat areas impacted by prior land use practices and as part of other erosion control activities	Short-term	Project
Enhance Plant Communities and Habitat			
Revegetation	Revegetate 1.26 acres along Weeks Creek	Short-term	Project
	Revegetate and remove invasive species in a 1-acre area along the PG&E Road	Short-term	Project
Tree and Shrub Encroachment	Remove Douglas fir and bay laurel trees encroaching into coast redwood forest within approximately 11 acres	Short-term	Project
	Remove encroaching coyote brush and other invasive species within 2.17 acres of valley needlegrass grassland habitat	Short-term	Project
	Monitor serpentine bunchgrass habitat for encroachment from coyote brush and Douglas fir; remove encroaching trees and shrubs	Ongoing	Program

Table 2-7. Management Plan Actions, Timing, and Level of Analysis

Resource Issue	Recommended Management Activities	Timing	Project/Program Level Analysis
	Monitor chaparral and mixed hardwood habitat for encroachment of Douglas fir and bay laurel trees	Ongoing	NA
	Control tree and shrub encroachment in grassland through the use of prescribed fire	Short-term	Project
	Control tree and shrub encroachment through thinning and mechanical control in appropriate communities throughout the Preserve	Short-term	Project
	Control tree and shrub encroachment in forests through the use of prescribed fire	Long-term	Program
Densely Stocked Forests	Work with a Registered Professional Forester to develop a Forest Management Plan to guide forest management prescriptions and unit planning for mechanical thinning and guide implementation of tree thinning operations to reduce fire risk and to achieve desired forest conditions	Short-term	Program
	Implement forest thinning operations in stands that are adjacent to accessible roads	Short-term	Program
Invasive Species	Implement invasive species eradication in high priority areas through hand-pulling, mowing, thatch removal, and mechanical control	Short-term	Project
	Limit factors favoring introduction of exotic plant species by limiting visitor access points (e.g. trailheads). The District would conduct trail-side monitoring and targeted plant removals where invasives are found. Access points to the Preserve would be limited to reduce the spread of non-native invasive species.	Short-term	Project
	Implement invasive species eradication in high priority areas through application of herbicides	Short-term	Project
	Control invasive species in grassland communities through the implementation of small-scale prescribed fire projects in conjunction with CalFire; specific burn plans would be developed for each individual prescribed fire project	Short-term	Project

Table 2-7. Management Plan Actions, Timing, and Level of Analysis

Resource Issue	Recommended Management Activities	Timing	Project/Program Level Analysis
	Monitor Preserve for the spread of invasive plant species	Ongoing	NA
	Control new occurrences of invasive plant species not currently documented on the Preserve	Ongoing	Program
	Control fully established populations of grassland invasive species that are not proposed for control with prescribed fire (e.g., bull thistle, hedgehog dogtail, velvet grass, and wild oat) as funding and resources are available	Long-term	Program
Altered Fire Regime	As part of the proposed Forest Management Plan, develop a fire management program to guide use of prescribed fire in habitats across the Preserve	Short-term	NA
	Coordinate with CalFire and a Registered Professional Forester to develop shaded fuel breaks along Erland-Cleland Tie Road, property frontage along Erland Road, and a portion of Plum Ranch Road	Short-term	Project
	Identify areas for additional future shaded fuel breaks; conduct thinning and understory reduction to develop fuel breaks	Long-term	Program
	Maintain shaded fuel breaks	On-going	Program
	Develop individual burn plans for prescribed fire in the Preserve's forests and woodlands, and implement prescribed burns in conjunction with CalFire and professional fire organizations	Long-term	Program
Buffer Zones for Sensitive Features			
Infrastructure and Access Close to Sensitive Resources	Establish 100-foot buffer zones around sensitive terrestrial species and habitats and cultural resources	Short-term	Project
	Establish 300-foot buffer zones around/along riparian zones, vernal pools, and other aquatic habitat	Short-term	Project

Table 2-7. Management Plan Actions, Timing, and Level of Analysis

Resource Issue	Recommended Management Activities	Timing	Project/Program Level Analysis
Sudden Oak Death Treatment			
Confirmed Sudden Oak Death Impact Areas	Train land managers on identification of SOD symptoms	Short-term	Project
	Develop and implement a stand management plan to treat SOD and increase tree spacing in infected areas	Long-term	Project
	Educate forest professionals, land managers, contractors, and the general public about how to prevent the spread of SOD	Ongoing	Project
	Implement Best Management Practices designed to reduce the potential spread of SOD	Short-term & Ongoing	Project
Preserve Visitors			
Resource Protection and Allowable Public Access	Implement volunteer patrols to hike or ride trails on horseback to ensure the site is being used in accordance with the Management Plan	Ongoing	Project
	Allow low-impact activities (hiking and horseback riding) on the Preserve by permit following District-sponsored training program	Ongoing	Project
	Limit equestrian use to riders entering from neighboring properties and to those who have completed a District-sponsored orientation and training	Ongoing	Project
	Limit hiking and horseback riding in inclement weather	Ongoing	Project
	Do not allow dogs on the Preserve	Ongoing	Project
	Limit access to trails near vernal pools until the pools dry for the season	Ongoing	Project
	Limit visitors to established trails	Ongoing	Project
	Protect cultural resource sites	Ongoing	Project
Expand Public Access	Develop a docent program to train volunteers to staff the Preserve to provide guided tours for hikers on Open Space days	Short-term	Project
	Plan and host Open Space days to offer hikes and tours to the general public	Ongoing	Program

Table 2-7. Management Plan Actions, Timing, and Level of Analysis

Resource Issue	Recommended Management Activities	Timing	Project/Program Level Analysis
	Encourage environmental education to allow classes for school children and a self-guided interpretive trail	Ongoing	Program
Support Low-impact Recreational Use Research	Allow credentialed researchers, scholars, and their students to conduct research on the Preserve	Ongoing	Program

2.7 Site-specific and Programmatic Environmental Protection Measures and General Program Measures

Management of the Preserve is intended to protect and enhance native habitats and conserve the Preserve's natural, biotic, cultural, and scenic resources. Proposed Management Plan activities are designed to improve water quality, conserve and enhance native habitats, and reduce wildfire risks. However, any activity that involves ground-disturbance or work in an area with sensitive resources has the potential for adverse impacts. The following environmental protection measures (referred to as Project Measures) were developed to describe the minimum level of impact avoidance for all ground-disturbing management activities. These Project Measures are an essential part of the Project Description and would be implemented as part of all ground-disturbing actions.

Project Measure 1 - Planting and Revegetation after Soil Disturbance for Restoration

The District, to the extent feasible, shall ensure plants disturbed by management actions be replaced with native plant species in accordance with the following measures:

- Implement soil protection measures, including seeding or planting promptly with appropriate native species and covering with weed-free straw mulch, and/or installing biodegradable erosion control fabric on slopes.
- Use seed or container stock of local origin for plantings. Seed or propagules for revegetation shall be collected from the Preserve itself if a viable source is present. Where this is not possible, propagules shall be from within the Russian River watershed, with exceptions being made only after review by a qualified staff member or consultant. Within these geographic parameters, collections shall be made with the goal of capturing natural genetic variation (e.g., collect from a range of elevations and from plants exhibiting varied phenology).
- Native plant species historically present at the site shall be used and species with high wildlife and/or pollinator values will be used where feasible and appropriate.
- In limited instances, non-invasive, non-persistent grass species (e.g., sterile wheat) may be used in conjunction with native species to provide fast-establishing, temporary cover for erosion control.

- Soil amendments are typically not needed for establishment of native vegetation in intact native soils. If soils have been disturbed and require additional organic matter or nutrients to support native plants, limited organic, weed-free amendments may be used to help establish restoration vegetation. Organic fertilizers may be used only above the normal high water mark of any adjacent waterways. No chemical fertilizers shall be used.
- For management actions that have removed native vegetation, post-disturbance revegetation success will be based on individual site conditions and will generally be based on the following: 1) establishment of native trees and shrubs at a ratio of 1:2 living after five years (or the ratio mandated by regulatory permits if permits are needed), 2) establishment of herbaceous cover equal to that of adjacent undisturbed ground within three years, and 3) no increase in invasive species populations (or no greater cover of invasive species than that of adjacent undisturbed ground).
- If needed, a temporary irrigation system will be installed to ensure establishment of vegetation; when vegetation is sufficiently established, irrigation materials will be removed.

Project Measure 2 - Reduction of Construction Emissions

The District shall ensure that dust and other emissions are controlled during construction activities by implementing the following measures, as recommended by the BAAQMD (BAAQMD 2017b):

- Exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) will be watered two times per day during the dry season.
- Haul trucks transporting soil, sand, and other loose material off-site will be covered.
- Visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- Vehicle speeds on unpaved roads will be limited to 15 miles per hour.
- Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage for construction workers will be provided at all access points.
- Construction equipment will be maintained and properly tuned in accordance with manufacturer's specifications. All construction equipment will be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- During construction activities, a publicly visible sign will be posted with District and BAAQMD contact information regarding dust complaints. The District will respond and take corrective action within 48 hours of receiving a complaint.

Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance

The District shall ensure erosion control, sediment detention, and site maintenance activities occur in accordance with the following measures:

- Ground disturbance will not exceed the minimum area necessary to complete the project or activity. Existing native vegetation will be preserved to the maximum extent feasible.

- All disturbed areas will be protected from erosion. Measures to stabilize disturbed soils will include, but not be limited to, placement of straw wattles, jute netting, silt fencing, and native reseeding. When a project involves grading or work within or adjacent to a stream, waterway, or other sensitive aquatic habitats, a spill prevention and clean-up plan, a Stormwater Pollution Prevention Plan, or similar document, will be prepared and implemented during construction activities to protect water quality. The plan will address polluted runoff and spill prevention policies, best management practices (BMPs) that are required to be available on site in case of rain or a spill (e.g., straw bales, silt fencing), clean-up and reporting procedures, and locations of refueling and minor maintenance areas.
- Debris, sediment, rubbish, vegetation, or other construction-related materials will be placed in an approved location. No materials, including petroleum products, chemicals, silt, fine soils, or substances deleterious to the function of a watercourse, water quality, or biological resources will be allowed to pass into, or be placed where it can pass into, stream channels.
- If rain occurs while materials are temporarily stockpiled, the stockpiles will be covered with plastic that is secured in place to ensure the piles are protected from rain and wind. Silt fencing or wattles will be installed on contour around all stockpile locations.
- Spoil materials from clearing, grubbing, grading, and channel excavation will be disposed of at a site approved by the District.
- Fire-suppression equipment will be reviewed and approved by the District or contracted staff before construction begins and will be available on site at all times.
- Areas that have received prescribed fire treatments will be evaluated and monitored for soil instability and erosion. Unacceptable levels of post-fire erosion, potentially as a result of greater-than-intended fire intensity, will be remediated through the implementation of control measures such as those described above.

Project Measure 4 - Pollution Prevention

The District shall employ BMPs for staging, maintenance, fueling, and spill containment of potentially hazardous materials used on the Preserve, including, but not limited to, the following:

- Vehicles and equipment will be inspected daily for leaks and repaired immediately if necessary.
- Fueling will take place away from watercourses and sensitive areas.
- Major vehicle and equipment maintenance and washing will be performed offsite.
- Spill cleanup materials will be maintained onsite during all activities that require the use of vehicles, equipment, or hazardous materials. Any spill will be cleaned up immediately.
- Spent fluids, such as motor oil and radiator coolant, and used vehicle or equipment batteries will be collected, stored, and recycled as hazardous waste offsite.

Project Measure 5 - Prevent Spread of Sudden Oak Death

The District shall be responsible for protecting against the spread of SOD through implementation of the following requirements:

- Before purchasing any nursery stock for restoration plantings, confirm that the nursery follows current BMPs for preventing the spread of SOD (consult the California Oak Mortality Task Force,

www.suddenoakdeath.org, for current standards). All plant materials will be inspected for symptoms of SOD before bringing onto the Preserve.

- Train management staff on host species, symptoms, and disease transmission pathways for *Phytophthora ramorum* and other *Phytophthora* species, and on BMPs to prevent the spread of SOD, including:
  - Clean equipment after working in forest and woodland habitats, including chainsaws, boots, and truck tires (spray with a 10% bleach solution or other disinfectant, then rinse).
  - Work in forest and woodlands in the dry season instead of the wet season when spores are being produced and infections are starting. Avoid or minimize pruning oak, tanoak, and bays in wet weather.
  - Leave potentially infected downed trees on site instead of transporting the material to an uninfected area. Where infection is already known to be present, leaving *P. ramorum*-infected or killed trees on site has not been shown to increase the risk of infection to adjacent trees.
  - If necessary to reduce safety or fire hazards, infected trees can be cut, branches chipped, and wood split. Avoid working in wet weather. Clean equipment after work is completed. Do not leave cut wood and chips in an area where they might be transported to an uninfected location.
- Educate Preserve users about measures to prevent the spread of SOD. Provide signage at major trailheads explaining that SOD occurs on the Preserve, showing typical symptoms and explaining that it can be spread by Preserve visitors, especially in wet winters, during rainy and windy weather.

Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire

The District shall coordinate with CalFire, the BAAQMD, and the interested public during the planning and implementation of all prescribed fire projects. For each prescribed fire project, the District will work with qualified prescribed fire personnel to:

- Develop a site-specific burn plan that is approved by CalFire and conforms to the agency's specifications. The burn plan will include a description of the prescribed fire project area and burn objectives, an analysis of site-specific environmental setting and any potentially affected resources, a burn prescription and predicted fire behavior, and contingency and medical plans.
- Develop a smoke management plan that is approved by the BAAQMD and conforms to the agency's specifications. The smoke management plan must include emissions estimates, wind and weather prescriptions, any necessary mitigations to reduce impacts from smoke, contingency procedures if the burn or smoke impacts exceed the original prescription, and public notification and complaint protocols.
- Conduct public outreach to solicit public input and to inform neighboring landowners and the interested public about potential prescribed fire projects and possible smoke impacts. Public outreach will occur throughout the burn planning process and public notification will take place prior to implementation of burns. Neighboring landowners and all sensitive receptors that may be impacted by smoke from a prescribed fire project shall be notified prior to burning.

- Develop a "Go/No Go Checklist" approved by CalFire and the BAAQMD that provides final confirmation of necessary conditions for implementing a prescribed fire project.

Additionally, the District will partner with qualified entities for the implementation of burns. All prescribed fire projects on the Preserve shall be implemented by CalFire or a qualified professional organization.

Project Measure 7 - Herbicide Use

The District shall ensure that herbicides are used in accordance with the manufacturers' recommendations. Herbicides will only be used to control invasive species and when other control measures are determined to be infeasible or less effective. Herbicides will be used only by applicators who hold a Qualified Applicator License or Certificate. Techniques such as spot application will be employed to ensure that only the minimum amount of herbicide necessary is used. Herbicides will not be used in areas where surface water bodies could be effected.

Project Measure 8 - General Measures to Avoid Impacts on Biological Resources

The District shall ensure the following biological resources protection measures are implemented on the Preserve:

- Perform preconstruction surveys prior to significant ground disturbance within all native habitats year-round. Surveys (on the day preceding work and/or ahead of the construction crew) will be performed by a qualified biologist to ensure no special-status species or common wildlife are occupying the area. If wildlife species are observed within the work area or immediate surroundings, these areas must be avoided until the animal(s) has (have) vacated the area, and/or, upon approval by the regulatory agencies, the animal(s) must be relocated out of the area by a qualified biologist.
- Conduct a training session for all construction crew personnel before any significant ground disturbance or building work, year-round. The training will be conducted by a qualified biologist and will include a discussion of the sensitive biological resources on the Preserve and the potential presence of special-status species. This must include a discussion of special-status species' habitats, protection measures to ensure species are not impacted by project activities, project boundaries, and biological conditions outlined in the project permits, as applicable.

Project Measure 9 - Prevent the Spread of Invasive Species

The District shall prevent the spread of invasive plant species to the extent feasible. Weed control methods will include, but will not be limited to:

- Clean plant material and soil from the tires and undercarriage of vehicles and equipment (e.g., mowers) that have traveled through weed-infested areas before they leave those areas. Cleaning may be done with a hose if water is available and/or with a scrub brush or stiff broom.
- Train staff and Preserve volunteers to recognize invasive species and report new infestations promptly.

Project Measure 10 - Ensure Adequate Emergency Access

The District shall ensure that adequate access to the Preserve for emergency vehicles is maintained at all work sites, during all management activities including construction and prescribed burning.

2.8 Permits and Approvals

The table below lists the federal, State, and local regulatory or permitting agencies that may have permitting or approval authority over activities proposed in the Management Plan.

Table 2-8. Regulatory/Permitting Agencies

Regulatory/Permitting Agency	Requirement	Potential Permit/Approval
Federal Agency		
U.S. Army Corps of Engineers	Compliance with the Clean Water Act (CWA) Section 404	Approval of fill in waters of the U.S. or jurisdictional wetlands pursuant to the federal Clean Water Act
U.S. Fish and Wildlife Service	Endangered Species Act (ESA) Section 7 consultation	Consultation with U.S. Army Corps of Engineers
State Agencies		
North Coast Regional Water Quality Control Board	Compliance with the CWA Section 401 or State CWA	Water Quality Certification or Waste Discharge Requirements
Bay Area Air Quality Management District	Compliance with air quality and burning regulations	Approved Smoke Management Plan and Burn Notification
CalFire	Compliance with prescribed fire rules and regulations	Vegetation Treatment Program (VTP) or Vegetation Management Program (VMP) contract, approved burn plans and associated environmental reviews
	Compliance with timber harvest plans and forestry rules	Approved Timber Harvesting Plan or similar document and associated environmental reviews
California Department of Fish and Wildlife	Compliance with Fish and Game Code Section 1602	1602 Lake and Streambed Alteration Agreement
	Compliance with Fish and Game Code Section 2081	Incidental Take Permit for state-listed wildlife and/or plant species covered under the California ESA
Local and Regional Agencies		
Sonoma County Permit and Resource Management Department	Sonoma County Ordinances	Grading, Building, Roiling, Zoning

3 Determination

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology/Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☐ Hydrology/Water Quality	☐ Land Use/Planning	☐ Mineral Resources
☐ Noise	☐ Population/Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities/Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)
On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

4-30-19
Date

4 Environmental Effects of the Project

4.1 Aesthetics

Aesthetics Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of public views of the site and its surroundings? If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Setting

The Preserve is located in eastern Sonoma County, just northeast of Santa Rosa. The Preserve is visible from several locations in northeast Santa Rosa, as well as nearby roads including Calistoga Road and State Route 12 (SR-12). The Preserve has rolling topography as well as steep ridges and sharp elevation changes, which range from 760 feet to 1,800 feet. The Preserve's ridgeline offers sweeping views of Cotati Valley and the Sonoma Mountains. At lower elevations, the Preserve's natural diversity, wide range of habitats, and mosaic of vegetation types provide a variety of vistas. Many natural areas can be found on the Preserve, including stands of coast redwood lining portions of Alpine Creek, alluvial meadows, dense forest, and open grassland. Portions of four creeks run through the Preserve (Alpine, Ducker, Van Buren, and Weeks Creeks), as well as a number of unnamed tributaries and springs. The Ducker Creek watershed is highly visible from Santa Rosa, and the entire Preserve is a key component of the region's scenic beauty.

The Preserve is set within a landscape with high aesthetic values and is surrounded primarily by rural residential land holdings, including single-family residences, natural forests and grasslands, and ranches and pastures.

4.1.1 Project-level Analysis

a) Adverse effect on a scenic vista – Less-than-significant

The Preserve encompasses natural spaces with outstanding scenic quality that are visible from the surrounding area, including portions of Santa Rosa and its proximate communities and roadways. There are no designated scenic vistas on the Preserve nor are there designated scenic vistas viewable from the Preserve. Some of the activities proposed in the Management Plan could lead to changes in views of the project site. Such activities include selective thinning of Douglas firs and bay laurel saplings that are encroaching into coast redwood habitat; creation of shaded fuel breaks; control and prevention of coyote brush encroachment into grasslands; and removal of high priority exotic invasive plant species. However, the change in scenic quality caused by these activities would be minor, as the activities would be implemented selectively, in a targeted manner, and over time. Removal of encroaching species is designed to encourage regrowth of native species, such as coast redwoods or perennial grasses, that are appropriate to the specific community type; and the removal of invasive plants would be followed by revegetation and planting as appropriate. Over the long-term, these activities would result in improved native habitat with enhanced assemblages of native vegetation, and are expected to increase the aesthetic value of the Preserve.

Prescribed fire activities could temporarily impact scenic vistas by causing views of blackened shrub and grassland vegetation. Prescribed burning would be small-scale and would occur only within discrete units of grassland throughout the Preserve (Figure 11, Section 2.4.3). Burns may cause a blackening of the ground and the exposure of soil, which would temporarily impact area aesthetics. However, these impacts would be greatly reduced after a growing season, as fire-induced seed germination and regrowth occur. Scorching of trees may occur, though burns would be targeted to open grassland areas and would be low-intensity so only trees within ecotones (i.e., transitional areas between habitat types) along the edges of grassland units would be likely to be impacted. Impacts on scenic vistas as a result of the prescribed burning activities proposed by the Management Plan would occur only within a small portion of the Preserve, would be short-term in nature with grasses and forbs expected to quickly regenerate, and would maintain the natural character of the habitat. The impact would, therefore, be less-than-significant. In the long-term, prescribed fire activities are expected to enhance the aesthetics of the Preserve by promoting native habitat conditions and enhancing the open character of the area's grasslands, while also reducing the likelihood of a catastrophic wildfire which could substantially impact the visual character of the Preserve.

Additionally, some of the erosion control and road treatment activities would require use of construction equipment and small-scale ground disturbance, which could temporarily impact the Preserve's scenic vistas. These activities could be visible during construction from roads and trails within the Preserve; however, once construction is complete, visual changes would be minimal. In the long-term, such activities are likely to lead to lasting benefits to the Preserve's visual character by enhancing native habitat and reducing sedimentation and erosion. Therefore, the impact would be less-than-significant.

b) Damage scenic resources within a designated Scenic Highway – Less-than-significant

The portion of State Route-12 (SR-12) south of the Preserve, from Danielli Avenue to London Way, is a state-designated scenic highway. The portion of SR-12 nearest to the Preserve, north and west of Danielli Avenue, is eligible to be considered a state scenic highway but is not officially designated as such. No portion of the Preserve is directly adjacent to SR-12, so project activities would not damage resources within the scenic highway corridor itself. However, intermittent views of the Preserve are available from SR-12 and contribute to the scenic nature of the roadway. Some forest management activities proposed in the Management Plan could be temporarily visible from SR-12, which is located approximately 1.5 miles south of the Preserve. Visual changes are expected to be less-than-significant because the small size of the proposed management actions, the nature of the proposed activities, and the distance between the Preserve and the highway all mean the visual changes would be minimal.

c) Substantially degrade existing visual character – Less-than-significant

Thinning of encroaching Douglas firs, creation of shaded fuel breaks, road treatments, prescribed burning, and erosion control measures would require the use of heavy construction equipment and would result in some ground disturbance. These activities have the potential to temporarily degrade the visual character of the site, but such impacts would be short-term and small-scale. Invasive vegetation treatment and removal activities could also lead to short-term visual impacts, but the areas where such activities take place would be revegetated and the scenic character of the location would be restored. Prescribed fire would cause blackening of the ground and other impacts to the Preserve's visual character, but these impacts would be small-scale and short-term and will be substantially reduced within a season, as native regrowth takes place. As a result, the impact on the Preserve's scenic resources and visual character would be less-than-significant.

d) New source of light or glare – No Impact

The implementation of activities proposed in the Management Plan would take place during the day and would not result in any new source of light or glare. Therefore, there would be no impact from light and glare.

4.1.2 Program-level Analysis

a, b, c) Adverse effect on a scenic vista, degradation of visual character, or damage scenic resources – Less-than-significant

Maintenance of shaded fuel breaks, invasive species management, forest thinning, and grassland management would have the same less-than-significant impacts on scenic vistas and scenic resources as described for activities. Prescribed burning in forested and woody habitats would result in more scorching of trees and would likely consume the majority of understory vegetation within each burn unit. Blackened tree trunks and scorched canopies, as well as consumed ground cover and understory, would be prevalent throughout a burn unit in the first few months after a burn. However, robust regeneration of understory vegetation and scorched tree canopies would occur over the course of a year following prescribed burning. Ultimately, the proposed activities would be designed to improve native habitat and enhance

vegetation assemblages, which would not adversely affect scenic resources with minor alteration of views from trails and roadways on the Preserve. The proposed activities would not result in significant, adverse impacts to scenic views from SR-12 or any other roadway in the vicinity.

d) New source of light or glare – No Impact

Maintenance of shaded fuel breaks, invasive species management, forest thinning and prescribed fire, and grassland management would take place during the day and would not result in any new source of light or glare. Therefore, there would be no impact.

4.2 Agriculture and Forestry Resources

Agriculture and Forestry Resources Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC §12220(g)), timberland (PRC §4526), or timberland zoned Timberland Production (Government Code §51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Setting

The Preserve is currently managed as open space to protect and conserve its natural, cultural, and scenic resources. Adjacent ownerships consist primarily of rural residences, ranches, and scattered agricultural lots varying in size from one to hundreds of acres. Developed parcels generally contain single-family residences and structures associated with ranching and agriculture. Much of the land surrounding the Preserve consists of lightly developed forest, grasslands, and pasture. The Preserve itself is home to a diversity of natural vegetative communities, including grasslands and forest and woodland habitats (Section 2.3.6).

The California Land Conservation Act of 1965, known as the Williamson Act, allows local governments to enter into contracts with private landowners that grant tax relief in exchange for preservation of agricultural land and open space. The Hayfork Ranch, located adjacent to the central portion of the Preserve at the junction of Calistoga and St. Helena roads, is enrolled under a Williamson Act contract as a District open space easement (California Department of Conservation 2013), but is not part of the Preserve itself.

The California Department of Conservation (DOC) Farmland Mapping and Monitoring Program categorizes farmland to assess its relative importance. Important farmland categories represent the agricultural land most suitable for cultivating crops; these categories including Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. None of these categories are present in the project area. All of the land within the Preserve is classified as either Grazing Land or Other Land (California Department of Conservation 2018).[9]

4.2.1 Project-level Analysis

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use – No Impact

All of the land within the Preserve is classified by the Farmland Mapping and Monitoring Program as either Grazing Land or Other Land (California Department of Conservation 2018). The Preserve does not contain any land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Implementation of the proposed management activities including erosion control and road drainage improvements, invasive species management, native restoration activities in the Management Plan would not result in a change in important farmland status or conversion of farmlands to non-agricultural use. Therefore, there would be no impact.

b) Conflict with existing zoning for agricultural use or a Williamson Act contract – No Impact

The Preserve is not under a Williamson Act contract, though the adjacent Hayfork Ranch is enrolled under a Williamson Act contract as a District open space easement (California Department of Conservation 2013). Implementation of the proposed management activities including, erosion control and road drainage improvements, invasive species management, native restoration activities in the Management Plan would not affect the Williamson Act contract on this neighboring land.

All of the land within the Preserve is zoned Resources and Rural Development by Sonoma County (Sonoma County 2016) and is managed by the District as an open space preserve. Surrounding land uses include rural residential, grazing, and agriculture. Erosion control and road drainage improvements, invasive species management, native restoration activities proposed in the Management Plan would not impact surrounding agricultural uses and would not conflict with existing zoning for agricultural use. Therefore, there would be no impact.

[9] The Grazing Land classification indicates land on which the existing vegetation is suitable for grazing of livestock. The Other Land classification refers to land which does not fall within any of the other categories, with typical uses including low density rural development, heavily forested land, mined land, or government land with restrictions on use.

c) Conflict with existing zoning for, or cause rezoning of, forestland or timberland – No Impact

Timberland, as defined by PRC §4526, means land, other than land owned by the federal government and land designated as experimental forest land, which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products. Government Code §51104(g) defines a timberland production zone as an area which has been zoned pursuant to §51112 and §51113 and is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses. The project area is managed by the District as an open space preserve; there is no timberland or area zoned timberland production on the Preserve. Therefore, erosion control and road drainage improvements, invasive species management, Douglas fir and bay encroachment management, prescribed fire in grasslands, native restoration activities proposed in the Management Plan would have no impact on timberland or any timberland production zone.

Forest land, as defined by PRC §12220(g), is land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. The Preserve meets this definition, as over 60% of the area is composed of natural communities that support native tree cover and it contains notable forest resources. However, no activities proposed in the Management Plan would conflict with or cause any change in the zoning of this forest land. Therefore, there would be no impact.

d) Result in the loss of forest land or convert forest land to non-forest use – No Impact

The Management Plan includes forest management activities but would not result in the loss of forest land or convert forest land to non-forest use. Activities include thinning of Douglas fire and bay laurel saplings near Alpine creek and other target areas to promote diverse habitat assemblages, to protect coast redwood saplings, and to prevent type conversion by encouraging regrowth of historic habitat types on the Preserve, including coast redwood stands. The creation of shaded fuel breaks would also result in some removal of saplings and ladder fuels. However, mature, healthy trees would not be removed and these shaded fuel breaks will reduce the risk of catastrophic wildfire on the Preserve, which poses a significant risk to the area's forest resources. In the long-term, these activities are anticipated to result in greater habitat diversity and increased forest health and resilience on the Preserve, and no activity would result in the loss or conversion of forest land. There would be no impact.

e) Involve other changes in the existing environment that could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use – No Impact

The proposed activities within the Management Plan are designed to manage, enhance, and conserve the Preserve's natural resources. Implementation of these activities would not involve other changes in the existing environment that could result in the conversion of farmland or forest land. As a result, there would be no impact.

4.2.2 Program-level Analysis

a-e) Convert farmland, conflict with Williamson Act contract, cause rezoning of forestland or timberland, or result in the conversion or loss of farmland or forest land – No Impact

The Management Plan includes future forest management activities but would not result in the loss of forest land or convert forest land to non-forest use. Activities include targeted thinning of encroaching trees, prescribed fire within forest and woodland habitats, and maintenance of shaded fuel breaks. The analysis for these future management activities is the same as for the management activities discussed above and, in the long-term, the program-level activities are anticipated to result in greater habitat diversity and increased forest health and resilience on the Preserve. No activity would result in the loss or conversion of forest land or farmland. There would be no impact.

4.3 Air Quality

Air Quality Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Result in a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors or dust) adversely affecting a substantial number of people?	☐	☐	☒	☐

Setting

The Federal Clean Air Act (CAA) and the California Clean Air Act form the basis of the air quality regulations and programs that govern the Preserve and the surrounding region. The Preserve is located in southern Sonoma County within the San Francisco Bay Area Air Basin (SFBAAB) and air quality is monitored and regulated by the U.S. Environmental Protection Agency (EPA), the California Air Resource Board (CARB), and the Bay Area Air Quality Management District (BAAQMD).

A region's success in promoting good air quality is measured by comparing the concentration of pollutants in the atmosphere to the known safe level set as State and federal standards. Chemicals with potential basin-wide effects are regulated under the CAA in two groups: 1) toxic air contaminants with immediate, acute toxicity effects and 2) criteria pollutants that are common chemicals with long-term health effects. Acutely toxic chemicals are problematic at any concentration; however, the effect of criteria contaminants depends on the amount of exposure over time. Criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), sulfates, lead, and fine (PM2.5) and coarse (PM10) particulate matter.

EPA sets limits on maximum atmospheric concentration for each criteria pollutant. The State of California is required to use these limits but may also set higher standards when CARB determines that tighter limits would protect human health. When an area is at or below the regulatory standard, it is said to be "Attainment" for that pollutant. The SFBAAB is designated nonattainment for the federal and State ozone standards, the state PM10 standard, and the federal and state PM2.5 standards (BAAQMD 2017a). The SFBAAB is designated attainment or unclassified for all other state and Federal air quality standards.

Air quality in Sonoma County, where the Preserve is located, is generally better than much of the rest of the SFBAAB. Sonoma County experiences some of the lowest levels of ozone and PM2.5 in the entire Bay

Area (BAAQMD 2016). The BAAQMD measures air quality in Sonoma County at a monitoring station in Sebastopol. Data from this station indicates that the levels of air pollutants in Sonoma County are below air quality limits for all criteria pollutants (BAAQMD 2017d).

Air pollutants can be locally problematic when they occur at high densities or when the source is close to a sensitive receptor[10]. The Preserve is located in a rural setting, northeast of the city of Santa Rosa. Lands surrounding the Preserve consist primarily of rural residences, ranches, and undeveloped forests and grassland. The nearest sensitive receptor to the Preserve is Maria Carrillo High School, approximately three-quarters of a mile southwest of the Preserve's boundary.

4.3.1 Project-level Analysis

a) Conflict with or Obstruct Applicable Air Quality Plan – No Impact

In 2017, BAAQMD adopted a Clean Air Plan (CAP) (BAAQMD 2017c). It provides comprehensive guidelines to protect air quality, public health, and the climate. Per BAAQMD's Air Quality CEQA Guidelines, BAAQMD considers a project consistent with the CAP if it: 1) can be concluded that a project supports the primary goals of the CAP (by showing that the project would not result in significant and unavoidable air quality impacts); 2) includes applicable control measures from the CAP; and 3) does not disrupt or hinder implementation of any CAP control measure (BAAQMD 2017b).

Because implementation of the Management Plan would not result in a significant and unavoidable air quality impact (refer to Impact b, below), it would not conflict with the primary goals of the 2017 CAP. The CAP includes 85 control measures across nine sectors: stationary (industrial sources), transportation, energy, buildings, agriculture, natural and working lands, waste management, water, and super-GHG pollutants. The Management Plan does not include new stationary sources or new permanent mobile sources, does not introduce a new land use, and would not use a substantial amount of energy. Implementation of Management Plan activities would not hinder implementation of any control measures included in the CAP. Therefore, there would be no impact.

b) Result in a cumulatively considerable net increase of any criteria pollutant – Less-than-significant

The Management Plan proposes some activities that would result in short-term emissions, including road and trail treatments, erosion control activities, mechanical vegetation control and the creation of shaded fuel breaks, prescribed fire, and the general use of vehicles and equipment.

Emissions from construction activities proposed in the Management Plan would be short-term, but could have the potential to result in an air quality impact. Construction associated with proposed road treatments, erosion control projects and ongoing mechanical vegetation control and thinning would result in temporary emissions associated with grading, worker trips, and use of equipment and vehicles.

[10] Sensitive receptors are areas that are occupied by populations that are more susceptible to adverse effects from pollutants. Examples include hospitals, communities for the elderly, schools, and daycare facilities.

Potential emissions from these projects were evaluated using the California Emissions Estimator Model (CalEEMod). The full results of this air quality analysis using CalEEMod can be found in Appendix B. Table 4-1, below, displays the potential average daily emissions associated with these Management Plan activities, assuming a 45-day construction window, compared to the thresholds of significance developed by the BAAQMD (BAAQMD 2017b). As shown in Table 4-1, BAAQMD Thresholds of Significance and Potential Project Emissions, the proposed management activities would not result in emissions in excess of the applicable BAAQMD thresholds of significance for criteria pollutants.

Table 4-1. BAAQMD Thresholds of Significance and Potential Project Emissions

Air Contaminant	Threshold of Significance (lb/day)	Project Emissions (lb/day)
ROG	54	1.47
NO_x	54	15.44
PM10	82	0.68
PM2.5	54	0.63
PM (Fugitive Dust)	None	7.46
CO	None	7.85

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_x = oxides of nitrogen; PM10 = coarse particulate matter with an aerodynamic resistance diameter of 10 micrometers or less; PM2.5 = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; CO = carbon monoxide.

The Management Plan also proposes the development of 43 acres of shaded fuel breaks on the Preserve, which would require the use of handheld equipment as well as some use of heavy equipment, such as dozers, tractors, and chippers. The resulting emissions could result in an air quality impact. Potential emissions from shaded fuel break development were also modeled using CalEEMod; this analysis was performed separately due to the unique nature of the activity and the fact that it is not a traditional land use or construction project. Emissions were calculated by combining the construction phase output (for heavy equipment use, worker trips, and the movement of vehicles on unsurfaced roads on the Preserve) with the operational output for the use of landscaping equipment and hand-held power tools. The full results of this analysis can be found in Appendix B. Table 4-2. BAAQMD Thresholds of Significance and Potential Project Emissions, below, displays the potential average daily emissions associated with shaded fuel break development compared to the thresholds of significance developed by the BAAQMD. As shown in Table 4-2, the development of shaded fuel breaks would not result in emissions in excess of the applicable BAAQMD thresholds of significance for criteria pollutants.

Table 4-2. BAAQMD Thresholds of Significance and Potential Project Emissions, Shaded Fuel Breaks

Air Contaminant	Threshold of Significance (lb/day)	Project Emissions (lb/day)
ROG	54	0.48
NO_x	54	3.70
PM10	82	0.19
PM2.5	54	0.17
PM (Fugitive Dust)	None	13.05
CO	None	1.95

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_x = oxides of nitrogen; PM10 = coarse particulate matter with an aerodynamic resistance diameter of 10 micrometers or less; PM2.5 = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; CO = carbon monoxide.

Though road treatments, erosion control projects, and shaded fuel development activities would not be implemented simultaneously, even if the emissions from these activities (shown in Tables 4-1 and 4-2) were to be combined, total project emissions would still be below the applicable BAAQMD thresholds of significance.

The movement of vehicles and construction equipment, particularly on unpaved roads, during these activities could temporarily result in PM10 and PM2.5 emissions in the form of fugitive dust. The amount of fugitive dust generated would vary depending, in part, on the specific construction activity taking place, weather conditions, and soil characteristics. The BAAQMD *CEQA Air Quality Guidelines* consider the impact from construction-phase dust to be less-than-significant if recommended measures are implemented. These measures are included as ***Project Measure 2 - Reduction of Construction Emissions*** in Section 2.6 and require best management practices during construction such as watering exposed surfaces, preventing sediment tracking, limiting vehicle speeds on unpaved roads, etc. Implementation of ***Project Measure 2 - Reduction of Construction Emissions*** would ensure that the impact from fugitive dust emissions as a result of project construction activities is less-than-significant by controlling emissions during all construction activities.

The Management Plan includes project-level prescribed fire activities in grassland communities that could temporarily affect air quality. Prescribed burning produces smoke, which is a mixture of carbon dioxide, carbon monoxide, particulate matter, water vapor, hydrocarbons, and other materials (CARB 2016). The specific composition of smoke produced by a fire depends on a range of factors, including fuel type and weather conditions. Smoke can result in reduced visibility, respiratory impacts, and increased levels of pollutants. Depending on weather conditions and other factors, smoke from prescribed burning on the Preserve may blow to nearby areas and linger anywhere from less than an hour to several days. All impacts from smoke would be temporary. Grassland burns would produce comparatively little smoke, while pile burning would produce more. Coordination with BAAQMD and development of a smoke management plan would ensure that prescribed burning takes place under appropriate conditions to minimize smoke impacts.

BAAQMD Regulation 5 prohibits most forms of open burning but provides exemptions and regulations for prescribed burning of range, forest, marsh, and wildland areas (BAAQMD 2013). Because the project-level prescribed fire in grassland activities proposed in the Management Plan are allowed under Regulation 5, the air quality impacts that would be created by such activities would be exempt from regional air quality standards. In accordance with Regulation 5, and as described in ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire***, the District would cooperate extensively with the BAAQMD in the planning and implementation of all prescribed fire activities. In addition to developing a specific burn plan, as described in the Project Description, the District would register each burn with the BAAQMD, obtain BAAQMD and CalFire permits and approvals for the burn, and develop a smoke management plan and obtain approval of the plan from the BAAQMD. These steps, along with the short-term nature of prescribed fire emissions and because prescribed burns are allowed under BAAQMD Regulation 5, would ensure that the impact of project-level prescribed fire activities proposed in the Management Plan would be less-than-significant.

The ongoing operation of the Preserve, as described in the Management Plan, would not result in any change in land use or any new stationary or area sources of emissions and pollution. No significant, permanent increase in vehicle trips would result from Management Plan activities. Operation of the Preserve does not currently exceed the applicable BAAQMD thresholds of significance for operational emissions and would not change substantially due to implementation of activities associated with the Management Plan. Therefore, the impact of Preserve operation on criteria pollutants would be less-than-significant.

c) Expose Sensitive Receptors to Substantial Pollution Concentrations – Less-than-significant

The Preserve is located in a rural setting that is sparsely populated. Adjacent ownerships consists primarily of rural residential lots, ranches, and undeveloped forests and grasslands. The nearest sensitive receptor is Maria Carrillo High School, approximately three-quarters of a mile southwest of the Preserve's boundary. There are no sensitive receptors in the immediate vicinity of the Preserve.

As described above, construction-related emissions associated with erosion control and road treatment activities are well below the BAAQMD thresholds of significance. Additionally, these activities will occur entirely within the boundaries of the Preserve, three-quarters of a mile from the nearest sensitive receptor. The construction-related emissions associated with the erosion control and road treatment activities proposed in the Management Plan would not expose any sensitive receptors to substantial pollution concentrations.

Smoke emissions from prescribed fire activities could potentially affect sensitive receptors in a wider area around the Preserve, however a BAAQMD-approved smoke management plan would be developed for each individual prescribed burn to minimize potential smoke-related impacts to surrounding communities and sensitive receptors. As described in ***Project Measure 6, Agency Coordination, Approvals, and Public Notification for Prescribed Fire*** all sensitive receptors that may be affected by smoke from a prescribed fire project will be notified prior to burning. Additionally, the District would obtain final BAAQMD authorization for each prescribed burn no more than 24 hours prior to the burn, based on weather conditions and current air quality. Prescribed burning will only occur with proper authorizations and under specified conditions that minimize adverse effects. These controls would ensure that any potential impacts to sensitive receptors from prescribed fire activities proposed in the Management Plan would be less-than-significant.

d) Result in other emissions (such as those leading to odors or dust) adversely affecting a substantial number of people? – Less-than-significant

Although construction equipment used in some Management Plan activities may generate odors, work would occur entirely within the boundaries of the Preserve and would not affect surrounding landowners or a substantial number of people. Prescribed fire activities would produce smoke, but as described above in Impact c, smoke emissions from prescribed burns would be carefully controlled and approved by the BAAQMD, and would have a less-than-significant impact. Prescribed burns would not be conducted when prevailing winds would have the potential to carry smoke from the Preserve towards Santa Rosa and substantially populated areas, or at times when CalFire and/or BAAQMD states conditions are not ideal

for burning due to potential smoke and air quality impacts. Additionally, surrounding landowners would be consulted throughout the planning and implementation process for individual prescribed burns and the District would notify the potentially affected public prior to conducting any burns. Management activities proposed in the Management Plan would not generate other emissions that would significantly affect a substantial number of people. Therefore, the impact would be less-than-significant.

4.3.2 Program-level Analysis

a) Conflict with or Obstruct Applicable Air Quality Plan – No Impact

As noted above, BAAQMD considers a project consistent with the CAP if it: 1) can be concluded that a project supports the primary goals of the CAP (by showing that the project would not result in significant and unavoidable air quality impacts); 2) includes applicable control measures from the CAP; and 3) does not disrupt or hinder implementation of any CAP control measure (BAAQMD 2017b).

Longer term activities proposed in the Management Plan include developing a forest management plan, vegetation management contract, or similar document to provide further specific management of the Preserve's forests and woodlands; managing the Preserve's forest, woodland, and chaparral communities with prescribed fire; maintaining shaded fuel breaks through mowing, thinning, and understory reduction; controlling fully-established populations of invasive species and addressing new outbreaks; and preventing type conversion in the Preserve's natural communities by removing encroaching coyote brush and Douglas fir within select areas, including serpentine bunchgrass habitat. These activities would not result in significant air quality impacts (see Impact b, below) and would comply with, and not hinder the implementation of, control measures set forth in the CAP. Therefore, there would be no impact.

b) Result in a cumulatively considerable net increase of any criteria pollutant – Less-than-significant

Thinning and understory reduction, coyote brush and Douglas fir removal, and invasive species control would be implemented with hand tools or handheld power tools. No substantial ground disturbance is proposed. However, some activities may require the limited use of construction equipment, trucks, and other vehicles. However, due to their natural and scale, the proposed program-level activities would not result in emissions that would exceed the applicable BAAQMD thresholds of significance. The impact from these activities would therefore be less-than-significant.

The expanded prescribed fire activities discussed in the Management Plan would have the potential to generate emissions and significant smoke that could temporarily affect air quality in the same manner as project-level activities. The forest, woodland, and chaparral prescribed fire activities would be guided by a forest management plan, vegetation management contract, or similar document that would be developed by a credentialed subject matter expert, such as a qualified registered professional forester. The impact analysis for program-level prescribed fire projects is the same as for project-level burns. Program-level prescribed burns would be subject to the same planning and approval process as required for project-level burns and as described in ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire***. The impact of expanded prescribed fire activities proposed in the Management Plan would be less-than-significant.

c) Expose Sensitive Receptors to Substantial Pollution Concentrations – Less-than-significant

The nearest sensitive receptor to the Preserve is Maria Carrillo High School, approximately three-quarters of a mile southwest of the Preserve's boundary. There are no sensitive receptors in the immediate vicinity of the Preserve.

The analysis for potential impacts of continued erosion control activities; control of tree and shrub encroachment through the use of prescribed fire, thinning, and mechanical treatment; control of invasive species; and development of more shaded fuel breaks as needed and maintenance of existing fuel breaks; on sensitive receptors is the same as discussed above. The majority of the longer term activities proposed in the Management Plan would require only the limited use of vehicles and equipment and would not expose any sensitive receptors to substantial pollution concentrations. Smoke emissions from prescribed fire activities would have the same potential to impact sensitive receptors as burns described above and would be subject to the same restrictions, reviews, and approvals. These controls would reduce the likelihood of any potential impacts to sensitive receptors from prescribed fire activities proposed in the Management Plan. The impact would be less-than-significant.

d) Result in other emissions (such as those leading to odors or dust) adversely affecting a substantial number of people? – Less-than-significant

Although the equipment used in some program-level activities such as selective thinning and creation of shaded fuel breaks may generate limited emissions and odors, work would occur entirely within the boundaries of the Preserve and would have a less-than-significant impact on surrounding landowners or a substantial number of people, due to the distance of these activities from homes and concentrated populations. Prescribed fire activities would produce smoke, but as described above in Impact c, smoke emissions from prescribed burns would be carefully controlled and approved by the BAAQMD, and would have a less-than-significant impact. Future prescribed fire would be conducted in a similar fashion and would be subject to the same planning and approval requirements as discussed above. Therefore, the impact would be less-than-significant.

4.4 Biological Resources

Biological Resources Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

Setting

The Saddle Mountain Preserve supports forests, woodlands, chaparral, grassland, riparian corridors, and wetlands. Most of these habitats are diverse in native flora and fauna, and are connected to extensive adjacent intact habitat as well, providing valuable connectivity and climate resilience. Serpentine grassland, chaparral, and Sargent cypress forest are present, as are a number of additional sensitive habitat types. Seven special-status plant species and six special-status wildlife species have been documented on the Preserve and others have high likelihood to occur. These include several federally and/or state-listed species. Key natural resource concerns on the Preserve are the protection of these

species and sensitive habitats; control of invasive or otherwise undesired species; road improvements to protect stream quality; limiting the spread of Sudden Oak Death; managing human uses; climate change impacts; and managing fuel loads and fire hazard to benefit habitat diversity while also protecting nearby human infrastructure. The Management Plan is expressly designed to address these concerns.

4.4.1 Project-level Impacts

a) Impacts on special-status species – Less-than-significant with Mitigation

Biological evaluations of the Preserve have identified the presence of or high potential to occur for a number of special-status plant and animal species. Information about special-status species and habitat types within the Preserve and surrounding areas was obtained from the following sources, and the results are shown in Section 2.3.7:

- California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB) (CDFW 2018a)
- U.S. Fish and Wildlife Services (USFWS 2018) online database for federal threatened and endangered species,
- California Native Plant Society Online Inventory of Rare and Endangered Plants (CNPS 2018)

Definitions

Special-status plants and animals refer to those species that are afforded legal protection and include:

- Species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA);
- Species listed or proposed for listing as threatened or endangered under the California Endangered Species Act (CESA);
- Species that are recognized as candidates for future listing by agencies with resource management responsibilities, such as USFWS, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), and CDFW;
- Species defined by CDFW as California Species of Special Concern;
- Species classified as Fully Protected by CDFW;
- Plant species, subspecies, and varieties defined as rare or threatened by the California Native Plant Protection Act (California Fish and Game Code Section 1900, et seq.);
- Species that otherwise meet the definition of rare, threatened, or endangered pursuant to Section 15380 of the CEQA Guidelines; and
- Plant species listed by the California Native Plant Society (CNPS) (CEQA Guidelines Section 15380) according to the California Rare Plant Ranks (CRPR[11]).

[11] California Rare Plant Ranks are provided below; lower numbers (on a scale of 1-4) indicate greater rarity:

- Rank 1A: Presumed extirpated in California and rare or extinct elsewhere;
- Rank 1B: Rare, threatened or endangered in California and elsewhere;
- Rank 2A: Presumed extirpated in California, common elsewhere;
- Ranch 2B: Rare or endangered in California, more common elsewhere
- Rank 3: Plants about which more information is needed; a review list
- Rank 4: Plants of limited distribution; a watch list

In addition to special-status species, nesting native bird species are protected under both federal and state regulations. Under the federal Migratory Bird Treaty Act (MBTA), it is unlawful to take, kill, and/or possess migratory birds at any time or in any manner, unless the appropriate permits are obtained. Protections extend to active nests, eggs, and young birds still in the nest. Birds and their nests are also protected under the California Fish and Wildlife Code (§3503 and §3503.5), and federal Bald and Golden Eagle Protection Acts. Most bird species, with a few specific exceptions, are protected under the MBTA and California Fish and Game Code.

Special-status Plants

Nine special-status plant species are known to occur on the Preserve or have high potential to occur. These include one species (Clara Hunt's milk vetch), which is listed as federally endangered and state threatened; the remainder are considered rare by the California Native Plant Society. These plants are listed below, with proposed management activities that have the potential to adversely affect them. Activities of concern include ground-disturbing activities such as roadway erosion and drainage repair, invasive species control, prescribed fire, fuels reduction, and thinning. If management activities occur in habitats that support special-status plants, impacts on special-status plants could result, including direct loss of individual plants, loss of existing seedbanks, and alteration of habitat conditions.

Napa false indigo is a woodland species that occurs in areas where potential roadway erosion control and drainage improvement activities could occur. It also occurs in areas where shaded fuel breaks and invasive species removal activities may occur. Plants are known to occur along the Erland-Cleland Tie Road in areas along the proposed shaded fuel break. Any location where ground-disturbing activities could occur in Napa false indigo habitat, individual plants could be impacted.

Several special-status species have habitat within chaparral and Sargent cypress vegetation types. Potential impacts could occur to Sonoma canescent manzanita, narrow-anthered brodiaea, Mt. St. Helena morning glory, and Rincon Ridge ceanothus, Calistoga ceanothus, and Sonoma ceanothus. Potential impacts could occur during implementation of roadway erosion and drainage improvement activities and vegetation management activities including thinning of Douglas fir and bay laurel trees and saplings, fuels reduction, and prescribed fire.

Management activities that would occur in grasslands could impact Clara Hunt's milk vetch. Grassland invasive species management, roadway erosion and drainage improvements, and prescribed fire could all occur within grassland habitats.

Lobb's aquatic buttercup grows in vernal pools. Invasive species management in wetlands could impact this species.

The Management Plan includes establishment of buffers around sensitive features, including around habitat that supports special-status plants (i.e., at least 100 feet for upland features and 300 feet for riparian or wetland features), which would help reduce potential impacts; however, some management activities would occur within the buffers to meet management goals. However, direct loss of individual

special-status plants and disturbance to their habitat could result in impacts, and the impacts could be significant.

Implementation of ***Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats***, would reduce potential impacts on special-status plants to less-than-significant levels by maintaining buffer distances from known occurrences. The measure also requires surveys for work in any new areas not previously studied and requires oversight by a qualified botanist for any work within established buffers. Compensation for the loss of individual special-status plant is required to reduce impacts if impacts cannot be avoided.

Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats
The District shall ensure that the following protection measures for special-status plants and their habitat are implemented during management activities. Where avoidance of individuals or habitat is infeasible, the District shall compensate for loss as required by CDFW and USFWS:

- The District shall conduct a botanical survey to ensure that no special-status plants are present in the area of potential ground disturbance prior to initiation of work. If special-status plants or their habitat are not identified during initial site surveys, no further mitigation for impacts on target species is necessary under this measure. Surveys shall be conducted at the appropriate time for plant identification, and shall be conducted by a botanist experienced with Sonoma County sensitive species.
- Ensure that special-status plants and their habitat are not damaged during road erosion control and drainage improvement activities. Napa false indigo is most likely to occur in these locations. Train crews to recognize this species prior to ground-disturbing activities, and have a trained supervisor oversee all work in areas where this plant occurs.
- Ensure that special-status plants and their habitat are not damaged by invasive species control efforts. Invasive species control is planned in or near locations supporting Lobb's aquatic buttercup, Napa false indigo, and Clara Hunt's milk vetch. Ensure that control efforts do not damage these plants, their seedbank, or habitat conditions. Prior to invasive control work, determine whether any known special-status occurrences are present within 100 feet. If so, a natural resource specialist or botanist shall plan and supervise the work.
- Ensure that special-status plants and their habitat are not damaged by fuels reduction, prescribed fire, or other vegetation thinning efforts. Fuels reduction is proposed along the Erland-Cleland Tie Road, along which Napa false indigo occurs. Prior to work, determine whether any known special-status plant occurrences are present within 100 feet. If so, a natural resource specialist or botanist shall plan and supervise the work (in conjunction with other specialists as needed).
- Any herbicide application to treat non-native plants must ensure that no special-status plants are affected.

Implementation of prescribed fire in habitats that support special-status plants could result in loss of individual plants, and the impact could be significant. Implementation of ***Mitigation Measure BIO-2,***

Protect Special-status Plants during Prescribed Burning, would reduce potential impacts on special-status plants resulting from prescribed fire activities to less-than-significant levels by ensuring that appropriate measures are implemented to protect special-status plant species during burning.

Mitigation Measure BIO-2, Protect Special-status Plants during Prescribed Burning
The District shall ensure that the following protection measures for special-status plants are implemented prior to and during prescribed fire activities:

- Prior to conducting prescribed fire activities in habitat that supports special-status plant species, a qualified botanist or biologist shall survey the proposed burn area and identify any special-status plants or critical plant habitat that is present. If special-status species are present in the burn area, a botanist or qualified natural resource specialist shall work with professional fire personnel to plan and supervise the burn to protect special-status plants. Depending on the specific species' characteristics and response to fire, a botanist shall determine if the special-status plant(s) may be negatively impacted by prescribed fire activities. If prescribed fire is determined to have a potentially negative impact on the special-status plant species, measures shall be implemented to protect the plant(s) including, but not limited to, the following:
    - The location of special-status plant(s) will be flagged or otherwise marked
    - An appropriate buffer will be established with environmentally sensitive area (ESA) fencing or other means to identify the sensitive area
    - Locations of special-status plants or habitat that should not be included in the prescribed fire shall be clearly marked on burn plans and in the burn unit
    - Control lines or firebreaks shall be established at a sufficient distance to exclude fire from the area containing special-status plant species and their habitat
    - Sensitive locations containing special-status plant species shall be monitored during prescribed fire activities to ensure that fire is excluded from the area and to implement remedial actions, such as fire suppression, as needed.

Special-status Wildlife

Six special-status animal species have been identified on the Preserve to date, and four others are known to occur near the Preserve. Table 2-3 summarizes the special-status wildlife species that have the potential to occur within the Preserve. Vegetation management activities (e.g., invasive plant species removal or fuel load management) and ongoing activities have the potential to impact native wildlife through disturbance, direct mortality, and alteration of habitat. Impacts on native wildlife would be managed through preconstruction surveys, trainings, and biological oversight for construction and ongoing management activities.

Special-status Fish and Aquatic Wildlife Species

Creeks and wetlands on the Preserve provide documented and potential habitat for special-status amphibians, reptiles, and fish. Foothill yellow-legged frogs are present in Weeks Creek and suitable habitat is present in Alpine and Van Buren Creeks. California giant salamanders and red-bellied newts have been documented downstream in Mark West Creek and may be present in the creeks and uplands.

Northwestern ponds turtles have been observed on adjacent parcels and may use the aquatic habitats and nest in uplands. Steelhead have been documented in Alpine Creek. Suitable habitat may also be present in Weeks and Van Buren Creeks within the Preserve.

Roadway erosion control activities (such as stream crossing treatments), native revegetation and habitat enhancement, and invasive species treatments near creeks or wetlands could result in impacts on protected aquatic species if present in and near the work area during implementation. Potential impacts on aquatic species could result from direct disturbance or mortality to individual animals or through habitat alteration. Such potential impacts on protected aquatic species could be significant.

Implementation of ***Mitigation Measure BIO-3, Protect Fish and Aquatic Wildlife Species***, would reduce impacts on special-status aquatic species to less-than-significant levels by requiring preconstruction surveys by a qualified biologist prior to work in potential habitats to determine whether special-status species are present at or near the location of management activities on the Preserve. This mitigation measure also provides measures to avoid impacts on individuals. Where required, a qualified and permitted biologist would relocate listed wildlife to areas that have been predetermined to provide suitable habitat. Continued public access on the Preserve is unlikely to impact aquatic species, because permitted visitors would be restricted to the existing road and trail network.

Mitigation Measure BIO-3, Protect Fish and Aquatic Wildlife Species

The District shall ensure that the following measures for aquatic species protection are implemented for ground-disturbing management activities near creeks and wetlands:

- A preconstruction survey for foothill yellow-legged frog shall occur prior to beginning work in any wetted stream channel (e.g., wet crossing treatments, culvert replacement), and work shall only occur in areas that have been surveyed by a qualified biologist. Frogs surveys would be restricted to the stream channels. Frogs shall be relocated outside of the work area by a qualified biologist, which may require consultation with CDFW and USFWS. Ongoing monitoring during construction shall occur to ensure frogs have not moved back into the area, and they are not being impacted by activities.
- A preconstruction survey for steelhead and other native fish shall occur prior to beginning work in any perennial stream channel (i.e., wet crossing treatments, culvert replacement), and work shall only occur in areas that have been surveyed by a qualified biologist. Dewatering activities may be needed if fish are present during construction. Ongoing monitoring during implementation of restoration activities shall occur to ensure fish are not being impacted.
- If water is present during construction of the any project, fish and other vertebrate aquatic species shall be relocated up- and/or downstream prior to construction, species shall be excluded from the work area, and the stream shall be dewatered. A comprehensive aquatic species relocation and dewatering plan shall be developed in consultation with CDFW, USFWS, and NOAA Fisheries during acquisition of ecological permits.
- A preconstruction survey for adult northwestern pond turtles and nest sites shall occur prior to beginning work for all projects within or near streams and other permanent water bodies. Any adults found within the work area shall be relocated to suitable off-site habitat. Nest sites

discovered during the preconstruction survey or anytime during construction shall be avoided until vacated, as determined by a qualified biologist. Ongoing monitoring shall occur during construction to ensure no turtles have moved back into the area.

Protected Bird Species

Habitats on the Preserve provide potential nesting habitat for special-status bird species. Sharp-shinned hawk, oak titmouse, wrentit, Nuttall's woodpecker, and northern spotted owl are known to occur year-round on the Preserve. Ongoing management activities could result in tree removal or trimming, ground disturbance, or construction-related noise, which could result in impacts on protected nesting birds if present in and near the work area. Potential impacts on nesting birds could result from destruction of eggs or occupied nests, mortality of young, and abandonment of nests with eggs or young birds prior to fledging. Such potential impacts on protected nesting birds could be significant.

Implementation of ***Mitigation Measure BIO-4, Protect Nesting Birds***, would reduce potential impacts on nesting birds to less-than-significant levels by requiring preconstruction surveys by a qualified biologist to determine if nesting birds are present at or near activity sites and by identifying exclusionary zones around the nests or delaying work until the breeding season is over or nesting is complete. Timeframe limitations would also limit potential impacts to breeding birds by avoiding work during specific times of the year. Continued permitted public access on the Preserve is unlikely to impact nesting birds, because visitors would be restricted to the existing road and trail network where nesting is unlikely.

Mitigation Measure BIO-4, Protect Nesting Birds

The District shall ensure that the following protection measures for birds are implemented for ground-disturbing and/or vegetation management activities:

- Work shall occur outside of the critical breeding bird period (February 15 through August 31) for construction projects and during ongoing land management (e.g., vegetation trimming and removal, shaded fuel break development, etc.). If activities must occur during this period, work areas shall be surveyed by a qualified biologist prior to commencing. Surveys shall be required for all human-related ground disturbance activities in natural habitats and for vegetation trimming and removal. The surveys shall be conducted within one week prior to initiation of vegetation clearing, tree removal and trimming, shaded fuel break development, and other vegetation activities. If the biologist finds no active nesting or breeding activity, work can proceed without restrictions. If active raptor or owl nests are identified within 100 feet of the construction area or active nests of other special-status birds (e.g., passerines, woodpeckers, hummingbirds, etc.) are identified within 50 feet of the construction area, a biologist shall determine whether or not construction activities may impact the active nest or disrupt reproductive behavior. If it is determined that construction would not affect an active nest or disrupt breeding behavior, construction can proceed without restrictions. The determination of disruption shall be based on the species' sensitivity to disturbance, which can vary among species; the level of noise or construction disturbance; and the line of sight between the nest and the disturbance. If the biologist determines activities would be

detrimental, the nesting area and 250-foot buffer for larger nesting birds (e.g., owls, raptors, herons, egrets) and 50-foot buffer for small nesting songbirds shall be avoided until the nest has been vacated.

- If the work area is left unattended for more than one week following the initial surveys, additional surveys shall be completed. Ongoing construction monitoring shall occur to ensure no nesting activity is disturbed. If State and/or federally listed birds are found breeding within the area, activities shall be halted and consultation with the CDFW and USFWS shall occur.

Northern Spotted Owl

Northern spotted owls occupy the densely forested habitats within the Preserve. Activities which could affect owls include the prescribed fire and bay removal associated with the habitat enhancement activities and general forest thinning and tree removal. Implementation of these management activities may impact nesting owls if activities occur within 0.5 acre of an active nest during the breeding season, and the impact could be significant.

Implementation of ***Mitigation Measures BIO-4, Protect Nesting Birds***, would reduce potential impacts on nesting northern spotted owls to less-than-significant levels by requiring preconstruction surveys by a qualified biologist and changing implementation timeframes if management activities occur in suitable forested and woodland habitats and within one mile of a documented owl occurrence as described in U.S. Fish and Wildlife Service (USFWS) Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*) (USFWS 2011).

Mitigation Measures BIO-4, Protect Nesting Birds

Implementation of **Mitigation Measure BIO-5, Protect Northern Spotted Owl**, would also mitigate potential impacts on northern spotted owls to less-than-significant levels by requiring preconstruction surveys by a qualified biologist to determine if nesting spotted owls are present at or near management activity sites and by identifying exclusionary zones around the nests. Implementation of management activities could also be delayed until the breeding season is over or nesting is complete. Continued permit-only public access on the Preserve is unlikely to impact owls because the Preserve would be closed from sunset to sunrise to protect nocturnal wildlife and most of the occupied habitat is not accessible.

Mitigation Measure BIO-5, Protect Northern Spotted Owl

The District shall ensure that the following protection measures for northern spotted owls are implemented for habitat disturbing management activities:

- Assume presence of northern spotted owl in Douglas fir, redwood, and mixed woodland habitats on the Preserve.
- Breeding northern spotted owls shall be protected in accordance with the measures outlined in ***Mitigation Measure BIO-4, Protect Nesting Birds***, above. Protection shall include focused breeding owl surveys for projects occurring from March 1 through August 31 in areas of suitable forested and woodland habitat and within 1 mile of a documented owl occurrence.

- If spotted owls are determined to be present during the breeding season within 0.5 miles of the work area, no work shall occur between March 1 and August 31 or until nesting completion has been verified by a qualified biologist.
- If the absence of northern spotted owl cannot be verified, the species shall be assumed to be present and either: 1) the work shall be performed after August 31 or 2) sound reduction measures shall be implemented in consultation with a qualified biologist, CDFW, and USFWS to ensure activities do not significantly raise noise above ambient levels.
- No trees or understory vegetation shall be removed within 500 feet of a documented active breeding location for northern spotted owl (either through previously confirmed sightings or project-specific verification by the project biologist).
- For projects proposed during the non-breeding season in suitable habitat, construction activities shall be overseen by a qualified biologist to ensure roosting and foraging birds are not being impacted.

Special-status Bats

There are approximately 15 bat species with known occurrences within northern California, and a number of these species have a high probability of occurring within the Preserve and adjacent lands. Bats are highly mobile, with many being migratory. All local Sonoma County species are insectivorous and feed by echolocation. Bats on the Preserve may use tree hollows and other natural and man-made (e.g., cabin) crevices for roosting. Two special-status bat species have reported occurrences near the Preserve—pallid bat and Townsend's big-eared bat. Additional bat species identified as having moderate to high priority for conservation by the Western Bat Working Group may also occur on the Preserve. Potential impacts on special-status and common bat species could be significant during implementation of the management actions that require tree removal or trimming.

Implementation of ***Mitigation Measure BIO-6, Protect Special-status Bats***, would reduce impacts on special-status bat species to less-than-significant levels by requiring preconstruction surveys and avoidance of disturbance to roosting bats. Continued permit-only public access on the Preserve is unlikely to impact bats because the Preserve would be closed from sunset to sunrise

Mitigation Measure BIO-6, Protect Special-status Bats

The District shall ensure that the following protection measures for bats are implemented during management activities on the Preserve:

- Complete presence/negative finding bat surveys prior to removal or significant trimming of any trees which are over 6 inches in diameter at breast height. Surveys shall be completed by a qualified biologist. Because each individual bat species may use different roosts seasonally and from night to day, surveys must be conducted by a qualified biologist at the appropriate times. If trees planned for trimming or removal are identified as active roost sites, appropriate and specific avoidance measures shall be developed. Avoidance measures may include, but would not be limited to, seasonal limitations on work when roosts are unoccupied and/or establishment of buffer areas around occupied roosts.

- For all trees previously identified as active roost sites and subject to trimming or removal, trees shall be taken down in a two-step process – limb removal on day one shall be followed by bole removal on day two. This approach would allow bats, if they are present, an opportunity to move out of the area prior to completing removal of the trees. No trees supporting special-status bats shall be removed without prior consultation with CDFW.
- If work is postponed or interrupted for more than two weeks from the date of the initial bat survey, the preconstruction survey shall be repeated.
- Construction shall be limited to daylight hours to avoid interference with the foraging abilities of bats.

b) Impacts on riparian habitat and sensitive natural communities – Less-than-significant

Sensitive natural communities on the Preserve include redwood forest, Sargent cypress woodland, California bay forest, Oregon oak woodland, valley oak woodland, manzanita chaparral, native grassland, and wetlands. Several streams and associated riparian habitat are also present. Both short-term and long-term management practices are designed to improve site conditions in riparian and sensitive natural communities on the Preserve. Native plantings and invasive species control are planned in riparian habitat, redwood habitat, and native grassland. Implementation of buffers as described in the Section 2.4.5 would provide protection of these sensitive resources.

Road drainage improvements and repairs are planned in many of these settings, and would cross drainages. ***Project Measure 1 - Planting and Revegetation after Soil Disturbance for Restoration*** and ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance*****,** are included as part of the project and described in Section 2.6. These measures require including erosion control measures and the requirement to replant areas disturbed during management activities. Strict adherence to the measures would keep potential impacts on riparian and other sensitive communities to less-than-significant.

Prescribed fire may be used in many of these settings. The goal of using fire would be to maintain and improve habitat complexity by providing diverse native-dominated habitats. As discussed in the Project Description Section 2.4.3, the District would work with CalFire and a prescribed burn specialist to develop burn plans. If a burn were to take place near sensitive resources, the burn plan would be subject to appropriate resource review, such as consultation with a qualified botanist and relevant agencies. Conditions and environmental protection measures would be included in the burn plan if needed to protect sensitive habitat. Impacts to sensitive habitats would be less-than-significant.

c) Impacts on jurisdictional wetlands or waters – Less-than-significant with Mitigation

Sonoma County, State, and federal regulations require conservation of wetlands and compliance with a no-net loss policy through avoidance of sensitive habitats and compensatory mitigation such as enhancement or restoration.

Some erosion control and native vegetation plantings could be implemented within jurisdictional waters or wetlands. Erosion repair and roadway drainage improvement activities could result in temporary

disturbance and potential fill of federally and State-protected wetlands. By their nature, in-channel stabilization and roadway improvements would be located in or near stream channels and could impact adjacent wetlands depending on the site. These impacts could be significant.

Implementation of ***Mitigation Measure BIO-7, Protect Wetlands and Waters***, would reduce impacts to a less-than-significant level through implementation of a compensatory mitigation program for impacts on wetlands or waters that cannot be avoided.

> ***Mitigation Measure BIO-7, Protect Wetlands and Waters***
> The District shall conduct a wetlands survey for areas that would be permanently or temporarily disturbed to confirm the location, extent, and regulatory status of wetland and water features within the management activity area. Project impacts on wetlands and waters shall be avoided where feasible. If jurisdictional wetlands cannot be avoided, the project may require a Clean Water Act (CWA) Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 permit from the Regional Water Quality Control Board. All permit requirements shall be implemented.
>
> In addition, compensation for impacts on wetlands and waters shall follow the requirements in the CWA Section 404/401 permits. Compensatory mitigation may consist of the following:
>
> - Providing compensatory mitigation through aquatic resource restoration, establishment, enhancement, and/or preservation.
> - Obtaining credits from a mitigation bank.

d) Impacts on the movement of fish or wildlife species – Less-than-significant

Sonoma County directs the preservation and restoration of elements of wildlife habitats and corridors throughout the county, and the District's plans are designed to enhance and protect existing wildlife migration corridors. Erosion control treatments are designed to improve instream habitat conditions for aquatic species and preserve adjacent habitats. Existing plant communities and habitats would be enhanced to support local wildlife populations through active vegetation management and invasive plant removal. Vegetation management could have a significant impact on wildlife movement. Vegetation management may temporarily cause wildlife to travel away from the disturbance area; however, the impact would be temporary and occur only for the duration of implementation of management actions. In the long-term, implementation of the management activities described in the Management Plan would reduce impacts on native and migratory wildlife species by maintaining habitat complexity by providing diverse multistory forest and woodland habitats for wildlife utilization and plant community diversity.

e, f) Conflict with local policies or ordinances or with a Habitat Conservation Plan or Natural Community Conservation Plan – Less-than-significant

The Sonoma County General Plan 2020 contains numerous goals, policies, and action items to protect biological resources. The policies require conservation of wetlands and waterways so that there is no net loss of wetlands, preservation of significant vegetation and trees, and specific measures for construction in and adjacent to sensitive habitats, such as stream channels. Implementation of the management actions could conflict with applicable county policies protecting biological resources, as identified in the

previous impact discussions regarding special-status species, riparian vegetation, and wetlands. However, the mitigation measures identified in the impacts analysis above would ensure that management actions comply with county policies, and the impact would be less-than-significant.

Actions proposed would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. No impacts would occur.

4.4.2 Program-level Impacts

a) Impacts on special-status species – Less-than-significant with Mitigation

Special-status Plants

The impacts for future management activities on special-status plants would be the same as described above in the project-level analysis. Long-term management of the Preserve including continued implementation of future erosion control activities; control of tree and shrub encroachment through the use of prescribed fire, thinning, and mechanical treatment; invasive species control; and maintenance of existing fuel breaks, could affect Napa false indigo stands along roads. Implementing stated setbacks and measures described in ***Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats*** and ***Mitigation Measure BIO-2, Protect Special-status Plants during Prescribed Burning*** would ensure that any impacts would be less-than-significant.

Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats
Mitigation Measure BIO-2, Protect Special-status Plants during Prescribed Burning

Special-status Wildlife

Long-term management of the Preserve, including continued implementation of future erosion control activities; control of tree and shrub encroachment through the use of prescribed fire, thinning, and mechanical treatment; invasive species control; and creation of new and maintenance of existing fuel breaks, would have the same impacts as described above for more short-term actions. Implementation of management activities would be subject to the project and mitigation measures described above in Section 4.4.1, Project-Level Impacts. Implementation of the mitigation measures would reduce impacts to less-than-significant levels.

Mitigation Measure BIO-3, Protect Fish and Aquatic Wildlife Species
Mitigation Measure BIO-4, Protect Nesting Birds
Mitigation Measure BIO-5, Protect Northern Spotted Owl
Mitigation Measure BIO-6, Protect Special-status Bats

b) Impacts on riparian habitat and sensitive natural communities – Less-than-significant

Proposed Management practices are designed to improve site conditions in riparian and sensitive natural communities on the Preserve. These include removal of encroaching woody vegetation to protect native

grassland and use of fire and thinning to control Douglas fir encroachment into oak woodland. Forest thinning to reduce fuel loads is also planned. Forest thinning and prescribed fire could have impacts on sensitive natural communities. As discussed in the Project Description Section 2.4.3, the District would work with CalFire and a prescribed burn specialist to develop burn plans and vegetation management plans. If work were to take place near sensitive resources, the plan would be subject to appropriate resource review, such as consultation with a qualified botanist and relevant agencies. Conditions and environmental protection measures would be included in the burn or vegetation management plan if needed to protect sensitive habitat. Impacts to sensitive habitats would be less-than-significant.

c) Impacts on jurisdictional wetlands or waters – Less-than-significant with Mitigation

No additional program-level activities (i.e., beyond the project-level activities) are planned that would affect wetlands and waters. Future management activities would be subject to Mitigation Measure BIO-7, Protect Wetlands and Waters. See project-level analysis in Section 4.4.1.

Mitigation Measure BIO-7, Protect Wetlands and Waters

d) Impacts on the movement of fish or wildlife species – No impact

No additional program-level activities (i.e., beyond the project-level activities) are planned that would affect fish and wildlife movement. See project-level analysis, Section 4.4.1.

e, f) Conflict with local policies or ordinances or with a Habitat Conservation Plan or Natural Community Conservation Plan – Less-than-significant

The Sonoma County General Plan 2020 contains numerous goals, policies, and action items to protect biological resources. The policies require conservation of wetlands and waterways so that there is no net loss of wetlands, preservation of significant vegetation and trees, and specific measures for construction in and adjacent to sensitive habitats, such as stream channels. Implementation of the management actions could conflict with applicable County policies protecting biological resources, as identified in the previous impact discussions regarding special-status species, riparian vegetation, and wetlands. However, the mitigation measures identified in the impacts analysis above would ensure that management actions comply with County policies, and the impact would be less-than-significant.

Proposed program-level actions would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. No impacts would occur.

4.5 Cultural Resources

Cultural Resources Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historic resource pursuant to §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

Setting

Archaeology is the systematic study of past human life and culture through recovery and examination of remaining material evidence, such as graves, buildings, tools, and pottery. In Sonoma County, archaeological research generally involves study of the Native American inhabitants of the land from roughly 8,000 years ago to the early 1800s when the County was settled by American, Russian, Spanish, and Mexican colonists, and most Native Americans were brought into the mission system.

The Preserve's natural characteristics, including multiple sources of freshwater and a mosaic of habitat types, have made it a prime location for human occupation throughout the millennia. Prior to European settlement, the land that includes the Preserve was occupied by the Southern Pomo, hunter-gatherers with complex social structures (Tom Origer & Associates 2008, 2018). The Southern Pomo typically settled in permanent villages with dense populations and established seasonal camps and smaller sites throughout the region. The Southern Pomo and other Native American tribes in the vicinity also influenced the landscape through the frequent use of fire to facilitate hunting, cultivation, and other uses. These interventions represented a continuation of the natural process of landscape alteration caused by grazing and lightning strike-induced fires that occurred prior to indigenous land management. Thus, fire and grazing have shaped the landscape on and around the Preserve for millennia.

Historic resources, as distinguished from archaeological resources, include antiques, buildings, structures, and sites generally from the past two centuries, marking the successive eras of Russian, Mexican, and North American occupation. The historic period brought with it large-scale changes to the landscape, with logging, clearing of the land for agriculture, importation of livestock, and fire suppression leading to drastic alterations in the vegetation and habitat types in the Preserve and the surrounding area. Throughout the historic period, the Preserve was used for timber operations and livestock ranching.

Tom Origer & Associates conducted cultural resources surveys of the Preserve in 2008 and 2018 (Tom Origer & Associates 2008; Tom Origer & Associates 2018). The 2008 survey documented four previously recorded prehistoric sites, four isolated specimens, two stone fences, six historic sites, and one prehistoric site on the Preserve. The survey was unable to confirm two prehistoric sites recorded during previous

studies conducted in the 1970s. The 2018 survey included evaluation of seven erosion control project locations proposed in the Management Plan, as well as the previously recorded six prehistoric sites, six historic sites, and two stone fences.

4.5.1 Project-level Analysis

a) Cause a substantial change to historical resources – Less-than-significant with Mitigation

The Management Plan identifies seven historic resources within the Preserve: two stone fences; two mid-20th century camps; one mid-to-late 20th century camp; one collapsed barn; Plum Ranch Orchard, a complex with one small wood frame building, stone foundation, artificial pond, and cistern; and an outhouse. The latter two historic resources represent the only structures located on the Preserve.

The Management Plan recommends the establishment of buffers around sensitive features, including 100-foot cultural resource avoidance buffers for visible sites. Any potential intensification of visitor use would be directed outside of buffer areas and modification of the environment should be avoided within buffers to the greatest extent possible. The Management Plan also restricts ground disturbance in areas where cultural resources occur but are not visible. However, as shown in Table 5.4 of the Management Plan (Appendix A), some of the proposed erosion control activities would by necessity take place within the 100-foot buffer of a cultural or historic resource. However, the 2018 survey found that no historic resources would be impacted during construction of these erosion control projects.

Additionally, road and trail improvements, erosion control efforts, and development of shaded fuel breaks involve ground-disturbing construction activities and there is a chance that a previously undiscovered historical site could be impacted during these construction activities.

Mitigation Measure CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources, would be implemented to reduce these potential impacts on historical resources to less-than-significant levels by providing standard practices for the protection of both documented and as of yet undiscovered historical resources during ground-disturbing activities. ***Mitigation Measure CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources***, would be implemented to reduce potential impact on previously undiscovered historical resources to less-than-significant levels by providing standard procedures to protect such resources if discovered during ground-disturbing activities.

> ***Mitigation Measure CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources***
>
> Prior to ground-disturbing activities within 100 feet of a documented historic resource, the District shall examine the site to determine if the resource is within or outside the area of disturbance. If the historic resource is outside the area of disturbance or can be avoided, temporary fencing shall be placed around the historic resource and the project shall be designed and constructed to avoid impairment of the historic resource.
>
> If the historic resource is determined to be within the area of disturbance and cannot be avoided, *The Secretary of the Interior's Standards for the Treatment of Historic Properties* shall be followed. A qualified historic preservation professional shall be retained to develop a treatment plan. Such

professionals may include architects, architectural historians, historians, historic engineers, archaeologists, and others who have experience in working with historic structures. Mitigation measures recommended by the qualified historic preservation professional shall be implemented. These measures could include, but not necessarily be limited to:

- Avoidance of significant historic resources;
- Graphic documentation (photographs, drawings, etc.); and/or
- Restoration, stabilization, repair, and reconstruction.

If subsurface historic materials are encountered during project activities, the piece of equipment or crew member that encountered the materials shall stop and the find shall be inspected by a qualified historian/archaeologist. Project personnel shall not collect historic materials. If the historian/archaeologist determines that the find qualifies as a unique historic resource for the purposes of CEQA (Guidelines Section 15064.5(c)), all work shall be stopped in the immediate vicinity to allow the archaeologist to evaluate the find and recommend appropriate treatment. Such treatment and resolution shall include either modifying the project to allow the materials to be left in place or undertaking data recovery of the materials in accordance with standard archaeological methods. The preferred treatment is protection and preservation.

Mitigation Measure CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources

The District shall ensure that if previously unknown historic resources are encountered during construction, the piece of equipment or crew member that encountered the materials shall stop and the find shall be inspected by a qualified archaeologist. Project personnel shall not collect historic materials. If the archaeologist determines that the find potentially qualifies as a unique historic resource for the purposes of CEQA (Guidelines Section 15064.5(c)), all work shall be stopped in the immediate vicinity to allow the archaeologist to evaluate the find and recommend appropriate treatment. Such treatment and resolution shall include either project modification to allow the materials to be left in place or undertaking data recovery of the materials in accordance with standard archaeological methods. The preferred treatment is protection and preservation.

The Management Plan includes prescribed fire within grassland units on the Preserve to manage invasive species and enhance native habitat by restoring historic landscape disturbance patterns. Prescribed fire activities would be designed to use existing firebreaks (e.g., roads and trails) and natural breaks (e.g. creeks and wetlands) to the extent possible. However, the installation of small, shallow control lines and other firebreaks around some burn units would likely be necessary. As a result, the use of prescribed fire would be unlikely to impact below-ground resources and human remains, but could have the potential to affect historical and archaeological resources, particularly above-ground resources if fire is used within the vicinity of these resources. ***Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources***, would reduce the potential impacts to historical and archaeological resources to a less-than-significant level by identifying and avoiding cultural resources during burning operations.

Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources

The District shall, prior to the implementation of prescribed fire activities, ensure that a qualified archaeologist surveys the proposed burn unit to identify any historic and archaeological resources present. A qualified archaeologist shall mark locations, and all fire and staging activities shall be excluded in marked areas. Prior to conducting a prescribed burn, wildland fire officials shall receive training on the location of cultural resources and measures necessary to protect them. Upon completion of burning activities, markings designating the location of cultural resources shall be removed.

b) Cause a substantial change to archaeological resources – Less-than-significant with Mitigation

As noted above, five archaeological sites and four isolated archaeological specimens were documented on the Preserve during the most recent survey (Tom Origer & Associates 2008, 2018). Some proposed project-level activities in the Management Plan, including erosion control and road and trail improvement, require ground disturbance and limited excavation. There are known archaeological sites in the vicinity of the roadways where project activities would take place; however, 2018 site surveys indicate no known resources in the disturbance area of the proposed erosion control sites. Other project-level activities may be located in areas where previously undiscovered archaeological resources exist. Thus, the potential impact on archaeological resources could be significant, given the potential for damage to previously undiscovered resources during ground-disturbing activities.

Mitigation Measure CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources, would reduce any impact on recorded or as of yet undiscovered archaeological resources to a less-than-significant level by identifying, protecting, preserving, or recovering significant archaeological resources.

Mitigation Measure CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources

The District shall avoid known archaeological resources where feasible and follow the treatment recommendations presented in the cultural resources reports for the Preserve (Tom Origer & Associates 2008, 2018). All projects shall be designed, constructed, and operated to avoid damage to the resource as guided by the cultural resources treatment measures. Measures may include, but are not limited to, temporary protective barriers, construction worker training, or relocation of the project itself.

If avoidance of the location of a known archaeological resource is not feasible, a qualified archaeologist shall be retained to perform an evaluation of the resource and to determine its significance. The resource would be subject to archaeological research and testing in order to adequately document the site and its scientific data. Mitigation measures recommended by the qualified archaeologist shall be implemented and may include graphic documentation, avoidance of the resource, or accession of materials.

If previously unknown archaeological materials are encountered during construction, the piece of equipment or crew member that encountered the materials shall stop, and the find shall be inspected by a qualified archaeologist. Project personnel shall not collect archaeological

materials. If the archaeologist determines that the find potentially qualifies as a unique archaeological resource for the purposes of CEQA (Guidelines Section 15064.5(c)), all work shall be stopped in the immediate vicinity to allow the archaeologist to evaluate the find and recommend appropriate treatment. Such treatment and resolution shall include either project modification to allow the materials to be left in place or undertaking data recovery of the materials in accordance with standard archaeological methods. The preferred treatment is protection and preservation.

As noted above, project-level activities include the use of prescribed fire within the Preserve's grasslands, which has the potential to significantly affect historical and archaeological resources. ***Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources***, would reduce the potential impacts from prescribed fire to historical and archaeological resources to a less-than-significant level.

Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources

c) Disturb any human remains – Less-than-significant with Mitigation

No human remains have been documented on the Preserve during any of the previous cultural resource surveys on the area. However, ground disturbing activities related to erosion control or road treatment projects could potentially disturb previously undocumented buried human remains. These activities could therefore have a potentially significant impact on human remains. ***Mitigation Measure CUL-5, Procedures for Encountering Human Remains***, would reduce impacts on human remains to a less-than-significant level by requiring the implementation of standard procedures if human remains are encountered.

Mitigation Measure CUL-5, Procedures for Encountering Human Remains

The District shall implement the following actions should human remains be encountered during project activities:

The treatment of any human remains and associated or unassociated funerary objects discovered during soil-disturbing activities shall comply with applicable State laws. If human graves are encountered, the District shall ensure that all work stops in the vicinity and the Sonoma County Coroner is notified. A qualified archaeologist shall evaluate the remains. If human remains are of Native American origin, the Coroner shall notify NAHC within 24 hours of identification, pursuant to PRC §5097.98. NAHC would appoint a Most Likely Descendant. A qualified archaeologist, the District, and the Most Likely Descendant shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of any human remains and associated or unassociated funerary objects (CEQA Guidelines §15064.5[d]). The agreement would take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 48 hours to reach agreement on these matters. If the Most Likely Descendant and the other parties cannot not agree on the reburial method, the District shall follow PRC §5097.98(b), which states that "the landowner or his or her authorized representative shall reinter the human

remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."

4.5.2 Program-level Analysis

a-c) Cause a substantial change to historical resources, archaeological resources, and human remains – Less-than-significant with Mitigation

Program-level activities proposed in the Management Plan include targeted thinning, maintenance of shaded fuel breaks, control of well-established invasive species and new outbreaks, and application of prescribed fire to woodland, forest, and chaparral habitats. These program-level activities would not require significant ground-disturbance, though some limited ground-disturbance would be associated with prescribed burning, thinning, and invasive control activities. As a result, program-level activities could have a significant impact on historical resources, archaeological resources, and human remains. In particular, prescribed fire could have a potentially significant impact on above-ground archaeological and historical resources. Implementation of

Mitigation Measures CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources, CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources, CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources, CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources, and ***CUL-5, Procedures for Encountering Human Remains***, as described above, would reduce the potential impact of longer term activities on historical resources, archaeological resources, and human remains, to a less-than-significant level.

Mitigation Measure CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources
Mitigation Measure CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources
Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources
Mitigation Measure CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources
Mitigation Measure CUL-5, Procedures for Encountering Human Remains

4.6 Energy

Energy Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Setting

The utility provider for both natural gas and electricity in the area encompassing the Preserve is Pacific Gas and Electric (PG&E). There is an above-ground PG&E transmission line running east-west across the southern portions of the Preserve. However, there are no existing utility services to the Preserve itself. The Preserve does not receive electrical or natural gas hookups and ongoing operation of the Preserve would not consume electricity or natural gas. The electronic gate at the entrance to the Preserve at the intersection of Calistoga and Cleland Ranch roads is solar-powered.

The Energy Action Plan 2008 Status Update, produced by the California Public Utilities Commission and the California Energy Commission, provides statewide guidance on meeting energy needs while achieving energy efficiency (California Public Utilities Commission and California Energy Commission 2008). Assembly Bill 32, also known as the Global Warming Solutions Act of 2006, addresses greenhouse gas emissions throughout different sectors of California's economy and sets emission reduction goals. Assembly Bill 32 is further addressed in the Section 4.8 Greenhouse Gas Emissions. Locally, the Open Space and Resource Conservation Element of the Sonoma County General Plan sets forth policies to achieve the County's goal of promoting energy conservation and reducing demand for energy (Sonoma County 2016).

4.6.1 Project-level Impacts

a) Result in environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources – Less-than-significant

There is no existing electricity or natural gas service on the Preserve and implementation of Management Plan activities would not result in the development or ongoing use of electricity or natural gas utility services on the Preserve. Therefore, project-level activities would result in no environmental impact due to wasteful, inefficient, or unnecessary consumption of electricity and natural gas resources.

Construction of road treatment and erosion control projects would require the use of construction equipment and would therefore result in the consumption of petroleum-based fuels. Additionally, project-level prescribed fire activities in the Preserve's grasslands would require the use of small amounts

of petroleum-based fuels for ignition, as well as for vehicles and support equipment. Other management activities, including invasive species control, targeted thinning, and creation of shaded fuel breaks, would require the use of vehicles and equipment that would also consume petroleum-based fuels. However, ***Project Measure 2 - Reduction of Construction Emissions*** requires that equipment is maintained in good working order and limits the idling of equipment and vehicles to a maximum of five minutes to avoid wasteful use of equipment. The project-level activities are small-scale and would not result in wasteful, inefficient, or unnecessary consumption of petroleum and transportation fuels. As a result, the impact from project-level activities would be less-than-significant.

b) Conflict with renewable energy or energy efficiency plans – No Impact

Project-level activities proposed in the Management Plan would not increase the use of electricity or natural gas utilities, and would result in only a minor increase in the consumption of petroleum-based fuels for vehicles and equipment. These activities would not conflict with or obstruct any renewable energy or energy efficiency plan. There would be no impact.

4.6.2 Program-level Impacts

a) Result in environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources – Less-than-significant

Longer-term activities proposed in the Management Plan would not result in the development or ongoing use of electricity or natural gas utility services on the Preserve. Therefore, activities would result in no environmental impact due to wasteful, inefficient, or unnecessary consumption of electricity and natural gas resources.

Future prescribed fire activities in the Preserve's forest, woodland, and chaparral communities would require the use of small amounts of petroleum-based fuels for ignition, as well as for vehicles and support equipment. Other activities, including ongoing invasive species control, targeted thinning and control of encroaching species, and continued maintenance of shaded fuel breaks, would require the use of vehicles and equipment that would consume petroleum-based fuels. However, ***Project Measure 2 - Reduction of Construction Emissions*** requires that equipment is maintained in good working order and limits the idling of equipment and vehicles to a maximum of five minutes. Program-level activities are small-scale and would not result in wasteful, inefficient, or unnecessary consumption of petroleum and transportation fuels. As a result, the impact from program-level activities would be less-than-significant.

b) Conflict with renewable energy or energy efficiency plans – No Impact

Program-level activities proposed in the Management Plan would not increase the use of electricity or natural gas utilities, and would result in only a minor increase in the consumption of petroleum-based fuels for vehicles and equipment. These activities would not conflict with or obstruct any renewable energy or energy efficiency plan. There would be no impact.

4.7 Geology and Soils

Geology and Soils Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

Setting

Two geologic units, the Franciscan Complex and Sonoma Volcanics, underlie the majority of the Preserve. Additionally, smaller portions of the Preserve are composed of the Glen Ellen Formation and the Merced Formation. The Preserve's soils consist primarily of loams and clay loams, with slopes ranging from 5% to 75%. These soils have erosion hazards that range from slight to high and slow to rapid runoff potential. Serpentine soils are present within three of the Preserve's soil map units, Montara cobbly clay loam (30-75% slopes), Raynor-Montara complex (0-30% slopes), and Yorkville clay loam (30-50% slopes).

Paleontology is the study of the forms of life existing in prehistoric or geologic times as represented by the fossils of plants, animals, and other organisms. Paleontological remains in Sonoma County include plants, invertebrates and vertebrates ranging in age from approximately 140 million years to less than 8,000 years before the present. Within the County, paleontological remains have been primarily recovered from the following geologic formations (Sonoma County 2006):

- Franciscan complex – The Franciscan formation largely covers the northern part of the County, except for Alexander Valley and the northern Santa Rosa Plain;
- Wilson Grove – Paleontological resources are common in the Wilson Grove formation that is located in the western part of the County;
- Ohlson Ranch and Petaluma – Resources are also commonly located in the Ohlson Ranch and Petaluma formations in the vicinity of Occidental, Sebastopol, and the coast and at the base of Sonoma Mountain; and
- Sonoma Volcanics – The Sonoma Volcanics formation is found in the Sonoma Mountains and the Sonoma/Napa Mountains that form the eastern border of the County.

Within the Preserve, there are three geologic units that are associated with the Sonoma Volcanics and Franciscan complex geologic formations.

4.7.1 Project-level Analysis

a) Cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
a.i-iii) Rupture of a known earthquake fault, strong seismic ground shaking, and seismic-related ground failure – No Impact

The Preserve is not located on any known earthquake fault, though it lies approximately three miles from the Rodgers Creek Fault and the Redwood Hill Fault. As a result, the Preserve could be subject to very strong seismic ground shaking and seismic-related ground failure if significant seismic activity were to occur along one of the nearby faults (ABAG 2018).

Implementation of the Management Plan activities would not cause the rupture of any known earthquake fault and would not result in adverse effects involving strong seismic ground shaking or seismic-related ground failure. No new or significantly altered structures are proposed and activities recommended in the Management Plan would not change the local impacts of earth-shaking events. Therefore, there would be no impact.

a.iv) Landslides – No Impact

Landslide potential on the Preserve ranges from high to extremely high in the southwestern portion of the Preserve, moderate to extremely high in the middle portion, and low to extremely high in the eastern portion (California Geological Survey, 2018). As noted in the Management Plan (Appendix A), one naturally occurring landslide has been noted on the Preserve, on the slope above the south bank of Van Buren Creek near the eastern property boundary.

Activities proposed in the Management Plan would not result in additional landslides or exacerbate any existing landslide. Road and trail treatments would improve drainage and reduce runoff, erosion, and

sedimentation. Erosion control measures would be implemented for any ground-disturbing activities and disturbed areas would be promptly stabilized and re-vegetated as necessary. Therefore, there would be no impact.

b) Result in substantial soil erosion or the loss of topsoil – Less-than-significant

The Management Plan identifies soil erosion as a significant management challenge on the Preserve. Topography on the Preserve is varied and includes steep ridges, relatively flat creek beds, and gently rolling hills. Soils are typically characterized by a moderate to very high erosion potential. Numerous sites of road-related erosion have been identified on the Preserve.

As a result, measures to control soil erosion are an integral component of the Management Plan. Erosion control activities and road treatments are designed to address known sources of erosion and sedimentation on the Preserve. These activities would reduce soil erosion and the loss of topsoil on the Preserve relative to existing conditions.

Invasive species control, encroaching thatch removal, and prescribed fire in grassland habitats could temporarily result in areas of exposed soil. As described in ***Project Measure 1 - Planting and Revegetation after Soil Disturbance for Restoration*** and ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance***, disturbed areas would be immediately stabilized and, if appropriate, re-seeded. BMPs to prevent erosion would be implemented and would include native re-seeding, installation of straw wattles and jute netting, and silt fencing near streams and creeks. Implementation of these measures would ensure that the impact would be less-than-significant.

c) Located on a geologic unit or soil that is unstable, resulting in landslide, lateral spreading, subsidence, liquefaction, or collapse – No Impact

The Preserve is not located on a geologic unit or soil that is unstable and project-level activities proposed in the Management Plan would not cause instability or result in landslide, lateral spreading, subsidence, liquefaction, or collapse. According to the Association of Bay Area Governments (ABAG 2018), portions of the Preserve are potential debris flow areas (i.e., susceptible to rainfall induced landslides). None of the activities in the Management Plan would increase the risk of debris flows as proposed activities are designed to improve drainage and reduce erosion. The Management Plan does not propose the construction of any structures or buildings, and construction of the proposed erosion control activities would not cause or be impacted by any landslides. There would be no impact.

d) Located on expansive soil – No Impact

As noted above, soils on the Preserve consist primarily of loams and clay loams. These soils are not known to be expansive. There would be no impact.

e) Have soils incapable of adequately supporting wastewater disposal systems where sewers are not available – No Impact

No septic tanks or wastewater disposal systems are proposed in the Management Plan. There would be

no impact.

f) Destroy a unique paleontological resource or site or unique geologic feature – Less-than-significant with Mitigation

Sonoma County has paleontologically rich formations and portions of the Preserve are underlain by geologic formations known to potentially contain paleontological remains, including units of Sonoma Volcanics and Franciscan complex. When located in these geologic formations, the project-level activities proposed in the Management Plan that entail ground disturbance, primarily erosion and sedimentation control activities, would have slight potential to unearth and degrade paleontological resources. Therefore, the impact of project-level activities on paleontological resources could be significant.

Mitigation Measure GEO-1, Avoid or Document Paleontological Resources, would reduce the potential impact of project-level activities on paleontological resources by requiring evaluation and salvage of any paleontological resources found during construction. The impact on paleontological resources would be less-than-significant.

> ***Mitigation Measure GEO-1, Avoid or Document Paleontological Resources***
>
> If a paleontological resource is discovered during construction, the District shall halt all ground-disturbing activities within 50 feet of the find. The District shall notify a qualified paleontologist who would document the discovery, evaluate the potential resource, and assess the nature and significance of the find. Based on scientific value or uniqueness, the paleontologist may record the find and allow work to continue or recommend salvage and recovery of the material. The paleontologist shall make recommendations for any necessary treatment that is consistent with currently accepted scientific practices.

4.7.2 Program-level Analysis

a) Cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
a.i-iv) Rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, and landslides – No Impact

Implementation of management activities recommended in the Management Plan would not cause the rupture of any known earthquake fault and would not result in adverse effects involving strong seismic ground shaking, seismic-related ground failure, or landslides. No new or significantly altered structures are proposed and program-level activities would not change the local impacts of or potential for earth-shaking events or landslides. Therefore, there would be no impact.

b) Result in substantial soil erosion or the loss of topsoil – Less-than-significant

As noted above, soil erosion is identified as a significant management challenge on the Preserve and measures to control erosion are an integral component of the Management Plan. Invasive species control, thinning and thatch removal, and prescribed fire in forest, woodland, and chaparral habitats, could temporarily result in areas of exposed soil. As described in ***Project Measure 1 - Planting and Revegetation after Soil Disturbance for Restoration*** and ***Project Measure 3 - Erosion Control, Sediment Detention, and***

Site Maintenance, disturbed areas would be immediately stabilized and, if appropriate, re-seeded and revegetated. BMPs include installation native re-seeding, installation of straw wattles and jute netting, and silt fencing near streams and creeks. Implementation of these BMPs would ensure that the impact would be less-than-significant.

c, d, e) Located on a unstable soils, expansive soils, or soils incapable of supporting wastewater disposal systems – No Impact

The Preserve is not located on soils that are unstable or expansive. Program-level activities proposed in the Management Plan would not cause instability or result in landslide, lateral spreading, subsidence, liquefaction, or collapse. No septic tanks or wastewater disposal systems are proposed in the Management Plan There would be no impact.

f) Destroy a unique paleontological resource or site or unique geologic feature – Less-than-significant with Mitigation

The analysis for the potential impact of longer-term management activities on paleontological resources is the same as those described above. Management activities that entail ground disturbance would have the potential to unearth and degrade paleontological resources. However, the implementation of **Mitigation Measure GEO-1, Avoid or Document Paleontological Resources**, described above, would reduce the potential impact of program-level activities on paleontological resources by requiring evaluation and salvage of any paleontological resources found during ground disturbance. The impact on paleontological resources would be less-than-significant.

Mitigation Measure GEO-1, Avoid or Document Paleontological Resources

4.8 Greenhouse Gas Emissions

Greenhouse Gas Emissions Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Setting

Global climate change is the observed increase in average global temperatures, along with other changes in climatic factors such as wind, precipitation, and storm frequency and intensity. Climate change can result from natural factors and processes, but recent trends in global climate change, including the marked increase in global temperatures over the past half-century, are primarily attributable to human activities. By trapping heat in the atmosphere, greenhouse gas emissions (GHGs), which result from a wide array of human activities such as the burning of fossil fuels and deforestation, are a primary cause of human-induced climate change.

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). Known as Global Warming Potential (GWP), the potency of GHGs and its relative contribution to global climate change can vary widely, depending on the ability of the GHG to trap heat in the atmosphere and its atmospheric lifetime. GWP is measured relative to CO_2, the most abundant GHG, and therefore has a GWP of 1. Methane has a GWP of 28-36, nitrous oxide has a GWP of 265-298, and the GWP of HFCs and PFCs can be in the tens of thousands (EPA 2017).

There are two means for reducing GHGs in the atmosphere: cutting emissions of GHGs and increasing sequestration, the process by which atmospheric GHGs are stably incorporated into non-mobile forms such as trees and soil. In California, there are four significant pieces of legislations seeking to address climate change and GHG emissions:

- Assembly Bill (AB) 32, the Global Warming Solutions Act, addresses total GHG emissions across the State and throughout different sectors of California's economy, with the goal of reducing emissions to 1990 levels by 2020.
- Senate Bill (SB) 375 requires reduction of emissions from automobiles and light trucks.
- SB 97 requires consideration of climate change in all environmental assessments under CEQA, regardless of the specific source of GHGs or other climate change effects.
- SB 32 sets a GHG emissions reduction target of 40% below 1990 levels by 2030.

The California Air Resources Board (CARB) is tasked with the implementation of AB 32 through the development of a Scoping Plan, which is to be updated every five years. CARB produced its second update to the Scoping Plan in 2017 (CARB 2017). The Scoping Plan identifies natural and working (i.e., agricultural) lands as a critical component to the State's climate change strategy and notes their potential to be both a source and a sink for GHG emissions. In recent years, natural and working lands in California have experienced significant carbon loss, primarily as a result of wildfire. The Scoping Plan states that the objective for natural lands such as the Preserve is to promote their role as a carbon sink while minimizing GHG and other emissions associated with factors such as management and wildfire. Certain management and restoration activities, such as forest fuel reduction treatments and prescribed fire, are highlighted as helping achieve GHG emissions reductions. The Scoping Plan points to the California Forest Carbon Plan (FCP) as a collaborative, multi-agency effort to promote the role of forests in emissions reductions and carbon sequestration. The FCP proposes a range of goals and actions to address GHG emissions and climate change through forest management. Goals include increasing fuels treatments, such as prescribed fire, and restoring conditions within forest communities through actions such as selective thinning (Forest Climate Action Team 2018).

GHG emissions are also regulated by the Bay Area Air Quality Management District (BAAQMD). No quantitative thresholds of significance for potential construction GHG emissions are set forth, but the BAAQMD has established a threshold of 1,100 metric tons per year of CO_2-equivalent (CO_2E) for operational emissions (BAAQMD 2017b). The BAAQMD 2017 Climate Action Plan (CAP) addresses climate change and GHG emissions. For the natural and working lands, the CAP focuses primarily on increasing carbon sequestration on lands such as the Preserve (BAAQMD 2017c).

Finally, the Sonoma County Regional Climate Protection Authority's Climate Action 2020 document provides planning and guidance for reducing GHGs and addressing climate change locally in Sonoma County (RCPA 2016). Climate Action 2020 provides measures to preserve natural open space, enhance natural resources including open and timber lands, and increase carbon sequestration.

4.8.1 Project-level Analysis

a) Generate greenhouse gas emissions that may have a significant impact on the environment – Less-than-significant

Some management activities proposed in the Management Plan would result in small increases in GHG emissions. These activities include construction of erosion control and sediment reduction projects, shaded fuel break development, prescribed fire in grasslands, and use of equipment during vegetation management and invasive species removal. Other activities, such as revegetation projects, are anticipated to increase carbon sequestration on the Preserve.

During construction of the erosion control projects and shaded fuel breaks proposed in the Management Plan, GHG emissions would result from the use of construction equipment and from vehicle trips to and from the Preserve. These emissions were estimated using CalEEMod, and the full results of this analysis are included as Appendix B. Based on this analysis, construction activities would generate approximately

38.77 metric tons of CO_2E during the year of construction and shaded fuel break development would generate approximately 3.58 metric tons of CO_2E in a year. As noted above, the BAAQMD has not established thresholds for construction activities, however the projected emissions would be well below the 1,100 metric tons per year of CO_2E threshold of significance for operational emissions.

The Management Plan proposes prescribed fire activities in the Preserve's grassland communities for the purpose of controlling invasive vegetation and promoting native habitat conditions. These activities would emit GHGs, primarily CO_2. The exact quantity of GHGs emitted would vary depending on a range of factors, including number of acres burned, prevailing weather conditions, and vegetation composition/fuel type. While such prescribed fire activities cause short-term GHG emissions, the CARB Scoping Plan notes that prescribed fire can have a long-term beneficial impact on GHG reduction, by reducing the risk of wildfire and increasing carbon sequestration through restoration of native habitat conditions (CARB 2017). Utilizing prescribed fire to manage the Preserve's grasslands would reduce the risk of catastrophic wildfire by controlling invasive species, reducing shrub and thatch encroachment, managing fuel loads, and maintaining open native grassland habitat conditions. As a result, such activities would lead to long-term reductions in potential GHG emissions.

Other Management Plan activities, such as mechanical vegetation management and invasive species removal, would result in limited GHG emissions from the use of equipment and vehicles. Invasive species removal would be conducted with herbicides, hand-pulling, and, when necessary, hand tools. Mechanical vegetation control, including the select removal of encroaching Douglas fir, bay laurel, and coyote brush, would be accomplished with hand tools and chainsaws. Thinned material would be treated (e.g., chipped or cut, or piled and burned) and remain on-site; off-haul of materials would not be necessary. Short-term reductions in carbon storage would result from these activities, but are expected to be offset by the long-term benefits of reducing wildfire hazards and promoting native regeneration and regrowth of remaining vegetation. GHG emissions that would result from these activities would be minimal and well below the BAAQMD threshold for operations.

Ongoing operation of the Preserve requires occasional vehicle trips for maintenance and management activities, as well as occasional docent-led tours. These activities occur now and are not anticipated to substantively increase as a result of the Management Plan.

Shorter-term management activities proposed in the Management Plan would have a less-than-significant impact on GHG emissions.

b) Conflict with an applicable greenhouse gas reduction plan, policy, or regulation – No Impact

As described above, the erosion control and invasive species control activities would result in only minor increases in GHG emissions and would not conflict with any GHG reduction plan, policy, or regulation.

Vegetation management activities, including select thinning of Douglas fir, bay laurel, and coyote brush, and prescribed fire activities in grassland communities would also not conflict with applicable GHG reduction plans and regulations. CARB's Scoping Plan encourages the management of vegetation on natural lands like the Preserve to reduce the risk of wildfire and to promote native habitat conditions.

Select thinning, fuel management, and small-scale grassland prescribed fire on the Preserve would promote the goals set forth in the Scoping Plan.

Additionally, all prescribed fire activities on the Preserve would be subject to further specific burn planning, including the development of a smoke management plan, and all burns would be registered with and approved by the BAAQMD. All individual prescribed burns would be planned and executed in conformance with all applicable CARB, BAAQMD, and CalFire rules and regulations, which are designed to ensure that projects are implemented in a manner consistent with GHG reduction plans and policies.

Shorter-term management activities proposed in the Management Plan would not conflict with any applicable GHG reduction plan, policy, or regulation. Therefore, there would be no impact.

4.8.2 Program-level Analysis

a) Generate greenhouse gas emissions that may have a significant impact on the environment – Less-than-significant

Managing the Preserve's forest, woodland, and chaparral communities with prescribed fire; controlling fully-established populations of invasive species and addressing new outbreaks; and preventing type conversion in the Preserve's natural communities by removing encroaching coyote brush and Douglas fir within select areas, including serpentine bunchgrass habitat are all included in the Management Plan.

Invasive species control and mechanical vegetation management would result in a minor increase in GHG emissions as a result of the use of vehicles and equipment, including wood chippers and chainsaws. The GHG emissions that would result from these activities would be minimal and well below the BAAQMD threshold for operations. The short-term reduction in carbon storage that would be result from these activities is expected to be offset by the long-term benefits of reducing wildfire hazards and promoting native regeneration and regrowth.

The Management Plan proposes prescribed fire activities in the Preserve's forest, woodland, and chaparral communities for the purpose of controlling invasive vegetation, reducing fuel loads, and promoting diverse habitat conditions. These activities would emit GHGs, primarily CO_2. As with the analysis presented above, the exact quantity of GHGs emitted would vary depending on a range of factors, including number of acres burned, prevailing weather conditions, and vegetation composition/fuel type. All prescribed fire would be subject to specific burn planning, and all burns would be executed in conformance with all applicable CARB, BAAQMD, and CalFire rules and regulations to reduce the risk of adverse impacts. The CARB Scoping Plan notes that prescribed fire can have a long-term beneficial impact on GHG reduction, by reducing the risk of wildfire and increasing carbon sequestration through restoration of native habitat conditions (CARB 2017). CARB has identified fuel management activities as critical to meeting the State's climate goals and achieving long-term reductions in potential GHG emissions. Additionally, research has indicated managing forests with a combination of targeted thinning and prescribed fire can increase carbon stability and reduce potential wildfire emissions, particularly given the effects of climate change and the increase in severe wildfire events (Krofcheck et al. 2017; Liang et al. 2018).

Therefore, longer-term activities proposed in the Management Plan would have less-than-significant impacts from GHG emissions.

b) Conflict with an applicable greenhouse gas reduction plan, policy, or regulation – No Impact

Vegetation management and invasive species control activities would result in only minor increases in GHG emissions and would not conflict with any GHG reduction plan, policy, or regulation.

Vegetation management activities, including targeted thinning, maintenance of shaded fuel breaks, and forest and woodland prescribed fire, would also not conflict with applicable GHG reduction plans and regulations, as these activities are included in a number of applicable GHG reduction and climate change adaption plans. The CARB Scoping Plan identifies "forest fuel reduction" and "prescribed fire and managed ignition" as management actions that are important to meeting the State's GHG reduction targets (CARB 2017, p. 87). Further, the California Forest Carbon Plan proposes to increase the rate of forest fuels treatments and states that "fuel reduction in forests, whether through mechanical thinning, use of ecologically beneficial fire, or sustainable commercial timber harvest to achieve forest health goals, involves some immediate loss of forest carbon, but these treatments can increase the stability of the remaining and future stored carbon" (Forest Climate Action Team 2018, p. 2).

Vegetation management activities proposed in the Management Plan would not conflict with any applicable GHG reduction plan, policy, or regulation.

4.9 Hazards and Hazardous Materials

Hazards and Hazardous Materials Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☒	☐	☐

Setting

The Preserve encompasses 960 acres of undeveloped land. The Management Plan includes activities that work with two kinds of hazardous materials:

- Gasoline, oil, diesel, and other fluids associated with vehicle use, including cars and construction equipment; and
- Herbicides used in limited quantities to control invasive plant species.

4.9.1 Project-level Analysis

a, b) Hazardous materials and accidental spill conditions – Less-than-significant

The Management Plan does not propose the routine use, storage, transport, or disposal of hazardous materials. However, erosion control, thinning, and prescribed fire would include the use of hazardous materials such as fuels, lubricants, and solvents. Transport of hazardous materials to and from the Preserve as a part of these activities could result in an incremental increase in the potential for accidents. However, both the State and Sonoma County have policies and laws that relate to the storage, transport, use, and disposal of hazardous materials. Caltrans and the California Highway Patrol (CHP) regulate the transportation of hazardous materials and wastes, including container types and packaging requirements, as well as licensing and training for truck operators, chemical handlers, and hazardous waste haulers. Worker safety regulations cover hazards related to the prevention of exposure to hazardous materials and a release to the environment from hazardous materials use. Regulations and criteria for the disposal of hazardous materials mandate disposal at an appropriate landfill. Cal-OSHA also enforces hazard communication program regulations, which contain worker safety training and hazard information requirements, such as procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees. ***Project Measure 4 - Pollution Prevention***, described in Section 2.6, requires the implementation of BMPs for staging, maintenance, fueling, and spill containment of potentially hazardous materials used on the Preserve. ***Project Measure 4 - Pollution Prevention***, and the rules and regulations described above, would reduce the risk of accidental spill conditions to a less-than-significant level.

Additionally, invasive species control activities proposed in the Management Plan would include the limited use of herbicides, which could lead to potential for an accidental release of hazardous or toxic materials. ***Project Measure 7 - Herbicide Use*** would be implemented whenever and wherever herbicides are used on the Preserve. This measure places strict parameters on the use of herbicides and mandates that herbicides are only applied by a licensed and qualified professional. These requirements, and the application of herbicides in accordance with all local agency and manufacturer usage restrictions, would reduce the risk of accidental release into the environment to a less-than-significant level.

c) Emit hazardous materials within one-quarter mile of a school – No Impact

The school closest to the Preserve, Maria Carrillo High School, is approximately three-quarters of a mile away. There are no existing or planned schools within one-quarter mile of the Preserve. Therefore, there would be no impact.

d) Included on a List of Hazardous Materials Sites – No Impact

The online data resources that provide information on the location of hazardous materials release sites pursuant to Section 65962.5 of the Government Code indicate that there are numerous leaking underground storage tanks and other contaminated soil and groundwater sites located throughout Sonoma County; however no hazardous sites occur on the Preserve and the nearest such site is over a mile away. Therefore, there would be no impact.

e) Safety Hazard for People Residing or Working within Two Miles of an Airport – No Impact

The Preserve is not located within an airport land use plan or within two miles of a public or private airport. The closest airport is Sonoma County Airport, which is approximately nine miles away. Proposed management activities identified in the Management Plan do not involve any new potential hazards to people residing or working within two miles of an airport. Therefore, there would be no impact.

f) Impair or Interfere with an Adopted Emergency Response/Evacuation Plan – No Impact

The size and nature of the activities proposed in the Management Plan would not require the closure of public roadways or otherwise interfere with emergency evacuation plans for the surrounding area. Erosion control and roadway treatment activities (e.g., culvert replacement, rock armoring, rolling dips, etc.) could result in temporary road closures within the Preserve, but would not impact roadways outside of the Preserve's boundaries. Prescribed burning could lead to increased smoke on nearby roadways and temporarily decreased visibility. However, smoke would be carefully managed in accordance with an approved smoke management plan and measures such as public notification of burn days and smoke warning signage would be implemented. Project-level activities could cause a slight increase in vehicle use during construction activities and potential short-term reduced visibility from prescribed fire, but this would not impair emergency response plans or evacuation plans. Therefore, there would be no impact on emergency response or evacuation plans.

g) Increase Exposure to Wildfires – Less-than-significant with Mitigation

According to CalFire mapping, the Preserve has high to very high fire danger (CalFire 2007) and is located within the wildland urban interface (ABAG 2018). Most activities proposed in the Management Plan are intended to reduce fire hazard severity on the Preserve. Activities that would benefit fire safety include restoring grasslands by reducing thatch layers and removing encroaching coyote brush; select thinning of encroaching Douglas fir and bay laurel; creating shaded fuel breaks; controlling invasive species; and enhancing riparian habitat.

However, construction activities for erosion control and roadway treatment could temporarily increase the possibility of wildfire as a result of equipment sparks in dry vegetation. Implementation of ***Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction***, would require the use of construction techniques that would reduce the likelihood of wildland fires during construction. Implementation of this measure would reduce the impact to a less-than-significant level by removing combustible vegetation from staging and other construction areas to minimize the risk of fire.

> ***Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction***
>
> Prior to construction activities, the District shall remove and clear away dry, combustible vegetation from the construction site with specific focus on the staging areas for heavy equipment. Grass and other vegetation less than 18 inches in height shall be maintained where necessary to stabilize the soil and prevent erosion. Vehicles shall not be parked in areas where exhaust systems can contact combustible materials. Fire extinguishers and fire suppression tools shall be available on the site when conducting construction activities.

Implementation of the Management Plan's proposed activities would include the development of a prescribed fire program within the Preserve's grassland units to manage invasive species and enhance grassland habitat. These prescribed fire activities are anticipated to decrease the long-term risk of wildfire on the Preserve by reducing fuel loads. However, implementation of individual prescribed fire projects could result in wildfire if not properly managed. ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed*** mandates that the Preserve's prescribed fire program would be developed in consultation with CalFire and the BAAQMD. A burn plan would be developed by a qualified professional, and approved by CalFire and the BAAQMD, for each individual burn and would include measures to prevent escape and escalation of prescribed fire. All burns would be carried out as described in the Project Description, natural firebreaks would be utilized wherever possible and adequate control lines and artificial firebreaks would be established around burn units as necessary. Burns would take place only when weather conditions, such as moisture levels and the direction and speed of winds, are appropriate as determined by the BAAQMD and CalFire. All prescribed fire activities would be implemented by qualified prescribed fire specialists from CalFire or other professional organizations. Burning would only occur as approved by regulatory agencies and only when conditions meet strict regulatory standards. The implementation of prescribed fire as described in the Project Description and subject to ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed,*** in conjunction with the planning and approval process for each individual prescribed fire project, would ensure that prescribed fire in the Preserve's grasslands would not increase the risk of wildfire. The impact would be less-than-significant.

4.9.2 Program-level Analysis

a, b) Hazardous materials and accidental spill conditions – Less-than-significant

The analysis of the impact of longer term activities on hazards and spill conditions is the same as the analysis for project-level activities. Longer term activities in the Management Plan do not propose the routine use, storage, transport, or disposal of hazardous materials. The implementation of ***Project Measure 4 - Pollution Prevention*** would reduce the risk of pollution and accidental spills and the implementation of ***Project Measure 7 - Herbicide Use*** would ensure that herbicides are properly used within narrow parameters. The impact would be less-than-significant.

c, d, e, f) Emit hazardous materials within one-quarter mile of a school, on a list of hazardous material sites, safety hazard near an airport, or interfere with emergency response/evacuation plan – No Impact

The Preserve is not within one-quarter mile of a school or two miles of an airport and does not contain any hazardous materials sites. No longer term activities would interfere with an adopted emergency response or evacuation plan. There would be no impact.

g) Increase Exposure to Wildfires – Less-than-significant with Mitigation

Most management activities proposed by the Management Plan are intended to reduce fire hazard severity on the Preserve. Activities that would benefit fire safety include thinning areas of overly-dense

forest and controlling encroachment; maintaining shaded fuel breaks; controlling well-established and new outbreaks of invasive species; and prescribed burning.

However, ground disturbing activities associated with longer-term actions could increase the possibility of wildfire through the use of vehicles and equipment. Implementation of ***Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction***, described above, would require the use of techniques that would reduce the likelihood of wildland fires during construction and ground disturbance. Implementation of this measure would reduce the impact to a less-than-significant level by removing combustible vegetation from staging areas to minimize the risk of fire.

Implementation of the Management Plan's program-level activities would include the expanding the prescribed fire program to manage the Preserve's forest, woodland, and chaparral habitats. The exact locations, objectives, and prescriptions of these prescribed fire activities would be determined through the development of a Forest Management Plan, Vegetation Management Plan contract, or similar document, as described in the Project Description (Section 2.4.3). These prescribed fire activities are anticipated to decrease the long-term risk of wildfire on the Preserve by reducing ground and ladder fuels and reducing basal areas in overstocked stands of forest. The potential impacts from program-level prescribed fire activities are the same as those described above for project-level burns. The implementation of ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire*** and the extensive planning and approval process for each individual prescribed fire project would ensure that program-level prescribed fire projects would not increase the risk of wildfire. The impact would be less-than-significant.

Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction

4.10 Hydrology

Hydrology and Water Quality: Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☐	☐	☒	☐
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Setting

The Preserve is located in the Mark West Creek and Santa Rosa Creek watersheds, set within the larger Russian River Hydrologic Unit, and contains portions of four creeks (Alpine, Ducker, Van Buren, and Weeks creeks), as well as several of their unnamed tributaries. Alpine Creek's headwaters are located in the Preserve's mountainous northeastern parcel and the Creek's subwatershed encompasses approximately

380 acres in the central portion of the Preserve. Alpine Creek flows out of the Preserve, into a reservoir, and eventually drains via an outlet stream into Mark West Creek. Ducker Creek drains a small area in the southeastern corner of the southwestern portion of the Preserve, eventually emptying into the Santa Rosa Creek watershed. The seasonal Van Buren Creek drains approximately 125 acres of the northeastern portion of the Preserve and flows into Mark West Creek. Weeks Creek, which is also seasonal, drains approximately 170 acres of the southern portion of the Preserve and flows into Mark West Creek just north of the intersection of St. Helena and Calistoga roads. Other surface water features on the Preserve include several springs and a small, man-made and year-round pond near the historic hunting cabin.

The southwestern portion of the Preserve is located within Federal Emergency Management Agency (FEMA) Flood Zone X, an area with low flood hazard and a 0.2% annual chance of flooding (FEMA, 2018). The northeastern portion of the Preserve is located within FEMA Flood Zone D, an area of undetermined but possible flood hazards.

4.10.1 Project-Level Analysis

a) Violate water quality standards or degrade water quality – Less-than-significant

Implementation of erosion control and road drainage improvement, native plant revegetation, tree and shrub encroachment reduction, prescribed fire in grasslands, and invasive species management would temporarily disturb soils and, if not properly managed, could result in localized areas of soil erosion or siltation that could degrade water quality. Invasive species control, thinning and thatch removal, and erosion control projects. In particular, construction activities associated with erosion control projects have the potential to impact water quality. However, ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance,*** requires implementation of construction-period control measures that would limit disturbance to only the areas required to complete the project, require erosion and sedimentation control, and preserve vegetation as an effective form of erosion control (see Project Description Section 2.6). If needed, temporary soil stabilizing and erosion and sedimentation reduction methods, such as silt fences or straw barriers, would be installed. Post-construction erosion and sedimentation control measures would also be required for all actions that disturb vegetation or soil. Implementation of ***Project Measure 1 - Planting and Revegetation after Disturbance for Restoration***, would require the prompt revegetation of soils disturbed as a result of management activities. Because implementation of ground disturbing activities would require implementation of these project measures, including revegetation, water quality, and soil erosion protection measures, impacts from construction and ground disturbance on water quality would be less-than-significant.

Prescribed fire activities in the Preserve's grasslands would also result in areas of exposed soil and could cause erosion and impacts to water quality if not properly managed. As described in ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance*** straw wattles, jute netting, silt fencing, and native reseeding would be utilized to prevent erosion following ground disturbance, including as a result of prescribed burning. Implementation of these measures would ensure that prescribed fire activities have a less-than-significant-impact on water quality.

Thinning and other forest management activities could disturb soils; however, water quality would be protected during implementation. Trees that are thinned or pruned would be left on site to provide soil cover and prevent erosion. Trees and limbs would be either chipped or lopped and scattered across the landscape or piled and burned depending on the individual site and landscape conditions as determined by a Registered Professional Forester or professional fire personnel. Ground cover following thinning would reduce erosion potential and protect water quality. Selection of forest management areas would also be subject to streamside buffers, which are designed to protect water quality and riparian resources through forest management practices designed specifically for these sensitive areas.

Road treatments and erosion control projects require the use of heavy equipment. ***Project Measure 4 - Pollution Prevention,*** would be implemented during use of petroleum-powered equipment in and near waterways and would include monitoring equipment for leaks, storing equipment away from waterways, and having spill and containment materials on-hand. These measures would protect water quality during construction of erosion control and road upgrade projects. As a result, the impact would be less-than-significant.

b) Substantially decrease groundwater supply or interfere with groundwater recharge – No Impact

No wells or structures that would remove groundwater are proposed in the Management Plan. No project-level activities would interfere with groundwater recharge. Therefore, there would be no impact.

c.i-iv) Substantially alter drainage patterns resulting in erosion or siltation, increased flooding, additional sources of polluted runoff or runoff that exceeds the capacity of stormwater drainage systems, or impeded or redirected flood flows – Less-than-significant

Channels and drainage patterns within the Preserve would not be substantially altered by the activities identified in the Management Plan. Erosion control activities planned for roads and gullies are designed to alter stormwater in ways that would reduce erosion and silt-laden runoff. Riparian enhancement and planting activities would also reduce erosion. Project-level activities would not increase storm waters or influence flooding. As described above, soil that is exposed as a result of activities, including prescribed fire, invasive species control, erosion control and road treatments, and thinning, would be stabilized and, when necessary, re-seeded through the implementation of ***Project Measure 1 - Planting and Revegetation after Disturbance for Restoration***. The impact of management activities on drainage patterns resulting in erosion, siltation, altered flood flows, or polluted runoff would be less-than-significant.

d) Release pollutants due to inundation in flood hazard, tsunami, or seiche zones– No Impact

The Preserve is not located in a flood hazard zone or an area prone to inundation by seiche or tsunami. Activities proposed in the Management Plan would not result in the release of pollutants due to inundation. There would be no impact.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan – No Impact

The Preserve is not located in a groundwater basin with a sustainable groundwater management plan or under the jurisdiction of a Groundwater Sustainability Agency. The Preserve is located within the jurisdiction of the North Coast Regional Water Quality Control Board (NCRWQCB), which has produced a Water Quality Control Plan for the North Coast Region (NCRWQCB 2011). This Water Quality Control Plan delineates objectives for inland surface waters, including prevention of sedimentation, pollution, and other water quality impacts. Activities proposed in the Management Plan would not conflict with or obstruct implementation of this Water Quality Control Plan. As a result, there would be no impact.

4.10.2 Program-Level Analysis

a) Violate water quality standards or degrade water quality – Less-than-significant

Potential water quality impacts associated with expanded erosion control and restoration activities, forest thinning, prescribed fire in grasslands and forest lands, and continued limited visitor access to the Preserve would be the same as those described above for project-level activities. Management activities would be subject to the Project 1, 3, and 4 to protect water quality. Prescribed fire, forest thinning, restoration, and ongoing invasive species management would be less-than-significant.

b) Substantially decrease groundwater supply or interfere with groundwater recharge – No Impact

No wells or structures that would remove groundwater are proposed in the Management Plan. No program-level activities would interfere with groundwater recharge. Therefore, there would be no impact.

c.i-iv) Substantially alter drainage patterns resulting in erosion or siltation, increased flooding, additional sources of polluted runoff or runoff that exceeds the capacity of stormwater drainage systems, or impeded or redirected flood flows – Less-than-significant

Channels and drainage patterns within the Preserve would not be substantially altered by the program-level activities identified in the Management Plan. Additionally, program-level activities would not increase storm waters or influence flooding. As described above, soil that is exposed as a result of program-level activities, including prescribed fire, invasive species control, and thinning, would be stabilized and, when necessary, re-seeded through the implementation of ***Project Measure 1 - Planting and Revegetation after Disturbance for Restoration*** and ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance***. The impact of program-level activities on drainage patterns resulting in erosion, siltation, altered flood flows, or polluted runoff would be less-than-significant.

d) Release pollutants due to inundation in flood hazard, tsunami, or seiche zones– No Impact

The Preserve is not located in a flood hazard zone or an area prone to inundation by seiche or tsunami. Program-level activities proposed in the Management Plan would not result in the release of pollutants due to inundation. There would be no impact.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan – No Impact

As noted above, the Preserve is not located in a groundwater basin with a sustainable groundwater management plan, but is subject to the NCRWQCB's Water Quality Control Plan for the North Coast Region (NCRWQCB 2011). Program-level activities proposed in the Management Plan would not conflict with or obstruct implementation of this Water Quality Control Plan. As a result, there would be no impact.

4.11 Land Use and Planning

Land Use and Planning Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

Setting

The Preserve is comprised of four parcels totaling approximately 960 acres. The property was acquired in 2006 by the District through a fee title purchase and is managed as an open space preserve. The Preserve is located in eastern Sonoma County, northeast of Santa Rosa as shown on Figure 1. Project Location. Nearly land uses are primarily low density rural residential and agricultural lands. The zoning and land use designations for the Preserve's parcels are shown in the table below.

Table 4-3. Preserve Zoning and Land Use

APN	Zoning	Land Use
028-380-008	RRD B6 40, RC50/50 RC200/50 SR	RRD 40
028-390-028	RRD B6 40, BH RC50/50 RC100/50 RC200/50 SR	RRD 40
028-160-080	RRD B6 40, BH RC100/50 RC200/50 SR	RRD 40
028-160-044	RRD B6 40, SR	RRD 40

Parcel zoning include Resources and Rural Development (RRD), Riparian Corridor (RC) with widths ranging from 50 feet along smaller tributaries to 200 feet along Weeks and Van Buren Creeks. The Preserve also have a Biotic Habitat (BH) and Scenic Resource (SR) combining districts established to protect and enhance biotic resources for habitat and environmental values and to preserve the visual character and scenic resources on the property.

4.11.1 Project-level and Program-level Analysis

a) Divide a community – No Impact

The Preserve is not located within an established community and no action proposed in the Management Plan would divide or otherwise affect an established community. Therefore, there would be no impact.

b) Cause a significant environmental impact due to conflict with any land use plans, policies, or regulations – No Impact

The Sonoma County General Plan designates the lands comprising the Preserve as Resources and Rural Development, a land use category that includes lands designated for resource protection and public

recreation. Implementation of Management Plan activities would not conflict with this designated land use, or any other land use plan, policy, or regulation. Therefore, there would be no impact.

A number of conservation plans cover the area comprised by the Preserve, including the Sonoma County Biodiversity Action Plan, the Franz Valley Area Plan, and the Upper Mark West Watershed Management Plan, Phase 1. None of the project-level activities proposed by the Management Plan would conflict with any of these plans or any other applicable habitat conservation plan. Many actions proposed in the Management Plan, including erosion control activities and habitat enhancement, would ultimately benefit the goals set forth in these plans. Therefore, there would be no impact.

4.12 Mineral Resources

Mineral Resources Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Setting

Mineral resources occur throughout Sonoma County and extraction of these resources has occurred throughout the history of human habitation of the area. Presently, mining operations are primarily related to the extraction of rock, sand, and earth for use in construction and related activities. The California Geological Survey has mapped and classified areas of significant mineral resources as MRZ-2 (CGS 2013). No portion of the Preserve is designated MRZ-2. The nearest mine in the vicinity of the Preserve is the Mark West Quarry, approximately 3.5 miles to the north.

4.12.1 Project-level and Program-level Analysis

a, b) Result in the Loss of Availability of Mineral Resources – No Impact

The Preserve is managed by the District as an open space preserve and no mineral extraction currently occurs or is proposed to occur on the site. Implementation of erosion control, native plant revegetation, tree and shrub encroachment reduction, forest thinning, prescribed fire in grasslands and forest lands, and invasive species management would not interfere with any operational mine or otherwise result in the loss of availability of valuable or locally important mineral resources. Therefore, there would be no impact.

4.13 Noise

Noise Would the project result in:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒

Setting

Noise is defined as unwanted sound, and is a subjective reaction to the physical phenomenon of sound. Noise interferes with sleep, speech, recreation, and tasks demanding concentration or coordination. The result is an increase in public annoyance with the noise source and a decrease in environmental quality.

Sound is compression waves that can travel through air, earth, and water. The most common unit of sound measurement is the decibel (dB). The threshold of hearing is considered to be 0 dB, and the range of sounds in normal human experience is 0 to 140 dB. Each 10 decibels reflects a 10-fold increase in noise intensity.

Sound waves travel at different frequencies. Because the human ear is not as sensitive at some frequencies, different sound weighting scales (dBA) have been developed. The "A" weighting scale is the most commonly used for environmental noise assessment, as it correlates well with human response to noise sources such as aircraft and traffic. Because sound drops off with distance, all sound measurements are reported with distance from the source. The decibel scale is further refined to measure human hearing by using an A-weighted scale (dBA) that counts sounds within the center of human hearing frequencies as louder.

How humans perceive noise can be further influenced by how quiet background sound levels are and the kind of sound being generated. For instance, the same noise source would tend to sound louder at night. Noise standard levels may be adjusted upward for high ambient noise and downward for very simple, repetitive sounds. Some people and circumstances are more vulnerable to the adverse effects of noise than others. “Sensitive receptors” include residences, schools, hospitals, long-term care facilities, places of public worship, and libraries. Noise level is generally evaluated at the nearest sensitive receptor.

Table 4-4. Noise levels from Common Activities and Local Noise Standards, Noise Levels from Common Activities and Local Noise Standards, shows expected noise from these uses, other common uses, and local standards for comparison.

Table 4-4. Noise levels from Common Activities and Local Noise Standards

Common Activities	dBA	Local Standards
Rock band (near amplifier)	110	Unacceptable noise levels
Jet fly-over at 1,000 feet	105	
	100	
Gas lawnmower at 3 feet	95	
	90	
Diesel truck 50 mph at 50 feet	85	
	75	
Gas lawnmower at 100 feet	70	
Normal Speech at 3 feet	65	Sonoma County day L_2=65
Heavy traffic at 300 feet	60	Sonoma County night L_2=60;
Large business office	55	
Quiet urban area in day	50	Sonoma County day L_{50}=50
Normal speech at 50 feet	45	Sonoma County night L_{50}=45
Quiet urban area at night	40	Acceptable
Quiet rural area at night	25	

Sources: Sonoma County 2016, Caltrans 2009

The various noise exposure limits of different State and federal agencies range from 75 to 90 dBs to protect hearing over the long term. However, the EPA recommends a level of 55 dB to protect against non-auditory health effects such as hypertension, cardiovascular disease, and nervous disorders.

The ambient (or background or pre-project) noise level is defined as the noise from all sources near and far and usually refers to the noise level that is present before a noise source being studied is introduced. In very quiet environments, virtually any change in local activities would cause an increase in noise levels and a loss of "peace and quiet." Such increases may be considered significant by residents in these areas, even if the measured increase is small.

The Sonoma County General Plan 2020 (General Plan) Noise Element, adopted in 2008 and amended in 2012, establishes the measures and standards to be incorporated into a countywide noise ordinance. These noise standards define acceptable levels with different day and night standards; see Table 4-4 below.

Table 4-5. Sonoma County General Noise Limits

Property Type or Zone	Daytime Limits	Nighttime Limits
Residential	60 dBA Intermittent 50 dBA Intermittent	50 dBA Constant 40 dBA Constant
Commercial/Mixed Use	65 dBA Intermittent 55 dBA Constant	65 dBA Intermittent 55 dBA Constant
Public Property	Most restrictive noise limit applicable to adjoining private property	

(Ord. 03-2006 § 2, 2006).

The area around the Preserve consists primarily of rural, single-family homes and large landholdings. There are no sensitive receptors located in the vicinity of the Preserve. Residences are located away from the Preserve boundary. The Santa Rosa city limits lie adjacent to the southwestern edge of the Preserve and relatively dense, single-family residential communities can be found approximately ½ mile southwest of the area.

4.13.1 Project-level Analysis

a) Generate noise levels in excess of established standards – Less-than-significant with Mitigation

Some of the activities proposed in the Management Plan, including erosion control projects and road and trail treatments, would require the use of construction equipment that may generate noise. Other activities, such as invasive vegetation control, targeted thinning and thatch removal, and creation of shaded fuel breaks, may also necessitate the use of power tools, including chainsaws. Short-term prescribed fire activities would not require the use of heavy equipment but would temporarily increase vehicle traffic to the Preserve as fire personnel and trucks are moved to and around the site. Continued access to the Preserve by permitted users would not affect existing noise levels in the area.

Road drainage improvements and erosion control projects would increase noise levels in the immediate vicinity of the project site; however, the elevated sound levels would be temporary and would not substantially impact surrounding landowners or any sensitive receptors given the distance of the projects away from the Preserve boundaries in most locations. The proposed road drainage improvements along Plum Ranch Road, near the western edge of the Preserve, would be located within 230 feet of a residence. Erosion control and road drainage improvement activities would require use of light-duty construction equipment, generating noise levels from about 74 to 86 dBA at 50 feet from the project site. Since noise decreases by 6 dB with each doubling of distance (AIHA 2013), peak construction noise would be 86 dBA at the property line and approximately 50 dBA at the residence. The remainder of the proposed erosion control and roadway drainage improvements would be located in the Preserve interior along the Erland-Cleland Tie and along smaller spur roads and trails (See Figure 6, Erosion Control Treatment Areas) and would not impact local residences or sensitive receptors.

Invasive vegetation control and creation of shaded fuel breaks would require the use of power tools; these management activities could occur near residences along the Preserve's northern and western boundaries (see Figures 9 and 10). Implementation of a shaded fuel break along Erland Road on the northeastern Preserve boundary would require the use of chainsaws and chippers, which generate about 95-100 decibels at the tool operator (EMC 2014). This equates to 58 dBA at about 400 feet[12]. Most residences are located more than 400 feet away from the Preserve boundary; however, several residences along Erland Road are located within 250 feet of the proposed shaded fuel break. Temporary noise at these residences during tree removal and tree trimming could range from 60 to 70 dBA. This is slightly louder than a lawn mower. It does not have the potential to adversely influence human health, but it may be annoying and be experienced as a significant impact from excessive noise.

Potential noise impacts from vegetation management and other Management Plan actions requiring use of construction equipment would be reduced to less-than-significant by implementation of the measures in ***Mitigation NOI-1***.

Mitigation Measure NOI-1, Reduce Noise

The District shall ensure that noise reduction actions are implemented for all activities that use construction equipment within 200 feet of the Preserve boundary. Noise reduction measures may include the following:

- Equip internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and are appropriate for the equipment.
- Locate stationary noise-generating equipment as far as possible from sensitive receptors in the vicinity.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.
- Provide signs at the Preserve entrance to inform users of the noise-producing activities, the location of the activities, and the duration.
- Inform residences in the areas near noise-generating actions to inform residents of the noise-producing activities, location of the activities, and the duration.
- Designate a "disturbance coordinator" responsible for responding to complaints about construction noise and taking reasonable measures to correct the problem. Conspicuously post a telephone number for the disturbance coordinator near management activities.

Management activities that involve the use of heavy equipment on the Preserve would be limited to the hours between 8:00 a.m. and 6:00 p.m., Monday through Friday, and between 9:00 a.m. and 6:00 p.m. on Saturday, as noted in the County Noise ordinance. Therefore, noise generated from the use of heavy equipment would result in less-than-significant noise impacts.

[12]Noise attenuates about 6 dB for each doubling of the distance from the source. Figuring that the distance from the power tool to the operator is 3 feet (common in OSHA calculations), starting with 100 dB, and reducing by 6 dB at 6, 12, 24, 48 (about 50), 100, 200, and 400 feet, leads to a reduction of 42 dB.

b) Generate excessive groundborne vibration or groundborne noise –No Impact

Noticeable or distressing groundborne vibration is commonly caused by heavy construction such as pile driving, blasting, or heavy-tracked construction equipment, as well as trains and other vehicles with mass and speed. Vibration can cause damage to buildings and roadways depending on the proximity to the vibration-producing action. None of the proposed management activities would generate groundborne noise or vibration, except for use of heavy equipment needed to implement the erosion control and road drainage improvements. However, there are no structures close enough to the proposed activities to have impacts from vibration. There would be no impact from groundborne vibration.

4.13.2 Program-level Analysis

a) Generate noise levels in excess of established standards – Less-than-significant with Mitigation

Similar to the shorter term management activities, some of the longer-term activities proposed in the Management Plan, including ongoing invasive vegetation control, thinning and mechanical vegetation control, maintenance of shaded fuel breaks, and fuels management, would necessitate the use of power tools, including chainsaws, and vehicles. The exact location of these management activities is undefined; however, these activities could occur within 200 to 400 feet of residences surrounding the Preserve in similar areas as those described for the short-term impacts above. Noise producing management activities could occur up to the boundary of the Preserve and, therefore, could be heard by residences adjacent to the Preserve. The noise would be occasional and of limited duration; nonetheless, the impact could be significant. ***Mitigation Measure NOI-1, Reduce Noise***, would reduce potential impacts to less-than-significant levels and would require notification of residences and Preserve users of the noise-producing actions and the duration of the activities.

Mitigation Measure NOI-1, Reduce Noise

b) Generate excessive groundborne vibration or groundborne noise –No Impact

None of the proposed longer-term management activities would generate groundborne noise or vibration, except for use of heavy equipment needed to implement future erosion control and road drainage improvements. There are no structures close enough to the proposed activities to have impacts from vibration. There would be no impact from groundborne vibration.

4.14 Population and Housing

Population and Housing Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Setting

The Preserve is located in a sparsely populated rural area just northeast of Santa Rosa and is managed by the District for its open space, natural resource, and scenic values. There are no residences on the Preserve and the construction of residences or structures is not proposed in the Management Plan or otherwise planned for the area. Nearby land uses are primarily low density rural residential and agricultural. The Santa Rosa city limits adjoin the southwestern edge of the Preserve and relatively dense residential communities lie approximately one-half mile from the Preserve's southwestern corner.

4.14.1 Project-level and Program-level Analysis

a, b) Induce population growth, displace people or displace housing – No Impact

The Preserve is currently managed by the District as an open space preserve and there are no residences within the Preserve's boundaries. The immediate vicinity of the Preserve consists primarily of rural, low-density residences and large landholdings. The Management Plan proposes no changes to population or housing.

Activities proposed in the Management Plan are designed primarily to improve natural resources and habitats and reduce erosion and sedimentation. Implementation erosion control and road restoration, native plant revegetation, tree and shrub encroachment reduction, invasive species management, forest thinning, and prescribed fire in grasslands and forest lands would not result in the construction of roads for future development and would not induce population growth or displace people or housing. Therefore, there would be no impact.

4.15 Public Services

Public Services Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i. Fire protection?	☐	☐	☒	☐
ii. Police protection?	☐	☐	☐	☒
iii. Schools?	☐	☐	☐	☒
iv. Parks?	☐	☐	☐	☒
v. Other public facilities?	☐	☐	☐	☒

Setting

The Preserve is located adjacent to, but outside of, the Santa Rosa city limits. Fire protection services are provided by the Sonoma County Fire and Emergency Services Department and CalFire. The Preserve is located in a High to Very High Fire Hazard Severity Zone and is designated as a State Responsibility Area (CalFire 2007). Police services are provided by the Sonoma County Sheriff's Department. The nearest school to the Preserve is Maria Carrillo High School, approximately three-quarters of a mile southwest.

4.15.1 Project-level Analysis

a.i) Create adverse physical impacts associated with maintaining public fire protection service – Less-than-significant

As noted above, the Preserve is located in a High to Very High Fire Hazard Severity Zone and is designated as a State Responsibility Area (CalFire 2007). Implementation of erosion control, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and providing permit-only public access activities proposed in the Management Plan would not increase the need for new facilities or new public services. The activities would not increase response times for fire or police protection or increase the need for public services. Invasive species control, targeted timber thinning, creation of shaded fuel breaks, and thatch control, would reduce fuel loads and fire hazards throughout the area.

Prescribed fire activities that would be implemented as a part of the Management Plan would take place in the select units of grassland throughout the site. Prior to each prescribed burn, fuel loads may be mechanically reduced, as necessary, and firebreaks and control lines would be established around the

burn unit. Specific burn plans would be developed for each individual prescribed burn and would include provisions for fuel management and fire containment as described in the project description. All prescribed fire activities would be planned in cooperation with CalFire and executed by trained prescribed fire professionals. Implementation of prescribed burns would require cooperation with public fire protection services, but would not necessitate the development of new or expanded facilities. Prescribed fire activities, as well as all other project-level activities proposed by the Management Plan, would have a less-than-significant impact on fire protection services.

a.ii-v) Create Adverse Physical Impacts Associated with Maintaining Public Police Protection, Schools, Parks, or Other Public Services – No Impact

Erosion control, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and providing permit-only public access proposed in the Management Plan would not result in population increases or the demand for increased public services. The management activities do not include increased public use of the Preserve and would, therefore, not impact police or Sheriff services. The Management Plan would not create a need for additional schools, parks, or other public facilities. There would be no impact.

4.15.2 Program-level Analysis

a.i) Create adverse physical impacts associated with maintaining public fire protection service – Less-than-significant

Implementation of expanded invasive species management, erosion control, tree and shrub encroachment, forest thinning, shaded fuel break maintenance, and future permit-only public access activities proposed in the Management Plan would not result in the construction of structures or an increase of population in the area and would therefore not increase the area's overall fire hazard severity or require an expansion of public fire protection services.

Implementation of prescribed fire to manage forest, woodland, and chaparral habitats on the Preserve would undergo an extensive planning and approval process and mechanical vegetation control, including the establishment of firebreaks and control lines, would take place as necessary prior to burning. Further, the use of prescribed fire to manage forests, woodland, and chaparral on the Preserve would be guided by the development of a Forest Management Plan, Vegetation Management Plan contract, or similar document, as described in Section 2.4.3 of the Project Description. Implementation of prescribed burns would require cooperation with public fire protection services, but would not necessitate the development of new or expanded facilities. As a result, these prescribed fire activities, as well as all other program-level activities proposed in the Management Plan, would have a less-than-significant impact on fire protection services.

a.ii-v) Create Adverse Physical Impacts Associated with Maintaining Public Police Protection, Schools, Parks, or Other Public Services – No Impact

Expanded invasive species management, erosion control tree and shrub encroachment reduction, forest thinning, and permit-only public access proposed in the Management Plan would not result in population

increases or the demand for increased public services. These activities do not include a substantial increase in public use of the Preserve and would, therefore, not impact police or Sheriff services. The Management Plan would not create a need for additional schools, parks, or other public facilities. There would be no impact.

4.16 Recreation

Recreation Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☒	☐

Setting

The District manages the Preserve primarily to conserve and enhance its natural and scenic value. Public access to the Preserve is limited primarily to docent-led outings and trained volunteer patrols. A number of existing parks and other recreational facilities are located in relatively close proximity to the Preserve. Rincon Valley Community Park is less than one mile southwest, Annadel State Park is approximately 2 miles south, Hood Mountain Regional Park is approximately 2 miles southeast, and Bothe-Napa Valley State Park is approximately 2 miles northeast. There are no parks or recreational facilities directly adjacent to the Preserve.

4.16.1 Project-level Analysis

a, b) Create Adverse Physical Impacts from Increased Park Usage or from Construction or Expansion of Recreational Facilities – Less-than-significant

As noted above, public access to the Preserve is limited primarily to docent-led outings and trained volunteer patrols. The District intends to continue this level of public access and use of the Preserve. Erosion control, native plant revegetation, tree and shrub encroachment reduction, and invasive species management would not increase the use of nearby recreational facilities. The Management Plan includes continuing to provide for volunteer patrols and maintaining a docent program to train volunteers and provide permit-only access opportunities. In order to reduce potential impacts from visitors, Management Plan activities include upgrading certain roads and trails to reduce erosion and improve drainage, while also decommissioning and closing segments of roads and trails to provide buffers around sensitive resources and to direct use to less sensitive areas of the Preserve. No new trails, roads, or other recreational facilities would be constructed. Implementation of these activities would have a less-than-significant impact on the Preserve's natural and recreational resources.

Additionally, management activities proposed in the Management Plan would have no impact on other parks beyond the Preserve itself, and would not cause increased use or physical deterioration to any other park.

4.16.2 Program-level Analysis

a, b) Create Adverse Physical Impacts from Increased Park Usage or from Construction or Expansion of Recreational Facilities – Less-than-significant

Expanded invasive species management, erosion control tree and shrub encroachment reduction, forest thinning, prescribed fire in grassland and forest lands, and maintenance of shaded fuel breaks would not create physical impacts from increased use. Long-term activities in the Management Plan include encouraging environmental education opportunities on the Preserve and planning and hosting Open Space days to offer hikes and tours to the general public. These proposed activities would not substantially increase visitation or public use of the Preserve throughout the year. No new trails, roads, or other recreational facilities would be constructed. Implementation of these activities would have a less-than-significant impact on the Preserve's natural and recreational resources.

Additionally, the activities proposed in the Management Plan would have no impact to other parks beyond the Preserve itself, and would not cause increased use or physical deterioration to any other park.

4.17 Transportation

Transportation Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Conflict with a plan, ordinance or policy addressing the circulation system, including transit, roadways, bicycle lanes and pedestrian paths?	☐	☐	☐	☒
b) For a land use project, would the project conflict with or be inconsistent with CEQA Guidelines section 15064.3(b)(1)?	☐	☐	☒	☐
c) For a transportation project, would the project conflict with or be inconsistent with CEQA Guidelines section 15064.3(b)(2)?	☐	☐	☐	☒
d) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e) Result in inadequate emergency access?	☐	☐	☒	☐

Setting

Access to the Preserve is limited, as the property frontage along public roads is restricted to two small areas. There is an approximately 500-foot frontage along Calistoga Road, which is a public road, at the junction with Cleland Ranch Road, which is a private road. There is another approximately 500-foot frontage along St. Helena Road. Public access to the Preserve is only available from Cleland Ranch Road at the southern portion of the property. Cleland Ranch Road is located at a sharp curve on Calistoga Road and limited visibility and fast moving traffic on Calistoga Road make this turnoff difficult for access by large vehicles and trailers. According to Sonoma County, Calistoga Road in the vicinity of the Preserve has an average daily traffic volume of 4,649 (Sonoma County 2018).

4.17.1 Project-level Analysis

a) Conflict with a plan, ordinance, or policy addressing the circulation system – No Impact

Currently, the Preserve generates very small amounts of traffic along Calistoga Road from ongoing management operations and occasional volunteer and guided access. Traffic from visitation and ongoing operation of the Preserve would not increase substantially as a result of continued limited public access, erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, and invasive species management activities proposed in the Management Plan.

Implementation of these activities would generate short-term increases in traffic along Calistoga Road as equipment and workers are moved to and from the Preserve. The proposed erosion control and road treatment projects are anticipated to require heavy construction equipment, including a bulldozer, loader, and excavator, and would result in a short-term increase in construction-related vehicle trips along Calistoga Road. Additionally, tree thinning, creation of shaded fuel breaks, and prescribed fire would all require the movement of workers and vehicles to and from the Preserve. However, these management and construction activities would not generate enough truck and vehicle traffic to cause a substantial change in existing traffic load along Calistoga Road. Further, all the activities would take place on the Preserve and no public road closures would be necessary. No bicycle lanes or pedestrian paths would be impacted by these activities. As a result, the implementation of the activities proposed by the Management Plan would not conflict with any plans, ordinances, or policies addressing the circulation system in the vicinity of the Preserve. There would be no impact.

b) Conflict with CEQA Guidelines section 15064.3(b)(1) – Less-than-significant

Erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, grassland prescribed fire, and invasive species management activities proposed in the Management Plan would result in a minor increase in vehicle miles traveled (VMT). Construction related to erosion control and road treatment projects, as well as implementation of mechanical vegetation management, prescribed burning, and invasive species control activities, would require the movement of small numbers of workers and equipment to and from the Preserve. However, these increases in VMT would be minor, involving only a small number of vehicles, and temporary in nature. Continued limited public access would not change VMT. As a result, the impact on VMT would be less-than-significant.

c) Conflict with CEQA Guidelines section 15064.3(b)(2) – No Impact

The proposed Management Plan is not a transportation project. Therefore, there would be no impact.

d) Increase hazards due to a geometric design feature or incompatible uses – Less-than-significant

As noted above, Cleland Ranch Road, which provides the primary access point to the Preserve, is located at a sharp curve on Calistoga Road. Limited visibility and relatively dense, fast moving traffic along Calistoga Road can make turning off and onto Cleland Ranch Road hazardous. However, activities proposed in the Management Plan would not substantially increase this hazard. Erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, grassland prescribed fire, and invasive species management activities would not include a substantial increase in the number of visitors to the Preserve. Public use of the Preserve would remain limited to docent-led outings and trained volunteers, and horse trailers would continue to be prohibited from accessing the Preserve.

Prescribed burning, mechanical vegetation management, invasive species control, and erosion control projects would require the movement of workers, vehicles, and construction trucks to and from the Preserve along the intersection of Cleland Ranch Road and Calistoga Road. However, this minor increase

in vehicle traffic would be short-term in nature and would not substantially increase the hazard caused by the turnout along a sharp curve. The impact would be less-than-significant.

e) Result in inadequate emergency access – Less-than-significant

All management activities would take place within the boundaries of the Preserve and would cause only short-term, minor increases in vehicles moving to and from the Preserve. Prescribed burning could lead to increased smoke on nearby roadways and temporarily decreased visibility. However, smoke would be carefully managed in accordance with an approved smoke management plan and measures such as public notification of burn days and smoke warning signage would be implemented. Emergency access along nearby roads and to residences would not be impeded. No roadways would be blocked or otherwise become impassible due to management activities.

Implementation of ***Project Measure 10 - Ensure Adequate Emergency Access*** would ensure that emergency access to and from the Preserve would be maintained during all construction and ground-disturbing activities associated with management actions proposed by the Management Plan. As a result, the impact would be less-than-significant.

4.17.2 Program-level Analysis

a) Conflict with a plan, ordinance, or policy addressing the circulation system – No Impact

Traffic from visitation and ongoing operation of the Preserve would not increase substantially as a result of longer term management activities proposed in the Management Plan.

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and forest prescribed burning would generate short-term increases in traffic along Calistoga Road as equipment and workers are moved to and from the Preserve. The proposed thinning and prescribed fire activities would require the movement of workers and vehicles to and from the Preserve. However, these activities would not generate enough truck and vehicle traffic to cause a substantial change in existing traffic load along Calistoga Road. Further, all activities would take place on the Preserve and no public road closures would be necessary. No bicycle lanes or pedestrian paths would be impacted by these activities. As a result, the implementation of the activities proposed in the Management Plan would not conflict with any plans, ordinances, or policies addressing the circulation system in the vicinity of the Preserve. There would be no impact.

b) Conflict with CEQA Guidelines section 15064.3(b)(1) – Less-than-significant

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and forest prescribed burning activities proposed in the Management Plan would result in a minor increase in vehicle miles traveled (VMT). Thinning, prescribed burning, and ongoing invasive species control activities would require the movement of small numbers of workers and equipment to and from the Preserve. However, these increases in VMT would be minor, involving only a small number of vehicles, and temporary in nature. As a result, the impact of the management activities on VMT would be less-than-significant.

c) Conflict with CEQA Guidelines section 15064.3(b)(2) – No Impact

The proposed Management Plan is not a transportation project. Therefore, there would be no impact.

d) Increase hazards due to a geometric design feature or incompatible uses – Less-than-significant

As noted above, the turnoff to and from Cleland Ranch Road can be hazardous due to a sharp curve along Calistoga Road. However, expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and forest prescribed burning activities proposed in the Management Plan would not substantially increase this hazard. Public use of the Preserve would remain limited to docent-led outings, trained volunteers, environmental education, and designated Open Space days, and horse trailers would continue to be prohibited from accessing the Preserve.

Thinning, prescribed burning, and ongoing invasive species control, would require the movement of workers, vehicles, and construction trucks to and from the Preserve along the intersection of Cleland Ranch Road and Calistoga Road. However, this minor increase in vehicle traffic would be short-term in nature and would not substantially increase the hazard caused by the turnout along a sharp curve. The impact would be less-than-significant.

e) Result in inadequate emergency access – Less-than-significant

All activities would take place within the boundaries of the Preserve and would cause only short-term, minor increases in vehicles moving to and from the Preserve. Prescribed burning in the Preserve's forest, woodland, and chaparral communities could lead to increased smoke on nearby roadways and temporarily decreased visibility. However, smoke would be carefully managed in accordance with an approved smoke management plan and measures such as public notification of burn days and smoke warning signage would be implemented. Emergency access along nearby roads and to residences would not be impeded. No roadways would be blocked or otherwise become impassible due to program-level activities.

Implementation of ***Project Measure 10 - Ensure Adequate Emergency Access*** would ensure that emergency access to and from the Preserve would be maintained during all ground-disturbing activities associated with program-level actions proposed by the Management Plan. As a result, the impact would be less-than-significant.

4.18 Tribal Cultural Resources

Tribal Cultural Resources Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-significant Impact	No Impact
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?	☐	☒	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Setting

As of July 2015, Assembly Bill (AB) 52 requires that lead agencies consider the effects of projects on tribal cultural resources and that consultation with federally and non-federally recognized Native American tribes take place early in the environmental review process. As defined in PRC §21074, tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are listed, or determined to be eligible for listing, on the national, state, or local register of historical resources.

Tom Origer & Associated originally conducted a cultural resources survey of the Preserve in 2008 and updated this survey in 2018. The Native American Heritage Commission (NAHC), the Federated Indians of Graton Rancheria, the Lytton Band of Pomo Indians, and the Ya-Ka-Ama were contacted; the NAHC responded that they have no record of tribal cultural resources in the Preserve. The field survey

documented four previously recorded prehistoric sites, one new prehistoric site, and four isolated prehistoric specimens on the Preserve.

4.18.1 Project-level Analysis

a.i, ii) Result in a substantial adverse change in a tribal cultural resource that is listed or eligible for listing or that is determined by the lead agency to be significant – Less-than-significant with Mitigation

As per Public Resources Code 21080.3.1(d), the District notified local tribes with a cultural affiliation with the area about the proposed management plan via letter on July 17, 2017.

Table 4-6: Native American Tribal Outreach

Contact	Tribe
Greg Saris, Chairperson	Federated Indians of Graton Rancheria
Gene Buvelot	Federated Indians of Graton Rancheria
Scott Gabaldon, Chairperson	Mishewal-Wappo Tribe of Alexander Valley

As noted above, five prehistoric sites and four isolated prehistoric specimens have been documented on the Preserve. It is possible that undiscovered significant tribal cultural resources are present on the Preserve. Erosion control and road and trail improvement, require ground disturbance and limited excavation. Known erosion control sites were evaluated for the presence of known archaeological and tribal resources (Tom Origer & Associates 2018). No resources were identified during the site visits. There are known prehistoric sites and potentially undiscovered tribal cultural resources near the roadways where project activities would take place. Thus, the potential impact on tribal cultural resources could be significant, given the potential for damage to such resources during ground-disturbing activities.

Although cultural resource surveys of the area found no remnants of cultural or historical resources, the Preserve could contain currently unknown buried artifacts or remains. Ground-disturbing construction activities associated with native plant revegetation, tree and shrub encroachment reduction, grassland prescribed fire, and invasive species management activities could disturb tribal resources if the resources are located in the construction area. Therefore, the potential impact on tribal resources is considered potentially significant if a resource is present and disturbed during construction.

Mitigation Measure TCR-1, Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered, would be implemented to reduce the potential impacts from management activities. Implementation of this mitigation measure would ensure that local tribes are notified and consulted to determine the most appropriate treatment of any encountered tribal resource. Therefore, the potential impact on tribal resources would be less-than-significant with mitigation.

> ***Mitigation Measure TCR-1, Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered***
>
> In the event that any Native American archaeological remains are discovered during implementation of management activities, the District shall contact and consult with local tribes

who have a traditional and cultural affiliation with the Project area including Cloverdale Rancheria of Pomo Indians, Dry Creek Rancheria of Pomo Indians, Lytton Rancheria of California, and Mishewal-Wappo Tribe of Alexander Valley. If the tribe(s) considers the resource to be a tribal resource, the City shall consult with the tribe to develop appropriate mitigation measures in accordance with Public Resources Code 21080.3.2.

Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources, would be implemented to reduce the potential impacts on tribal cultural resources from ground disturbance associated with project-level activities.

Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources

The District shall consult annually with representatives from interested tribes to relay information about the upcoming management activities and to allow for the tribes to provide information about the specific area. If the review identifies that a project may cause substantial adverse change to a tribal cultural resource, the District shall avoid or minimize adverse impacts in one of the following ways:

1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context.
2) Treatment of the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
    a. Protecting the cultural character and integrity of the resource
    b. Protecting the traditional use of the resource
    c. Protecting the confidentiality of the resource

4.18.2 Program-level Analysis

a.i, ii) Result in a substantial adverse change in a tribal cultural resource that is listed or eligible for listing or that is determined by the lead agency to be significant – Less-than-significant with Mitigation

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and forest prescribed burning activities proposed in the Management Plan would result in ground disturbance. As a result, these activities have the potential to impact known prehistoric resources and potential undiscovered tribal cultural resources on the Preserve. Thus, the potential impact on tribal cultural resources could be significant, given the potential for damage to such resources during ground-disturbing activities. ***Mitigation Measure TCR-1, Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered***, and ***Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources***, described above, would be implemented to reduce the potential impacts on tribal cultural resources from ground disturbance.

Mitigation Measure TCR-1: Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered

Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources

4.19 Utilities and Service Systems

Utilities and Service Systems Would the project:	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

Setting

The Preserve is managed by the District to conserve and enhance its natural and scenic values. There are no operational buildings on the Preserve or utility infrastructure currently in use. There is one developed well located in the southeastern portion of the property, one developed spring box located in the northeastern portion of the property, and two capped wells presumably drilled when a subdivision was being planned on the Preserve.

4.19.1 Project-level Analysis

a) Require relocation, construction, or expansion of new utility facilities – No Impact

Erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, and invasive species management activities proposed in the Management Plan would not generate wastewater and would not require additional connections to, or expand the use of, any utility facilities. These activities would not increase impervious surfaces on the Preserve or increase

stormwater runoff. Continued limited public access would not require relocation, construction, or expansion of new utilities. There would be no impact.

b) Have sufficient water supplies available –No Impact

Erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, and invasive species management activities would require only minimal use of water. Some irrigation may be necessary during the establishment period for planting and re-vegetation efforts, but this water use would be short-term and would not result in insufficient water supplies. Construction of erosion control activities would require watering of disturbed areas to limit fugitive dust emissions, however this would be accomplished with a water truck and tank brought from off-site and would not result in insufficient water supplies. Continued limited public access would not require water supplies. As a result, there would be no impact on water supplies.

c) Have access to adequate wastewater treatment capacity – No Impact

Erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, and invasive species management activities would not generate wastewater or require treatment of wastewater. Continued limited public access would not change the wastewater treatment capacity. There would be no impact.

d) Generate solid waste in excess of local infrastructure capacity – No Impact

Implementation of some management activities, including invasive species control and mechanical vegetation treatments (thinning, creation of shaded fuel breaks, thatch reduction) would generate solid waste in the form of green and wood waste. Continued limited public access would not exceed infrastructure capacity.

Invasive vegetation would be piled onsite and either chipped, burned, or allowed to naturally decay depending on the species and amount of material.

Byproducts of mechanical vegetation treatment, including felled trees and thatch and underbrush material, would also be kept onsite. Felled trees would be cut into sections or chipped and scattered in appropriate locations. Thatch and underbrush would also be chipped and scattered. If an oak tree infected with sudden oak death is determined to be a hazard it would be felled, cut and chipped, and left to dry in a location with adequate sun.

No green or wood waste from these activities would be hauled offsite and would therefore not affect the capacity of local infrastructure. There would be no impact.

e) Comply with statutes related to solid waste – No Impact

The solid waste generated by erosion control and roadway drainage improvement, native plant revegetation, tree and shrub encroachment reduction, and invasive species management activities would be composed primarily of green and wood waste and would not be hauled offsite. Disposal of green and wood waste onsite would comply with applicable federal, state, and local regulations. In the event that

any solid waste would need to be disposed of offsite, it would be hauled to a licensed landfill or disposal site for recycling or disposal in compliance with federal, state, and local regulations. There would be no impact.

4.19.2 Program-level Analysis

a) Require relocation, construction, or expansion of new utility facilities – No Impact

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance activities proposed in the Management Plan would not generate wastewater and would not require additional connections to, or expand the use of, any utility facilities. These activities would not increase impervious surfaces on the Preserve or increase stormwater runoff. Continued limited public access would not require relocation, construction, or expansion of new utilities. There would be no impact.

b) Have sufficient water supplies available – No Impact

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance activities would require only minimal use of water. Some irrigation may be necessary during the establishment period for planting and re-vegetation efforts following ground disturbance, but this water use would be short-term and would not result in insufficient water supplies. There would be no impact on water supply availability.

c) Have access to adequate wastewater treatment capacity – No Impact

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance activities would not generate wastewater or require treatment of wastewater. There would be no impact.

d) Generate solid waste in excess of local infrastructure capacity – No Impact

Implementation of some activities, including continued invasive species control and mechanical vegetation treatments (forest thinning, ongoing maintenance of shaded fuel breaks, and felling of diseased oaks, if necessary) would generate solid waste in the form of green and wood waste.

Invasive vegetation would be piled onsite and either chipped, burned, or allowed to naturally decay depending on the species and amount of material.

In accordance with the Forest Management Plan or similar document that would be developed, byproducts forest thinning and ongoing mechanical vegetation management, including felled trees and underbrush material, would also be kept onsite. Felled trees would be cut into sections or chipped and scattered in appropriate locations. Thatch and underbrush would also be chipped and scattered. If an oak tree infected with sudden oak death is determined to be a hazard it would be felled, cut and chipped, and left to dry in a location with adequate sun.

No green or wood waste from expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance activities would be hauled offsite and would therefore not affect the capacity of local infrastructure. There would be no impact.

e) Comply with statutes related to solid waste – No Impact

The solid waste generated by expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance activities would be composed primarily of green and wood waste and would not be hauled offsite. Disposal of green and wood waste onsite would comply with applicable federal, state, and local regulations. In the event that any solid waste would need to be disposed of offsite, it would be hauled to a licensed landfill or disposal site for recycling or disposal in compliance with federal, state, and local regulations. There would be no impact.

4.20 Wildfire

Wildfire	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☒	☐	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

Setting

The Preserve is located in a High to Very High Fire Hazard Severity Zone and is designated as a State Responsibility Area (CalFire 2007).[13] As noted in the Sonoma County General Plan 2020 Public Safety Element, wildland fire is a significant hazard in Sonoma County due to a combination of factors, including weather, topography, and accumulated fuel loads (Sonoma County 2016). A number of significant wildfire events have caused extensive damage in Sonoma County, with nearly 100,000 acres burned and 2,000 structures lost to large fires between 2000 and 2015. In October 2017, Sonoma County experienced several large and devastating wildfires, with both the Nuns Fire and the Tubbs Fire starting the night of October 8, 2017. The Tubbs Fire started near Calistoga and, travelling along a corridor just north of the Preserve, spread to portions of Santa Rosa within six hours, destroying 5,636 structures, burning 36,807

[13] CalFire has legal responsibility for providing fire protection and wildland fire management in any designated State Responsibility Area.

acres, and leading to at least 23 deaths (CalFire 2018b). The Nuns Fire started near Glen Ellen and burned north into Annadel Park just south of the Preserve, destroying 1,355 structures and burning 56,556 acres.

Policy documents and plans for addressing wildfire risks in Sonoma County include the Sonoma County General Plan 2020 Public Safety Element (Sonoma County 2016), the Sonoma County Hazard Mitigation Plan (Sonoma County 2016), the Sonoma County Community Wildfire Protection Plan (Fire Safe Sonoma 2016), and Strategic Fire Plan Sonoma-Lake-Napa Unit (CalFire 2015).

4.20.1 Project-level Analysis

a) Impair an emergency response plan or evacuation plan – No Impact

The size and nature of the erosion control and roadway drainage improvement, prescribed fire in grasslands, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and shaded fuel break development activities proposed in the Management Plan would not require the closure of public roadways or otherwise interfere with emergency evacuation plans for the surrounding area. Erosion control and roadway treatment activities (e.g., culvert replacement, rock armoring, rolling dips, etc.) could result in temporary road closures within the Preserve, but would not impact roadways outside of the Preserve's boundaries. Prescribed burning could lead to increased smoke on nearby roadways and temporarily decreased visibility. However, smoke would be carefully managed in accordance with an approved smoke management plan and measures such as public notification of burn days and smoke warning signage would be implemented. These activities could cause a slight increase in vehicle use during construction activities and potential short-term reduced visibility from prescribed fire but would not impair emergency response plans or evacuation plans. Therefore, there would be no impact on emergency response or evacuation plans.

b) Exacerbate wildfire risks – Less-than-significant with Mitigation

The Preserve has no occupants and, therefore, erosion control and roadway drainage improvement, prescribe fire in grasslands, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and shaded fuel break development activities proposed in the Management Plan would not expose any project occupants to an exacerbated risk of wildfire. Most of the activities are intended to reduce fire hazard severity on the Preserve. Activities that would benefit fire safety include restoring grasslands by reducing thatch layers and removing encroaching coyote brush; select thinning of encroaching Douglas fir and bay laurel; creating shaded fuel breaks; controlling invasive species; and enhancing riparian habitat.

However, construction activities for erosion control and roadway treatment could temporarily increase the possibility of wildfire due to the use of construction equipment in wildland areas. Implementation of ***Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction***, described in Section 4.9.1, would require the use of construction techniques that would reduce the likelihood of wildland fire starts during construction. Implementation of this measure would reduce the impact to a less-than-significant level by removing combustible vegetation from staging and other construction areas to minimize the risk of fire.

Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction

Implementation of the Management Plan's would include the development of a prescribed fire program within the Preserve's grassland units to manage invasive species and enhance grassland habitat. These prescribed fire activities are anticipated to decrease the long-term risk of wildfire on the Preserve by reducing fuel loads. However, prescribed fire can have a significant impact on the potential for wildfires if it is not managed properly. The Preserve's prescribed fire program would be developed in consultation with CalFire as described in the Project Description and included in ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire***. A burn plan would be developed by a qualified professional and approved by CalFire, for each individual burn and would include fire control measures to prevent escape and escalation of prescribed fire. All burns would be carried out as described in the Project Description, natural firebreaks would be utilized wherever possible, and adequate control lines and artificial firebreaks would be established around burn units as necessary. Burns would take place only when weather conditions, such as moisture levels and the direction and speed of winds, are appropriate as determined by CalFire and the Bay Area Air Quality Management District. All prescribed fire activities would be implemented by qualified prescribed fire specialists or CalFire personnel. The implementation of prescribed fire as described in the Project Description, in conjunction with the planning and approval process for each individual prescribed fire project would ensure that prescribed fire in the Preserve's grasslands would not increase the risk of wildfire. The impact would be less-than-significant.

c) Require infrastructure as a result of wildfire risk – Less-than-significant

As noted above, prescribed fire in grasslands, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and shaded fuel break development activities proposed in the Management Plan are intended to reduce the risk of wildfire on the Preserve. None of the activities would require the installation of infrastructure that would exacerbate wildfire risks or that would have a significant ongoing impact on the environment.

The Management Plan includes the development of shaded fuel breaks, which would provide areas to slow fire progression and allow fire fighters access to fight wildfire. The shaded fuels breaks would be located along Plum Ranch Road, Erland-Cleland Tie Road, and the Preserve frontage road along Erland Road. No infrastructure would be needed to develop the fuel breaks. Individual prescribed burn units would be designed and selected to maximize the use of natural or pre-existing fire breaks to the extent possible when conducting prescribed fire activities. However, to ensure safety and to reduce the potential for escape or escalation of prescribed burns, some prescribed fire projects may require digging control lines and fire breaks. Areas impacted by control lines and fire breaks would be restored and re-vegetated immediately following prescribed fire activities, in accordance with ***Project Measure 1 - Planting and Revegetation after Soil Disturbance for Restoration***. As a result, the impact would be less-than-significant.

d) Expose people or structures to risks as a result of runoff, post-fire slope instability, or drainage changes – Less-than-significant

As noted above, erosion control and roadway drainage improvement, prescribe fire in grasslands, native plant revegetation, tree and shrub encroachment reduction, invasive species management, and shaded fuel break development activities proposed in the Management Plan are intended to reduce the risk of wildfire on the Preserve. These activities would not increase the risk of downslope flooding or landslides as a result of runoff, post-wildfire slope instability, or drainage changes.

However, some activities would involve ground-disturbance and result in areas of exposed soil, including construction of erosion control projects, prescribed burning in grasslands, and invasive species control. If not properly managed, these activities could cause erosion and slope instability. Implementation of ***Project Measure 1 - Planting and Revegetation after Soil Disturbance*** and ***Project Measure 3 - Erosion Control, Sediment Detention, and Site Maintenance*** would require that disturbed areas be immediately stabilized and, if appropriate, re-seeded. As a result, project-level activities proposed in the Management Plan would not expose people or structures to significant risks as a result of runoff, post-fire slope instability, or drainage changes. The impact would be less-than-significant.

4.20.2 Program-level Analysis

a) Impair an emergency response plan or evacuation plan – No Impact

Implementation of the of the expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, forest prescribed burning, and shaded fuel break maintenance would have no impact on emergency response or evacuation plans as described above.

b) Exacerbate wildfire risks – Less-than-significant with Mitigation

Expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and shaded fuel break maintenance activities proposed in the Management Plan would not increase risk of wildfire. These activities are intended to reduce fire hazard severity on the Preserve.

Ground disturbing activities associated with use of construction equipment could increase the possibility of wildfire through the use of vehicles and equipment. Implementation of ***Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction***, would require the use of techniques that would reduce the likelihood of wildland fires during construction and ground disturbance. Implementation of this measure would reduce the impact to a less-than-significant level by removing combustible vegetation from staging areas to minimize the risk of fire.

Mitigation Measure HAZ-1, Reduce Wildland Fire Hazards during Construction

Implementation of the Management Plan's expanded forest prescribed burning activities would include the expanding the prescribed fire program to manage the Preserve's forest, woodland, and chaparral habitats. The exact locations, objectives, and prescriptions of these prescribed fire activities would be determined through the development of a Forest Management Plan, Vegetation Management Plan

contract, or similar document. Implementation of prescribed fire would be subject to the same requirements described in the Project Description and ***Project Measure 6 - Agency Coordination, Approvals, and Public Notification for Prescribed Fire*** and evaluated for the project-level impact activities.

c, d, e) Require infrastructure as a result of wildfire risk, expose people or structures to risks as a result of runoff, post-fire slope instability, or drainage changes – Less-than-significant

Implementation of the expanded invasive species management, erosion control, tree and shrub encroachment reduction, forest thinning, and shaded fuel break maintenance would have the same impacts as those described for shorter term project-level activities. The impact would be less-than-significant.

5 Mandatory Findings of Significance

Mandatory Findings of Significance	Potentially Significant Impact	Less-than-significant with Mitigation	Less-than-Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past, current, and probable future projects.)	☐	☒	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

a) Degrade the environment – Less-than-significant with Mitigation

With implementation of the mitigation measures, the activities proposed in the Management Plan do not have the potential to degrade the quality of the environment, including wildlife species or their habitat, plant or animal communities, or important examples of major periods of California history or prehistory, either directly or indirectly.

b) Cause cumulatively considerable impacts – Less-than-significant with Mitigation

Cumulative impacts are defined as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts” (CEQA Guidelines Section 15355). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. This Initial Study/Proposed MND utilizes the “plan” approach, per CEQA Guidelines Section 15130(d), to determine if the proposed Management Plan project-level actions as a whole make a considerable contribution to a significant cumulative impact. Cumulative impacts have been identified using the summary of impacts in the Sonoma County General Plan 2020 Draft and Final EIR (Sonoma County 2006).

The General Plan 2020 Final EIR identified significant cumulative impacts related to land use/population/housing, transportation, air quality, biological resources, noise, water quality/hydrology, agriculture, soils/geology, and public services. Each of these cumulative impacts is summarized in more detail below.

Transportation Impacts

Significant and unavoidable transportation impacts were identified in the General Plan EIR related to increased traffic volumes, delay, and decreases in levels of service (LOS) along major highways in the County. Implementation of the Management Plan would not contribute to congestion identified in the General Plan EIR. The LOS standards regulate long-term impacts due to future development and do not apply to temporary, construction-related traffic. As described in the Project Description and in the transportation section, the magnitude of management actions are small and would require a minimal number of vehicles to implement and/or construct. Most management actions would not change operations on the Preserve and would not change traffic levels. Therefore, the Management Plan as a whole would not contribute to the County's cumulative traffic impact.

Cultural and Native American Tribal Resources Impacts

Significant and unavoidable impacts on cultural resources were identified in the General Plan EIR related to increased development throughout the County. Implementation of the Management Plan would not contribute to impacts on cultural resources identified in the General Plan EIR. Implementation of ***Mitigation Measure CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources; Mitigation Measure CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources; Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources; Mitigation Measure CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources; Mitigation Measure CUL-5, Procedures for Encountering Human Remains***; ***Mitigation Measure TCR-1, Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered***; and ***Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources*** require protection of cultural resources through identification of known resources in the area for all management activities prior to construction, and through a process to protect resources if encountered during construction. Therefore, the Management Plan as a whole would not contribute to cumulative impacts on cultural resources.

> ***Mitigation Measure CUL-1, Identify and Avoid or Minimize Impacts on Historic Resources***
> ***Mitigation Measure CUL-2, Avoid Impacts on Previously Undiscovered Historic Resources***
> ***Mitigation Measure CUL-3, Minimize Impacts of Prescribed Fire on Cultural Resources***
> ***Mitigation Measure CUL-4, Identify and Avoid or Minimize Impacts on Archaeological Resources***
> ***Mitigation Measure CUL-5, Procedures for Encountering Human Remains***
> ***Mitigation Measure TCR-1, Consult with Native American Tribes if Previously Undiscovered Artifacts are Discovered***
> ***Mitigation Measure TCR-2, Identify and Avoid or Minimize Impacts on Tribal Cultural Resources***

Air Quality Impacts

Significant and unavoidable air quality impacts were identified in the General Plan EIR related to the emission of ozone precursors, odors/toxic air contaminants, and diesel emissions. Growth in cities and cumulative projects would contribute to all of these impacts, resulting in a significant cumulative impact on air quality, particularly for those impacts related to automobile traffic. The Management Plan would not involve a sustained increase in traffic, and therefore, would not contribute to cumulative air quality impacts.

Biological Resources Impacts

Significant biological resources impacts were identified in the General Plan EIR related to special-status species, the loss of sensitive natural communities, and reduction in migration. Implementation of ***Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats; Mitigation Measure BIO-2, Protect Special-status Plants during Prescribed Burning; Mitigation Measure BIO-3, Protect Fish and Aquatic Wildlife Species; Mitigation Measure BIO-4, Protect Nesting Birds; Mitigation Measure BIO-5, Protect Northern Spotted Owl; Mitigation Measure BIO-6, Protect Special-status Bats***; and ***Mitigation Measure BIO-7, Protect Wetlands and Waters*** would require protection of listed species through preconstruction surveys and protection measures during construction. Therefore, implementation of Management Plan project- and program-level activities, along with required mitigation measures, would not contribute to cumulative impacts on special-status species.

Mitigation Measure BIO-1, Avoid Loss of Special-status Plants and their Habitats

Mitigation Measure BIO-2, Protect Special-status Plants during Prescribed Burning

Mitigation Measure BIO-3, Protect Fish and Aquatic Wildlife Species

Mitigation Measure BIO-4, Protect Nesting Birds

Mitigation Measure BIO-5, Protect Northern Spotted Owl

Mitigation Measure BIO-6, Protect Special-status Bats

Mitigation Measure BIO-7, Protect Wetlands and Waters **Water Quality**

Hydrology and Water Quality Impacts

Significant water quality and hydrologic impacts were identified in the General Plan EIR related to groundwater consumption, well interference, streambank erosion, and erosion from redirected flood flows. The Management Plan would have no impacts or less-than-significant impacts related to water quality and hydrology. Some project- and program-level activities would improve water quality and reduce streambank erosion. Therefore, the project would not contribute to any significant cumulative impacts on water quality or hydrology.

Geology and Soils Impacts

Significant geologic impacts were identified in the General Plan EIR related to geologic hazards associated with planned infrastructure expansion. The Management Plan does not propose any activities that would result in infrastructure expansion; therefore, the project would not contribute to any significant cumulative impacts on geology.

Public Services Impacts

Significant impacts associated with the demand for and expansion of public services were identified in the General Plan EIR. Public services would not be significantly affected with implementation of the Management Plan. Therefore, the project would not contribute to any significant cumulative impacts on public services.

c) Have substantial adverse effects on human beings – Less-than-significant with Mitigation

With implementation of the mitigation measures, the management activities proposed in the Management Plan do not have the potential to, either directly or indirectly, cause substantial adverse effects on human beings.

6 Preparers

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Appendix A

Saddle Mountain Preserve Draft Management Plan

SADDLE MOUNTAIN OPEN SPACE PRESERVE MANAGEMENT PLAN

AG + OPEN SPACE
SONOMA COUNTY

LAND FOR LIFE

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2019

SADDLE MOUNTAIN OPEN SPACE PRESERVE MANAGEMENT PLAN

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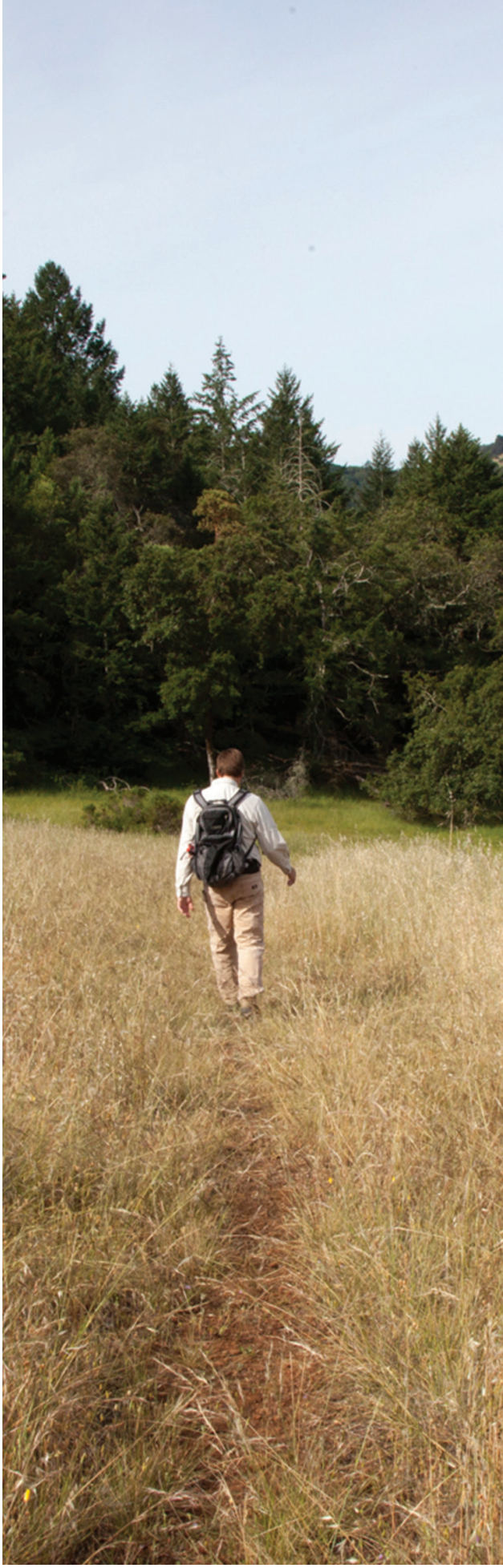

FIGURES

TABLES

APPENDICES

LIST OF ACRONYMS

AGS: Annual Grassland
BAAQMD: Bay Area Air Quality Management District
BLM: Bureau of Land Management
BMP: Best Management Practice
CAL-IPC: California Invasive Plant Council
CDFW: California Department of Fish and Wildlife
CEQA: California Environmental Quality Act
CNDDB: California Natural Diversity Database
CNPS: California Native Plant Society
COW: Coastal Oak Woodland
CPC: Closed-Cone Pine-Cypress
DFR: Douglas Fir
EPA: Environmental Protection Agency
FEW: Fresh Emergent Wetland
FMP: Forest Management Plan
FMWW: Friends of the Mark West Watershed
GP 2020: Sonoma County General Plan 2020
LAC: Lacustrine
MCH: Mixed Chaparral
MHC: Montane Hardwood-Conifer
MRI: Montane Riparian
NPDES: National Pollutant Discharge Elimination System
NSO: Northern Spotted Owl
NTU: Nephelometric Turbidity Unit
PWA: Pacific Watershed Associates
RRD: Resources and Rural Development
SER: Society for Ecological Restoration
SMPMP: Saddle Mountain Open Space Preserve Management Plan
SOD: Sudden Oak Death
TMDLs: Total Maximum Daily Loads
TREX: Prescribed Fire Training Exchange
USFS: US Forest Service
VMP: Vegetation Management Program
VTP: Vegetation Treatment Program
WTM: Wet Meadow

ACKNOWLEDGEMENTS

Special thanks and appreciation to the California Coastal Conservancy for their financial support. Ag + Open Space would also like to thank the Saddle Mountain Open Space Preserve Volunteer Patrol members who have vigilantly monitored the Preserve since its acquisition in 2006 and provided countless hours towards the conservation and enhancement of the Preserve.

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Board of Directors

Ag + Open Space is governed by a Board of Directors, which consists of the five elected County Supervisors, one representing each Supervisorial District. The current Ag + Open Space Board of Directors includes:

Susan Gorin, 1st district
David Rabbitt, 2nd district (current chair)
Shirlee Zane, 3rd district
James Gore, 4th district
Lynda Hopkins, 5th district

1. INTRODUCTION

1.1 Regional Setting

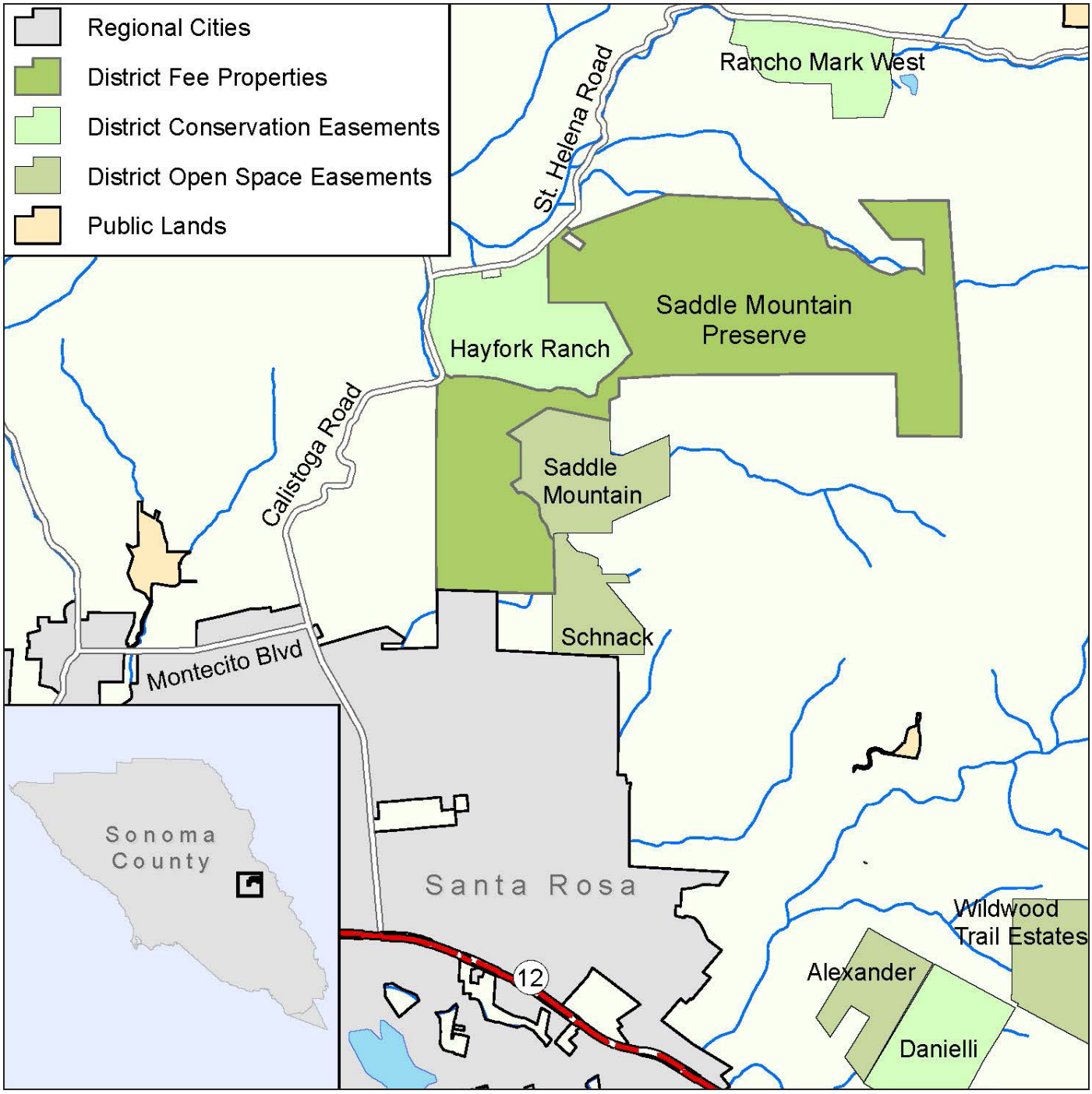

Figure 1. Location of Saddle Mountain Open Space Preserve

The Saddle Mountain Open Space Preserve (Preserve) is located in northern California's central Mayacamas Mountains, northeast of the inland city of Santa Rosa in Sonoma County. The Preserve comprises 960 acres (1.5 mi^2 or 4 km^2) of relatively undeveloped land that is dominated by mixed grasslands with a history of livestock grazing. Elevation ranges from 760 feet (233 meters) at the property's northwest boundary to 1,800 feet (549 meters) in the southeast corner; the summit of the eponymous mountain is 1450 feet (442 meters) above sea level. Climate is Mediterranean, characterized by hot, dry summers and wet, stormy winters. Average annual rainfall for Saddle Mountain is estimated at 45 inches (114 mm; Giblin and Associates 2003b).

The area exhibits flooding and drought conditions at unpredictable intervals. Three tributaries of Mark West Creek (Alpine, Weeks, and Van Buren) and one tributary of Santa Rosa Creek (Ducker Creek) flow from east to west across the Preserve (Section 2.12, Water Resources).

The Preserve is located in one of the most biologically diverse regions in the nation. Potentially, 289 species of wildlife occur amid a range of upland and wetland vegetation communities. The property's watersheds include Alpine and Weeks Creeks, both important tributaries to Mark West Creek, which has been identified by California Department of Fish and Wildlife (CDFW) as supporting salmonid viability. The California Natural Diversity Database (CNDDB) and field surveys identify fourteen rare/ sensitive species on or adjacent to the property. Sonoma County is also part of one of the largest wine grape-growing regions in the world with over a dozen designated American Viticultural Areas and hundreds of wineries in production. Human population in the Santa Rosa vicinity is significant and increasing, along with demand for clean water, homesites, and local employment.

Photo 1. Saddle Mountain

1.2 History of Preserve Establishment

With its sweeping views of the Santa Rosa plain, the Saddle Mountain Open Space Preserve property was considered a prime real estate development location since at least the 1970s. In 1978, the proposed development of a subdivision resulted in the preparation of an Environmental Impact Report. The local community successfully opposed development efforts until July 2003, when final approval was given by Sonoma County to subdivide the property into 29 estate parcels. Then the Sonoma County Agricultural Preservation and Open Space District (Ag + Open Space) became involved in negotiations to purchase the property to conserve habitat value and preserve a key viewshed from Annadel State Park and Spring Lake Regional Park.

Photo 2. View of Santa Rosa from Saddle Mountain

In January 2006, the Board of Directors adopted resolution #06-0041 approving the fee title purchase of the 960-acre Saddle Mountain property. The State Coastal Conservancy contributed grant funding to assist with the acquisition of the property and to provide funding for a management plan (i.e. this document). The total purchase price was $9,213,000. Terms of the sale agreement include an access easement to an existing residence for the seller, an easement for water use for the seller, and a trail easement over the two lots retained by the seller. Additionally, Ag + Open Space possesses a Right of First Offer over the lots retained by the seller.

1.3 Vision Statement

The Saddle Mountain Open Space Preserve will protect and conserve riparian woodland, montane forest, mixed grassland, and chaparral providing high quality habitats in support of native Sonoma County biodiversity and improving watershed function. Public access will be structured to ensure minimal impacts to sensitive species and habitats while maintaining a high-quality visitor experience.

1.4 Conservation Purpose

The purpose of the acquisition is to conserve and protect the natural, scenic, agricultural, aesthetic, biotic, rare and endangered species habitat, and openness values of the Preserve. The Preserve is visible from much of the city of Santa Rosa and provides viewsheds for Annadel State Park and Spring Lake Regional Park; it serves as an important backdrop that contributes to quality of life and community identity in Santa Rosa.

1.5 Goals and Objectives

The goal of the Saddle Mountain Open Space Preserve Management Plan (Plan) is to thoroughly assess the property's biotic and abiotic conditions, and develop recommendations that will direct Ag + Open Space's actions to preserve the property's unique mosaic of complex native California habitat types, biodiversity value and ecosystem function.

Specific Objectives for the Preserve include:

- Conservation of large stands of contiguous oak woodland in the Mark West Creek watershed
- Conservation of high quality riparian habitat and adjacent uplands and wetlands in the Mark West Creek and Santa Rosa Creek watersheds
- Protection of highly visible open space land with outstanding scenic qualities
- Management of the Preserve in a manner that minimizes impacts and enhances natural resources
- Provision of recreational opportunities in close proximity to urban areas that are compatible with the conservation purposes

The three chief conservation challenges that will direct short-term responses on the Preserve are:

- Control and remediation of erosion sources, with integrated management of sediment delivery to stream and wetland systems
- Control and prevention of non-native plant species, with eradication where feasible and long-term reduction of coverage elsewhere
- Strategic reduction of fuel buildup and overcrowded conditions within forest habitats

1.6 Existing Plans and Partnerships

The significant ecological resources reflected by the diverse plant communities, high water quality, intact in-stream and riparian habitat, and endangered species occurrence in the area make the upper Mark West Watershed extremely regionally significant for conservation projects, including planning documents, projects, and partnerships. Mark West Creek has been identified as a high priority stream for preservation and restoration by a number of state, federal and local agencies. The Association of Bay Area Governments, with the concurrence of the Sonoma County Board of Supervisors, has designated the Upper Mark West Watershed as a Priority Conservation Area in recognition of its extraordinary environmental values, regional significance, urgency for protection, and level of community involvement. Exceptional natural resources are coupled with a highly engaged community of landowners and residents who have demonstrated their interest, awareness, and stewardship ethic to restore and protect the watershed. Voluntary participation is particularly important due to the fact that the Preserve is surrounded by private rural residential land holdings.

1.6.1 Existing Plans

Introduced below is a small selection of the dozens of existing planning efforts/ plan documents that directly address the Preserve area.

Sonoma County General Plan 2020[1]

Sonoma County General Plan 2020 (GP 2020) was adopted September 2008 and is a revision of the previous General Plan that was adopted in 1989. The broad purpose of GP 2020 is to express policies which will guide decisions on future growth, development, and conservation of resources through 2020 in a manner consistent with the goals and quality of life desired by the county's residents. Under State law many actions on private land development, such as Specific Plans, Area Plans, zonings, subdivisions, public agency projects and other decisions must be consistent with the General Plan. The SCGP includes ten elements: Land Use, Housing, Agricultural Resources, Open Space and Resource Conservation, Water Resources, Public Safety, Circulation and Transit, Air Transportation, Public Facilities and Services and Noise. Each of these will need to be considered in the development and restoration activities proposed on the Saddle Mountain Open Space Preserve.

[1] Sonoma County General Plan portal http://www.sonoma-county.org/PRMD/gp2020/index.htm

Sonoma County Biodiversity Action Plan[2]

This document was compiled with Ag + Open Space by the Community Foundation of Sonoma County (2010) to highlight the enormous biodiversity of and threats to the area's plant and animal species, habitats, and communities. Natural history information and stakeholder viewpoints are provided in support of general recommendations that managers can utilize to take action.

Franz Valley Area Plan[3]

This plan was originally adopted in 1979 and modified in 2008. It focuses on the Franz Valley Study area: 91,520 acres in northeastern Sonoma County that drain into the Maacama and upper Mark West Creek watersheds. Specific area plans provide intermediate level of detail between the county general plan and site specific plans which are intended to provide information, analysis, and citizen participation on a local basis. This plan includes local Land Use and Open Space Planning sections that cover information ranging from rural residential development intensity, riparian setbacks and historical site preservation that apply to the upper Mark West Creek region including the Saddle Mountain Open Space Preserve.

Upper Mark West Watershed Management Plan, Phase 1[4]

The goal of the Upper Mark West Watershed Management Plan (2008) is to "provide tools, resources and guidance for stakeholders to protect the natural environment in the upper Mark West Creek watershed, restore and enhance altered landscapes, and to steward the land in perpetuity." The Draft Upper Mark West Watershed Management Plan, Phase 1 includes a compilation of existing information, and a needs assessment. The Sonoma Resource Conservation District is developing a comprehensive Integrated Watershed Management Plan for the Upper Mark West and Maacama Creek Watersheds to develop a list of recommendations to improve water quality and riparian and aquatic habitat conditions in the watersheds.

1.6.2 Existing Studies

An array of projects in the Saddle Mountain area have provided relevant information and templates that contribute to priority preservation goals related to road upgrade, sensitive habitat restoration, water monitoring, and fisheries viability. See Appendix 1, Projects and Studies in the Saddle Mountain Open Space Preserve Area.

Road Assessments and Improvements

Unpaved rural road systems and concentrated runoff from paved roads are significant sources of erosion and fine sediment delivery to streams. The assessment and improvement of roads for sediment reduction is a primary habitat restoration priority in the upper Mark West Creek watershed. Publicly funded road assessment and improvement projects in the project area include:

- The assessment and upgrade of approximately 12 miles of private, unpaved roads including Cleland Ranch Road, which runs through the Saddle Mountain Open Space Preserve, was completed in 2006 by the Sonoma Resource Conservation District and Pacific Watershed Associates in cooperation with over 70 landowners.
- The County of Sonoma Transportation and Public Works Department worked with Pacific Watershed Associates to assess the public roads and associated drainage in the upper Mark West Creek watershed.
- Ross Taylor & Associates' "Russian River Stream Crossing Inventory and Fish Passage Evaluation" assessed passage of juvenile and adult salmonids and developed a project scheduling document to prioritize corrective treatments to provide unimpeded fish passage at road/stream intersections, and included recommendations for Van Buren and Alpine Creek crossings at St. Helena Road.

Habitat Restoration and Improvements

- A native riparian revegetation project was conducted on Mark West Creek on private land upstream of the Saddle Mountain Open Space Preserve in 2004 by the Sonoma Resource Conservation District and Circuit Rider Productions, Inc.
- Monan's Rill Association conducted a forest improvement and fuel loads management project in the upper Mark West watershed in cooperation with California Department of Forestry and Fire Protection.
- Several instream habitat improvement projects were conducted by CDFW along the lower reaches of Mark West Creek.

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[2] Sonoma County BAP http://www.lagunafoundation.org/knowledgebase/?q=node/272

[3] Franz Valley Area Plan http://www.sonoma-county.org/prmd/docs/divpages/franz_vly_area_plan.pdf

[4] Upper Mark West Watershed MP, P1 http://www.lagunafoundation.org/knowledgebase/?q=node/262

Water and Biological Quality Monitoring

Water quality and associated aquatic habitat monitoring has been conducted intermittently in a number of locations in the project area. Below is a list of the organizations that have collected water quality monitoring data; refer to Section 6.1.2, Water Quality Improvement Projects for additional information.

- Sonoma Resource Conservation District Monitoring and Assessment Program
- Sonoma County Water Agency, Fisheries Enhancement Program
- California Department of Fish and Wildlife, Stream Inventory Reports for Mark West, Weeks, and Van Buren Creeks
- Community Clean Water Institute, Volunteer Citizen Water Quality Monitoring Program
- Friends of Mark West Watershed, Continuous Temperature Monitoring Program

Biological surveys to assess the type, population size and distribution of fish species in Mark West Creek and its significant tributaries has primarily focused on assessing the presence/absence and related population size of salmonid fish, steelhead trout, and Coho salmon occurring in the upper watershed. Below is a list of the organizations that have conducted fisheries studies.

- Sonoma County Water Agency, Fisheries Enhancement Program
- Merritt-Smith Consulting, Salmonid Juvenile Density Monitoring
- California Department of Fish and Wildlife, Stream Inventory Reports for Mark West, Weeks, and Van Buren Creeks
- Sonoma State University researcher Kristy Deiner sampled in the upper reaches of Mark West Creek as research for a paper titled "Population structure and genetic diversity of trout (*Oncorhynchus mykiss*) above and below natural and man-made barriers in the Russian River, California," published in Conservation Genetics in 2007.

Grazing

Lisa Bush, Certified Rangeland Manager, developed a Conceptual Grazing Plan for the Saddle Mountain Open Space Preserve in April 2008. The study included field observations of grassland areas, describing potential benefits of grazing as a grassland management technique on the property. The Plan describes various constraints and requirements of a successful grazing program. Identified grazing challenges include the property's geographic position, rugged topography, intergrading vegetation types, and current paucity of grazing infrastructure (e.g. sound fencing and water sources). Due to these challenges, Ag + Open Space has determined that introducing grazing to the Preserve is not feasible at this time.

1.6.3 Existing Partnerships

In addition to the agencies and organizations directly involved in the purchase and management of the Preserve (Section 2.2, History of Preserve Establishment), due to the high level of community engagement in the upper Mark West Creek watershed there are several community and watershed-based groups that are invested in the management of the Preserve.

The Alpine Club, a "social benefit" organization for the residents of the upper watershed, was formed in the 1940s and has performed work such as creek cleanups in additional to its social function. Today the Alpine Club has over 120 member families in the upper Mark West Creek watershed.

The Friends of the Mark West Watershed (FMWW) formed in 2001 as the environmental advocacy arm of the Alpine Club. The FMWW has been instrumental in establishing the Saddle Mountain Open Space Preserve since it first challenged a proposal to subdivide and develop estate homes on 1300-acre Saddle Mountain Ranch. The FMWW promoted a win-win solution, partnering with Ag + Open Space, the Coastal Conservancy, and others in the public acquisition of the property.

Recent activities of the Alpine Club and Friends of Mark West Creek that affect the Preserve include:

- Establishing Saddle Mountain Volunteer Patrols in partnership with the District
- Preparing for Emergencies and Fire Preparedness Task Force
- Creating a historical record of the Mark West watershed and its community
- Installing road signs marking the Mark West creek and watershed boundaries
- Carrying out Upper Mark West Creek Restoration and Preservation projects in the Mark West Creek watershed

Ag + Open Space policy regarding research on preserve lands states, "The District encourages appropriately reviewed natural and cultural resource studies on a preserve when these studies are consistent with the District's mission and the preserve's conservation purpose. Research will be allowed if the results of the research could be used to advance the District's understanding of preserve resources, natural processes, values and uses." Research should support and provide a basis for "preserve planning, development, operations, management, education and interpretive activities." Engaging with local organizations can also help further the District goals of raising awareness of the natural and cultural resource management priorities as well as involving the community and neighboring landowners in expanding beneficial management strategies beyond the District's property.

Research projects that inventory and/or establish baseline conditions for species or habitats targeted for restoration or enhancement are recommended. Inventories of initial conditions using standardized protocols can serve as a tool for measuring the effectiveness of various management strategies. Additionally, comparative research projects that test the effectiveness of various management methodologies can be used to refine future management. An example of this would include trials of various invasive plant management techniques such as grazing, burning, tarping, etc. and associated ongoing botanical surveys.

Local entities engaged in related research include the California Native Plant Society, Milo Baker Chapter, which supports conservation activities such as rare plant inventories; Sonoma State University students, who can be engaged in a variety of natural and cultural resource projects; and the Sonoma Resource Conservation District's Watershed Monitoring and Assessment Program, which has been supporting monitoring and assessment activities in the upper Mark West Creek watershed for over ten years. These entities should be considered potential research partners for Ag + Open Space. Additionally, the Pepperwood Preserve, located in the upper Porter Creek watershed, tributary to Mark West Creek, is a venue for research projects conducted by numerous universities, colleges, and institutions on aspects of flora, fauna, and ecology.

1.6.4 Funding Opportunities

Several partners have played an important role in helping Ag + Open Space acquire the Saddle Mountain Open Space Preserve, including funding from the California State Coastal Conservancy and project support from the Sonoma Resource Conservation District and Friends of the Mark West Creek Watershed. This management plan identifies many priority implementation projects that provide opportunities for the development of new partnerships or strengthening of existing ties. In addition to Ag + Open Space's existing partnerships, this Preserve provides an opportunity to build or expand upon partnerships with Land Paths, the Community Clean Water Institute, local universities, and other research organizations.

Funding for project implementation, monitoring, and maintenance will be provided in part by Ag + Open Space through its existing sales tax measure reauthorized as Measure F in November 2006. Additional funding may be available through grants provided by the federal or state government or nongovernmental organizations. See Appendix 2 for a list of potential grant sources.

1.7 Management Plan Development Process

The Saddle Mountain Open Space Preserve Management Plan was developed utilizing existing documentation and expert input and analysis. Existing documents were compiled (Appendix 1, Projects and Studies in the Saddle Mountain Open Space Preserve Area, Appendix 2, Saddle Mountain Open Space Preserve Resource Catalog) and evaluated for data gaps. Where information was missing, incomplete, or outdated, consultants who are experts in their fields were enlisted to conduct property assessments and develop recommendations based on their findings and the intended uses of the Preserve. Assessments were conducted in 2008 and 2009 to survey property resources, including a roads survey, botanical inventory, grazing potential, and a cultural resources inventory. Each consultant identified issues of concern including but not limited to the condition of the Preserve roads and trails, the presence of invasive non-native plants, fire hazard, and possible degradation of cultural resources. Follow up field surveys were conducted in 2010 – 2017 to monitor the federally endangered Clara Hunt's milk-vetch populations and in 2014 to monitor the priority non-native species.

Preliminary management strategies were developed based upon the existing data analysis, property assessments, and expert recommendations. These management strategies and recommendations were reviewed by the project team and Ag + Open Space staff in a series of small group meetings designed to integrate management strategies and determine final recommendations for plan implementation. Public review of the draft plan occurred from March – April 2015 and is described in Appendix 3, Public Comment.

1.7.1 Data Acquisition and Analysis

Several contractors with specific professional expertise were involved in acquiring and/or analyzing data to inform the SMPMP. Their contributions are summarized below.

Pacific Watershed & Associates, Inc.

Pacific Watershed Associates Inc. assessed approximately nine miles of rural roads and one mile of trails within the Preserve, via aerial photo analysis, field inventories, and analysis of new field data. The study identified 28 current and potential road-related erosion sites and locations where sediment is delivered into streams.

Rob Evans & Associates

Rob Evans & Associates conducted a natural resources inventory of the Preserve, focusing on sensitive habitats most likely to contain listed plant species. Fieldwork included botanical surveys in 2008 and 2009, as well as documentation of local threats to ecosystems, habitats, and species, including locations of invasive plant species, potential Sudden Oak Death infestations, and Douglas-fir encroachment. Natural resource management opportunities are identified pertaining to invasive species management, sensitive habitat preservation, potential restoration sites, suitable parking areas, and principle viewsheds. Photo-documentation of the property includes photographic examples of natural resource problems, rare plants, representative habitat types, view-sheds, human development, roads, and trails. A GPS unit was used to document sensitive features and photo locations. Rob Evans conducted surveys during the spring bloom season in 2010 – 2014, and in 2016 and 2017 to monitor the federally endangered Clara Hunt's milk-vetch populations on the property. During the summer months of 2014 he re-surveyed the Preserve to update the spatial data for the priority non-native species' locations and extent. The botanical survey confirmed the occurrence of a variety of plants on the Preserve: 56 families, 231 genera, and 346 species were documented. Of the 346 total species, 267 are native to California and 76 non-native; 42 of the latter are considered "invasive." Six of the native species are designated "rare" by the California Native Plant Society (CNPS).

Tom Origer & Associates

Tom Origer & Associates conducted a historical and archaeological resources survey of the Preserve for Ag + Open Space. The study included archival research at the Northwest Information Center and Sonoma State University; consultation with the Native American Heritage Commission and local Native American representatives; field inspection of the project location; and written resources documentation and reports. Field surveys conducted by Tom Origer & Associates in 2008 found four of the six previously documented prehistoric sites. In addition, one prehistoric site, six historic period sites, two stone fences, and four isolated finds were identified on the property. These sites were re-surveyed in 2018 by Tom Origer & Associates.

1.7.2 Public Participation in Planning

Ag + Open Space hosted a public meeting February 18, 2015 at the Rincon Valley Library Community Meeting Room. It was attended by 52 people. Ag + Open Space presented the draft management plan, and offered the public the opportunity to provide input and comments on the management actions proposed by Ag + Open Space (Appendix 3, Public Comment).

1.7.3 Management Plan Updates

This plan is a "living" document: as more information from assessments of the Preserve's natural resources and monitoring results from implementation projects become available, this management plan will be revised to better protect resources and provide recreational opportunities for the area's residents. Outputs from implementation projects, including monitoring and reports, will be used to refine Ag + Open Space's management approach and redirect implementation projects if necessary. An evaluation framework has been developed (Section 4.7, Adaptive Management) to incorporate monitoring, assessment, and research results into future iterations of the plan. Monitoring is a key component of each project's implementation, with results analyses feeding back into the evaluation framework to inform future management practices.

Effectiveness of management strategies and implementation projects will be evaluated and compared to desired outcomes, and strategies adjusted accordingly as needed. If significant new information suggests that plans are inadequate or would benefit from changes, management goals and objectives will likely be modified. The proposal of significant changes will initiate the appropriate level of California Environmental Quality Act (CEQA) compliance.

1.8 Management Plan Structure

This iteration of SMPMP is organized into five sections, with related subsections (and sub-subsections) where warranted. Main document Sections 1-5 are supported by dozens of Fig-

ures (maps) and Tables. An Appendix is provided to supplement the Plan with detailed/ site-specific information that is indispensable, though too cumbersome for placement in the main document. Studies, reports, and conversations that provide the knowledge-base for the SMPMP recommendations are listed in the References. Plan structure is summarized below.

Section 1, Introduction: Presents the planning context, including the regional setting, Preserve history, shared vision, existing efforts, and Plan development process.

Section 2, Description of Saddle Mountain Open Space Preserve: Gives a detailed overview of property boundaries and adjacent ownership; access points and roads; built infrastructure and historical relics; cultural significance and land use; natural disturbance regimes; topography, geology, and soils; climate and water resources; vegetation communities and habitats; and wildlife and plant species.

Section 3, Overview of Resource Management Issues: Synthesizes results from studies (including on the Preserve) to reveal several management concerns that impair Saddle Mountain conservation value. Three issues have become the priority focus of this Plan and the recommended projects proposed herein: (1) erosion and sediment delivery, (2) invasive, non-native plants, and (3) fire and fuels management. Issues that require monitoring and assessment in the long-term, but are not of immediate treatment concern (e.g. oak mortality, fire hazard, cultural resources, human use impacts) are also described.

Section 4, Potential Management Strategies: Describes a number of tools that have potential for successful application by managers at Saddle Mountain in reducing the priority issues identified in the previous section (i.e. erosion, invasive species). The preferred strategies are (with some inherent overlap) enhancement of plant communities and habitats; native plant revegetation; establishment of buffer zones; restoration of landscape disturbance processes; management of visitor use impacts; and ongoing monitoring and evaluation.

Section 5 Priority Project Implementation: Proposes a collection of projects to implement specific, high-priority actions to achieve the goals of the SMPMP. The projects highlighted in this section are organized into four broad categories: erosion control projects, invasive species control projects, habitat enhancement projects, and fuel management projects. However, these four areas are functionally integrated in practice (e.g. control of erosion-site sediment delivery supports enhancement of sensitive habitats, and vice versa).

2. DESCRIPTION OF SADDLE MOUNTAIN OPEN SPACE PRESERVE

2.1 Location and Boundaries

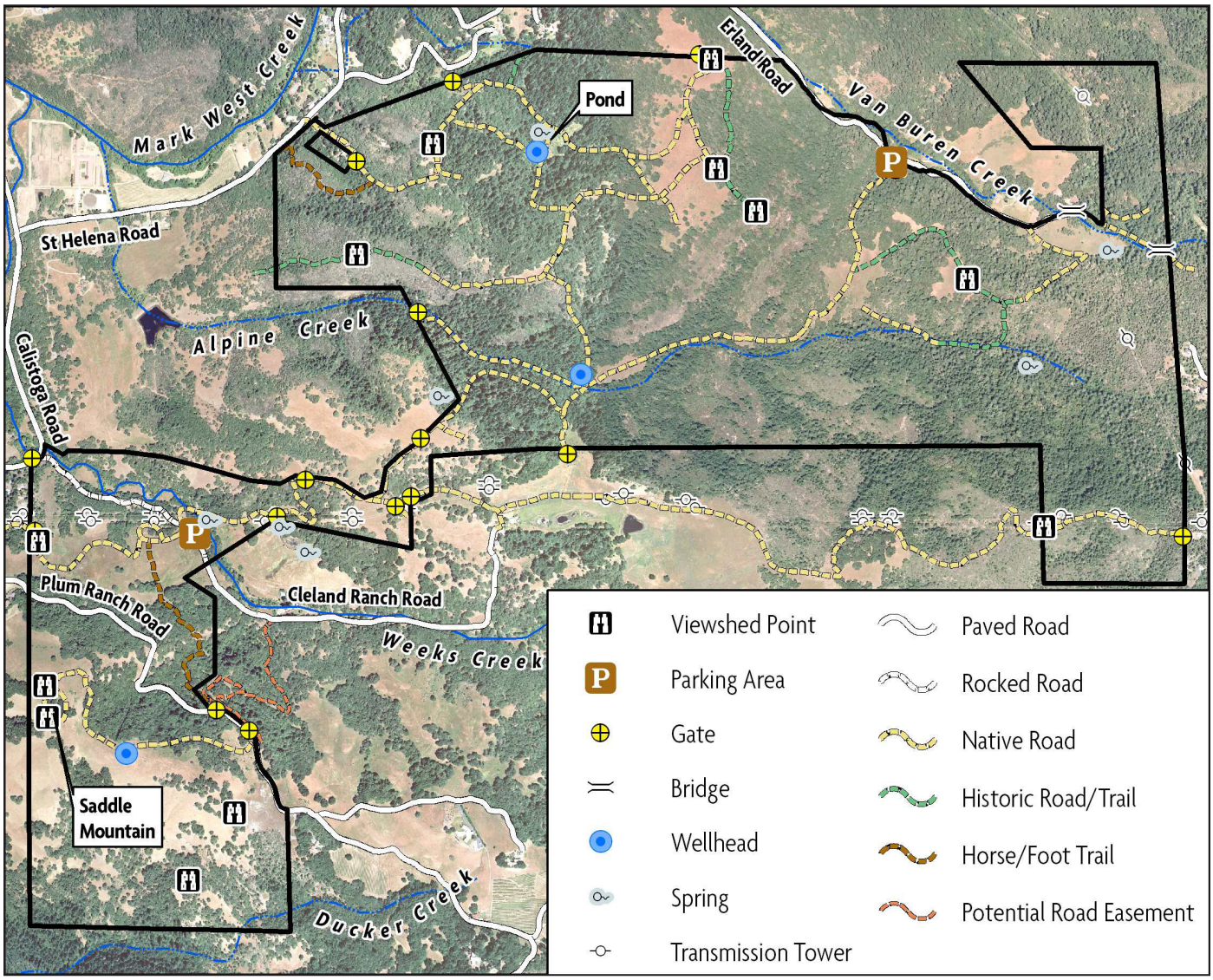


Figure 2. Saddle Mountain Open Space Preserve Base Map

The Saddle Mountain Open Space Preserve is located in the Mark West Creek and Santa Rosa Creek watersheds in the Russian River Hydrologic Unit in unincorporated eastern Sonoma County. It lies at the intersection of four USGS 7.5′ quadrangles: Mark West Springs in the northwest, Calistoga in the northeast, Santa Rosa in the southwest, and Kenwood in the southeast. The Preserve lies just north of the city limits of Santa Rosa, California. The site is accessible from Calistoga Road on Cleland Ranch Road, St. Helena Road, and via an access easement on Plum Ranch Road. Erland Road, another private road, has also been identified as an access point (Bowman Associates 2006).

2.2 Legal Features

The 960-acre Preserve consists of four Sonoma County legal parcels: Assessor's Parcel Numbers (APN) 028-390-028, 028-160-080, 028-160-044, and 028-380-008. All of these parcels are zoned Resources and Rural Development (RRD).

2.3 Adjacent Ownership

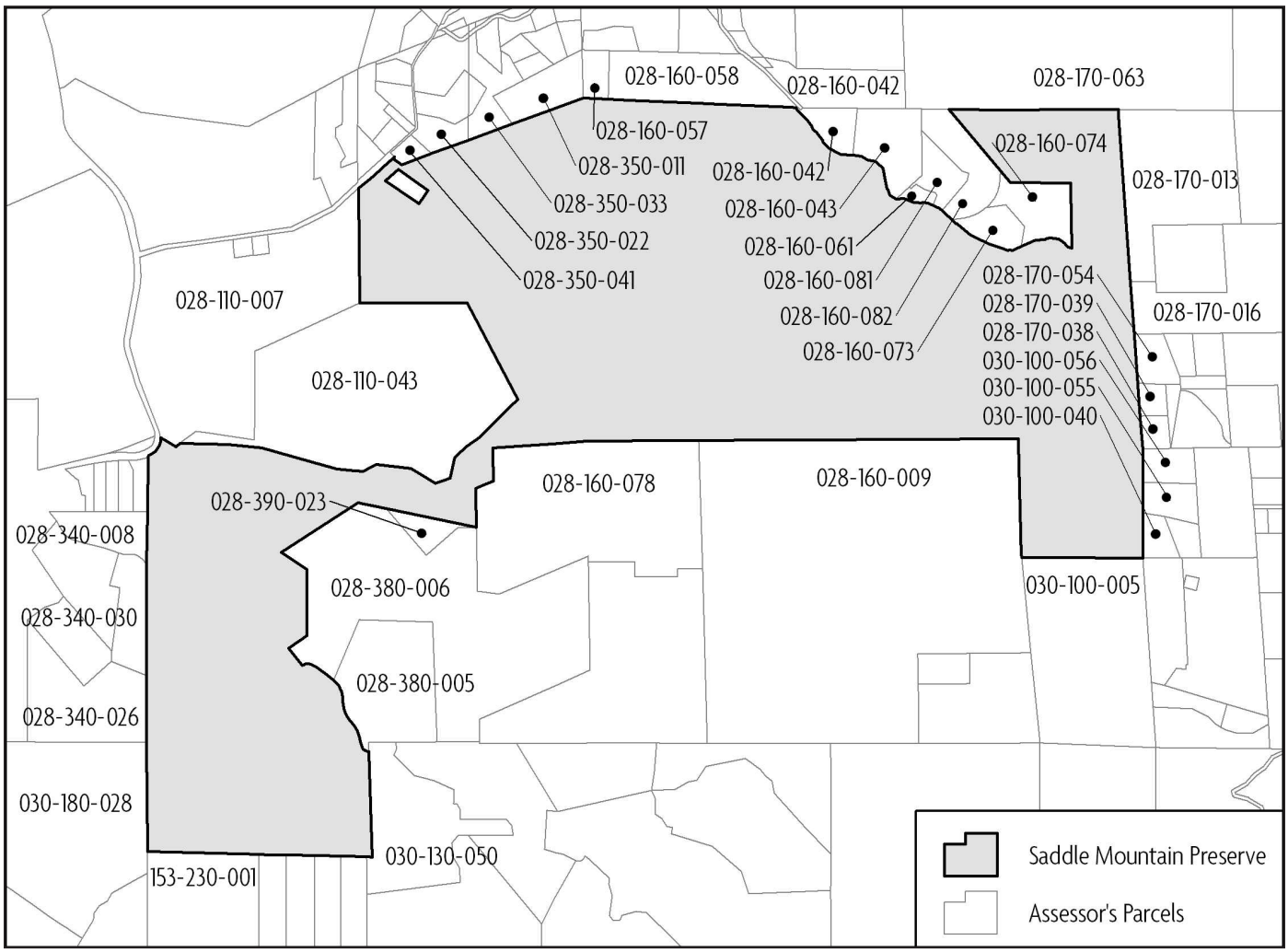


Figure 3. Saddle Mountain Open Space Preserve Parcel Map

The Saddle Mountain area is sparsely populated. Adjacent ownership consists mainly of rural residential lots varying in size from one to hundreds acres. Developed parcels generally contain single-family residences. Rincon Valley subdivisions, which contain incorporated residential city lots, border the southern portion of the property. Some of the adjacent properties consist of relatively undeveloped forest and grasslands, some are maintained as pasture or range for livestock (horses and/or cows), and a few have been intensively developed for wine-grape production. An equestrian facility at the corner of Calistoga and St. Helena Roads is the only commercial enterprise in the vicinity.

2.4 Public and Private Access

Access onto the Preserve has always been limited, as the property frontage along public roads is along two relatively small areas. There is an approximate 500-foot frontage along Calistoga Road at the junction of Calistoga Road and Cleland Ranch Road. Calistoga Road is a county maintained road and Cleland Ranch Road is private. The other public road frontage is an approximate 500-foot frontage along St. Helena Road where there is a gravel driveway leading from St. Helena Road to a private in-holding. The driveway leads to a chain across an unimproved, seasonal road that enters the property at the eastern boundary of the private in-holding at or near the property line.

Other access points are via private road easements. Plum Ranch Road, off Calistoga Road, provides access to the southern portion of the property. There is a gated, unimproved, seasonal ranch road on the property off Plum Ranch Road that leads to the summit of Saddle Mountain. Another gated, unimproved, seasonal ranch road is located on the Preserve off Erland Road. PG&E has

transmission tower maintenance road easements that access the southeastern and southwestern portions of the property.

Local residents access the Preserve via several unauthorized trails off Erland and St. Helena Roads and from adjacent properties. Currently public access is restricted to Ag + Open Space-trained volunteer patrollers and staff or partner-led outings and workdays.

Safe public access to the Preserve is limited and is available only from Cleland Ranch Road, which provides access to the southern portion of the property. Cleland Ranch Road is located at a sharp curve on Calistoga Road, and limited visibility and heavy, fast moving traffic on Calistoga Road make this turnoff extremely unsafe for access by buses or horse trailers.

Several private roads or trails provide private access points to the Preserve from neighboring properties.

- Plum Ranch Road enters the southern parcel of the property and provides access to private property located to its east. The turn onto Plum Ranch Road from Calistoga Road is very unsafe due to heavy traffic on Calistoga Road and limited visibility.
- The original property access is onto a private, unnamed road off St. Helena Road and provides access to the northern parcel.
- Along Erland Road, which is a private road that travels along the northern edge of the northern parcel, there is an access point for local residents only.
- A PG&E powerline maintenance road enters the property on the northwest side of the southern parcel and exits from the portion connecting the southern and northern parcels. This road re-enters and exits the property through the southernmost part of the northern parcel.
- A private road bridges the portion of the property that connects the southern and northern parcels. Gates on an un-named side road provide access for livestock movement to a property owner who owns property on both sides of the Preserve.
- A private road leads into the southern part of the northern parcel from private property.
- A private road enters the property on the western edge of the northern parcel from a neighboring property.
- A trail enters a northern property parcel to connect with the property trail and road network.
- A private road enters the eastern part of the northern parcel from a neighboring property just north of Erland Road.
- A horse trail developed by a neighbor enters the northern portion of the property from St. Helena Road and connects to the original property access road.

As part of the purchase transaction, Ag + Open Space completed work at the Cleland Ranch Road entrance to the property off Calistoga Road. These improvements included widening and paving the driveway apron and clearing vegetation and trees to provide clear site lines along a 250 foot distance. Additionally, Ag + Open Space completed work on Plum Ranch Road, which included paving, creating pull-outs, and constructing a fire-safe turnaround at the end on the property line.

2.5 Infrastructure

There are no structures on the Preserve, with the exception of a historic hunting cabin, an outhouse, and a cabin or barn in ruins. All of these structures are considered cultural resources. Current infrastructure is associated with previous land use, including ranching and timber operations. Historic fences from livestock ranching are mostly in disrepair; however, some fencing has been maintained by neighboring property owners who have livestock. The livestock water system has not been maintained and some of it has been lost through sale of some of the historic ranch property. There is a developed well that formerly served a trough in the saddle (Well No. 1) within the southeastern portion of the property, and a developed spring box that formerly served a galvanized cistern off Erland Road in the northeastern portion of the property. There are two capped wells along the road oriented north-south ("Wellhead Roads"), north of the Alpine Creek crossing that were presumably drilled when a subdivision was being planned for the Preserve.

Currently, Preserve visitors access the Preserve from Cleland Ranch Road off of Calistoga Road and park in a small mowed area about a half-mile into the property. This parking area can accommodate approximately 15 cars during the dry season; no improvement or expansion of this parking area is planned. Ag + Open Space installed an electric gate at the entrance to the property at Cleland Ranch Road in July 2015.

2.6 Cultural Resources

This section is included to provide information on the significance of the property from a human cultural perspective. However, the preservation of artifacts *in situ* and the restoration of built structures are both beyond the scope of this Plan at present.

Two studies performed in the Saddle Mountain area in 1977 identified six prehistoric sites, two historic fences, an abandoned cabin, and nine isolated finds (Origer and Fredrickson 1977; and Stradford and Fredrickson 1977); however, only the prehistoric sites were formally recorded. Of the six previously recorded sites located on the Preserve, four were found and records updated during the 2008 and 2018 surveys conducted by Tom Origer and Associates. Historically, the property primarily lay within what was designated as "public land" lying north of the Cabeza de Santa Rosa and Los Guilicos landgrants. A review of ethnographic literature for this area found that there are no ethnographic sites on the Preserve (Barrett 1908; Kroeber 1925, 1932; McLendon and Oswalt 1978). Numerous other studies (Flynn 1981; Greene 2003; Quinn and Origer 2001; Rich and Roscoe 2006; Roop 1988, 1991, and 1992; and Soule 1984) have been performed adjacent or near to the property. These authors identify a total of three cultural resources within one-quarter of a mile of the site. Table 2.1 lists 15 archaeological and/ or historical sites documented on the Preserve.

Table 2.1 Cultural Sites Documented in 2008

SITE NAME	SITE TYPE	DESCRIPTION	LOCATION (WATERSHED)
CA-SON-926 *	Prehistoric	Obsidian flakes and obsidian projectile point fragments on a ridge	Van Buren Creek Watershed
CA-SON-951	Prehistoric	Rock shelter with obsidian and basalt flakes and fragments of mammal bone	Weeks Creek Watershed
CA-SON-952 **	Prehistoric	Obsidian flakes along a road in a swale on a ridge	Weeks Creek Watershed
CA-SON-953	Prehistoric	Obsidian flakes along a road	Alpine Creek Watershed
CA-SON-954	Prehistoric	Obsidian flakes and possible metate (grinding stone) in meadow	Alpine Creek Watershed
CA-SON-955	Prehistoric	Obsidian flakes along a road, possible historic stone fire place and building	Alpine Creek Watershed
Isolated items	Prehistoric	Three obsidian biface fragments and chert tool fragment in roadway	Alpine Creek Watershed
Power Line Scatter	Prehistoric	Obsidian flakes along a road	Weeks Creek Watershed
Coin Camp	Historic	Mid-late 20th century camp along seasonal drainage	Alpine Creek Watershed
Far West Camp	Historic	Mid 20th century camp	Alpine Creek Watershed
Fence 1	Historic	Dry-laid field stone fence	Alpine Creek Watershed
Fence 2	Historic	Dry-laid field stone fence	Alpine Creek Watershed
Plum Ranch Orchard	Historic	Small wood frame building, stone foundation, artificial pond, cistern, privy.	Alpine Creek Watershed
Pond House/ Hunting Camp	Historic	Mid 20th century camp	Alpine Creek Watershed
Way Back Barn	Historic	Collapsed barn	Alpine Creek Watershed

* Note: No evidence of this site was found due to conflicting information about its location.

** Note: Site was visited but no evidence of prehistoric archaeological site indicators was found.

2.7 Current and Historic Land Use

Land use on the Preserve is currently limited to patrolling of the property by volunteers trained by Ag + Open Space. The District also offers approximately 4 public outings a year, led by entities contracted by Ag + Open Space, as well as approximately 6 workdays a year, and 2 trainings a year for people interested in becoming volunteer patrollers on the Preserve. Neighboring residents who live along Erland Road and are trained volunteer patrollers may access the Preserve on horseback.

Early occupants of Saddle Mountain presumably had an economy based largely on hunting, with limited exchange, and social structures based on extended family units. Later, milling technology and an inferred acorn economy were introduced. Both historic and modern human use patterns and natural resource management techniques have altered the property's landscape. The Preserve was a likely place for prehistoric occupation, as it has fresh water sources, well-drained soils, and a mosaic of grassland and woodland, which created an environment rich in natural resources. These features suggest that the property may have been utilized for hunting, resource gathering, and day-to-day activities (Barrow and Origer, 2008).

Since Europeans arrived, logging, land clearing, importation of livestock, and fire suppression have resulted in major changes in the property's vegetation patterns (Hill, 1978). The land was owned for several generations by the Merner family and known by various names (including Merner Lumber Company, Inc., Progress Lumber Company, Inc., and Merner Land Company, Inc.; Bowman and Associates, 2006). Much of the Douglas-fir and coast redwood forest has been logged, and multi-stump growth patterns of many of the oak stands indicate the hardwoods were most likely cut decades ago, presumably for fuel wood.

The Preserve was historically used as a livestock ranch (Bush 2008). The original ranch is located in the northeastern section of the southwestern parcel. Livestock grazing and periodic wildfires prevented the establishment of tree species in the grasslands of the property (Elgar Hill 1978). Other uses of the land have included timber production. While conducting field inspections of the ranch, archeological field crews searched for charcoal-making features that are fairly common in the hills east and north of Santa Rosa. Charcoal making results in features on the landscape that consist of circular level areas some 20 to 40 feet in diameter. These features, often situated on gentle slopes, also are marked by abundant small pieces of charcoal on and just below the ground surface. No archaeological evidence was found that charcoal making took place at Saddle Mountain Ranch.

2.8 Landscape Disturbance

Regular perturbations to the landscape via natural agents (e.g. wildfire, seasonal flooding, herbivores) are critical components of well-functioning ecosystems. Climate, land use, and habitat management practices influence the parameters characteristic of an area's disturbance "regimes," including its recurrence interval, location, and severity (Franklin et al. 2001, 2005). Whether a disturbance is natural, accidental, or managed, it by definition (Harrison et al. 2003) results in the removal of significant above ground biomass (e.g. dry thatch, grasses, forbs). The role of natural disturbance in maintaining species diversity and habitat viability is recognized as a central tenet of ecology, but complete understanding of cause-effect relationships that facilitate ecological resilience remains elusive. Nevertheless, maintenance of appropriate disturbance regimes has become a general practice for conservation biologists and land managers (Harrison et al. 2003).

It is observed that ecosystem function is compromised where natural disturbance regimes have been severely altered or curtailed by human activities (e.g. active fire suppression or complete exclusion of grazers). However, the magnitude of effects from highly modified regimes is not equal across habitat types (Keeley 2006). Some details on the history and effects of the most common disturbance practices (fire and grazing) are introduced below.

2.8.1 Disturbance by Fire

Human interference with natural ecological processes in California has been in place for at least twelve thousand years (Anderson, 2005). According to paleoecologists, California's oak woodlands replaced conifers during the transition of the late Pleistocene to the warmer Holocene epoch, approximately 10,000 years ago (Anderson, 2005). Then, approximately 2,500 to 2,800 years ago, climate conditions became cooler and moister, which favored Douglas-fir over oaks in the North Coast Ranges. Ecologists and soil scientists have concluded that regular burning by California Native Americans likely prevented the establishment of Douglas-fir in oak woodlands and prairies.

The Preserve shows evidence of repeated low intensity fires, which may have been naturally caused by lightning or deliber-

ately set by settlers or Native American residents. These low-intensity fires served to maintain grasslands, facilitate the gathering of acorns in oak woodlands, enhance game species habitat, reduce insect pest populations, and reduce fuels and the occurrence of catastrophic fires (Allen-Diaz et al. 2007, Biswell 1989). In California, only desert ecosystems were not regularly ignited (Bartolome et al. 2007). Thus, when people of European ancestry first arrived in California, they often did not find a pristine wilderness, but rather a managed landscape that was the result of thousands of years of intentional burning, selective harvesting, tilling and sowing, pruning, weeding, and transplanting.

The policy of wildfire suppression since 1935 has led to the establishment of Douglas-fir over much of the open habitat of what is now the Preserve. By 1935 state and local governments initiated programs to rapidly extinguish all wildfires in or near populated areas. Ecological changes that are directly attributable to or exacerbated by fire exclusion include:

- Coastal Oak Woodland habitat type on the Preserve is being encroached upon by Douglas-fir and is now classified Montane Hardwood-Conifer. Oak-dominated woodlands and forests are likely to transition to Douglas-fir dominated, with California bay becoming dominant in some locations.
- The Montane Hardwood habitat of oak, madrone, and bay trees is being invaded by Douglas-fir (Northen 1992b).
- In the chaparral, the trend is toward replacement of chamise with oak as the dominant species; however, the presence of Sudden Oak Death (SOD) on the property may change the direction of this successional trend.
- Douglas-fir and Redwood forests are likely stable in the near term, even in absence of fire, due to the longevity of these species (Moritz 2003) and the general resistance of forests versus grasslands to exotic species invasions (Keeley 2006).
- Grasslands are likely to diminish with encroachment of Douglas-fir or pioneer shrubs such as coyote brush (*Baccharis pilularis*): Cessation of annual burning on a grassland site in Berkeley resulted in an increase in ripgut brome and coyote brush and the eventual extirpation of purple needlegrass (*Nasella pulchra*) from the site (Bush 2008).

Photo 3. Coastal Oak Woodland being encroached upon by Douglas-fir

2.8.2 Disturbance by Grazers

The grazing ecology of California's grasslands extends back millions of years into the Tertiary Period. Present day relationships between grassland plants and grazing animals are strongly linked to these prehistoric associations (Edwards 1996). There is strong evidence that many of California's present-day genera of native perennial grasses evolved over millions of years with the extensive megafauna that once populated California (e.g. mastodon, mammoth, camel, llama, bison, elk, pronghorn, and horses). Modern grass genera that have been found associated with local fossil remains include wheatgrass (*Agropyron*), and oatgrass (*Danthonia*). Over the 10,000 years since the last ice age, the only large native grazers present in this part of California have been elk, which have been extirpated from much of the state.

It is an observable fact that since intensive ranching ended at Saddle Mountain, more grassland acreage has become the thatchy host of coyote brush. In certain instances, light grazing in oak woodland is thought to maximize some measures of local biodiversity (Allen-Diaz et al. 2007). Studies have documented the complete conversion of grassland to coyote brush-dominated coastal scrub in several locations in the bay area where grazing has ceased (Bartolome et al. 2007). However, the long-term effects of these changes are unknown and may include both positive and negative results. Managers at Saddle Mountain should determine case by case whether or not the ongoing physical encroachment of native shrubs (coyote brush) and trees (Douglas fir) into former rangeland areas presents a priority challenge that warrants action, or if unfacilitated habitat conversion to woody-type vegetation is acceptable.

2.9 Topography and Elevation

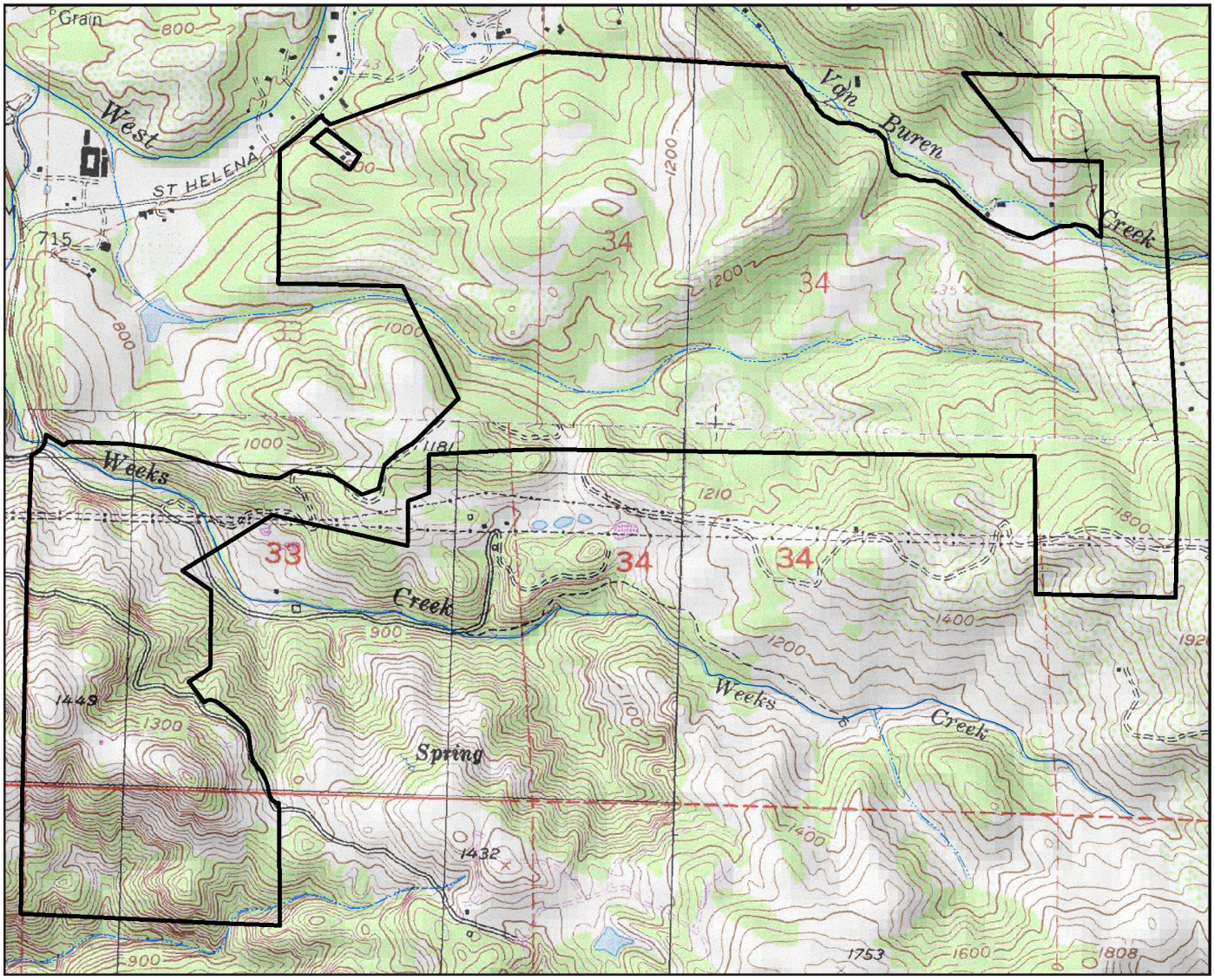
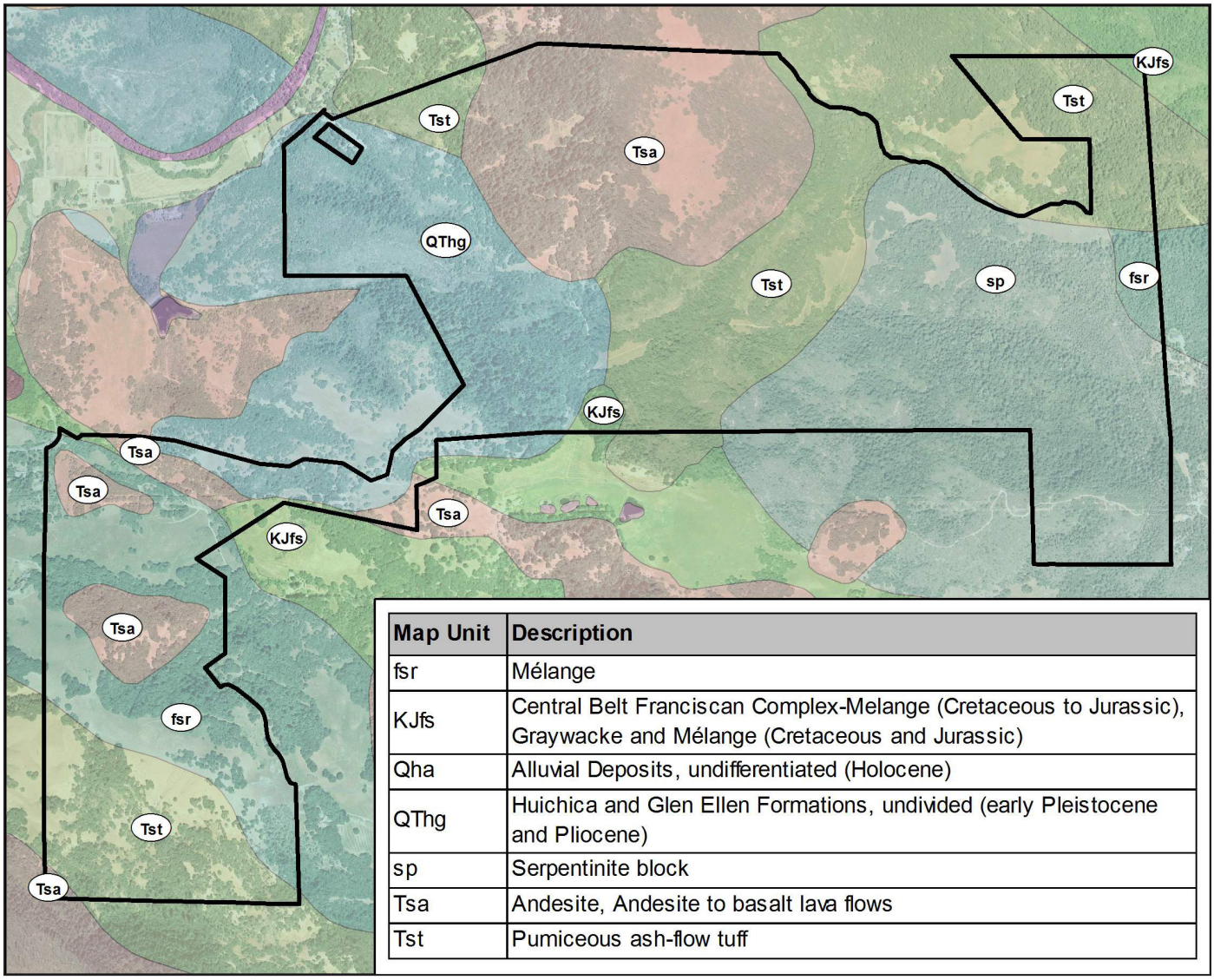


Figure 4. Topography

Elevations on the Preserve range from 760 feet (233 meters) above sea level near St. Helena Road to 1,800 feet (549 meters) in the southeast corner of the property. In the southwestern parcel, the highest point is approximately 1450 feet (442 meters) above sea level on one of the two peaks that form the "saddle" for which the mountain is named. The Preserve contains numerous steep ridges trending in an east-west direction divided by steep canyons carved by creeks. Elevation changes are steeper and occur in shorter distances in the southwest quadrant; the northeast quadrant tends towards more gently rolling topography.

2.10 Geology and Soils



Map Unit	Description
fsr	Mélange
KJfs	Central Belt Franciscan Complex-Melange (Cretaceous to Jurassic), Graywacke and Mélange (Cretaceous and Jurassic)
Qha	Alluvial Deposits, undifferentiated (Holocene)
QThg	Huichica and Glen Ellen Formations, undivided (early Pleistocene and Pliocene)
sp	Serpentinite block
Tsa	Andesite, Andesite to basalt lava flows
Tst	Pumiceous ash-flow tuff

Figure 5. Geology

2.10.1 Geologic Units

The main geologic units underlying the Preserve are the Franciscan Complex and Sonoma Volcanics. Other parts of the property are composed of Glen Ellen and Merced Formations. The Glen Ellen Formation has been mapped along the northwest edge of the southwestern portion of the property (Giblin and Associates 2003a, Elgar Hill 1978).

The Sonoma Volcanics

This unit contains mostly pale volcanic ash that is thought to have erupted from multiple sources near the town of Calistoga during the late Miocene to late Pliocene period. The Sonoma Volcanic rocks, together with the Clear Lake Volcanics, represent the northernmost occurrences of exposed volcanic rocks in the California Coast Ranges and are associated with the movement of the San Andreas Fault (Berkland 2001, Moores and Moores 2001, Alt and Hyndman 2000). Since deposition, the Sonoma Volcanics has undergone uplift and deformation due through faulting and folding (Giblin and Associates 2003b, Elgar Hill 1978).

The Franciscan Complex

This unit consists of an assortment of sedimentary rocks and basalt ocean floor jumbled together and compressed under great pressure in the oceanic trench during the Late Jurassic through Early Tertiary and thrust to the surface during uplift (Alt and Hyndman 2000). The serpentine masses that occur in distinct patches on the property are part of the Franciscan geology

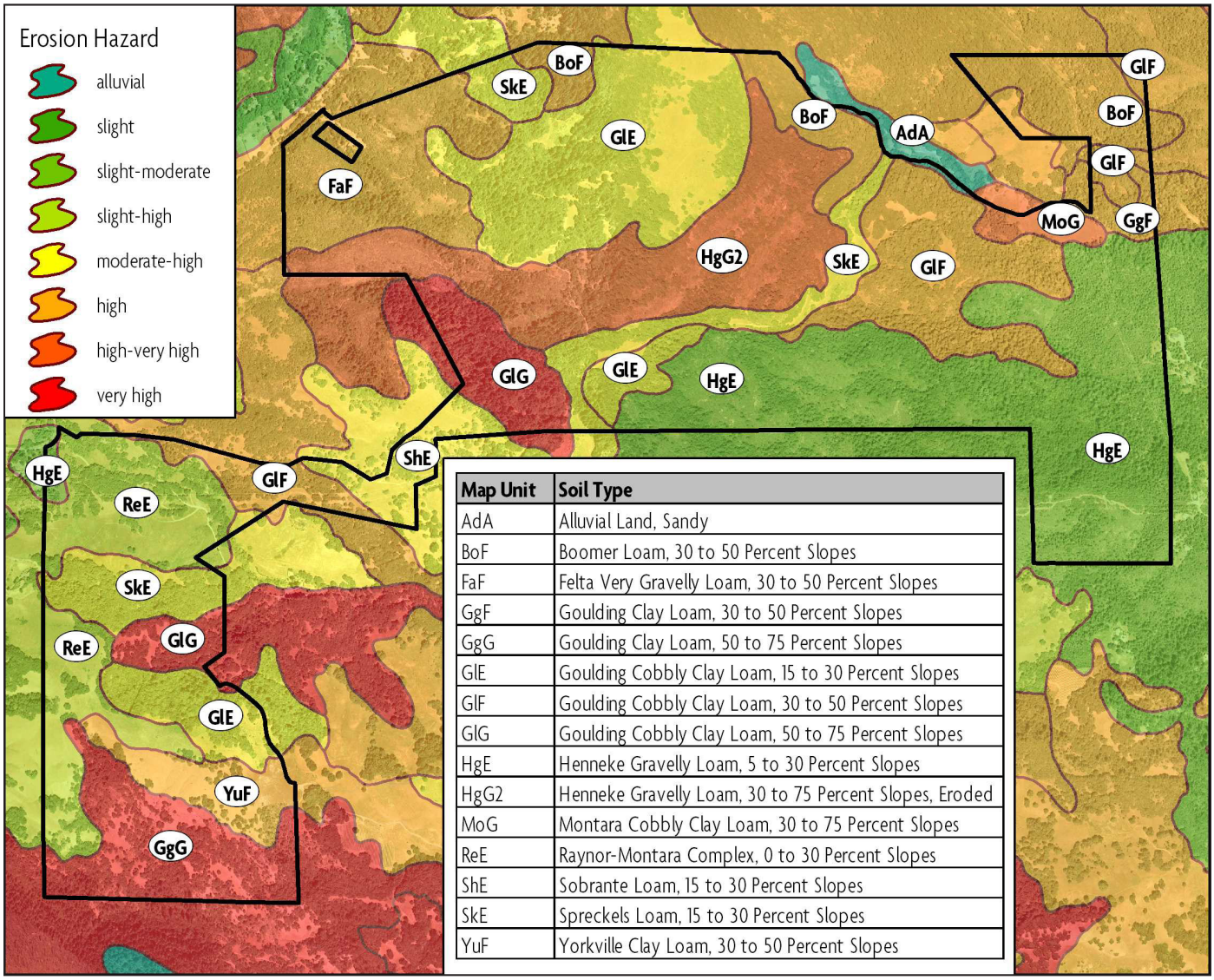
(Elgar Hill 1978). The Franciscan Complex underlies the Sonoma Volcanics formations throughout the property (Dwyer 1992).

The Glen Ellen Formation

This unit was created toward the end of the Sonoma Volcanics Formation period and is composed mostly of sedimentary rock deposited under lagoon and delta conditions. This layer contains lenses of gravel, sand, silt, and clay varying in thickness and extent (Wagner et al 2003, DWR 2004). The Glen Ellen Formation often overlays Sonoma Volcanics and, together with the Merced Formation, contains the principal water body in the Santa Rosa Valley Groundwater Basin (DWR 2004).

The Glen Ellen Formation and the Franciscan Complex are both easily eroded, leading to relatively frequent landslides (for example, in the southwest quarter of the property, occurring mainly in Franciscan sediments, Elgar Hill 1978). The Sonoma Volcanics Formation is much more stable with infrequent landslides (Laurel Marcus and Associates 2004). Fifteen soil types have been identified on the property (Figure 6. Soils); most of these soils have a high erosion hazard with rapid runoff potential. Two major geologic faults have been mapped on the property; one is a major thrust fault trending northwest (Giblin and Associates 2003a).

2.10.2 Soil Types



Map Unit	Soil Type
AdA	Alluvial Land, Sandy
BoF	Boomer Loam, 30 to 50 Percent Slopes
FaF	Felta Very Gravelly Loam, 30 to 50 Percent Slopes
GgF	Goulding Clay Loam, 30 to 50 Percent Slopes
GgG	Goulding Clay Loam, 50 to 75 Percent Slopes
GlE	Goulding Cobbly Clay Loam, 15 to 30 Percent Slopes
GlF	Goulding Cobbly Clay Loam, 30 to 50 Percent Slopes
GlG	Goulding Cobbly Clay Loam, 50 to 75 Percent Slopes
HgE	Henneke Gravelly Loam, 5 to 30 Percent Slopes
HgG2	Henneke Gravelly Loam, 30 to 75 Percent Slopes, Eroded
MoG	Montara Cobbly Clay Loam, 30 to 75 Percent Slopes
ReE	Raynor-Montara Complex, 0 to 30 Percent Slopes
ShE	Sobrante Loam, 15 to 30 Percent Slopes
SkE	Spreckels Loam, 15 to 30 Percent Slopes
YuF	Yorkville Clay Loam, 30 to 50 Percent Slopes

Figure 6. Soils

Edaphic (e.g. "serpentine") soils occur on the Preserve and support serpentine-adapted plant species, some of which are endemic to Sonoma County (Best et al. 1996). Such soils, derived from serpentinite, typically have nutrient profiles that include low levels of nitrogen, potassium, phosphorous, and calcium; high levels of magnesium; and imbalances in heavy metals (Kruckberg 1984). Soil map units occurring on the property that include serpentine-derived soils are Montara cobbly clay loam (30 to 75 percent slopes), Raynor-Montara complex (zero to 30 percent slopes), and Yorkville clay loam (30 to 50 percent slopes) (Bush 2008). Other soil types are described in Table 2.2.

Table 2.2. Soil Types and Commonly-Associated Vegetation Communities

CODE	SITE TYPE	SLOPE CLASS	EROSION HAZARD	RUNOFF POTENTIAL	TYPICAL LAND USE	COMMUNITY OCCURRENCE
BoF	Boomer Loam	30 – 50%	High	Rapid	Timber, limited grazing	Mixed evergreen forest
FaF	Felta Very Gravelly Loam	30 – 50%	High	Rapid	Range	Oak woodland
GgF	Goulding Clay Loam	30 – 50%	High	Rapid	Range	Grassland, oak woodland, chaparral
GgG	Goulding Clay Loam	50 – 75%	Very High	Rapid	Range	Grassland, oak woodland, chaparral
GIE	Goulding Cobbly Clay Loam	15 – 30%	Moderate to high	Medium to rapid	Range	Grassland, oak woodland, chaparral
GIF	Goulding Cobbly Clay Loam	30 – 50%	High	Rapid	Range	Grassland, oak woodland, chaparral
GIG	Goulding Cobbly Clay Loam	50 – 75%	Very high	Very rapid	Range	Grassland, oak woodland, chaparral
HgE	Henneke Gravelly Loam	5 – 30%	Slight to moderate	Slow to medium	Watershed, wildlife habitat, minimal grazing	Chaparral, serpentine chaparral, grassland, serpentine grassland
HgG2	Henneke Gravelly Loam	30 – 75%	High to very high	Rapid	Watershed, wildlife habitat, limited forage: cattle and sheep	Chaparral, serpentine chaparral, grassland, serpentine grassland
MoG	Montara Cobbly Clay Loam	30 – 75%	High to very high	Rapid to very rapid	Limited range, watershed, wildlife habitat, recreation	Grasslands, limited chaparral
ReE	Raynor-Montara Complex	0 – 30%	Slight to high	Slow to rapid	Range and pasture	Grassland, oak woodland
ShE	Sobrante Loam	15 – 30%	Moderate to high	Medium to rapid	Range, minimal use as orchards	Grassland, oak woodland
SkE	Spreckels Loam	15 – 30%	Moderate to high	Medium to rapid	Range and pasture	Oak woodland
YuF	Yorkville Clay Loam	30 – 50%	High	Rapid	Range, some wildlife cover & watershed.	Grasslands, oak woodland

2.11 Climate and Precipitation

The climate of Saddle Mountain is typical of Mediterranean climates with cool, wet winters and hot, dry summers. Temperatures are moderate, with monthly averages in nearby Santa Rosa ranging between 37 and 66 °F (3 to 19°C) during the winter and between 50 and 83 degrees °F (10 to 28°C) during the summer. Extreme temperatures have been recorded at 15 °F (-9°C) in December 1932 and 110 °F (43°C) in September 1971 and July 1972 (Western Regional Climate Center 2008).

Precipitation occurs mainly as rain; snowfall and hail occur infrequently and melt almost immediately. Average annual precipitation in Santa Rosa is 30.5 inches (775 mm) and mostly occurs between October and April (Western Regional Climate Center 2008). Giblin and Associates (2003b) report that precipitation on the Preserve averages about 45 inches (1,143 mm per year), although variability among and between years is common with drought and flood conditions alternating at irregular intervals.

2.12 Water Resources

2.12.1 Surface Waters

The Preserve contains portions of four creeks (Alpine, Ducker, Van Buren, and Weeks Creeks), as well as several of their unnamed tributaries. They are described below:

- The headwaters of Alpine Creek are located in the property's mountainous northeastern parcel. The Alpine Creek subwatershed encompasses roughly 380 acres (0.59 mi^2, 1.54 km^2) in the central portion of the property, ultimately flowing into a reservoir on an adjacent property. From there, an outlet stream crosses St. Helena Road and drains into Mark West Creek. Springs near the head of Alpine Creek provide the water source for summertime flow, which was estimated in 2002 at 10 to 20 gallons per minute (Giblin and Associates 2003b).

Photo 4. Alpine Creek with mature riparian habitat

- Ducker Creek drains a small area in the far southeastern corner of the southwestern parcel; it empties into the Santa Rosa Creek watershed.

Photo 5. Ducker Creek Drainage

- Van Buren Creek drains roughly 125 acres (0.20 mi^2, 0.51 km^2) of the northeastern portion of the property and flows to the Mark West Creek; it is a seasonal creek (i.e. dry during the summer months with only isolated reaches containing very low perennial flow or remnant pools remaining as refugia for aquatic wildlife).

Photo 6. Bridge over Van Buren Creek

- The Weeks Creek subwatershed drains approximately 170 acres (0.27 mi^2, 0.69 km^2) in the southern portion of the project area. Weeks Creek flows into Mark West Creek just north of the intersection of St. Helena and Calistoga Roads. Weeks Creek is seasonal.

Photo 7. Weeks Creek bank erosion

A number of springs were identified within and adjacent to the Preserve during the groundwater assessment (Giblin and Associates 2003a):

- Two small springs are located near the boundary between the overlying Sonoma Volcanics/Glen Ellen rocks to the north and the Franciscan Complex to the south. One of these springs drains to Weeks Creek; the other has been diverted to flow into a ranch pond on an adjacent property. These springs have relatively low flows which fluctuate seasonally.
- A larger spring is located further to the east where the Sonoma Volcanics and Franciscan Complex meet; this spring historically supplied water for the ranch house on an adjacent property.
- Near the Hunting Cabin, perched water forms a small spring that feeds a small man-made and year-round pond. Additionally a vernal pool is located near the hunting cabin that provides habitat for special status plant species as well as invasive species.
- A developed spring is located near Erland Road in the northeastern portion of the Preserve.

Photo 8. Spring box and irrigation line near Erland Road

- In the headwaters of Alpine Creek, a spring flows from serpentine rock providing the majority of late season flow into the creek. In the fall of 2002, seepage from this substantial spring into Alpine Creek was estimated to be 10-15 gallons per minute.

2.12.2 Groundwaters

Although the Glen Ellen Formation is an important groundwater source in the Santa Rosa Valley Groundwater Basin, its capacity to produce groundwater within the project area is limited and most of the aquifers are within zones in the Sonoma Volcanics containing open and interconnected fractures (Giblin and Associates 2003a). The low permeability of the Franciscan Complex, which underlies the Sonoma Volcanics and Glen Ellen Formations, along with the two project area faults (Section 3.10, Geology and Soils), act as barriers to groundwater movement. Groundwater recharge, which is a function of the amount and intensity of rainfall, slope, and soil permeability, was estimated by Giblin and Associates (2003); potential recharge area is limited to the area of volcanic rock and fractured inclusions within the Franciscan Complex.

Existing groundwater wells on and adjacent to the Preserve are described below:

- The southwest portion of the Preserve contains a primary well located at an elevation of about 1,350 feet (411 m) on a ridge in the southwest portion of the property (Figure 2, Saddle Mountain Open Space Preserve Base Map). Standing water level was at a depth of 430 feet (131 m) when the well was constructed in 1996 and the well was set at a depth of 504 feet (154 m) below the ground surface. It has not been utilized to any significant degree. This well was tested in 2002 and reported to have sufficient capacity to supply water for only a portion of the then-proposed housing development project (Giblin and Associates 2003a).
- The northeast parcel contains two wells; one is about 50 (15 meters) feet north of Alpine Creek in the western portion and the other is 2,300 feet (701 meters) north of the first. These wells draw water from depths ranging from 120 to 340 feet (37-104 meters) deep from fractured volcanic rock.
- Numerous offsite neighboring wells were identified and were reported to be between 200 and 500 feet (61-152 meters) deep and individually provided sufficient water for single-family residential use. The wells were mostly drilled within Franciscan and Volcanic Formations and believed to contain water due to the fracture zones between the two Formations.

2.12.3 Stream Depth and Flow

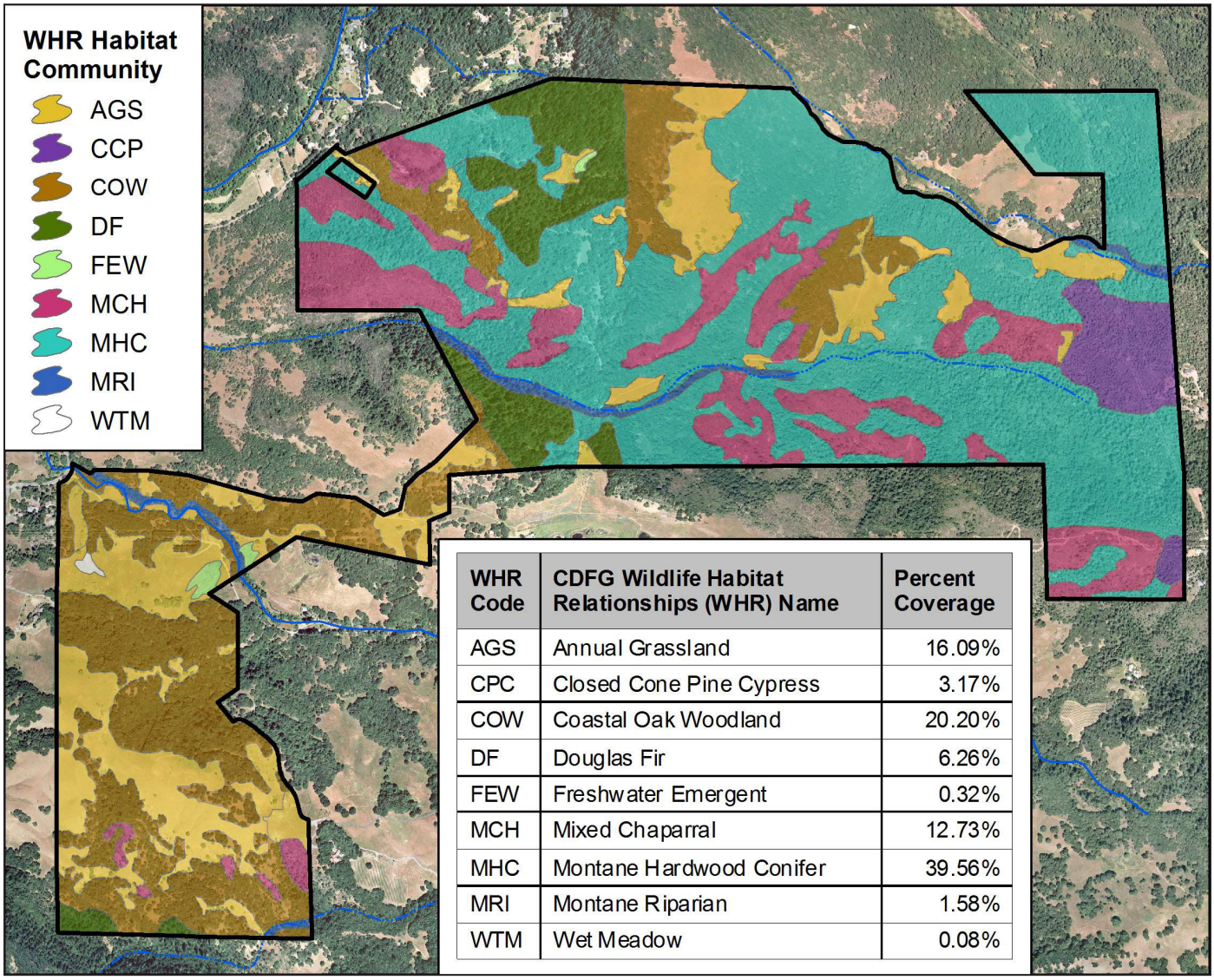
Based on the Mark West Creek Tributaries Stream Inventory Report (2006), which included measurements conducted on Weeks and Van Buren Creeks during the 1997 inventory, DFG noted a small percentage of pools (three percent and eight percent, respectively, of the assessed reaches of Weeks and Van Buren) and an even smaller ratio of primary (i.e. at least two feet deep) pools (one percent and 11 percent, respectively) of the assessed reaches of Weeks and Van Buren Creeks. In addition, in both Weeks and Van Buren Creeks, 100 percent of the pool tail-outs measured had embeddedness ratings of either three or four; only cobble embeddedness measured to be 25 percent or less (a rating of one is considered best for the needs of salmon and steelhead). Both the lack of pool depth and the high embeddedness ratings indicate a need for assessing and reducing sediment inputs into the property's creeks.

Stream flow, particularly through the late summer months, is a critical habitat issue in the upper Mark West Creek watershed and its tributaries. Even small surface reservoirs and low-volume diversions can exacerbate stream-drying in spring and summer (Deitch et al. 2008, 2009). Any land use changes proposed to the Preserve should be evaluated in terms of the potential water demand and projects developed in conjunction with a renewable water source such as winter water storage.

2.12.4 Dams and Impoundments

There is a small man-made pond within the northern portion of the Preserve near the hunting cabin that captures water from a nearby seep. The pond and associated dam at neighboring Hayfork Ranch, downstream of the property along Alpine Creek may serve as a barrier to fish passage, though resident fish were observed during field assessments in 2008.

2.13 Vegetation Communities



WHR Code	CDFG Wildlife Habitat Relationships (WHR) Name	Percent Coverage
AGS	Annual Grassland	16.09%
CPC	Closed Cone Pine Cypress	3.17%
COW	Coastal Oak Woodland	20.20%
DF	Douglas Fir	6.26%
FEW	Freshwater Emergent	0.32%
MCH	Mixed Chaparral	12.73%
MHC	Montane Hardwood Conifer	39.56%
MRI	Montane Riparian	1.58%
WTM	Wet Meadow	0.08%

Figure 7. Vegetation Communities

The Preserve contains ten vegetation communities, as identified by the California Department of Fish and Wildlife Habitat Relationships database, and corroborated during field reconnaissance conducted in May 2008. The boundaries of the habitat types on (Figure 7, Vegetation Communities) are general in nature and should not be used, for example, to delineate the presence or location of any jurisdictional wetlands. Although distribution of plant-life on the Preserve is complex, patterns exist:

- North-facing slopes on the property are predominantly forested while warmer, sunnier south-facing slopes contain open grassland, oak savannah, and chaparral.
- South of the saddle in the Weeks Creek watershed, vegetation is mostly a mixture of oak woodland and grasslands, while to the north vegetation is dominated by Douglas-fir, oaks, and other hardwoods.
- Chaparral is scattered throughout the property, primarily on ridgelines and south- southwest oriented slopes.
- Annual grassland, including a diversity of remnant native perennial grasses, occurs in fairly large expanses in the southwestern portion of the property and in smaller scattered patches in the northern portion.

Photo 9. Forested north-facing slope, oak savannah on south-facing slope, annual grassland

The Botanical Survey List (Appendix 4) compiled for this plan should be considered as a work in progress, as new species will likely be documented in the future. It is recommended that future botanical work focus on additional plant communities that are most likely to have listed or otherwise rare plants, including serpentine grassland, serpentine chaparral, vernal pool, and closed-cone pine-cypress. Recommended timing for botanical surveys is the beginning of February and continuing through June. Fieldwork was conducted on the Preserve from April to September 2008, and February to June 2009, which was an unusually dry period with almost no rainfall.

A total of 42 invasive plant species were documented on the Saddle Mountain property (Appendix 9, Invasive Plant Species List, and Figure 12, Invasive Plant Species). These species vary in their ecological impact, distribution, and invasive potential. Invasive plants, sometimes referred to as "transformer" species, displace native species, change plant community structure, and reduce the value of habitat for wildlife (Bossard et al, 2000). Invasive plants may also disrupt physical ecosystem processes such as fire regimes, erosion and sedimentation, nutrient cycling, and light availability. Native habitat types will exhibit variable susceptibility and response to invasive species.

2.13.1 Annual Grassland (AGS)

Annual grassland habitat covers approximately 16 percent of the Preserve. It occurs extensively throughout the southwestern portion of the property and in isolated patches in the northeastern portion. AGS on the Preserve, particularly in areas with thicker soils, is generally dominated by non-native species, although in areas with thin, rocky, or serpentine soils there are a high proportion of native perennial grasses. The Preserve's steep topography has precluded cultivation, which elsewhere has been responsible for eliminating native perennial grasslands. Overall grassland species composition and structure vary, depending on weather patterns, soil type, fire frequency, and livestock grazing patterns.

Local soil characteristics and topography strongly influence grassland species composition and production: Thin, coarse-textured, low-nutrient soils tend to support a greater diversity of native herbaceous plants because highly aggressive non-native annual grasses are less competitive in these conditions. These conditions are most extreme on soils derived from serpentinite, which typically have nutrient-poor profiles and can have imbalances in heavy metals (Kruckberg 1984). Clay-rich soils, such as Raynor clay, appear to support the highest density of medusahead.

Many grassland areas include significant components of threatened native perennial grasses. Historically, grazing by native ungulates and wildfire (anthropogenic or naturally occurring) maintained the open structure of AGS habitats. Although introduced annual grass species now dominate this habitat, it was historically dominated by native perennial bunchgrasses. Without active management, non-native annual grasses are likely to continue to dominate most native plant species (Bartolome et al. 2007). Thirty of the forty-two invasive species located on the Preserve occur in the Annual Grassland habitat type.

Photo 10. Native bunch grasses (blue wildrye)

Annual grasslands are heavily used by wildlife for foraging and nearby shrub and forested habitat often serve as shelter and breeding habitat. Reptiles known to breed in this habitat include western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus oreganus*), and mammals typical of grasslands include the

black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), American badger (*Taxidea taxus*), and coyote (*Canis latrans*). Birds likely to use annual grassland as breeding habitat include burrowing owl (*Athene cunicularia*), short-eared owl (*Asio flammeus*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*). Turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), and prairie falcon (*Falco mexicanus*) use this habitat for foraging (Kie 2005).

2.13.2 Coastal Oak Woodland (COW)

On Saddle Mountain, deciduous oaks dominate coastal oak woodland (COW) habitat, which covers about 20 percent of the landscape. COW habitat is extremely variable, both in composition and structure: The interplay of slope, aspect, soil, precipitation, and temperature leads to the formation of habitat that can resemble either savannah or montane hardwood forest. Coastal oak woodland overstory is made up of deciduous and evergreen hardwoods [Oregon oak (*Quercus garryana*), black oak (*Q. kelloggii*), blue oak (*Q. douglasii*), valley oak (*Q. lobata*), and coast live oak (*Q. agrifolia*) form both mixed and monospecific stands] with occasional conifers. The structure can be very dense with a closed canopy in mesic soils, but is sparse and open in drier soils. The shrub understory (often poison oak, *Toxicodendron diversilobum*) ranges from very dense to extremely sparse and ground cover can range from tightly packed ferns and forbs to a thick carpet of litter or even open grassland (Holland 1995).

Photo 11. Coastal oak woodland

The understory of the Coastal Oak Woodlands on the Preserve is largely made up of annual grasses and forbs, some of which are invasive. Fires historically occurred statewide throughout COW as low-intensity ground fires, so it is likely that the coastal oak woodland on Saddle Mountain experienced relatively frequent fire events. Oak recruitment is associated with fire events and has decreased since the onset of active fire suppression and cessation of the use of fire by ranchers for oak woodland management in the 1950s (Allen-Diaz et al. 2007).

Sudden Oak Death (SOD) occurs throughout the Preserve; thus, the presence of Oregon oak, blue oak, and valley oak, which are resistant to SOD, is likely to increase as coast live oak, tan oak, and black oak populations decline. The oak woodland on the property is also being threatened by Douglas-fir (*Pseudotsuga menziesii*) encroachment. If Douglas-fir continues to expand its range and becomes increasingly established, much of the COW habitat type on the Preserve will likely convert to Mixed Hardwood-Conifer forest.

COW in Sonoma County provides valuable habitat for a variety of reptile, amphibian, mammalian and avian species; in total, 215 vertebrate species of wildlife utilize this habitat for at least a portion of their life cycle. California newt (*Taricha torosa*), red-bellied newt (*Taricha rivularis*), California slender salamander (*Batrachoseps attenuatus*), northern western pond turtle (*Actinemys marmorata*), western fence lizard (*Sceloporus occidentalis*), and western skink (*Eumeces skiltonianus*) use many of the stages of coastal oak woodlands for reproduction, forage, and cover. Turkey vulture (*Cathartes aura*), white-tailed kite (*Elanus leucurus*), and red-tailed hawk (*Buteo jamaicensis*) also use coastal oak woodlands for reproduction, forage and cover. The more mature and dense this habitat is, the better its reproductive value for these birds. Coastal oak woodland also provides important habitat for Yuma myotis (*Myotis yumanensis*), big brown bat (*Eptesicus fuscus*), Sonoma chipmunk (*Neotamias sonomae*), California ground squirrel (*Spermophilus beecheyi*), black rat (*Rattus rattus*), brush mouse (*Peromyscus boylii*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), western spotted skunk (*Spilogale gracilis*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and black-tailed deer (*Odocoileus hemionus columbianus*) (CDFG CIWTG 2005). Quail, squirrels, and deer are so highly dependent on acorns for forage that a poor acorn year may be partially responsible for a temporary population decline for these species (Holland 1995).

2.13.3 Closed-Cone Pine-Cypress (CPC)

On the Preserve, Closed-Cone Pine-Cypress habitat accounts for just three percent of the area and occurs on serpentine soil in the southeastern corner of the property. CPC habitat is primarily composed of species of evergreen needle-leaved trees. Usually in CPC habitats, a single species of closed-cone pine or cypress dominates, with different associates accompanying each species. On the Preserve, Sargent cypress (*Cupressus sargentii*) is the dominant conifer and is largely associated with serpentine soil (Barbour 2007). Other serpentine-related species occurring there are leather oak (*Quercus durata*) and Sonoma ceanothus (*Ceanothus sonomensis*), the latter listed by CNPS as fairly threatened in California (1B.2). CPC habitat typically occurs within a matrix of chaparral or forest on sites that are less fertile than the surrounding soils (Jensen, 2005). On the Preserve, CPC habitat intergrades with serpentine bunchgrass habitat and serpentine chaparral (Northen 1992a).

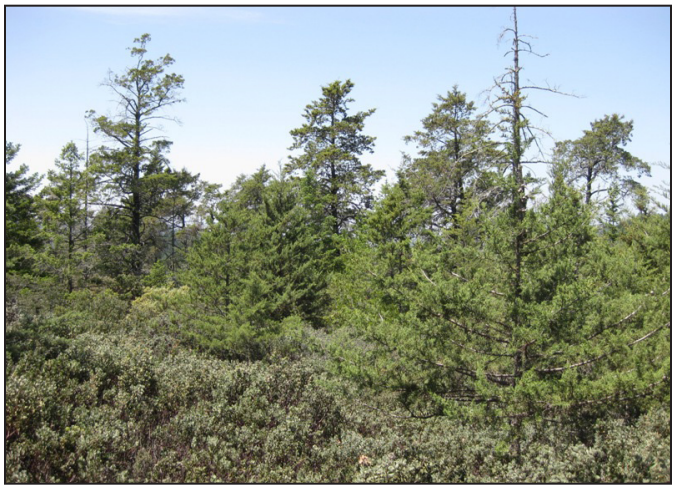


Photo 12. Closed-cone pine-cypress habitat with Sargent cypress, Sonoma ceanothus & hoary manzanita

This habitat is fire dependent: Both closed-cone pines and cypress produce serotinous cones that require the heat of fire to open and release seeds, although cones of some species will gradually open with age, with summer heat, or partially upon maturity (Barbour 2007). The full sunlight and bare soil present after fire events is conducive to seed germination and results in even-aged, dense stands of the dominant species. In the absence of fire, CPC habitat is likely to succeed to serpentine chaparral or grassland habitat due to the inability of the dominant species to reproduce in sufficient numbers to replace senescing individuals without the heat of fire. However, too-frequent fire recurrence (e.g. before the build-up of a canopy seed bank) can lead to stand extinction (Barbour 2007).

Closed-Cone Pine-Cypress habitat provides habitat for 148 vertebrate wildlife species including the western terrestrial garter snake (*Thamnophis elegans*), western skink (*Eumeces skiltonianus*), turkey vulture (*Cathartes aura*), sharp-shinned hawk (*Accipiter striatus*), American kestrel (*Falco sparverius*), peregrine falcon (*Falco peregrinus*), great horned owl (*Bubo virginianus*), and white-throated swift (*Aeronautes saxatalis*). Yellow-cheeked chipmunk (*Neotamias ochrogenys*), coyote (*Canis latrans*), long-tailed weasel (*Mustela frenata*), western spotted skunk (*Spilogale gracili*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and mule deer (*Odocoileus hemionus*) all use at least some stages of this habitat for reproduction, cover, and forage (CDFG CIWTG 2005).

2.13.4 Douglas-Fir (DFR)

Douglas-fir habitat accounts for about six percent of the vegetation cover on the property. DFR habitat varies in structure and composition according to geology, slope, aspect, soil type and moisture content, and latitude. The typical structure contains a sparse, irregular overstory of needle-leaved evergreens with a dense lower overstory of broad-leaved evergreens. In general, older stands contain a denser canopy layer while younger stands are more open.

Photo 13. Douglas fir forest

Although species composition varies, DFR habitat usually includes tanoak (*Lithocarpus densiflora*, not a "true" *Quercus* oak), and Pacific madrone (*Arbutus menziesii*) in association with various pines and oaks. DFR habitat on Saddle Mountain is dominated by Douglas-fir, usually in pure stands, but also occurs intermixed with redwood (*Sequoia sempervirens*) or madrone. The shrub layer may contain canyon live oak (*Quercus chrysolepis*), California blackberry (*Rubus ursinus*), poison oak, snowberry (*Symphoricarpos albus*), ceanothus, coffeeberry (*Rhamnus*

californica), and hazelnut (*Corylus cornuta* var. *californica*). Douglas-fir forests often intergrade with Montane Hardwood, Montane Hardwood-Conifer, Montane Riparian, and Montane Chaparral (Raphael 2005).

The Douglas-fir (DFR) habitat type on the Preserve is largely devoid of invasive species, with the exception of a small stand of Himalayan blackberry and scattered Italian thistle along Erland-Cleland Tie Road. Most of the Douglas-fir forest on the Preserve has been harvested for timber at least once. In 1970, an intense crown fire occurred in a Douglas-fir stand on the property. When allowed to spread in the absence of fire or other mechanism of control, Douglas-fir can act as an invasive, particularly in grassland habitats.

DFR habitat provides for a variety of wildlife species. In Sonoma County, 198 wildlife species utilize this habitat for at least part of their life cycle (CDFW CIWTG 2005). The distributions of northwestern, Pacific giant, Olympic, Del Norte, black and clouded salamander, tailed frog, and northwester garter snake and the distribution of Douglas-fir habitat are very similar. This habitat is critical for reproduction, cover, and forage for California giant salamander (*Dicamptodon ensatus*), California slender salamander (*Batrachoseps attenuatus*), northern alligator lizard (*Elgaria coerulea*), and rubber boa (*Charina bottae*). Common birds utilizing DFR include Pacific-slope flycatcher (*Empidonax difficilis*), chestnut-backed chickadee (*Poecile rufescens*), golden-crowned kinglet (*Regulus satrapa*), Hutton's vireo (*Vireo huttoni*), Cassin's vireo (*Vireo cassinii*), hermit warbler (*Dendroica occidentalis*), and varied thrush (*Ixoreus naevius*). Mammals that are typically associated with this habitat include fisher (*Martes pennanti*), deer mouse (*Peromyscus maniculatus*), dusky-footed woodrat (*Neotoma fuscipes*), western red-backed vole (*Clethrionomys californicus*), creeping vole (*Microtus oregoni*), Douglas' squirrel (*Tamiasciurus douglasii*), Trowbridge's shrew (*Sorex trowbridgii*), and shrew-mole (*Neurotrichus gibbsii*) (Raphael 2005).

2.13.5 Fresh Emergent Wetland (FEW)

On the Preserve, fresh emergent wetlands comprise less than one percent of land cover. The FEW habitats consist of frequently flooded wetlands characterized by erect, rooted, water-loving plants such as sedges (*Carex* sp.), rushes (*Juncus* sp.), cattail (*Typhus* sp.) and bulrush (*Scirpus* sp.). This habitat occurs in association with both aquatic (e.g. streams) and terrestrial habitats. The boundary between fresh emergent wetland and upland habitat is the delineation between mainly hydrophilic and meso- or xerophilic plant life (Kramer 1995). On the Preserve, FEW is particularly associated with the seeps and springs that naturally occur in several locations there (Section 2.12, Water Resources). FEW often occurs adjacent to vernal pool and grasslands on the property (Northen 1992).

Photo 14. Freshwater emergent wetland

Invasive species in this habitat type are primarily within the wetland/upland transition zone. Species include Himalayan blackberry, Harding Grass (*Phalaris aquatica*), velvet grass (*Holcus lanatus*), bull thistle (*Cirsium vulgare*) and pennyroyal (*Mentha pulegium*). Pennyroyal, an obligate wetland plant, is well established within the vernal pool near the hunting cabin.

Fresh emergent wetlands are among the most productive habitats in California; in Sonoma County this vegetation type provides habitat for 161 species of vertebrate animals for at least part of their life cycle (Kramer 1995, CDFW CIWTG 2005). Reptile species for which this is important habitat include the aquatic garter snake (*Thamnophis atratus*), western terrestrial garter snake (*Thamnophis elegans*), and northern western pond turtle (*Actinemys marmorata*). The California newt (*Taricha torosa*), Pacific chorus frog (*Pseudacris regilla*), California red-legged frog (*Rana draytonii*), and tiger salamander (*Ambystoma tigrinum*) utilize this habitat to a high degree for reproduction, cover, and foraging. Many migrant and resident species of waterfowl and wading birds utilize fresh emergent wetlands for all or a part of their life history. Mammals that extensively utilize this habitat include common muskrat (*Ondatra zibethicus*), marsh shrew (*Sorex bendirii*), and American mink (*Mustela vison*) (CDFG CWITG 2005).

2.13.6 Lacustrine (LAC)

On the Preserve, lacustrine habitat consists of the vernal pool and man-made pond near the hunting cabin within the northern portion of the property. Environmental conditions in these relatively calm waters contrast sharply with those of running water. Oxygen levels are usually much lower in lacustrine environments than that of rivers and streams. Vegetation along the man-made pond edge is dominated by the non-native lance-leaved water-plantain (*Alisma lanceolatum*), and also includes the invasive plant pennyroyal (*Mentha pulegium*) and the special status plant Lobb's buttercup (*Ranunculus lobbii*) (CNPS 4.2). Vegetation in the vernal pool is dominated by pennyroyal and popcorn flower (*Plagiobothrys* sp.) and also includes Lobb's buttercup.

Lacustrine habitats may occur in association with Fresh Emergent Wetlands, Riverine, and any of the terrestrial habitats. Lacustrine habitat is used by numerous species of birds, mammals, reptiles, and amphibians for food, water, cover, and reproduction (California Department of Forestry and Fire Protection 1988). A northern western pond turtle (*Actinemys marmorata*), listed as a California Species of Special Concern, was observed in the man-made pond during the botanical survey in 2009.

Photo 15. Man-made pond with berm

2.13.7 Mixed Chaparral (MCH)

On Saddle Mountain, Mixed Chaparral habitat occurs on very shallow, rocky soils with chamise (*Adenostoma fasciculatum)* as the dominant species over about thirteen percent of the property. Scrub oak (*Quercus berberidifolia*), ceanothus, and manzanita (*Arctostaphylos* spp.) are co-dominant species with toyon (*Heteromeles arbutifolia*), California buckeye (*Aesculus californica*), poison oak (*Toxicodendron diversilobum*), stunted bay-laurel (*Umbellularia californica*), northern sticky monkey-flower (*Mimulus aurantiacus*), and coffeeberry (*Rhamnus californica*) as associates or local dominants. MCH usually matures to a dense canopy layer from one to four meters in height. Herbaceous ground cover is common in young stands but becomes less frequent as stands age. Mixed chaparral intergrades with Annual Grassland, Coastal Oak Woodland, and mixed conifer habitat (England 2005b).

Photo 16. Mixed chaparral

MCH is a fire-adapted habitat. Herbaceous ground cover has a long-lived seed bank ready to sprout following fire; existing shrub cover resprouts or recolonizes from seed following fire (England 2005b). Many chaparral shrub species are considered fire dependent because seed germination is negligible after the first year postfire. Even after prolonged fire-free intervals, other vegetation communities do not replace chaparral. Instead, dominant canopy shrubs are likely to change in response to changes in fire regime (Keeley and Davis 2007). Recovery is rapid after fire; for the first 30 years, shrub cover increases and canopies begin to overlap and shrubs outcompete herbaceous species. Stands older than 25 to 35 years eventually become senescent with the rate dependent on species composition, slope, aspect, elevation, and soil type. Senescent stands tend to be highly flammable, with a lot of accumulated dead material.

The Mixed chaparral on the Preserve is largely devoid of invasive species, with the exception of a stand of French broom (*Genista monspessulana*) within a serpentine chaparral plant community along the PG&E access road and under a transmission line tower in the far eastern portion of the property. French broom is an aggressive invader and is likely to spread, particularly in disturbed areas. Mixed chaparral provides habitat for 197 species of vertebrate wildlife. This habitat has high value for western rattlesnake

(*Crotalus viridis*), common garter snake (*Thamnophis sirtalis*), common kingsnake (*Lampropeltis getula*), California whipsnake (*Masticophis lateralis*), gopher snake (*Pituophis catenifer*), and California newt (*Taricha torosa*). Mixed chaparral is valuable breeding habitat for turkey vulture (*Cathartes aura*), California quail (*Callipepla californica*), barn owl (*Tyto alba*), white-throated swift (*Aeronautes saxatalis*), Anna's hummingbird (*Calypte anna*), and rock wren (*Salpinctes obsoletus*). It also provides important habitat for brush rabbit (*Sylvilagus bachmani*), black-tailed jackrabbit (*Lepus californicus*), Sonoma chipmunk (*Neotamias sonomae*), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), skunks, mountain lion (*Puma concolor*), and bobcat (*Lynx rufus*) (CDFW CIWTG 2005).

2.13.8 Montane Hardwood-Conifer (MHC)

Montane hardwood-conifer forest is composed of conifers (at least one-third habitat composition) in the upper canopy and broad-leaved trees, usually evergreen, in the lower overstory. MHC covers about 13 percent of the landscape on the Preserve. Coast live oak, California bay, Pacific madrone, Douglas fir, and black oak dominate MHC habitat. The shrub layer contains any of several species: poison oak, hazelnut, creambush (*Holodiscus discolor*), California blackberry, and false indigo (*Amorpha californica* var. *napensis*), the latter listed by CNPS as fairly threatened in California (1B.2). Douglas-fir and California bay seedlings and saplings constitute a significant fraction of the shrub horizon in many areas of the property. The Montane Hardwood-Conifer on the Preserve is largely devoid of invasive species, with the exception of a small stand of French broom near a population of Napa false indigo along Well Head Road.

Photo 17. Montane hardwood-conifer forest

MHC forest is usually closed, with little understory except following disturbance or in ecotones between habitat types: It commonly intergrades with closed-cone pine-cypress, montane hardwood, redwood, montane riparian, and mixed chaparral. Basal fire scars are present on many of the older trees on the Preserve, indicating a long history of wildfire in this habitat with most of the fires being low-intensity ground fires. Because Douglas-fir seedlings and saplings are killed by fire but most hardwood species survive by resprouting, periodic low-intensity fires favor the presence of Montane Hardwood and Montane Hardwood-Conifer habitat (Elgar Hill 1978).

MHC habitat provides food, shelter, and reproductive opportunities for 221 species of vertebrate wildlife in Sonoma County. Western fence lizard (*Sceloporus occidentalis*), northern alligator lizard (*Elgaria coerulea*), rubber boa (*Charina bottae*), red-bellied newt (*Taricha rivularis*), and wandering salamander (*Aneides vagrans*) breed, forage, and find cover in this habitat type. Several raptor species, including osprey (*Pandion haliaetus*), sharp shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), northern goshawk (*Accipiter gentilis*), golden eagle (*Aquila chrysaetos*), and peregrine falcon (*Falco peregrinus*) reproduce in MHC, with mature stands especially suitable for nesting habitat. Mountain quail (*Oreortyx pictus*), band-tailed pigeon (*Patagioenas fasciata*), flammulated owl (*Otus flammeolus*), northern pygmy owl (*Glaucidium gnoma*), northern flicker (*Colaptes auratus*), western wood-pewee (*Contopus sordidulus*), northern rough-winged swallow (*Stelgidopteryx serripennis*), hermit thrush (*Catharus guttatus*), Cassin's vireo (*Vireo cassinii*), and western tanager (*Piranga ludoviciana*) also use this habitat extensively. Mammals for which MHC habitat is important include big brown bat (*Eptesicus fuscus*), brush rabbit (*Sylvilagus bachmani*) (in early successional stands), yellow-cheeked chipmunk (*Neotamias ochrogenys*), western gray squirrel (*Sciurus griseus*) (in mid- to late successional stands), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii*), ringtail (*Bassariscus astutus*), mountain lion (*Puma concolor*), and bobcat (*Lynx rufus*).

2.13.9 Montane Riparian (MRI)

Montane riparian habitat comprises just two percent of the property; nevertheless, viability in this zone is integral to maintaining high local biodiversity and watershed function. MRI usually presents as a narrow band of closely spaced deciduous trees with a closed overstory and variable understory. Tree species include big-leaf maple, California bay laurel, coast redwood, white alder (*Alnus rhombifolia*), and Oregon ash (*Fraxinus*

latifolia). Understory trees and shrubs may include willow (*Salix* sp.), poison oak, creambush, osoberry (*Oemleria cerasiformis*), California blackberry, and snowberry. At higher elevations, trees may drop out of this habitat with only shrubs remaining (Grenfell 1995, CRP 2003).

MRI occurs along Van Buren, Alpine, and Weeks Creeks. The riparian zone along Alpine Creek is largely devoid of invasive species. The riparian vegetation along the tributary of Ducker Creek on the property contains a limited amount of Himalayan blackberry (*Rubus armeniacus*). Weeks Creek is infested with substantial stands of Spanish broom (*Spartium junceum*) and Himalayan blackberry and lesser amounts of wild plum. Stands of greater periwinkle (*Vinca major*), English ivy (*Hedera helix*), and Himalayan blackberry are located along the reach of Van Buren Creek on the property, adjacent to Erland Road.

MRI habitat in Sonoma County provides valuable cover, reproductive potential, and forage for over 227 species of vertebrate wildlife in Sonoma County. All stages of this habitat are valuable for the aquatic garter snake (*Thamnophis atratus*), western terrestrial garter snake (*Thamnophis elegans*), California mountain kingsnake (*Lampropeltis zonata*), sharp-tailed snake (*Contia tenuis*), and southern alligator lizard (*Elgaria multicarinata*). Amphibians for which MRI habitat is essential include California giant salamander (*Dicamptodon ensatus*), red-bellied newt (*Taricha rivularis*), black salamander (*Aneides flavipunctatus*), and Pacific chorus frog (*Pseudacris regilla*). Many species of migrant and resident birds utilize this habitat as an important component of at least part of their life cycle, including black-crowned night heron (*Nycticorax nycticorax*), wood duck (*Aix sponsa*), osprey (*Pandion haliaetus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), and several other raptors, band-tailed pigeon (*Patagioenas fasciata*), several species of owls, white throated swift (*Aeronautes saxatalis*), woodpeckers, and many species of songbirds. Mammals that are typical of riparian forest include vagrant shrew (*Sorex vagrans*), ornate shrew (*Sorex ornatus*), long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), big brown bat (*Eptesicus fuscus*), and American mink (*Mustela vison*). Other mammals that regularly utilize this habitat include western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii*), common muskrat (*Ondatra zibethicus*), coyote (*Canis latrans*), black bear (*Ursus americanus*), ringtail (*Bassariscus astutus*), long-tailed weasel (*Mustela frenata*), mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), and mule deer (*Odocoileus hemionus*) (CDFW CIWTG 2005).

Photo 18. Montane riparian

2.13.10 Wet Meadow (WTM)

Wet meadow habitat is generally composed of a layer of herbaceous plants with no shrubs or trees except rarely along the edges. WTM habitat occupies about one percent of the Preserve. These habitats often spring from bog communities and in time may be succeeded by grassland/ savannah if the hydroperiod is altered or if some other environmental perturbation occurs. WTM habitats may occur as ecotones between freshwater emergent wetlands and grasslands (Ratliff 2005). Representative plant species include native California oatgrass (*Danthonia californica*) and meadow barley (*Hordeum brachyantherum*), sedges, and rushes. Invasive species within the Wet Meadow habitat type on the Preserve include moderate invasive species velvet grass (*Holcus lanatus*) and bull thistle (*Cirsium vulgare*).

Photo 19. Wet meadow

WTM is an important resource for wildlife. Wet meadow provides habitat for as many as 208 species of vertebrate wildlife. Aquatic garter snake (*Thamnophis atratus*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis*

sirtalis), California mountain kingsnake (*Lampropeltis zonata*), sharp-tailed snake (*Contia tenuis*), California newt (*Taricha torosa*), and Pacific chorus frog (*Pseudacris regilla*) utilize all stages of wet meadow for reproduction, cover, and forage. Great blue heron (*Ardea herodias*) forage in all vegetative stages of this habitat, as do many ducks and raptors. The peregrine falcon (*Falco peregrinus*) and prairie falcon (*Falco mexicanus*) use wet meadow for cover and reproduction as well as forage. Vagrant and fog shrew (*Sorex sonomae*) utilize dense wet meadow for reproduction, cover, and forage, while Botta's pocket gopher (*Thomomys bottae*), Pacific jumping mouse (*Zapus trinotatus*), and California vole (*Microtus californicus*) make use of all vegetative stages of this habitat to meet lifecycle requirements. Several predators, such as coyote (*Canis latrans*) and gray fox (*Urocyon cinereoargenteus*), forage in wet meadow habitat (CDFW CIWTG 2005).

2.14 Sensitive Habitats

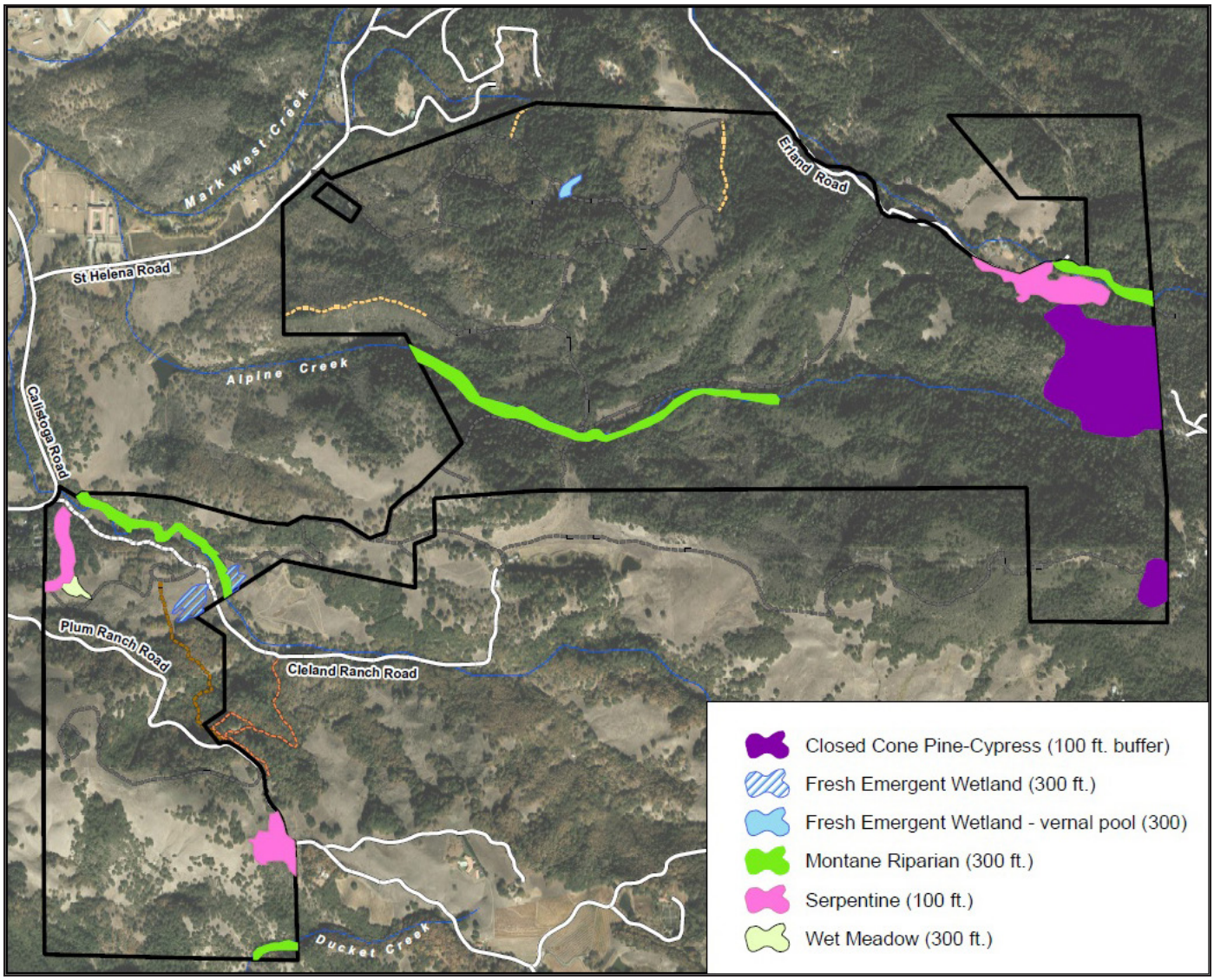


Figure 8. Sensitive Habitats

A suite of particularly significant or imperiled habitats has been identified on Saddle Mountain (Figure 8, Sensitive Habitats). Some are plant communities identified by Holland for CDFW as "rare" (Northen 1992) and others are known or suspected to support threatened or endangered species. Six of these habitats are documented on the Property: freshwater seeps, a vernal pool, valley needlegrass, serpentine chaparral, serpentine bunchgrass, and cypress forest. Instream and forest habitats support listed wildlife species (i.e. salmonids and northern spotted owl, respectively).

2.14.1 Freshwater Seeps

Freshwater seeps (Holland 45400) occur on the property, including one occupying the property's lower portions. It contains stands of *Juncus xiphioides, J. patens,* other rushes, sedge, and grasses common to wet habitat, including meadow barley (*Hordeum brachyantherum*). Off Cleland Road, between the serpentine bunchgrass habitat and meadow, is a small freshwater seep containing rush (*Juncus* spp.), sedge (*Carex* sp.) and creeping wildrye (*Elymus triticoides*) (Northen 1992).

2.14.2 Vernal Pool

A vernal pool (Holland 44000) is located near the hunting cabin within the northern portion of the Preserve. Vegetation includes Lobb's buttercup (CNPS 4.2), as well as popcorn flower, semaphore grass (*Pleuropogon californicus*), and spikerush (*Eleocharis macrostachya*). The invasive plant pennyroyal is well established within the pool, and a small patch of Himalayan blackberry is located adjacent to the pool.

2.14.3 Valley Needlegrass Grassland

The Valley Needlegrass Grassland (Holland 42110) occurs just uphill from the vernal pool (Northen 1992). The grassland contains native bunchgrasses such as purple needlegrass (*Nassella pulchra*) and California oatgrass (*Danthonia californica*). It is being threatened by coyote brush encroachment as well as invasive species, including velvetgrass, Himalayan blackberry, and bull thistle.

2.14.4 Serpentine Chaparral and Bunchgrass

Most of the property's Serpentine Chaparral (Holland 37620) and all of the Northern Interior Cypress Forest (Holland 83220) occur in the far eastern portion of the Preserve. Serpentine soils support distinctive flora that is uniquely adapted to high concentrations of heavy metals and low concentrations of calcium and other important nutrients. Serpentine chaparral is also located near the Cleland Ranch entrance road off Calistoga Road and at the eastern extent of Plum Ranch Road. This chaparral intergrades with Serpentine Bunchgrass (Holland 42130) habitat that contains a variety of native perennial grasses including California melic (*Melica californica*), slender wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*), junegrass (*Koeleria macrantha*), and big squirreltail (*Elymus multisetus*) (Northen 1992).

Photo 20. Serpentine Chaparral

2.14.5 Habitats Occupied by Listed Species

All habitats documented to support threatened or endangered species require special attention. On the property, these include habitat for two salmonids (threatened steelhead trout, *Oncorhynchus mykiss*; and endangered Coho salmon, *O. kisutch*) and the endangered northern spotted owl (*Strix occidentalis caurina,* "NSO"). This latter species is documented to nest in forest on the northern edge of the northeastern parcel.

2.15 Sensitive Plant Species

Seven of the native plant species occurring on the Preserve are considered of special conservation interest. Federally endangered Clara Hunt's milk-vetch (*Astragalus claranus*) was identified on the property in April 2009. The CNPS "rare" species that were encountered on the property during the 2008 botanical survey were: Lobb's buttercup (*Ranunculus lobbii*), Napa false indigo (*Amorpha californica* var. *napensis*), narrow-anthered California brodiaea (*Brodiaea californica* var *leptandra*), Sonoma canescent manzanita (*Arctostaphylos canescens* ssp. *sonomensis),* Sonoma ceanothus (*Ceonothus sonomensis*), and St. Helena morning glory (*Calystegia collina* ssp. *oxyphylla*). Table 2.3 lists the habitat where these species are found as well as the CNPS Rare Plant Ranking. These species warrant special consideration during management planning and implementation. Confidential Appendix 16 contains a map of sensitive habitats and sensitive plan species occurrences on the Property.

Table 2.3 Rare Plant Species Documented in 2009

SPECIES	COMMON NAME	CNPS[5] RANK	HABITAT
Amorpha californica var. napensis	Napa false indigo	CNPS 1B.2	MCH/MHC
Arctostaphylos canescens ssp. sonomensis	Sonoma canescent manzanita	CNPS 1B.2	MCH/CPC
Astragalus claranus	Clara Hunt's milk-vetch	CNPS 1B.1	AGS/COW
Brodiaea californica var. leptandra	Narrow-anthered brodiaea	CNPS 1B.2	MCH/CPC
Calystegia collina ssp. oxyphylla	Mt. St. Helena morning-glory	CNPS 4.2	AGS/MCH
Ceanothus sonomensis	Sonoma ceanothus	CNPS 1B.2	MCH/CPC
Ranunculus lobbii	Lobb's aquatic buttercup	CNPS 4.2	LAC

5 The California Rare Plant Ranking System (i.e. "CNPS Rank") according to CA Native Plant Society standards at http://www.cnps.org/cnps/rareplants/ranking.php

The presence of Rincon Ridge ceanothus (*Ceanothus confusus*) (CNPS 1B.1) and Calistoga ceanothus (*Ceanothus divergens*) (CNPS 1B.2) has been confirmed within a mile of the southeast corner of the northeastern parcel and is considered extant (CDFG 2008a). Rincon Ridge ceanothus grows in appressed groundcover mats and is tolerant of serpentine while Calistoga ceanothus is a rare chaparral plant. These species were not encountered during the 2008 botanical survey, but may occur within the Mixed Chaparral habitat type on the Preserve. The Mixed Chaparral habitat type is difficult to access as it forms a nearly impenetrable thicket of shrubs and small trees with intertwined branches and unyielding stems.

2.15.1 Clara Hunt's Milk-Vetch

Clara Hunt's milk-vetch (*Astragalus claranus*) (federal endangered, CNPS 1B.1) is exceedingly rare worldwide: There are only six documented locations, all in either Sonoma or Napa counties. One of these is within the Preserve. Any habitat documented to support this species should be considered highest priority for conservation, restoration, or other actions to foster the species. The local population was identified in April 2009. It is part of a larger, previously unknown population that extends across the property line onto an adjacent property. Additional populations of Clara Hunt's milk-vetch have been previously documented on the Hayfork Ranch property (CDFG 2008a).

Photo 21. Clara Hunt's milk-vetch

A small annual plant in the pea family (Fabaceae), the only known populations are located in Sonoma and Napa counties, where it typically is located in open areas or grasslands on thin, volcanic, clay soils. The bloom period is generally April-May (Best et al. 1996). It seems to favor lightly disturbed areas on the property, and in areas lightly grazed by horses on an adjacent property.

2.15.2 Lobb's Buttercup

Lobb's buttercup (*Ranunculus lobbii*), a rare vernal pool species (CNPS 4.2), was identified previously in the vernal pool by the old hunting cabin during a rare plant survey in 1992 (Northen 1992a). It is considered locally common in shallow vernal pools where it floats in the water (Best et al. 1996). It was documented in both the vernal pool and the manmade pond during the 2008-09 survey. The bioregional distribution of Lobb's buttercup is the North Coast, North Coast Ranges, Central Coast, and San Francisco Bay Area.

Photo 22. Lobb's buttercup

2.15.3 Napa False Indigo

Napa false indigo (*Amorpha californica* var. *napensis*) (CNPS 1.B.2) has been documented just north of the northeastern parcel and is considered extant (CDFG 2008a). It is considered locally common on dry brushy or wooded slopes (Best et al. 1996). During the 2008 botanical survey, Napa false indigo was encountered throughout the Preserve within the montane hardwood-conifer, montane riparian, and coastal oak woodland habitat types. The bioregional distribution of this species is the North Coast Ranges (Napa, Lake, Sonoma counties) and north San Francisco Bay Area (Marin County) (Hickman 1993).

Photo 23. Napa false indigo

2.15.4 Narrow-Anthered California Brodiaea

During the 2008 botanical survey, narrow-anthered California brodiaea (*Brodiaea californica* var. *leptandra*) (CNPS 1.B.2) was identified in serpentine chaparral habitat in the far southeastern portion of the property. Narrow-anthered California brodiaea is typically found in open forests and chaparral, often on serpentine soils (Hickman 1993). The bioregional distribution of this species is the Inner North Coast Ranges (Napa, Lake, Sonoma counties).

Photo 24. Narrow-anthered California brodiaea

2.15.5 Sonoma Ceanothus

Sonoma ceanothus (*Ceanothus sonomensis*) was previously identified on serpentine soil in the southeastern corner of the northeastern parcel during a rare plant search of the Preserve (Northen 1992a). It was found in association with Sargent cypress, leather oak, and other serpentine plants, extending beyond property boundaries to the south and east. During the 2008 botanical survey, Sonoma ceanothus was encountered in the closed cone pine-cypress and serpentine chaparral habitat types in the far eastern portion of the property. It is typically associated with chaparral, in sandy, serpentine, or volcanic soils (Hickman 1993). The bioregional distribution of this species is the Outer North Coast Ranges (Hood Mtn. Range, Sonoma and Napa counties).

Photo 25. Sonoma ceanothus

2.15.6 Sonoma Manzanita

Sonoma manzanita (*Arctostaphylos canescens* spp. *sonomensis*), listed by CNPS as 1B.2, may be present and should receive further taxonomic review during flower, typically from January to April. Sonoma manzanita is difficult to distinguish from Hoary manzanita (*Arctostaphylos canescens* spp. *canescens*), which was identified on the Preserve during the 2008 botanical survey. Thus, the manzanita genus (*Arctostaphylos*) should receive further taxonomic attention, particularly in the eastern portion of the property within the Closed-Cone Pine-Cypress and Mixed Chaparral habitats where Sargent cypress, Sonoma ceanothus, and serpentine soils are located. The bioregional distribution of Sonoma manzanita is the western Klamath Ranges and Outer North Coast Ranges.

Photo 26. Sonoma manzanita

2.15.7 St. Helena Morning Glory

During the 2008 botanical survey, St. Helena morning glory (*Calystegia collina* ssp. *oxyphylla*) was identified in serpentine chaparral habitat near the Cleland Ranch Road entrance to the Preserve. A serpentine endemic, the bioregional distribution of this species is the North Coast Ranges (Napa, Lake, Sonoma counties) (Hickman 1993).

Photo 27. St. Helena morning glory

2.16 Animal Species

2.16.1 Native Wildlife

Field studies could confirm the specifics, but it is known that Saddle Mountain provides habitat for as many as 289 wildlife species: twenty reptile species, 17 amphibian species, 63 mammal species, and 189 bird species. See Appendix 5, Potential Wildlife list (CDFW CIWTG 2005) for complete listings of species either documented to occur on the property, or known to occur in similar habitats in locations off the property.

2.16.2 Naturalized Exotic Animals

Wild turkeys (*Meleagris gallopavo*) are the only naturalized (i.e. established exotic) animal species encountered on the Preserve. Other species that may occur but were not documented on site are feral pig (*Sus scrofa*) and opossum *(Didelphis virginiana)*. The CDFW released wild turkeys starting in 1908 with the intent of establishing a new species for hunting. Concerns about their potential impacts to native plants and animals have been raised by both government agencies and the public since the early 1990s, when CDFW was still actively releasing wild turkeys to expand their range and provide new hunting opportunities. More recently, concerns have been raised about turkey populations in areas where sustaining native species is a primary management goal.

Feral and domestic cats as well as domestic dogs are likely on the property. Cats can travel long distances and are inclined to hunt birds and small mammals (Hill, 1978). Dogs are rarely successful in catching the wildlife they chase, but do occasionally kill wildlife, or injure the wildlife enough to cause their subsequent death. Packs of dogs are particularly threatening to wildlife and have been known to kill livestock. In particular, pregnant wildlife and newborn animals do not have the reserves to repeatedly expend in avoiding dogs.

2.17 Listed Wildlife Species

Several vertebrate species that are documented to or potentially occur on the Preserve are threatened, endangered, or otherwise designated special conservation status species. These include two native salmonids, one amphibian, one reptile, one bird, and five mammal species (Appendix 6, Endangered, Threatened and Special Status Species List).

As elsewhere, these species' population declines and special status is largely a result of habitat alteration/ fragmentation and reduced resource (especially water) quality. Management actions on the property should be implemented with consideration of these species' habitats and other requirements in mind. Costs and benefits must be weighed. For example, removal of excess woody debris, while desirable for fire management purposes, also removes a primary source of amphibian habitat; debris removal would not be expected to affect reptiles in the same way (Bury 2004).

2.17.1 Fishes

Some of the streams located within the Preserve provide habitat for steelhead trout (*Oncorhynchus mykiss;* state listed as threatened) and may potentially provide habitat for Coho salmon (*O. kisutch;* federal and state listed as endangered). The Mark West Creek watershed is known to still support a steelhead population; Coho were recorded there in 2001 but were not detected in 1993, 1994, or 2002 (CDFG 2002, CDFG 2004). They were again documented as present in 2015 (CDFW 2019). Stream-specific descriptions of potential limiting factors on the Preserve follow:

- A field survey in 2003 found Alpine Creek unsuitable as habitat for either steelhead or Coho due to the presence of long bedrock chutes without adequate resting areas (Halligan 2003).
- In Van Buren Creek, steelhead and roach were observed during a fish habitat inventory in 1997 (CDFG 2006). The California Department of Fish and Wildlife (CDFW) identifies migration barriers due to impoundments and gravel quality as the highest priority limiting factors to salmonid presence in Van Buren Creek.
- In Weeks Creek, no steelhead were observed during the 1997 fish habitat inventory (CDFG 2006). Water temperature and gravel quality are considered the highest priority limiting factors in Weeks Creek (CDFG 2002). However, Ag + Open Space consultant Rob Evans documented a steelhead trout in Weeks Creek constructing a redd near the road crossing in March 2018.
- The Santa Rosa Creek watershed supports steelhead and historically supported Coho salmon as recently as 1993 and 1994; however, surveys in 2000, 2001, and 2002 failed to detect Coho in Santa Rosa Creek (CDFG 2004).
- Limiting factors to salmonid survival in Ducker Creek include gravel quality, riparian stability, water temperature, and water quality (CDFG 2002).

2.17.2 Amphibians

The California Natural Diversity Database (CNDDB) (CDFG 2008a) identifies two documented sightings of foothill yellow legged frog (*Rana boylii*) on and near the Preserve. The foothill yellow legged frog is currently listed as a California Species of Special Concern by CDFG and as a Sensitive Species by the Bureau of Land Management (BLM) and US Forest Service (USFS) (CDFG 2008b). This species inhabits rocky streams in many habitat types including mixed conifer, mixed chaparral, and wet meadow (CDFG CIWTG 2005).

2.17.3 Reptiles

A northern western pond turtle (*Actinemys marmorata*), listed as a California Species of Special Concern, was observed in the manmade pond during the botanical survey in March 2009. In 2014, a turtle nest was also observed. The CNDDB (CDFG 2008b) contains a documented sighting (1999) of western pond turtle just west of the property boundary. Northern western pond turtles are associated with permanent to nearly permanent water bodies in a variety of habitat types (CDFG CIWTG 2005).

2.17.4 Birds

There is a confirmed northern spotted owl (*Strix occidentalis caurina*) nesting location in the northeastern parcel on the property (CNDDB 2008a). Northern spotted owls are listed as federally threatened, as a California Department of Forestry (CAL FIRE) Sensitive Species, and as a California Species of Special Concern by CDFW (CDFG 2008b, CDFG 2008c). This species inhabits dense, mature, multi-layered mixed-conifer and Douglas-fir habitats.

2.17.5 Mammals

Townsend's big-eared bat (*Corynorhinus townsendii*) and the pallid bat (*Antrozous pallidus*) are listed as California Species of Special Concern by CDFW and as Sensitive Species by BLM and USFS. The long-eared myotis (*Myotis evotis*) is listed as a Sensitive Species by BLM. All three species may inhabit the Preserve; these bats are found throughout the state at low and mid-elevations in a variety of habitats, but are not common. A bat survey by a quali-

fied biologist could confirm the presence of these species on the Preserve. The Sonoma tree vole (*Arborimus pomo*) is listed as a California Species of Special Concern by CDFW and may inhabit the property. It is rare to uncommon, but can occur in Douglas-fir and montane hardwood-conifer habitats. Fishers (*Martes pennanti*) are uncommon in the North Coast Ranges, but may inhabit the property. They are found in mature coniferous and deciduous riparian forests with a high degree of canopy closure and are listed as a California Species of Special Concern and a USFS Sensitive Species (CDFG 2008b, CDFG CIWTG 2005).

3. OVERVIEW OF RESOURCE MANAGEMENT ISSUES

This section describes priority and long-term issues identified during field surveys. Priority issues are (1) erosion and (2) invasive plant species: these warrant immediate action via implementation of projects targeted at reducing adverse impacts and enhancing existing viability. Other issues are included in this Plan because they present legacy challenges to be addressed, or because they might emerge as significant threats in the future. These include the woodland pathogen known as Sudden Oak Death; fire risk management; human use management; preservation of cultural resources; and mitigation of off-site factors.

3.1 Erosion and Sedimentation

3.1.1 Approach to Erosion Control

In the summer of 2008, Pacific Watershed Associates (PWA) conducted an assessment of erosion problems associated with the network of rural roads and trails within the Preserve. The purposes of the assessment project were: (1) to identify and quantify all current and potential erosion problems associated with the roads and trails, and (2) to develop a prioritized plan for erosion remediation, long-term erosion control, and maintenance for these roads and trails (Section 6.1.1, Erosion Remediation Projects). The PWA survey covered approximately 10 miles of road and trail. In 2015, PWA completed a reevaluation of inventoried roads, trails, and identified sites to update the treatment recommendations based on existing conditions (Appendix 7, Summary of PWA Field Data and Recommended Erosion Treatment Schematics).

An important element of long-term restoration and maintenance of both water quality and fish habitat is the reduction of impacts from upland erosion and sediment delivery. Sediment delivery to stream channels from roads and road networks has been extensively documented, and is recognized as a significant impediment to the health of salmonid habitat (Harr and Nichols, 1993; Flosi et al., 1998). Unlike many watershed improvement and restoration activities, erosion prevention and "storm-proofing" of rural, ranch, and forest roads has an immediate benefit to the streams and aquatic habitat of a watershed (Pacific Watershed Associates, 1994; Weaver and Hagans, 1999; Weaver et al., 2006). It helps ensure that the biological productivity of the watershed's streams is minimally impacted by future road-related erosion, and that future storm runoff can cleanse the streams of accumulated sediment, rather than depositing additional sediment from managed areas.

According to data collected by the California Department of Fish and Wildlife (CDFW) in 1996, excessive delivery of fine sediment is an issue affecting salmonid habitat in Mark West Creek, which has been identified by CDFW as an important component of recovery plans for salmonids in both the Russian River watershed and central California. Road-related erosion and sediment delivery has been identified as a significant contributor of fine sediment to the Mark West Creek stream system.

3.1.2 Condition of Road Network

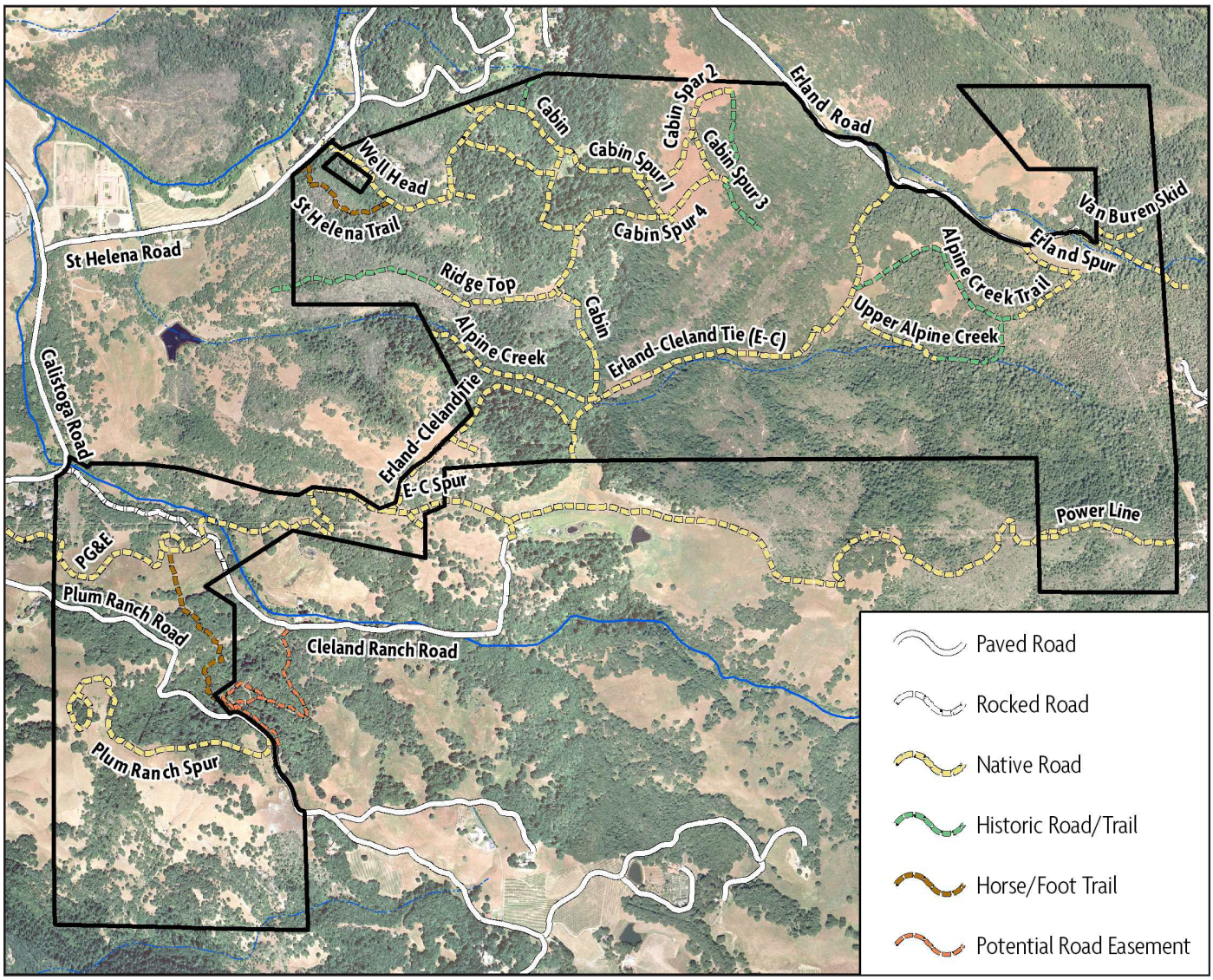


Figure 9. Road Network

On the whole, the erosion issues identified on the Preserve by PWA do not currently have a major impact on water quality or fish habitat in the affected streams. The roads on the Preserve are minimally developed, and have received little or no use in recent years, but identified problems are likely to worsen if left untreated, and have the potential to more significantly degrade both water quality and fish habitat in the future. PWA identified 3.35 miles of roads and 34 individual road-related sites that either are currently eroding and delivering sediment to the stream system, or show a strong potential to do so in the future (Table 3.1, Condition of Roads and Trails). Two sites of current or potential erosion and sediment delivery were identified on trails within the project area. One site was identified at which erosion was occurring without delivery of eroded sediment to streams; this location was assessed as a "maintenance" site. Rob Evans & Associates identified several additional non-road related erosion sites while performing the natural resources inventory fieldwork. These sites, located in the Weeks Creek watershed, were identified as potential Restoration Areas.

Roads listed below are in order of major roads and their spurs, followed by minor roads. Both trails described are undeveloped, "social" trails that appear to have been created by local users, both on foot and horseback. Neither of these trails had a developed fill prism or cutbank.

Cleland Ranch Road

Cleland Ranch Road is a well-maintained, rock surfaced road that begins at its gated intersection with Calistoga Road and runs for approximately 0.4 miles across the Preserve. This road was inventoried by PWA in 2004 as part of the Upper Mark West Creek Sediment Source Assessment (Pacific Watershed Associates, 2004). Road upgrades were constructed on Cleland Ranch Road under PWA supervision in 2007, and no further work is required. One site of road surface discharge was identified on Cleland Ranch Road in 2015; however, recommended treatments are located along the nearby PG&E Road, which intersects with Cleland Ranch Road.

Erland-Cleland Tie Road

Erland-Cleland Tie Road crosses both Weeks and Alpine Creeks. This road has the most significant cutbanks and fill prisms of any of the assessed roads (excluding Cleland Ranch and Plum Ranch Roads). Erland-Cleland Tie Road is unsurfaced for almost its entire length, except for a roughly 400 foot gravel-surfaced section located near the Erland Road intersection; this lower section of road is severely gullied. This road traverses both grassland and oak woodland areas. Eleven sites of erosion and existing or potential future sediment delivery were identified and assessed along this road, of which 10 are recommended for treatment: six stream crossings, two gullies, and two sites of bank erosion. Four small spur roads branch off from Erland-Cleland Tie Road. These are essentially tracks in the grass, and have no associated erosion sites.

Cabin Road

Cabin Road has a significant cutbank and fill prism from the Erland-Cleland Tie Road intersection for about 1,000 feet, and then becomes more of a track as it traverses a grassland setting. Five sites were identified on this road: three stream crossings and two gullies. We recommend treatment for each of these. While most of the Cabin Road will be upgraded, we recommend decommissioning one section of this "loop" road where the surface is severely gullied as the stream has diverted down the section of road. There are four spur roads off Cabin Road into grassland areas; these roads are essentially tracks in the grass and have no associated erosion sites.

Alpine Creek Road

Alpine Creek Road was located during field surveys. This 0.4 mile unsurfaced road extends west from Cabin Road along Alpine Creek, and exits the property on the west. For most of its length, Alpine Creek Road lies on the floodplain of Alpine Creek and has no road fill.

Upper Alpine Creek Road

Upper Alpine Creek Road is an unsurfaced, abandoned road that becomes evident where it enters an oak woodland area and continues along the right bank of Alpine Creek, which it fords. PWA inventoried three stream crossings on this road. Due to access, we recommend abandoning the road in place.

Alpine Creek Trail

Alpine Creek Trail is approximately 0.6 mile long and extends from the ridgetop terminus of Erland Spur Road, down to and across Alpine Creek, and then follows the left bank of Alpine Creek to Upper Alpine Creek Road. Past equestrian and hiking use has developed this "social" trail and is only evident by signs of brush clearing and tracks left by horses. No trail bed has been developed. PWA staff identified two erosion sites (stream crossings) along this trail.

Wellhead Road

Wellhead Road is an unsurfaced road that extends from Cabin Road (near the abandoned cabin) to the northwestern edge of the Preserve. PWA identified three sites that require treatment on this road: one stream crossing and one gully. Wellhead Road has one very short spur with no apparent erosion sites.

Wellhead II Road

Wellhead II Road is a very short (0.10 miles) abandoned spur road off of Cabin Spur Four Road that provides access to a wellhead. The road is grassed over and there are no erosion sites.

Ridge Top Road

Ridge Top Road is an unsurfaced road measuring approximately 0.25 miles. It extends from Cabin Road along the ridgetop that defines the northwestern boundary of the Alpine Creek watershed. The road may originally have been established to act as a fire break. No erosion sites were identified on this road.

Erland Spur Road

Erland Spur Road is an abandoned, overgrown road that is partially intermittent along its length. It is primarily used by recreational hikers and equestrians. It is approximately 0.3 mile long, extending uphill from Erland Road across grassland and oak woodland to the top of the ridge that divides the Alpine and Van Buren Creek watersheds, and then connecting with the Alpine Creek Trail. PWA identified one stream crossing along this road; however, no treatments are recommended.

PG&E Road

PG&E Road is a half-mile unsurfaced power line access road that extends across a grassland area to the south from Cleland Ranch Road, continuing beyond the Preserve boundary into an adjacent rural subdivision. The lower extent of the road is in poor condition, with a deeply rutted surface. PWA staff identified five problematic erosion sites along this road, each of which requires treatment: four stream crossings and one gully.

Power Line Road

Power Line Road is also an unsurfaced PG&E maintenance access road that crosses a series of power line corridors near the southeastern corner of the Preserve. The portion of this road that lies within the project area measures approximately 0.3 mile. No erosion sites were identified along this stretch of road.

Plum Ranch Road

Plum Ranch Road is a paved rural residential access road that crosses the southwestern portion of the Preserve. It includes three erosion sites: two sediment delivery sites (a stream crossing and a ditch relief culvert) and one maintenance site (a ditch relief culvert).

Plum Ranch Spur Road

Plum Ranch Spur Road is unsurfaced and approximately 0.7 mile long. It extends uphill towards the south from its gated intersection with Plum Ranch Road to a saddle on the ridgetop that defines the watershed boundary between Ducker and Weeks Creeks. This road lies under dense tree cover for most of its length. No erosion sites were identified on this road.

Van Buren Skid Road

Van Buren Skid Road is the only road that lies to the north of Erland Road. This abandoned, partially revegetated skid road extends from the vicinity of Erland Road to a broad flat area near the ridgetop, mostly under coniferous forest canopy. One erosion site (a gully) was identified along this road. However, due to access issues, this road is recommended for abandonment.

St. Helena Trail

St. Helena Trail is a 0.25 mile long, undeveloped trail that extends to the west from the western portion of Wellhead Road to St. Helena Road. This trail also is evident only by tracks left by horse use and brush clearing. No erosion sites were found along this trail.

Table 3.1 Road and trail characteristics, erosion site distribution, and treatment recommendations, Saddle Mountain Road and Trail Erosion Reevaluation, Sonoma County, California.

ROAD OR TRAIL NAME	TOTAL LENGTH (MI)	SURFACE TYPE	INVENTORIED SITES THAT ARE RECOMMENDED FOR TREATMENT	INVENTORIED SITES THAT ARE NOT RECOMMENDED FOR TREATMENT	TREATMENT RECOMMENDATION	FUTURE SEDIMENT DELIVERY (YD^3)
ROADS/TRAILS WITH INVENTORIED EROSION SITES						
Alpine Creek Road	0.37	Unsurfaced	-	2 stream crossings (#33, 34)	Abandon in place	10
Alpine Creek Trail	0.60	Unsurfaced	-	2 stream crossings (#28, 29)	Abandon in place	3
Cabin Road	0.70	Unsurfaced	3 stream crossings (#11, 13, 36) 1 gully (#14)	-	Upgrade	338
	0.17	Unsurfaced	1 gully (#12)	-	Decommission	63
Cleland Ranch[a]	0.42	Rock	1 road surface discharge point (#35)	-	Upgrade	94
Erland-Cleland Tie Road	2.00	Unsurfaced[b]	6 stream crossings (#2, 6, 7, 8, 9, 17) 2 gullies (#3, 4) 2 bank erosion sites (#1, 5)	1 stream crossing (#10)	Upgrade	802
Erland Spur Rd	0.33	Unsurfaced	-	1 stream crossing (#27)	Abandon in place	43

ROAD OR TRAIL NAME	TOTAL LENGTH (MI)	SURFACE TYPE	INVENTORIED SITES THAT ARE RECOMMENDED FOR TREATMENT	INVENTORIED SITES THAT ARE NOT RECOMMENDED FOR TREATMENT	TREATMENT RECOMMEN-DATION	FUTURE SEDIMENT DELIVERY (YD^3)
PG&E Road	0.51	Unsurfaced	4 stream crossings (#18, 20, 21, 22) 1 gully (#19)	-	Upgrade	69
Plum Ranch Road	0.78	Pavement	1 maintenance ditch relief culvert (#25) 1 stream crossing (#24)	1 ditch relief culvert (#23)	Upgrade	94
Upper Alpine Creek Road	0.17	Unsurfaced	-	3 stream crossing (#30, 31, 32)	Abandon in place	21
Van Buren Skid Road	0.10	Unsurfaced	-	1 gully (#26)	Abandon in place	12
Wellhead Road	0.50	Unsurfaced	1 stream crossing (#15) 1 gully (#16)	-	Upgrade	102
ROADS/TRAILS WITH NO INVENTORIED EROSION SITES						
Cabin Spur Roads 1-4	1.00	Unsurfaced	-	-	-	-
Cleland Ranch	0.42	Rock	-	-	-	-
Erland-Cleland Tie Spur Roads 1-4	0.50	Unsurfaced	-	-	-	-
Plum Ranch Spur Road	0.72	Unsurfaced	-	-	-	-
Power Line Rd	0.34	Unsurfaced	-	-	-	-
Ridge Top Rd	0.25	Unsurfaced	-	-	-	-
St. Helena Trail	0.26	Unsurfaced	-		-	-
Wellhead II Rd	0.10	Unsurfaced	-	-	-	-
Totals	**10.24**					**1,651**

[a] Recommended road drainage treatments associated with this site are actually located on PG&E Road.

[b] The road is partially rocked from Erland Road to site #2

[c] Includes sediment delivery from ALL sites, not just those recommended for treatment.

3.1.3 Erosion Sites and Sediment Delivery Volumes

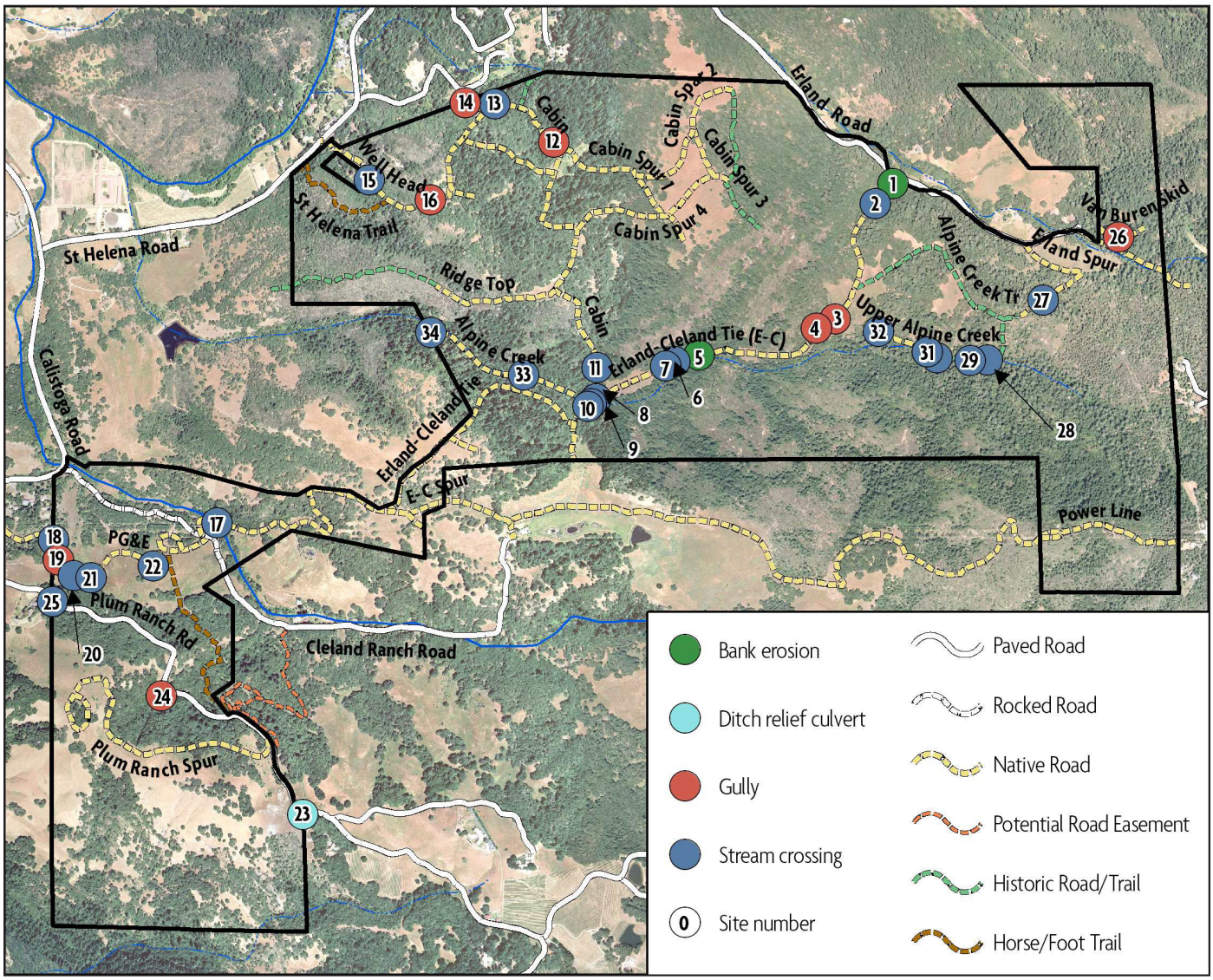


Figure 10. Road Related Erosion Sites

Erosion Sites/ Sources

PWA identified a total of 34 road-related erosion sites with the potential to deliver sediment to streams in the Saddle Mountain assessment area: 22 stream crossings, two ditch relief culverts, seven gullies, one road surface discharge point, and two sites of bank erosion (Table 3.2 Road Related Assessment Results). PWA also identified two trail-related erosion sites in the Saddle Mountain assessment area, both of which are stream crossings located on the Alpine Creek Trail.

Table 3.2. Assessment results for inventoried erosion sites and hydrologically connected road and trail segments, Saddle Mountain Road and Trail Erosion Reevaluation, Sonoma County, California.

SOURCES OF SEDIMENT DELIVERY	TOTAL SITES INVENTORIED (#)	MAINTENANCE SITES RECOMMENDED FOR TREATMENT[A] (#)	SEDIMENT DELIVERY SITES RECOMMENDED FOR TREATMENT (#)	HYDROLOGICALLY CONNECTED ROADS ADJACENT TO SEDIMENT DELIVERY SITES		TOTAL LENGTH OF ROADS AND TRAILS SURVEYED FOR PROJECT (MI)
				Inventoried (mi)	Recommended for treatment (mi)	
Stream crossings	24	0	15	2.05	1.89	-
Gullies	7	-	6	0.78	0.75	-
Ditch relief culverts	2	1	1	0.06	0	-
Road surface discharge point	1	-	1	0.16	0.16	
Bank erosion	2	-	2	0.30	0.30	-
TOTAL	**36**	**1**	**25**	**3.35**	**3.10**	**10.13**

[a]The maintenance site is a location where there is road related erosion but no observable sediment delivery to streams.

Evidence of one naturally occurring landslide was noted on the slope above the south bank of Van Buren Creek near the eastern property boundary. No other recent landslide activity has occurred on the property. Based on California Geological Survey map data, landslide potential on the Saddle Mountain Open Space Preserve ranges from high to extremely high in the southwestern portion of the property; moderate to extremely high in the middle portion; and low to extremely high in the eastern portion of the property.

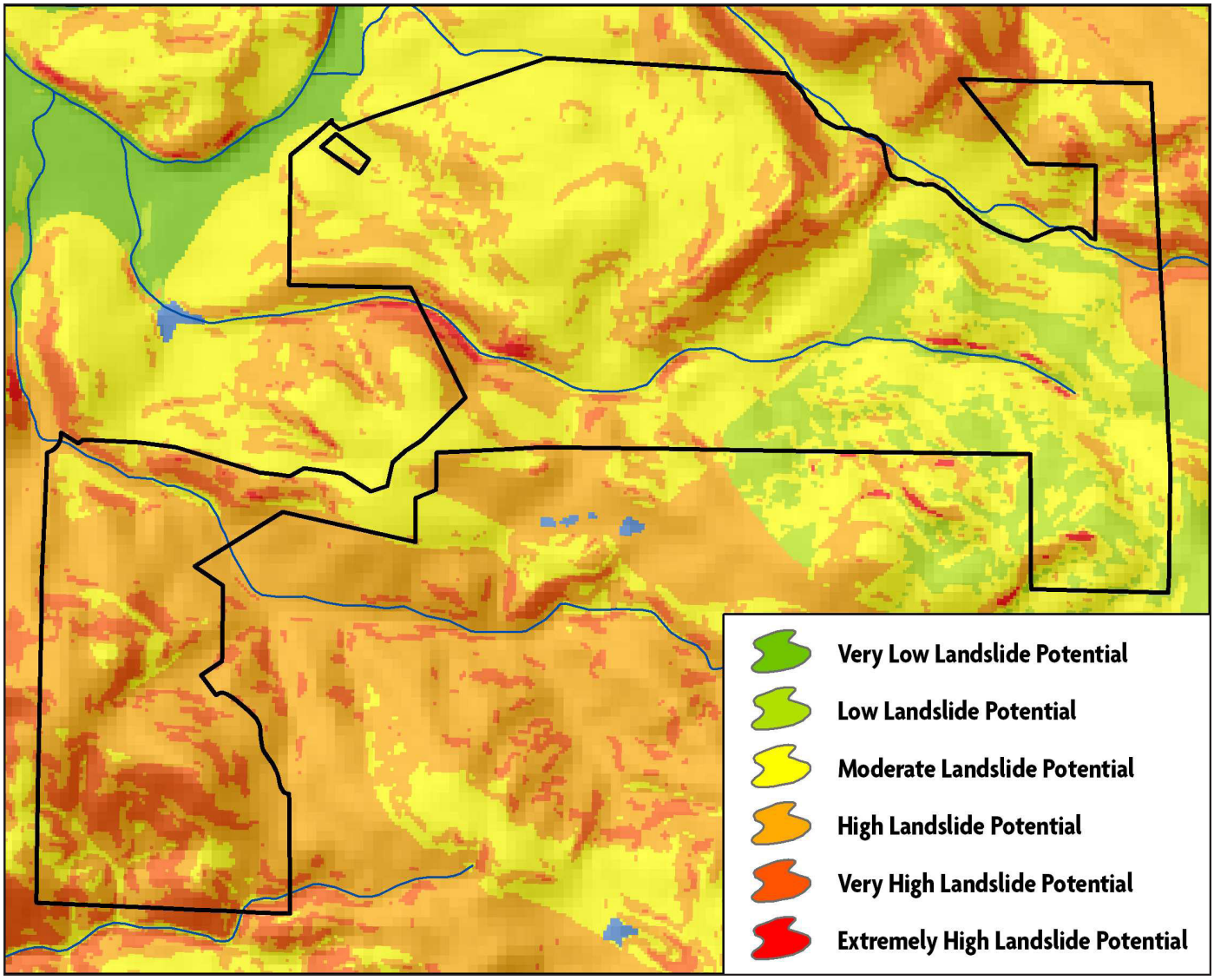


Figure 11. Landslide Potential

Future Sediment Delivery Estimate

Estimated future sediment delivery is the volume of sediment projected to be delivered to the stream system during the coming decades if no efforts are made to remediate the erosion problems identified in the field assessment. Sediment production from hydrologically connected road segments will originate from eroding cutbanks (through dry ravel, failure, brushing/grading practices, etc.) and ditches, as well as through mechanical pulverizing and surface wear of any unpaved road reaches. Field measurements indicate that approximately 1,391 cubic yards of sediment (89 percent of the project total) could be delivered to the stream systems in the project area over the next decade due to current road drainage patterns (Table 3.3, Estimated Future Sediment Delivery). The estimated future sediment delivery from stream crossings is approximately 150 cubic yards of sediment (ten percent of the total potential future sediment delivery within the assessment area). All this sediment would be delivered to Mark West Creek.

Estimated future sediment delivery resulting from gully enlargement at these sites is estimated to be 3 cubic yards, or less than 1 percent of the project total. Although the roads receive minimal use, the steepness of the terrain allows gullies to form on the hill slope below the roads where flow exits the road prism. The gullies then help to funnel concentrated flow down slope into the stream system. Sediment delivery from the two bank erosion sites is approximately 14 cubic yards (approximately 1 percent of the total). No site-specific future sediment volumes are associated with the ditch relief culverts or road surface discharge point. However, if left untreated, the sites will continue to act as a conduit for concentrated runoff from adjacent hydrologically connected road segments.

Table 3.3 Estimated future sediment delivery for sites and hydrologically connected road segments recommended for treatment, Saddle Mountain Road and Trail Erosion Reevaluation, Sonoma County, California.

SOURCES OF SEDIMENT DELIVERY	ESTIMATED FUTURE SEDIMENT DELIVERY (YD^3)	PERCENT OF TOTAL
Stream crossings	150	10%
Gullies	3	<1%
Ditch relief culverts	0[a]	0%
Road surface discharge point	0[a]	0%
Bank erosion	14	1%
Hydrologically connected road and cutbank surfaces adjacent to individual sediment delivery sites[b]	1,391	89%
TOTAL	**1,558**	**100%**

[a]No site-specific erosion at these sites.

[b]Decadal sediment delivery for paved and unpaved roads. Calculations assume a combined road, ditch and cutbank width of 12-18' for native surfaced or rocked roads, and a combined ditch and cutbank width of 5' for paved roads. Road surface lowering rates are averaged for each hydrologically connected road segment based on observed conditions.

Of the 24 stream crossings surveyed (Table 3.4, Stream Crossing Survey Results), three have culverts installed, eleven are fill crossings without drainage structures, eight are ford crossings with no fill within the crossing, and two are trail ford crossings. Eight of the 24 crossings show the potential for stream diversion, while three of these crossings are currently diverted. Field measurements show that the three existing stream crossing culverts were set too shallow in the road fill, which increases the potential for the culverts to plug as well as for the fillslope to be eroded below the culvert outlet. Two culverted stream crossings were determined to be undersized for a 100-year storm event.

Table 3.4. Erosion problems at stream crossings, Saddle Mountain Road and Trail Erosion Reevaluation, Sonoma County, California.

STREAM CROSSING PROBLEM	# INVENTORIED	PERCENTOF TOTAL[A]
Stream crossings with diversion potential	8	33%
Stream crossings currently diverted	3	13%
Crossings with culverts likely to plug[b]	2	8%
Crossings with culverts that are currently undersized[c]	2	13%

[a]From Table 2, total stream crossings inventoried = 24.

[b]Culvert plug potential is moderate to high.

[c]Culverts in stream channels that are less than the recommended minimum 24" diameter or culverts larger than 3 ft x 1 ft that are too small to convey the calculated 100-year peak storm flow.

3.2 Exotic and/or Invasive Plant Species

3.2.1 Approach to Exotic/ Invasive Species Control

The invasion of native habitats by non-native plant and animal species is a widespread problem in California, including on the Saddle Mountain property. An "invasive" is an exotic species that is in the process of increasing in its abundance across the landscape from a point of introduction and has the potential to spread widely (D'Antonio et al. 2007). Invasive plants, sometimes referred to as "transformer" species, displace native species, change plant community structure, and reduce the value of habitat for wildlife (Bossard et al, 2000). Invasive plants may also disrupt physical ecosystem processes such as fire regimes, erosion and sedimentation, nutrient cycling, and light availability.

Beginning with the first European settlements, non-native species were carried to California attached to the hulls of ships, submerged in the ships' ballast, or carried along in shipments of grain. In modern times, people as well as livestock unintentionally spread invasive species. Livestock can transport undigested seeds, and people can transport invasive species by means of their vehicles, equipment, and clothing. Invasive species have also been introduced purposely, without an understanding of the potential consequences of those introductions.

Invasive species threaten the diversity or abundance of native species through competition for resources, preying on or parasitizing wildlife, interbreeding with native populations, transmitting diseases, or causing physical or chemical changes to the invaded habitat. A large population of an invasive species can start from a very small number of individuals, and as those individuals can be difficult to see they may easily go undetected. Early detection and rapid response are the most effective and cost-efficient responses to invasive species, after prevention. It may be possible to eradicate an invasive plant species from the Preserve if it has not yet become widespread. However, in many cases plants may be widespread, which makes eradication difficult because re-invasion from adjacent properties is likely.

Cal-IPC suggests using an approach referred to as the "Bradley Method." In this approach, weed control is begun in portions of the site with the best stands of desirable native vegetation (e.g. those with few weeds) and proceeds slowly to areas with progressively worse weed infestations. This advice is based on modeling work that indicated that the rate of spread of small satellite populations is generally significantly higher than that of older, larger populations, and that containing or eliminating the outliers ultimately saves time and effort in the long run. The Bradley Method dictates that the targeted area should expand at a rate that allows previously treated areas to be monitored and maintained. It also advocates the use of techniques that minimize damage to native plants and disturbance to the soil so that the natives can thrive and defend against reinvasion.

The Preserve invasive species control program is best viewed as a component of an overall habitat restoration program, and should be focused on the overall objective rather than simply eradicating individual invasive species occurrences. This Plan advocates a pragmatic approach to the control of invasives that emphasizes both prevention and removal (i.e. control or eradication). Each method has advantages and disadvantages and often the best approach is an integrated management plan that combines the optimum use of all control strategies, providing various techniques that are compatible.

Prevention: Potential methods to prevent invasive plant establishment include:

- Reduction or removal of seed sources from dispersal routes, including roads, trails, stream corridors, and rights-of-way
- Closure of unnecessary roads and trails
- Minimizing soil disturbance
- Enhancing native habitats to better resist invasives
- Purchasing weed-free materials such as straw, mulch, and gravel for construction projects
- Establishing follow-up monitoring of work sites to detect new invasive plant populations
- Public outreach on the importance of early detection and prevention, for properties immediately adjacent to the Saddle Mountain property

Removal: Potential invasive plant eradication and/or reduction methods are listed below.

- Manual removal
- Mechanical control techniques (e.g. mowing, thatch removal)
- Application of herbicides
- Bio-control (e.g. weevils to control thistles)
- Solarization
- Flooding
- Prescribed burning
- Grazing

Control of invasives in grasslands presents an especially difficult challenge, as these species occur in a matrix of native species. It should be understood that weed management in grasslands is a long-term process that requires a flexible and persistent adaptive weed management program. Early detection and rapid response to new invaders in a given area has been shown to be effective (Stromberg et al, 2007).

Managed livestock grazing is not considered broadly feasible on the Saddle Management Preserve for invasive plant management. The Preserve is no longer suitable for large-scale commercial livestock production, but the disturbance provided by grazing can be used as a tool for specific management purposes such as weed control, maintaining open and diverse grasslands, and reducing fire fuels. However, the site is constrained by numerous factors that make grazing a challenge to implement, including steep topography, lack of existing grazing infrastructure, and difficulties with site access. Although these constraints would not preclude a successful grazing program, working with a custom grazier may be required for at least some portions of the grazing. Neighboring livestock owners may be interested in grazing some areas of the Preserve.

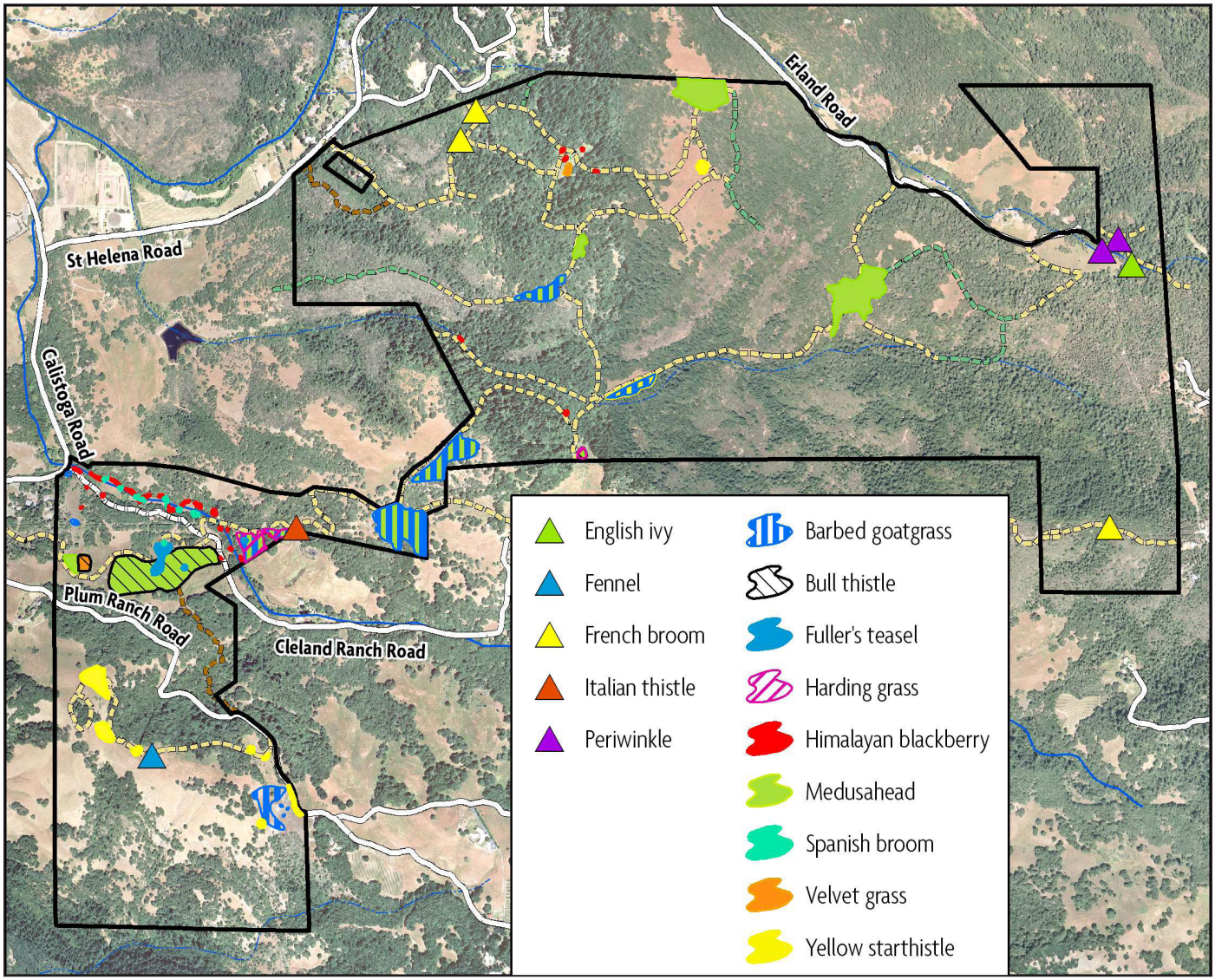


Figure 12. Invasive Plant Species Distribution

3.2.2 Exotic/ Invasive Species Occurrences

In addition to California's 4,200 native plant species, there are approximately 1,800 non-native plant species that grow wild in the state (California Invasive Plant Council, 2006). The California Invasive Plant Council (Cal-IPC) considers approximately 200 of these non-native plants invasive to California's wildlands. A total of 42 of these invasive plant species were documented on the Saddle Mountain property. According to criteria developed by Cal-IPC (California Invasive Plant Inventory[6]), eight are rated as "High," 19 "Moderate," and 14 "Limited." A list of all the plant species on the Preserve designated as invasive by Cal-IPC, along with the growth form, habitat type, and Cal-IPC rating are included in Appendix 9, Invasive Plant Species List. It is recommended that these species be monitored closely and a priority should be to limit their spread into serpentine grasslands and other sensitive plant communities.

Invasive plant species are impacting a number of the sensitive plant communities on the Preserve. Lobb's buttercup (*Ranunculus lobii*) was documented in the vernal pool near the historic hunting cabin on the property during a 1992 rare plant survey on the property (Northen 1992a). The vernal pool is being overrun by the invasive plant pennyroyal (*Mentha pulegium*). Velvetgrass (*Holcus lanatus*) and Himalayan blackberry (*Rubus armeniacus*) thrive in freshwater seeps. French broom is established along the transmission line maintenance road in the southeastern portion of the property contiguous with populations of Sonoma ceanothus and narrow-anthered brodiaea in the Serpentine Chaparral plant community. Serpentine Bunchgrass communities are threatened by barbed goatgrass and yellow starthistle. Sonoma ceanothus and narrow-anthered brodiaea, found within chaparral plant communities, are being threatened by Douglas-fir encroachment and by shading out by overstory trees and shrubs with the absence of fire. In 2016, a small population of rosy sandcrocus (*Romulea rosea*) was detected in the vicinity of the Clara Hunt's milk vetch population. Rosy sandcrocus is currently listed by Cal-IPC as a "watch" species with a high risk of becoming invasive. In addition to the priority species listed in Table 3.5 below, treatment of this population through hand removal should be a high priority due to its small size and its potential to impact a sensitive habitat area.

Infestations of English ivy, fennel, yellow starthistle, and French broom are currently relatively small and could be eradicated from the property with a minimum of effort and expense. There is a large patch of Himalayan blackberry with Spanish broom along Weeks Creek, which would require more effort. Medusahead and barbed goatgrass are relatively widespread and will require considerable planning and effort to control.

3.2.3 Priority Species for Treatment

Invasive plant species found on the property rated as High, as well as the highest priority Moderate species, are listed in Table 3.5 and are described in Appendix 10, Priority Invasive Plant Species Descriptions. Complete eradication from the property of a number of high priority species (e.g. medusahead) is not to be expected; they have become too widespread and already occur in high densities. The most pragmatic option for addressing established invasive species is to control their future spread and lessen their impact on native species.

[6] Cal-IPC categories include species rated High as having "severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Most are widely distributed ecologically." Species rated as moderate "have substantial and apparent, but generally not severe ecological impacts on physical processes, plant and animal communities, and vegetation structure." Species rated as limited "are invasive but their ecological impacts are minor." http://www.cal-ipc.org/ip/inventory/index.php

Table 3.5 Priority Invasive Species to Control

NAME	RATING	INVADED HABITATS	CONTROL EFFORT	NOTES
Barbed goatgrass (*Aegilops triuncialis*)	High	• Grassland • Serpentine	high	• seeds can remain viable for two years • tolerates shallow, dry, gravelly soils
Medusahead (*Taeniatherum caput-medusae*)	High	• Grassland • Oak Savannah • Oak Woodland • Chaparral	high	• only palatable to grazers early in the growing season • produces large quantities of high-silica litter, which smothers native species
Yellow starthistle (*Centaurea solstitialis*)	High	• Grassland	minimum (complete removal)	• only palatable to grazers early in the growing season • seeds can remain viable for ten years • staggered stages of maturity • resprouts from deep taproot
Fennel (*Foeniculum vulgare*)	High	• Disturbed Habitats	minimum (complete removal)	• tolerates drought • prolific seed production
English ivy (*Hedera helix*)	High	• Riparian	minimum (complete removal)	• vine mats cover native vegetation • leaves and seed can be toxic
Himalayan blackberry (*Rubus armeniacus*)	High	• Riparian • Wetland	medium (complete removal)	• reproduces vegetatively and by seed
French broom (*Genista monspessulana*)	High	• Grassland • Riparian • Woodland • Chaparral	minimum (complete removal)	• prolific seed production • mature stands are potential fire hazard
Spanish broom (*Spartium junceum*)	High	• Grassland • Riparian • Woodland • Chaparral	medium (complete removal)	• prolific seed production • mature stands are potential fire hazard • stump sprouting
Greater periwinkle (*Vinca major*)	Moderate	• Riparian	high	• reproduces vegetatively • vine mats cover native vegetation
Fuller's teasel (*Dipsacus sativus*)	Moderate	• Grassland • Riparian		• seeds can remain viable for six years
Pennyroyal (*Mentha pulegium*)	Moderate	• Wetland • Vernal Pool		• reproduces vegetatively and by seed
Harding grass (*Phalaris aquatica*)	Moderate	• Wetland • Riparian • Grassland • Woodland		• tolerates moist and dry soils • deep root system • potential fire hazard in dry months

3.3 Human Use Impacts

Both historic and modern human use patterns and natural resource management techniques have altered the property's landscape. The Preserve was a likely place for prehistoric occupation, as it has fresh water sources, well-drained soils, and a mosaic of grassland and woodland, which created an environment rich in natural resources. These features suggest that the property may have been utilized for hunting, resource gathering, and day-to day activities (Barrow and Origer, 2008). Six prehistoric sites were documented previously, and one additional prehistoric site was documented during Tom Origer & Associates' 2008 archaeological resources survey of the property for Ag + Open Space.

Since Europeans arrived, logging, land clearing, importation of livestock, and fire suppression have resulted in major changes in the property's vegetation patterns (Hill, 1978). Prior to Ag + Open Space's purchase of the property, the land was owned for

several generations by the Merner family under various names, including Merner Lumber Company, Inc., Progress Lumber Company, Inc., and Merner Land Company, Inc. (Bowman and Associates, 2006). Much of the Douglas-fir and coast redwood has been logged, and multi-stump growth patterns of many of the oak stands indicate the hardwoods were most likely cut decades ago, presumably for fuel wood.

The property's grasslands have been grazed in the past by livestock, and the remnants of an old stone fruit orchard are located off Plum Ranch Road.

3.3.1 Illegal Uses

Illegal activities encountered on the Preserve during the natural resources inventory fieldwork include evidence of marijuana cultivation, water diversion, unauthorized trail construction, and unauthorized herbicide use.

Local residents off Erland Road have reportedly encountered marijuana patches on the property in past years. None were encountered during the 2008 natural resources inventory fieldwork, though irrigation drip lines in disrepair and watering buckets were noted, and a grow site was eradicated in the Alpine Creek watershed in 2017. Marijuana growers can have a significant impact on the environment, including the clearing of native vegetation, increased erosion, and the introduction of fertilizer, pesticides, fencing, guard dogs, illegal campsites, and human waste.

Water diversion pipes were noted in portions of Alpine Creek and Van Buren Creeks on the property. Some of these water diversion lines are no longer functioning and are probably remnants of past marijuana cultivation operations, and have since been removed. Others appear to have been previously used to divert water from the property to private residences along Erland Road.

Unauthorized trail construction for horse access was noted off St. Helena and Erland Roads. Brush had been recently pruned, and a nearly full container of Roundup herbicide was encountered. An unauthorized trail off St. Helena Road, was constructed immediately adjacent to a listed plant, Napa false indigo (CNPS 1B.2), and continued use of this trail in its current location will likely impact the plant. It is recommended that these trails be closed and perimeter fences repaired.

3.3.2 Property Hazards

Property hazards of primary concern are related to the property's roads. Calistoga Road is a popular commute route from Santa Rosa to Napa and Lake Counties and traffic can be heavy at times. The junctions of both Plum Ranch Road and Cleland Road with Calistoga Road are located on curves, which makes pulling out onto Calistoga Road potentially hazardous. The Preserve's road system does not meet current Sonoma County Fire Safe Regulations in several categories, including road grades, road radius, road widths, and gates (Moritz, 2003).

Plum Ranch Road is a narrow paved road with several blind curves. It has "substandard road widths" that "cannot be corrected," according to the 2003 Fire Management Plan (although the plan does list several mitigation measures). Traffic on paved roads tends to lead to increased speeds, which makes driving on this road potentially hazardous if oncoming traffic is encountered.

There are no bridges at the creek crossings of Weeks Creek and Alpine Creek along Erland-Cleland Tie Road, making the crossing of these creeks, either on foot or in a vehicle, potentially hazardous during high flows. Currently, a four-wheel drive vehicle with high clearance is recommended during low flows.

There are several potentially hazardous non-road related conditions on the Preserve related to public access:

- The property consists of steep, rugged terrain that could lead to injury and the potential for getting disoriented or lost. It is recommended that directional signs be installed along Preserve roads and trails.
- Wildlife-related hazards include potential encounters with mountain lions, black bear, and rattlesnakes due to presence of suitable habitat for these species.
- There are remnants of interior fencing in disrepair that pose a tripping hazard to humans and an entanglement hazard to wildlife.
- Practices associated with the illegal cultivation of marijuana include armed guards, guard dogs, hazardous materials, and booby traps.

3.4 Other Issues

3.4.1 Sudden Oak Death

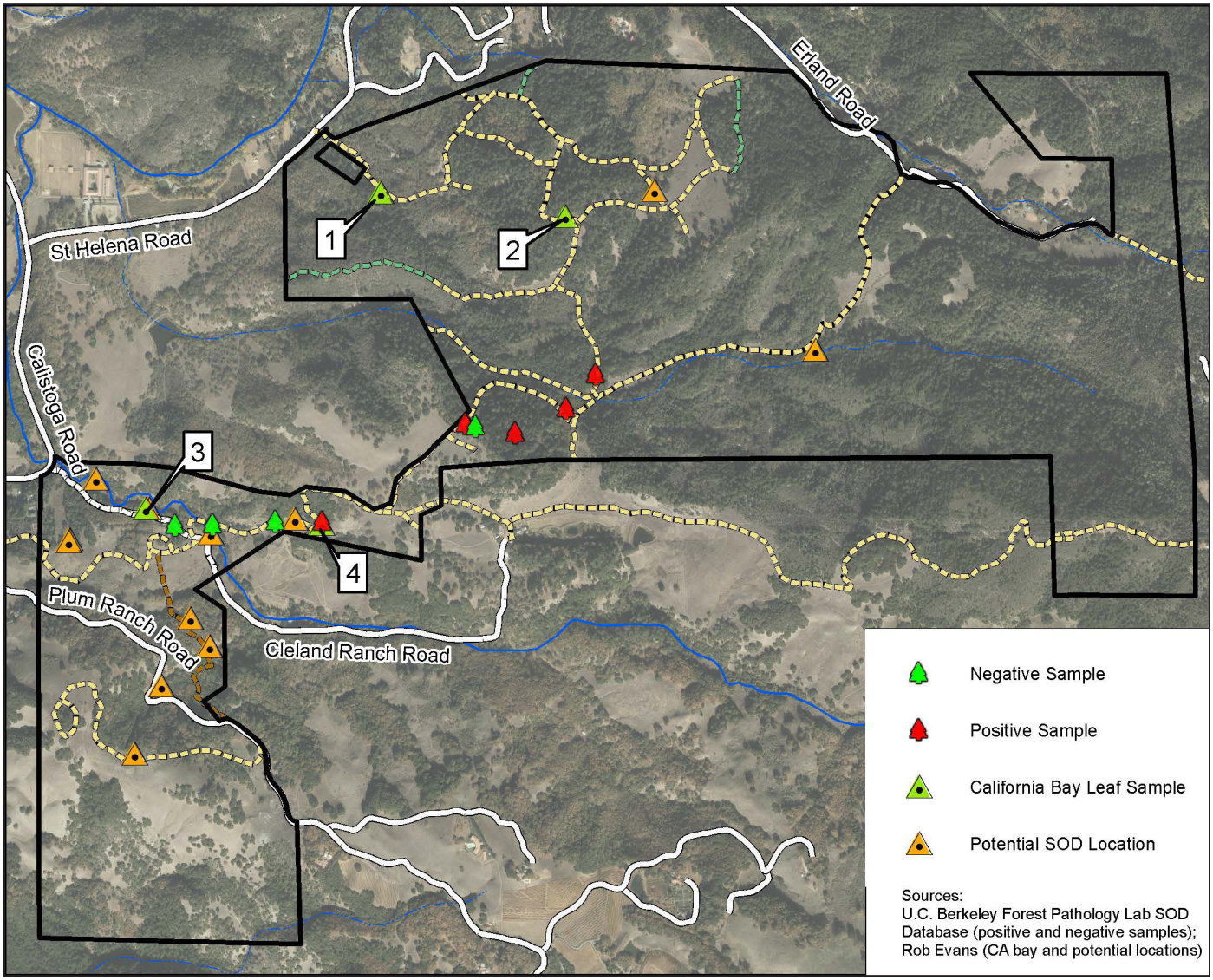


Figure 13. Documented and Potential Sudden Oak Death Areas

Sudden Oak Death (SOD) is the name given to a recently expressed plant epidemic caused by the foreign pathogen *Phytophthora ramorum*. First detected in 1995, the pathogen is hosted by, weakens, and/or kills three true oak species as well as a growing list of additional native plant species. Two oak species that are susceptible to SOD are found on the Preserve: coast live oak (*Quercus agrifolia*) and black oak (*Q. kelloggii*). Additional susceptible species that occur on the property include tanbark oak (*Lithocarpus densiflorus*), madrone (*Arbutus menziesii*), California bay-laurel (*Umbellularia californica*), California buck-eye (*Aesculus californica*), big-leaf maple (*Acer macrophyllum*), western azelea (*Rhododendron* spp.), manzanita (*Arctostaph-ylos* spp.), toyon (*Heteromeles arbutifolia*), coffeeberry (*Rham-nus californica*), and honeysuckle (*Lonicera hispidula*).

Photo 28. Potential Sudden Oak Death infestation of coast live oak

SOD can be fatal to coast live oak, black oak, tanoak, and western azelea. To date, this disease has been found infecting plants in coniferous forests, oak woodlands, and urban-wildland interfaces. Several coast live oak trees on the Preserve displayed symptoms of SOD, including dieback of major branches, as well as entire trees. Locations of these trees are within the Weeks Creek and Alpine Creek watersheds.

There is no fully proven, universally effective method for controlling the spread of SOD once infestation sources are established. Spores of *P. ramorum* have been isolated from plant debris in infested forests and it is likely that the spread of this pathogen in California has been facilitated by the activities of hikers, bikers, and vehicles, as well as by horses and deer. The California Oak Mortality Task Force[7], a nonprofit organization under the California Forest Pest Council that brings together public agencies, other nonprofit organizations, and private interests to address *P. ramorum*-related issues has developed guidelines and best management practices (BMPs) related to SOD that are applicable to the Preserve.

[7] For more detailed information on SOD, the COMTF website is: http://www.suddenoakdeath.org/

3.4.2 Fire Hazard and Fuels

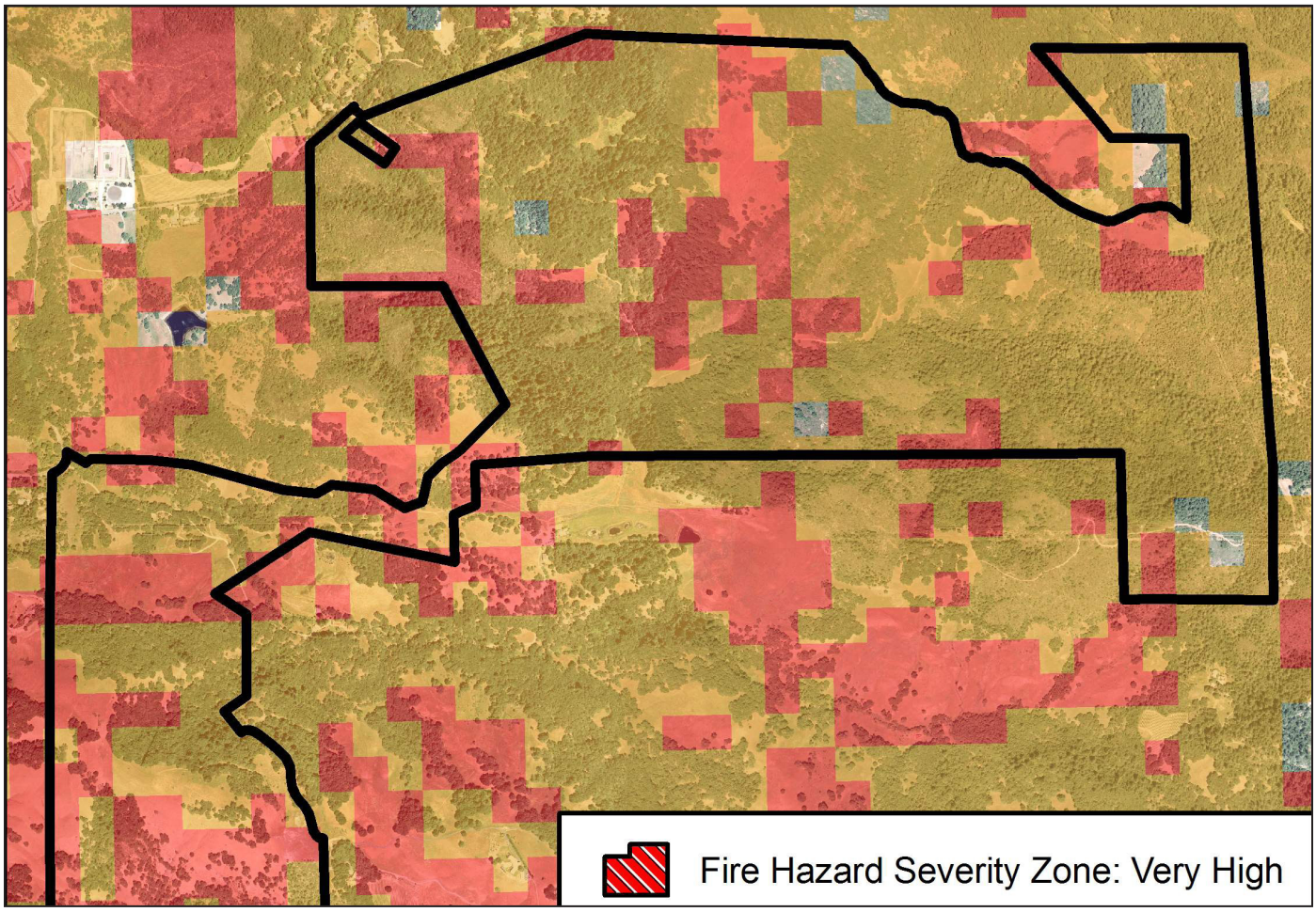


Figure 14. Fire Hazard

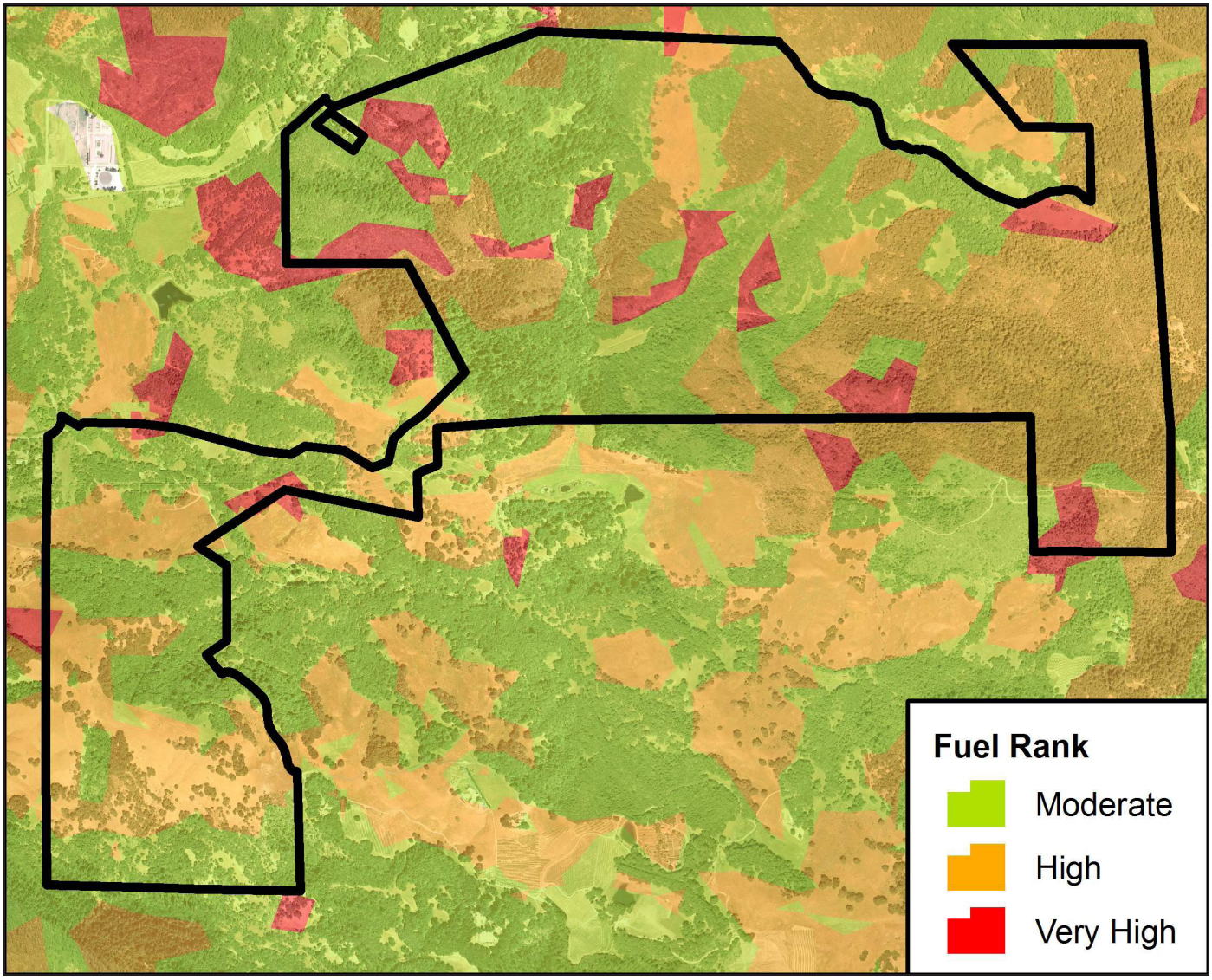


Figure 15. Fire Fuel Rank

Regardless of ongoing fire suppression efforts in the region, wildfire is likely to occur eventually, either by natural causes such as lightning, or by accident (Quinn and Keeley, 2006). The absence of fire for an extended period of time, particularly in chaparral, creates large contiguous areas with highly flammable fuel loads that are difficult to contain once a fire breaks out.

Fire Management Concepts, Inc. prepared a report entitled "Wildland Urban Interface Hazard Fuel Risk Assessment: City of Santa Rosa, California" for local fire agencies as a first step in developing a comprehensive Community Wildfire Protection Plan. According to Fire Management Concepts, Inc. (2004), "The vegetation communities that surround Santa Rosa to the north, east and south are similar in fuel type classification to those that burned in the Oakland Hills. In addition, many areas surrounding Santa Rosa have fuel types and dead fuel loading that are even more hazardous than those present during the Oakland Hills Fire. These areas contain coniferous forest, woodland and chaparral fuel types, which have not burned in over sixty years, creating excessive levels of dead fuel loading (dead logs, branches and forest debris). Excessive accumulations of dead fuels is one of the primary factors that contribute to the development of the extreme fire behavior, crown fire and long range spotting, which often characterize wildland fire in the urban interface."

Reliable predictions of wildfire behavior allow fire control agencies to determine what resources are needed to contain wildfires, minimize damage to natural resources, and protect property. Moritz (2003) developed a preliminary fire management plan to assess the Preserve so as to meet requirements

for development approval in 1996. Moritz used the BEHAVE[8] computer modeling system to assess fire behavior for the five wildland fuel models found on the Saddle Mountain Findings include (1) determination that the old stand of manzanita off St. Helena Road is "potentially explosive" and that (2) woodlands with an understory of brush or thickets of young Douglas-fir trees could also burn with an intensity that could create crown fires and spotting; these conditions are particularly hazardous along roads that must be used for emergency access and evacuation. The study also noted that Sudden Oak Death on the Preserve will increase near-term fire hazard, as infected dead wood becomes a highly flammable fuel ladder.

In recent years, fire behavior on several regional wildfires has far exceeded modeled predictions, due in part to extremely low fuel moistures associated with drought and/or offshore wind events prior to the onset of the rainy season. It is worth noting that the modeled outputs in the Moritz Saddle Mountain fire management plan are more than twenty years old at this point, and that wildfire hazards on the Preserve may be more severe than predicted in the 1996 plan. It may be helpful to re-assess fuel loading and potential fire behavior on the Preserve using current, fine-scaled vegetation and fuels data.

3.4.3 Cultural Resources Protection

The Preserve contains a number of important cultural resources and archaeological sites (Section 2.6, Cultural Resources). Prehistoric archaeological site indicators generally include: obsidian and chert flakes and chipped stone tools; grinding and mashing implements (e.g. slabs and handstones, and mortars and pestles); bedrock outcrops and boulders with mortar cups; and locally darkened midden soils. Midden soils may contain a combination of any of the previously listed items with the possible addition of bone and shell remains, and fire-affected stones. Historic period site indicators generally include: fragments of glass, ceramic, and metal objects; milled and split lumber; and structure and feature remains such as building foundations and discrete trash deposits (e.g. wells, privy pits, dumps).

In keeping with the CEQA guidelines, the primary recommendation for each archaeological site is that it should be avoided. If avoidance is not feasible, further study (i.e. site excavation and/or historic research) is necessary to determine site significance in terms of eligibility for inclusion on the California Register. Direct impacts to cultural resources for the Preserve could result if activities such as trail construction or improvement, and construction of visitor facilities (e.g. parking and restrooms) are undertaken near sites. Avoidance buffer zones of 100 feet (30 meters) should be established for visible cultural sites and ground disturbance restricted in areas where cultural resources occur but are not visible (Section 4.3, Buffer Zones for Sensitive Features). Every effort should be made to retain historic stone fences and avoid impacts to them, as described above. If improvements are planned that could affect the integrity of the stone fences they should be documented with photographs, measurements, thorough descriptions, and historical research.

There is the possibility that buried archaeological deposits could be present, and accidental discovery could occur. In keeping with the CEQA guidelines, if archaeological remains are uncovered, work at the place of discovery should be halted immediately until a qualified archaeologist can evaluate the finds (15064.5 [f]); and "if the find is determined to be an historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available."

4. POTENTIAL MANAGEMENT STRATEGIES

There are a number of long-term strategies and opportunities that are recommended to maintain and enhance the conservation priorities (i.e. conservation values) on/ of the Preserve. These include enhancement of plant communities and native habitats; revegetation; buffer zones around sensitive features; restoration of landscape disturbance processes; and ongoing monitoring.

4.1 Enhance Plant Communities and Habitats

Riparian woodlands, grasslands (including valley needlegrassland), wetlands, and chaparral (including serpentine and cypress microcosms) habitats on the property support sensitive and/or rare plant communities that would benefit from directed enhancement measures. A brief listing is provided below.

[8] BEHAVE, a widely distributed and accepted fire behavior predictive model, developed by the USDA Forest Service, allows planners to predict fire rate-of-spread, flame lengths, and fireline intensity (rate of heat release) using one of several generalized fuel models. Studies have shown that BEHAVE can be used to accurately predict fire behavior, but may or may not be appropriate for certain conditions (U. S. Department of the Interior, USGS, 2006)

Annual Grassland

- Mt. St. Helena morning-glory (*Calystegia collina* ssp. *oxyphylla*)

Fresh Emergent Wetland & Vernal Pool

- Lobb's aquatic buttercup (*Ranunculus lobbii*)

Mixed Hardwood- Conifer Forest

- Napa false indigo (*Amorpha californica* var. *napensis*)

Mixed Chaparral

- Napa false indigo (*Amorpha californica* var. *napensis*)
- Sonoma canescent Manzanita (*Arctostaphylos canescens* ssp. *Sonomensis*)
- narrow-anthered brodiaea (*Brodiaea californica* var. *leptandra*)
- Mt. St. Helena morning-glory (*Calystegia collina* ssp. *oxyphylla*)
- Sonoma ceanothus (*Ceanothus sonomensis*)

Closed Cone Pine-Cypress

- Sonoma canescent Manzanita (*Arctostaphylos canescens* ssp. *Sonomensis*)
- narrow-anthered brodiaea (*Brodiaea californica* var. *leptandra*)
- Sonoma ceanothus (*Ceanothus sonomensis*)

4.1.1 Riparian Habitat Enhancement

Most of the riparian zones on the Preserve are well vegetated with native riparian vegetation and largely devoid of invasive plants. However, past land use practices and establishment of invasive plant species have impacted some of the riparian and wetland habitats on the Preserve.

Riparian habitats should be managed to enhance cover for erosion prevention and/ or bank stabilization, and to conserve native plant communities and species. Downcutting and bank erosion along Weeks Creek, for example, is compromising habitat and water quality. In the same creek, establishment of Himalayan blackberry and Spanish broom threatens montane riparian habitat viability. All riparian zones on the Preserve would benefit from identification and treatment (including, as described, revegetation) of locations where invasive species have become established.

4.1.2 Grassland Habitat Enhancement

The Annual Grassland habitat type on the Preserve should be managed to enhance the local diversity of native perennial grasses and native forbs. Management of grasslands with a significant native component should be long-term and flexible to adapt to changing conditions. A combination of management techniques focused on invasive species control should be considered. Management efforts should be monitored in the long-term, and observations recorded. Given the abundance and diversity of native perennial grasses on the property, there are unique opportunities for research projects related to the ecology and management of the property's grasslands. Full restoration of natural landscape-scale disturbance processes (e.g. native grazers, wildfire) would be ideal. However, widespread application of livestock grazing is at present unfeasible and/ or impractical. Due to lack of access and grazing infrastructure, the use of livestock to improve native habitats is more applicable in theory than as a Preserve management strategy. The use of prescribed fire or mechanical removal of invasives and their thatch layer, followed by revegetation as necessary, are recommended treatment approaches for grassland areas threatened by invasive species.

The use of prescribed fire has been shown to be effective in controlling non-native annual grasses and encouraging regeneration on native perennial grasses and forbs. Prescribed fire presents significant liability and logistical concerns that would need to be thoroughly and appropriately addressed prior to reintroducing fire on the Preserve. Prescribed fire is being contemplated as a tool to manage invasive species, improve vegetation species composition and habitat conditions, and reduce fuel loading within the Preserve's grasslands and forests (See Section 5.4.3, Prescribed Fire). Ag + Open Space anticipates working with Cal Fire and potentially with local partners and programs such as a Prescribed Fire Training Exchange ("TREX") program to plan and execute prescribed burns, as resources and conditions permit.

Enhancement opportunities within the serpentine bunchgrass plant communities on the property include control of select invasive plant species as well as control of encroaching coyote brush and Douglas-fir, where appropriate. This habitat type has been shown to benefit from fall prescribed burns and year-round grazing (Bartolome et al. 2007); further research is warranted. Douglas-fir is a native tree species that is encroaching into Annual Grassland habitat on the Preserve. Its seeds fall and are spread by wildlife to suitably open sites. The great majority of seed falls within 330 feet (100 meters) from the mother tree, but can range as far as 1.2 miles or greater (US Dept. of Agriculture, 1965). Aggressively invasive Himalayan blackberry, velvetgrass, and bull thistle more immediately threaten the integrity of the Saddle Mountain's grasslands.

4.1.3 Wetland Habitat Enhancement

The property's freshwater wetlands (vernal pools and wet meadows) require revegetation and, where possible, management of invasive species. Exclusion of grazing around vernal pools can promote certain exotic species (e.g. medusahead grass) and, thus, grazing may be considered as an experimental (though not wide-spread) means of treatment. Prescribed burning has been used at other sites for enhancing vernal pools and other wetland habitats (Pollack and Kan 1998), though these means are not generally feasible on the Preserve.

Wetlands on the Preserve have been impacted by past grazing practices, road-related erosion, and invasive species establishment. The freshwater seep and vernal pool near the historic hunting cabin on the property have a variety of invasive species established, as does the wetland south of Cleland Road. Surrounding native wetland vegetation would most likely become re-colonized in areas treated for invasives, provided hydrologic conditions are unchanged and treatment methods are carefully conducted with minimal impact to native vegetation. It has been demonstrated that enhancement of vernal pool habitats that have been degraded can be effective, at least up to a decade following restoration efforts. In these cases, restored pools can offer similar ecosystem functions (e.g. habitat and hydrological function) as "natural" pools (Ferren et al. 1998). Maintaining vernal pools on the property may provide a positive feedback loop supporting the persistence of the pools: studies have shown that migrating waterbirds who use the pools as stop-over habitat act as vectors, moving plant propagules from pool to pool (Silviera 1998).

4.1.4 Chaparral Habitat Enhancement

Chaparral, including Serpentine Chaparral, and Northern Interior Cypress Forest, is a fire-adapted plant community. Fire is an essential part of the life cycle of these plant communities, which depend on fire for seed dispersal and/or germination. Without fire in these habitats, species composition is likely to change, resulting in reduced native biodiversity and wildlife habitat. Douglas-fir, oaks, and bay-laurel are becoming established in these habitat types on the property with the suppression of fire.

Chaparral is not resilient to alterations in the fire regime that involve excessive fire frequency (Keeley, 2007). This applies to both the trunk re-sprouting and seed germination of chaparral shrubs. Non-native grasses and forbs readily invade frequently burned shrublands and directly outcompete native herbs, perhaps favored by their early germination keyed to autumn rains. In addition, these invasive species modify the environment to further favor their persistence. They commonly form a dense herb layer that produces highly ignitable fuels and extends the length of the fire season. Additionally, the fire regime switches to a combination of surface and crown-fire, with the non-native grasses and forbs spreading fire to native chaparral shrubs before the shrub canopies have closed in. Because surface fuels generate lower fire intensities, such fires favor survival of the non-native seed bank, which would otherwise be destroyed in a crown-fire. Type conversion of native shrublands to alien grasslands has occurred over large portions of California (Keeley, 2007).

4.1.5 Forest & Woodland Habitat Enhancement

Habitat enhancement opportunities within the Douglas-fir Forest, Mixed Hardwood-Conifer, and Coastal Oak Woodland habitat types on the property include thinning of dense even-aged stands, fuel reduction, and invasive plant control. The absence of fire on the property in recent decades, as well as the clearing of oaks and other hardwoods in the mid to late 1800s, has led to unnaturally large areas of dense stands of even-aged tree species, invasion by shade-tolerant Douglas-fir within mixed hardwood and oak woodlands, and an abundance of fuel, including dead, low-hanging branches, dead saplings, and downed wood. Unnaturally dense forests provide fuel for severe wildfires. In overcrowded forests, trees compete for water, light, and nutrients, and without sufficient nutrients to go around, trees become stressed and susceptible to disease and beetle attacks (Bonnicksen, 2008).

Douglas-fir encroachment into the Coastal Oak Woodland habitat is threatening to convert the habitat to an eventual dominance of Douglas-fir (Moritz, 2003). Land managers at nearby Annadel State Park, and also at Pepperwood Preserve, are dealing with Douglas-fir encroachment by utilizing management techniques including prescribed burning, manual removal of Douglas-fir saplings, and girdling of larger Douglas-fir trees.

4.2 Native Plant Revegetation

A successful revegetation project will establish a diversity of plant types and native species that will improve fish and wildlife habitat, aid in sediment reduction, and provide erosion control. Once established, generally after two to three years, the project should require a minimal amount of management. The first step is development of a site-specific plan: The project site should be assessed and a budget designed that takes into account

project design, permitting, plant sources and nursery costs, cost of protective hardware and irrigation materials, as well as labor costs for project layout, implementation, maintenance and monitoring. It is recommended that plant material brought into the project site be of local sources within the watershed. Revegetation is recommended in disturbed areas that are not naturally regenerating with the native species that normally populate the habitat type, including areas where invasive species are removed. Revegetation will help prevent re-invasion of other invasive species. Revegetation is also an erosion prevention measure. The need to revegetate should be evaluated following any grading operation or other significant disturbance.

Various regulatory agencies may have jurisdiction over a habitat enhancement project and permits may be needed, depending on the project's character and extent. This is particularly true in riparian and wetland habitats. It is the property owner's responsibility to be familiar with these agencies and notify them when a project is planned. Most agencies encourage informal consultation early in the planning process so that the concerns of each party can be addressed and potential roadblocks can be kept to a minimum. For recommended revegetation projects included in this document, the CDFW and the Regional Water Quality Control Board should be consulted with prior to implementation. If planning to use herbicides, the Sonoma County Agricultural Commissioners Office should be consulted with as well.

4.2.1 Revegetation of Riparian and Wetland Habitat

Native plant revegetation projects within the riparian zones on the property are recommended to replace invasive species after control measures are implemented, and to aid in bank stabilization and erosion control. During the harvesting of the coast redwoods that once lined it, the riparian zone of Alpine creek was impacted by construction of skid and haul roads. While native vegetation, including redwood stump sprouts (secondary growth), has largely reclaimed the old roadbeds, the riparian zone could be enhanced by replanting coast redwood in ecologically appropriate areas in an effort to expand the current redwood population to historic levels.

After control measures are implemented, regardless of any permit requirements, the sites should be assessed for the need to replace the invasive plant species with desirable native species. The sites should be evaluated by a professional restoration ecologist for erosion potential following vegetation removal. In general, there should be signs of sufficient natural regeneration of native species within the riparian zone, and if not, a revegetation plan may be recommended if not already required by CDFW.

4.2.2 Revegetation of Upland Habitat

Recommended revegetation opportunities in upland habitats on the Preserve are intended to restore areas adversely impacted by prior land use practices, including road-related erosion and clearing of native trees and shrubs within the upper riparian zone.

A gully has been forming for some time in an upland drainage south of Weeks Creek. Previous land use managers have lined the gully with brush and debris as a primitive, low-tech, erosion control measure. Fuller's teasel, an invasive plant, is becoming established in the disturbed areas along the gully. Revegetation and biotechnical erosion control measures are recommended for this site. The open flat along the south bank of Weeks Creek, as it transitions into the riparian zone, has been identified as a potential area for revegetation. This area was likely cleared of trees in the past. Revegetation measures for this area should be incorporated into the riparian revegetation plan design.

Additional revegetation opportunities in upland areas may include some of the road-related erosion sites identified by PWA. After these sites are treated, the disturbed areas should be assessed for revegetation needs.

4.3 Buffer Zones for Sensitive Features

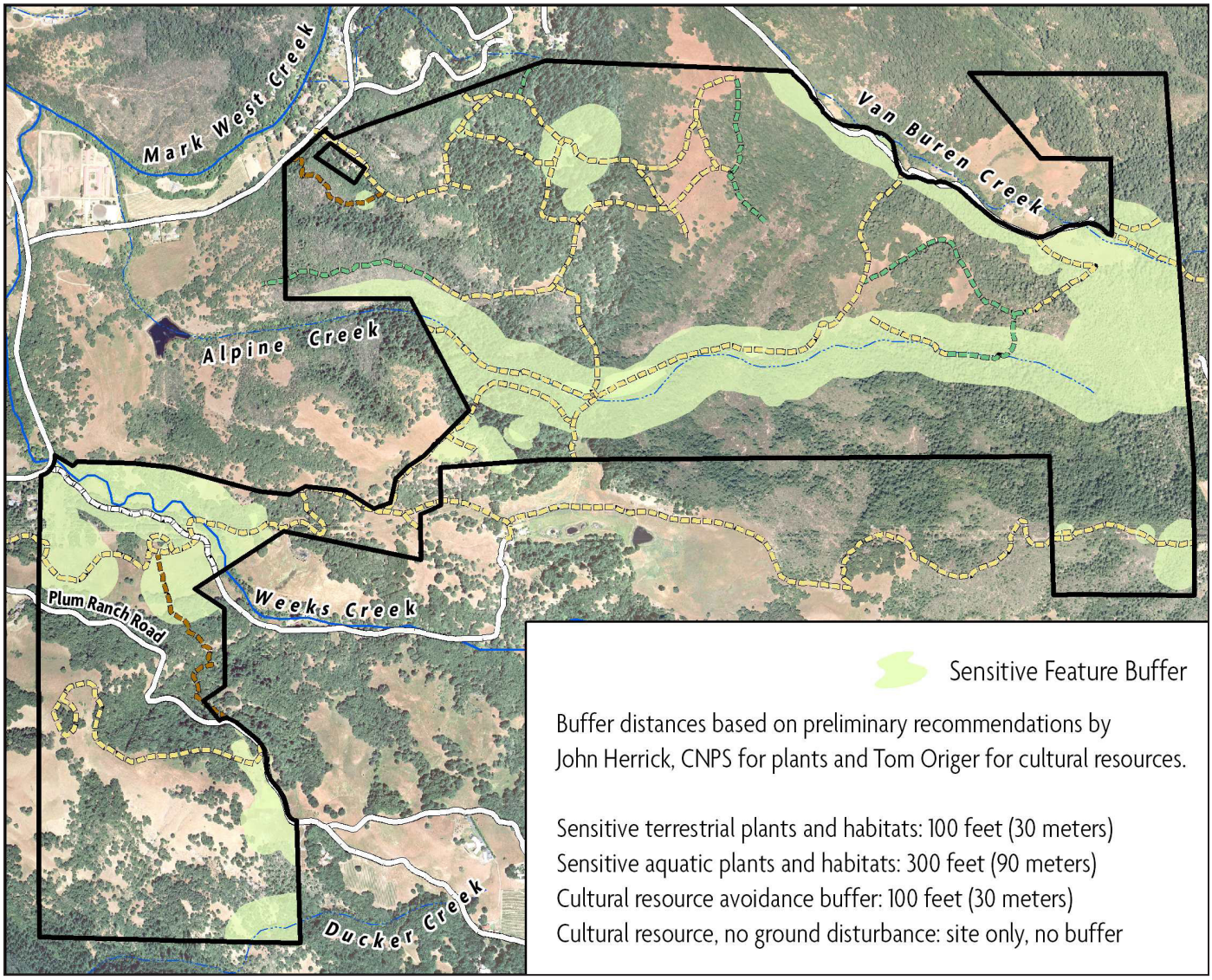


Figure 16. Sensitive Features Buffer Zone

The establishment of adequately-sized buffer zones around sensitive resources (e.g. habitats, species, archaeological sites, etc.) can be very effective for maintaining and enhancing these resources. Concentrated visitor use (e.g. picnic tables, etc.) and modification of the environment should be avoided within buffer areas. The size of buffer considered adequate to protect habitat function and species viability varies widely (e.g. 10 to 100+ meters to optimize a range of objectives for water quality, stability, habitat function, and wildlife habitat/ corridor; Burke and Gibbons 1995, Fischer and Fischenich 2000). For the purposes of this plan, initial recommendations for buffer set-backs are listed below to prevent direct damage to vegetation, as well as to protect water quality.

- At least 100 feet (30 meters) for terrestrial species and habitats (e.g. Closed cone Pine-Cypress and serpentine areas)
- At least 300 feet (90 meters) around/ along riparian zones, vernal pools, and other aquatic habitats (John Herrick, CNPS, pers. comm.)

4.4 Restoration of Landscape Disturbance Regimes

Grasslands that are not grazed, burned, or otherwise regularly disturbed to keep them open can be type converted to shrub communities. This process is evident in some areas at Saddle Mountain where coyote brush is invading grasslands at wood-

land margins. As well as increasing fire hazard, this conversion results in loss of grasslands, and thus loss of the species that occupy them.

Saddle Mountain grasslands have an unusually high proportion of native perennial grasses. Although the grassland flora also contains many non-native annual species, their density and biomass is much diminished compared with the same species growing on more productive sites. Many of the areas that support medusahead, which generally occurs on clay-rich soils, have a well-developed thatch layer that excludes most other annual species. In native grass-rich areas, this thatch layer has developed between the perennial bunchgrasses. Medusahead produces especially persistent and dense thatch, as its high silica content prevents dead plant matter from decomposing quickly. Disturbance or removal of excessive thatch is essential for germination and growth of some native species including popcornflowers (*Plagiobothrys* spp.), clovers (*Trifolium* spp.), owl's-clovers (*Castilleja* spp.), cream cups (*Platystemon californicus*), and red maids (*Calandrinia ciliata*) (Grey Hayes, pers. comm.). Thatch management and reduction of grassland canopy height to allow germination and growth of small-statured forbs may be achieved through grazing or burning, although these are considered experimental for the purposes of habitat enhancement (DiTomaso and Johnson, 2006). Mechanical removal may be preferable.

4.5 Management of Visitor Use Impacts

Recreational activities proposed to be allowed on the Preserve, including relatively low-impact activities such as hiking and limited horseback riding are well documented to have detrimental effects on a variety of habitats and individual species (e.g. Spahr 1990, Wilson and Seney 1994, Knight and Cole 1995, Liddle 1997, Maschinski et al. 1997, Yorks et al. 1997, Clark et al. 1998, Leung and Marion 2000, Marion and Leung 2001, Thurston and Reader 2001, Taylor and Knight 2003, Holmes and Geupel 2005, Marion and Olive 2006). Direct and indirect effects of visitor activities on the property's natural and cultural resources could include: trampling of plants and associated loss of plant population viability and vegetation cover; soil compaction and associated increased runoff from trails; alteration of vernal pool and other wetland bottoms' microtopography by people, horses, or bicycles moving off-trail; loss of local plant and animal diversity from deliberate collection of wildflowers and wildlife (e.g. tadpoles); increased displacement or disruption of native wildlife (including nesting endangered northern spotted owls); displacement of native plant species by exotic plant species (visitors and their animals act as vectors for invasive species); loss of vegetation and increased erosion associated with trail construction and expansion activities; littering and deliberate dumping of refuse; and vandalism (including intentional damage to trees).

4.5.1 Visitor Use

The relative impact of people traveling on foot (hikers, birdwatchers, and botanizers), horseback, and bicycle has been the subject of debate among experts in the field of recreational ecology. Impacts from recreational use of wildlands can be classified into four categories: trampling, erosion, wildlife disturbance, and spread of non-native plants. While all forms of recreation impact the environment, foot, wheel, and hoof traffic have different levels and scopes of impact and these impacts vary according to environmental conditions. For example, all types of use cause greater impacts during wet weather (Deluca et al. 1998). With respect to trampling, all user groups have been found to impact vegetation by trampling, with graminoids having the greatest resistance and recovery capacity and shrubs and trees experiencing the greatest long-term reductions in diversity (Yorks et al. 1997).

Hikers have been found to cause less erosional damage than other user groups; wheels apply both compaction and shearing forces to the ground and may be more prone to channelize soil and create gullies that exacerbate erosion processes (Lathrop 2003). The V-shaped ruts caused by bike tires can channel water and increase erosion as well as create barriers to wildlife movement by funneling small animals such as lizards and salamanders along the trail (Vandeman 2008). Comparisons between erosional impacts caused by horses and hikers showed that horses cause greater soil disturbance than hikers (Deluca et al. 1998, Cole and Spildie 1998, Wilson and Seney 1994). If trails are designed, constructed, and maintained to handle the demands of planned user groups, however, impacts should be minimal (Lathrop 2003).

Disturbance to wildlife has been found to occur with all recreational user groups and is more a function of distance than mode of travel (Taylor and Knight 2003), although a 2004 (Wisdom et al.) study found higher probability of elk movement from mountain bike activity than from hiking. Empirical evidence suggests that mortality to wildlife is greater from mountain bikes than hikers due to the speed with which bikes travel, their higher distance from the ground, and their concentration on negotiating the trail (Vandeman 2008).

All recreational users are potential vectors for the spread of non-native, invasive plants. Seeds can become lodged in clothing, bike mechanisms, accessories, and animal tails and fur and later be dropped along trails far from the point of origin, spreading non-native and potentially invasive plants throughout wildlands. Horses are likely to have a greater impact than other forms of travel. Since they often feed or graze in pastures containing non-native plants, horses can deposit these plants' seeds when they have bowel movements along the trail (Wells and Lauenroth 2007). The dung provides a nutrient-rich, moist growing medium favorable for seedling germination and establishment.

Although several studies have been conducted that conclude mountain biking has no more impact on wildlands than hiking (Chiu and Kriwoken 2003, Spahr 1990, Taylor and Knight 2003, Thurston and Reader 2001, Wilson and Seney 1994), these conclusions are disputed (Vandeman 2008). The largest impact of mountain bikers may have more to do with behavioral attributes than mechanical effects. Mountain bikers travel faster over longer distances than hikers, thus extending the range of impacts from a single user. Additionally, the manner of riding – including skidding, braking, acceleration, and turning – at accelerated speeds – may create greater erosion than that expected from moderate speeds used during experimental trials.

4.5.2 Low Impact Recreation

Ag + Open Space intends to enable recreational access on the Preserve that is compatible with preserving the conservation values of the property. Recreation will be permitted on the property only when consistent with resource management objectives. Activities which threaten or endanger visitors, the land or the environment will not be permitted. Allowable uses include hiking, wildlife observation and photography, picnicking, interpretive and educational activities, and botanizing. Equestrian use will be limited to property patrol by trained volunteers – currently residents of neighboring properties – who are familiar with the Preserve. The Volunteer Patrol will hike or ride trails on horseback to ensure that the site is being used in accordance with the management plan. They will identify any constrained parking conditions, vandalism, fences in need of repair, erosion along trails, adverse conditions to wildlife, environmental, or cultural resources, or any other conditions that warrant Ag + Open Space's attention. Horseback patrol will be restricted in sensitive habitats and where populations of sensitive plant species have been documented (see Figure 8, Sensitive Habitats Map, and Confidential Appendix 16, Sensitive Species Occurrences). Since the Preserve does not have safe access for horse trailers, equestrian use will be limited to those entering through neighboring properties where safe access is possible and who have completed an orientation and training program provided by Ag + Open Space representatives.

4.5.3 Trail Use

The primary purpose of the Preserve is to conserve Saddle Mountain's rich biodiversity and mosaic of complex habitats. Recreational use of the Preserve is appropriate only when and where it does not impact the conservation purpose of the acquisition. The Preserve provides habitat for several species of sensitive plants and animals and important cultural resources. To best protect the property's resources, roads and trails should be open only to hiking and limited horseback riding during those times of year when impacts are limited. Dogs are not allowed on the Preserve in order to prevent trampling of rare or sensitive plants and disturbance to wildlife and livestock utilized for vegetation management.

Select trail closures may be considered to protect sensitive habitat, sensitive plant and animals, and visitors. Traffic on trails that lead to or pass close to vernal pools should be restricted until the pools dry for the summer. Exceptions to trail closures may be made for volunteer patrol members; however, horse traffic should be restricted on steep slopes and within sensitive habitats during the winter months and volunteers should be instructed in proper SOD protocol to limit spread of the fungus.

4.5.4 Outreach and Public Engagement

Ag + Open Space provides regular outings, volunteer opportunities, and/or workdays, coordinated either by Ag + Open Space staff and/or with other partner organizations. A schedule of guided hikes is provided on the Ag + Open Space website. Ag + Open Space coordinates with other organizations to provide a wide range of appropriate activities and events that highlight the Preserve's natural resources. These events include bird watching, plant identification, cultural history tours, watershed education, and Preserve appreciation hikes.

Types of future outreach and public engagement on the Preserve may include the development of a docent program, which will be comprised of trained volunteers who are authorized to provide guided tours for hikers. Ag + Open Space may also plan and host public Open Space days that would offer hikes and tours to the public. Guided tours will be hosted by Ag + Open Space staff and partner organizations and will be limited to an appropriate number of visitors. Ag + Open Space staff will identi-

fy appropriate parking areas and establish a general route for the tours and outings. In addition to visitor information and public opportunities, Ag + Open Space will conduct outreach when preparing or updating management plans or other environmental documentation related to the preserve.

4.5.5 Low Impact Research

Appropriately reviewed and directed research of the Preserve's resources, natural processes, values, and uses by credentialed researchers and scholars or their students will be encouraged. Institutions fostering this research can include, but are not limited to, universities, colleges, foundations, other non-governmental organizations, federal, tribal, and state agencies, and Ag + Open Space staff. Results from research will be used to provide a scholarly basis for updates to this management plan, management activities, environmental education and interpretive activities. All data and information acquired through studies conducted on the Preserve will be retained by Ag + Open Space and made available to the public.

Research subjects that are considered highly appropriate on the Preserve include grazing regimes, serpentine plant communities, freshwater wetlands, Sudden Oak Death, grassland management, cultural resources, and other subjects that address management concerns or sensitive habitats. All research must be conducted to minimize impact to the Preserve's natural resources including the removal of equipment used to conduct the research. Removal of objects or specimens or other collections will be prohibited unless clearly necessary and in support of the property's conservation purpose. All research must be approved by the General Manager prior to initiation. Approval is subject to revocation if the research is subsequently determined to be detrimental to property resources or individuals conducting the research fail to act in a manner consistent with Ag + Open Space policies.

4.5.6 Environmental Education

Ag + Open Space will work with partner agencies and organizations to provide environmental education and interpretive activities on the Preserve. These activities could include classes for school children and a self-guided interpretive trail. Educational activities for school children and other youth groups will be conducted by Ag + Open Space partners and will cover topics approved by Ag + Open Space. Educational activities that support Preserve management such as wildlife and botanical surveys, invasive plant removal, and restoration projects will be a priority. The Preserve's cultural resources will be included as appropriate; however, locations of sensitive resources, sensitive animal habitat, and cultural resources will be protected.

Interpretive activities will reach out to a broader segment of the public and will include information about potential harm caused by off-trail hiking, and littering as well as information about the Preserve's natural resources and opportunities to participate in invasive species removal and restoration projects.

4.5.7 Avoiding Impacts to Sensitive Resources

All human recreational activities on the Preserve have the potential to cause damage to the property's sensitive resources (i.e. rare species, sensitive habitats, and cultural resources). However, there are a number of common-sense measures that have been suggested to manage potential visitor use impacts. Implementing these would go a long way toward preventing the degradation or outright loss of the property's sensitive habitats resources. Initial recommendations to ameliorate visitor use impacts include:

Limit visitor activities to established trails: Encourage use of existing trails to route visitors around or away from sensitive areas (e.g. individual rare plant occurrences, serpentine outcrops, and archaeological sites) to prevent direct trampling of plants and wetlands; to avoid flushing wildlife; and discourage collection of artifacts.

Properly maintain trails: Maintain trails to prevent excessive wear and erosion, reducing sediment input into nearby water bodies.

Limit types of visitor activities: Only relatively low-impact activities (hiking and limited horseback riding) should be allowed on the property, and the likely effect of each activity should be carefully evaluated before making a final determination about which activities are appropriate. Off-road vehicles, biking, hunting, and fishing should be actively prevented and restrictions enforced.

Establish buffers and prevent or limit access to particularly sensitive areas: Close portions of existing trails (seasonally or permanently) known or suspected to impinge on sensitive resources (e.g. rare plants and habitats, spotted owl nest sites, archaeological sites). If feasible, erect fenced exclosures around discrete habitats (e.g. vernal pools, serpentine outcrops) to prevent people and animals from trampling plants. Discourage visitor use of certain areas when impact potential is especially high, especially during the rainy winter season.

Prevent damage to and looting of archaeological sites: Any future facilities construction and improvements should be planned to avoid cultural resources. If trails and roads can be routed away from resources this will serve as mitigation on two levels; first the construction impact will be avoided, and second the foot traffic (and potential collectors) will be directed away from resources.

Modify visitor behavior: Post signs and/or construct kiosks to educate visitors about sensitive resources and direct them to behave appropriately (e.g. remain on trails, leave flowers unpicked, no dogs allowed on Preserve, pick up litter, etc.).

Limit factors favoring introduction of exotic plant species: Limit visitor access points (e.g. trailheads). People and domestic animals are excellent vectors for invasive species and trails are effective conduits of these species to backcountry areas. In fact, exotic species richness has been found to negatively correlate with distance from the trailhead (Benninger-Traux et al. 1992). Conduct trail-side monitoring and targeted plant removals where invasives are found.

4.5.8 Potential Access Roads and Trail Locations

To reduce the spread of non-native invasive plants, the number of access points should be limited. Currently, the most direct and safe access location for the majority of visitors is the Cleland Ranch Road entrance. Existing trail and road locations pass near sensitive plant populations and through sensitive habitat. Cleland Ranch Road is close to montane riparian habitat and two identified populations of Napa false indigo. The Erland-Cleland Tie Road passes through a cultural resource area that should not be exposed to any type of ground disturbance and the route also contains other cultural resources that should be protected from visitor traffic. This road and Alpine Creek Road pass through or close to sensitive plant habitat and montane riparian habitat. Erland Spur Road and Cabin and Cabin Spur 1 pass through sensitive plant habitat and Cabin, Cabin Spur 1 and Cabin Spur 4 pass through areas containing cultural resources. All of these roads have been identified as roads that will be maintained or upgraded for maintenance and visitor use when the Preserve is open to the public. Care must be taken during maintenance and upgrading to limit impacts to the Preserve's sensitive resources and if possible, they should be rerouted to less sensitive areas.

Alpine Creek Trail, which connects the Erland-Cleland Tie to the Erland Spur, and the lower half of the Upper Alpine Creek Trail will be closed. A road entering the eastern section of the northern parcel within sensitive plant habitat will be decommissioned.

4.5.9 Infrastructure Improvements

In keeping with the preservation goals of this management plan, infrastructure development will be kept to a minimum. Currently, Preserve visitors access from Cleland Ranch Road and park in a small mowed area about a half mile into the property. This parking area can accommodate approximately 15 cars; no improvement or expansion of this parking area is planned.

Ag + Open Space installed an electric gate at the entrance to the property at Cleland Ranch Road in July 2015. This greatly improves the security of the property, and ensures that access is only allowed to trained docents, volunteer patrollers, and those folks who have been given Ag + Open Space authorization to enter the Preserve.

4.6 Monitoring and Evaluation

To date, Ag + Open Space has not established a formal monitoring program of its fee properties. The following monitoring and evaluation recommendations are presented as potential future management strategies or as research opportunities.

4.6.1 Monitoring Protocols

Monitoring protocols should be designed to be able to determine whether specific objectives of this Plan are being met. The Society for Ecological Restoration (SER) recommends monitoring of a wide range of ecological properties, including vegetation diversity and structure, and other ecological processes that can include wildlife use of sites, herbivory on planted species, predation, and changes in soil processes (Stromberg, D'Antonio, Young and Kephart, 2007). Data should be collected and recorded, not only for the treated restoration site, but also for a comparable reference site. Photographic monitoring over time from fixed locations is a relatively simple, low-cost monitoring technique that can supplement quantitative data collection. Paired photographs from fixed locations can be useful tools in explaining complex changes over time.

Following are a number of regionally appropriate peer-reviewed protocol and guidance resources:

- California Salmonid Stream Habitat Restoration Manual, California Department of Fish and Wildlife. 1998. http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp

- Photo-Monitoring for Better Land Use Planning and Assessment, Range Land Monitoring Series, Publication 8067, University of California Division of Agriculture and Natural Resources. 2003. http://anrcatalog.ucanr.edu/pdf/8067.pdf.
- Measuring and Monitoring Plant Populations. Bureau of Land Management. BLM Technical Reference 1730-1. BLM Technical Reference 1730-1. http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf
- California Native Plant Society Relevé Protocol. California Native Plant Society Vegetation Committee. Revised 2004. http://www.cnps.org/cnps/vegetation/pdf/cnps_releve_protocol_20070823.pdf.
- Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1536&context=govdocs
- Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessment in California. State Water Resources Control Board. 2007. http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/phab_sopr6.pdf
- SWAMP - Clean Water Team Citizen Monitoring Program Guidance Compendium for Watershed Monitoring and Assessment. State Water Resources Control Board. http://www.swrcb.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml.
- Grazing Handbook, A Guide for Resource Managers in Coastal California. Sonoma Resource Conservation District. http://sonomarcd.org/documents/Grazing-Handbook.pdf.
- Handbook for Forest and Ranch Roads. Pacific Watershed Associates. 2014. Available for download at Mendocino County Resource Conservation District website. http://www.mcrcd.org/.

Monitoring of Erosion Sites

Effective erosion management evaluation employs a road treatment-based monitoring strategy typically using standard photo points. These established annual photo points compare the treatment sites over time to observe visible erosion after the first year. Because it is very difficult to directly measure sediment savings on a single project or treatment site, repeated inspections are recommended, including inspections after significant storm events through the first winter or two, and annually thereafter.

Monitoring of Exotic/ Invasive Species

On-the-ground monitoring is an extremely important aspect to a successful invasive species management program. Monitoring does not necessarily require extensive data collection and analysis, unless the program is a research project. Simply visiting the treatment sites on a regular basis, keeping good records, and performing re-treatment at appropriate times can lead to a successful invasive plant control program. Documentation of methods used, timing, and other relevant factors is important so future land managers do not have to "re-invent the wheel." Monitoring results can be published or presented at conferences to expand the knowledge base within this relatively new field. Fully successful treatment requires an adaptive management approach (Section 4.7, Adaptive Management). Most treatment methods will cause some degree of disturbance that may create temporarily favorable conditions for other invasive species, so a revegetation program may also be an appropriate component of maintaining some sites. Follow-up treatments that utilize an additional/ supplementary control method may be the best approach for dealing with changing conditions over time.

4.6.2 Evaluation and Monitoring Indicators

The evaluation method is to be developed for each project according to the specifications of each project's goal(s) and the data indicators that are applicable for that project. Various methods can determine the success of the intended outcome of the implemented management strategy (Table 4.1). If the management strategy employed to remove the target species has unintended or undesirable results, the adaptive management framework described in Section 4.7 allows for the re-evaluation and modification of the management strategy.

Table 4.1 Data Indicators to Measure Progress toward Recommended Management Strategies

MANAGEMENT STRATEGY	MANAGEMENT ACTIVITY GOALS	DESIRED OUTCOMES	EVALUATION STRATEGY	INTERIM MILESTONES	QUANTIFICATION OF INDICATORS
Erosion Control/ Sediment Reduction/ Water Quality Maintenance	Improve road drainage features preventing road-related erosion	Reduce fine sediment sources from entering water ways and detrimentally affecting aquatic habitat	Monitoring road treatment sites using photo points; bioassessment and macroinvertebrate sampling to assess water quality and aquatic habitat condition changes; turbidity or suspended sediment measurements to assess changes in quality of runoff from improved roads	Minimal erosion on improved road networks and decreased suspended sediment and sediment deposition downstream of improved road networks	Prevention of 1,900 yards of sediment entering target drainages (Weeks, Alpine and/or Van Buren Creeks); no decrease in the baseline IBI score; decrease in turbidity or suspended sediment concentration
Exotic/ Invasive Species Management	Remove and reduce population viability of invasive plant species	1. Reduce target species numbers in treated areas 2. Increase native plant species	Comparison of infested areas receiving treatment over time using GPS vegetation mapping, coupled with random quadrat analysis for percent cover	Annual decrease of the area infested with target species based on removal and treatment and associated increase of non-invasive species	10% annual decrease areal coverage of target species
Sensitive Habitat Enhancement/ Native Plant Revegetation	Introduce native plant competition to reduce the re-colonization of invasive plants; Prevent erosion by stabilizing erosion-prone areas with the installation of native vegetation	1. Increase in native plant coverage 2. Decrease erosion and fine sediment delivery to aquatic habitats	Comparison of percent cover with native grasses and forbs in seeded areas; survival rates of installed plants; comparison of infested areas receiving treatment over time using GPS vegetation mapping	Increased ground cover with native plant species, decrease in areal coverage of bare ground	90% establishment of planted native species; a minimum survival rate of 65% a year after planting is implemented

4.6.3 Evaluation of Erosion Control and Sediment Reduction

Erosion management evaluation will employ a road treatment-based monitoring strategy using standard photo points. These established annual photo points will compare the treatment sites over time to observe visible erosion after the first year. Because it is very difficult to directly measure sediment savings on a single project or treatment site, PWA recommends repeated inspections, after significant storm events through the first winter or two, and annually thereafter. Due to the ground disturbance associated with the road improvement project, runoff from the first winter following implementation is expected to yield sediment as the treatment sites settle and adjust. Once this initial adjustment is completed, there is not expected to be any detectable road surface erosion at the treatment sites.

While ideally the success of an improved road network would be evaluated in terms of improvement to aquatic habitat, since the target watersheds (Weeks, Alpine and Van Buren) are not contained entirely within the Preserve, and consequently the sediment impacts are not limited to the road drainage networks on the Preserve, it is not possible to evaluate success of the road improvements on the Preserve entirely via creek conditions. While using bioassessment of benthic macroinvertebrate communities to evaluate improvements to water quality and stream habitat conditions could be one evaluation tool, it would need to be correlated with a road-based project assessment parameters.

Targeted turbidity measurements can be taken at road-related runoff outlet points, such as culvert outlets. In order to employ this method, baseline, or pre-project, turbidity measurements should be taken at comparable runoff outlet points so that the background conditions can be established against which to measure improvement. A measurable improvement in terms of turbidity would be a decrease in Nephelometric Turbidity Units (NTUs) or Suspended Sediment Concentration (SSC) volume contained in the runoff. When establishing runoff outlet monitoring points, it should be noted that hydrology of the road system will change through implementation, and thus some runoff outlet points may change as well. This level of monitoring would be time-intensive and expensive.

There has not been extensive water quality monitoring conducted on any of the creeks flowing through the Saddle Mountain, so baseline conditions of water quality (i.e. prior to erosion treatments or plant revegetation) are not determined for the property. Because environmental conditions vary within, between, and among years, a fully accurate depiction of stream conditions would require ongoing data collection over multiple years. Some traditional quality parameters (e.g. temperature, dissolved oxygen, pH, conductivity, stream height) can be measured continuously using *in situ* (on site) data loggers.

In 2008, continuous temperature monitoring data loggers were deployed at two locations on Weeks Creek as it runs through the Preserve. These loggers collected water temperature data every half hour from May to October of 2008. Continuation and expansion of this monitoring program should be considered on Van Buren, Alpine and Weeks Creeks in order to assess and evaluate aquatic conditions on the property. Additionally, benthic macroinvertebrates sampling (bioassessment) conducted in the spring and/or fall, along with an assessment of streamflow and channel conditions, could indicate changes in aquatic habitat quality parameters. A discussion and listing of various published monitoring resources that include monitoring data collected in the upper Mark West Creek watershed in the vicinity of the Preserve are summarized in Appendix 12, Water Quality and Habitat Assessments, Methods and Protocols.

4.6.4 Evaluation of Exotic/ Invasive Species Control

Evaluation of invasive plant control treatment will require a monitoring plan to be finalized once the treatment method(s) is finalized. A suite of invasive plant control methods are recommended for priority target species. The monitoring plan should address the major objectives of the invasive plant control treatment including detecting and quantifying the change in plant species composition of the treated areas and the decrease in areal coverage of target species in the infested area. Monitoring approaches could include boundary mapping, which is the annual mapping of the perimeter of a plant population to monitor change in the area occupied by the population, utilizing photo points to evaluate the extent of the plant population over time, and measurement of percent cover of target species. Each of these methods requires and Ag + Open Space policy states that the results of pest control activities should be "monitored and compared to a baseline to determine the effectiveness of the control action and describe unanticipated effects" (Ag + Open Space, 2008).

For all plant community monitoring, whether it be related to invasive plant removal or native plant installation, the scale and intensity of the monitoring must be determined based on the project goals. According to Elzinga, et al,

> "Clearly, as you increase the scale and intensity you will know more about the species and its trend and status, but the monitoring will be more expensive. With limited funds, you can monitor one or a few species at a large scale and high intensity, or more species at a more limited scale and lower intensity. The setting of priorities is the first step in determining the importance and number of species and/or populations that require attention, the monitoring resources that should be allocated to each, and the complexity of the objective for each species or population that can be monitored."

The general recommendation is that the most sensitive habitats and/or rarest plant species should be monitored most intensively (i.e. the vernal pools and/or Clara Hunt's milk-vetch), while the less sensitive habitats should be monitored less intensively at a larger spatial scale.

4.7 Adaptive Management

Adaptive management is a structured, iterative process of educated decision-making where results are evaluated and actions adjusted in order to improve future management based on what has been learned. Adaptive management aims to simultaneously maximize one or more resource objectives and accrue site-specific information needed to improve future management. Adaptive management is often characterized as "learning by doing" and can change throughout the course of a project.

Ag + Open Space's Open Space Preserve Policies (Ag + Open Space, 2008) point out that "management activities and monitoring are linked activities" and states that the employment of an adaptive management process "uses feedback from research and monitoring to evaluate the management actions; this enables the District to modify or continue to support management objectives and strategies."

4.7.1 Long Term Maintenance and Monitoring

Monitoring is a key component of adaptive management. Monitoring the outcomes of management actions provides the information necessary to adjust management strategies or implementation actions to achieve desired results. As monitoring data from individual project implementation are gathered and evaluated, direction toward stated goals and objectives will be evaluated. Where progress is being made toward goal achievement, long-term maintenance will be initiated, with monitoring and data analysis continuing to provide feedback into the management process. If monitoring data analysis indicates that project implementation is not creating or maintaining desired conditions, alternative strategies will be reviewed, and the optimal strategy or strategies will be implemented. Long-term monitoring will continue, with subsequent data analysis providing feedback to measure each subsequent implementation activity until progress towards objectives is achieved. See Appendix 14, Monitoring Approaches for Recommended Management Strategies, for a list of recommended monitoring protocols, suggested resources, and target outcomes.

4.7.2 Project Assessment and Evaluation

The establishment of a monitoring plan for the habitat enhancement projects recommended on the Preserve is necessary to assess the on-going management of the property, the success of projects implemented for habitat enhancement and the impacts of visitor use, as well as for compliance with the Open Space Preserve Policies (Ag + Open Space, 2008). The employment of an adaptive management strategy for the ongoing management and monitoring planning allows for the opportunity to reprioritize and/or improve management approaches in response to unforeseen conditions. Based on the Open Space Preserve Policies, "habitat monitoring will be the primary basis for evaluating the effectiveness of management actions," with the goal of managing preserve lands "primarily for biological integrity, ecosystem health, and biological diversity" (Ag + Open Space, 2008). This should be the guiding principal for evaluation and adaptation of ongoing enhancement and management activities. See Table 4.2 for a matrix of suggested adaptive management monitoring approaches for the priority strategies recommended in this plan and in Appendix 14, Monitoring Approaches for Recommended Management Strategies.

Table 4.2 Adaptive Management Approach to Monitor Recommended Management Strategies

MONITORING TYPE	PROTOCOL	RESOURCE HYPERLINK	IMPLEMENTATION TIME PERIOD	MONITORING OBJECTIVE	MANAGEMENT OUTCOMES	PRIORITY
STRATEGY: EROSION CONTROL AND SEDIMENT MANAGEMENT						
Culvert Assessment	Modified CDFW Upslope Inventory	http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp	Fall, and after large storms that have mobilized debris, to inform necessary maintenance to avoid culvert failure and related erosion	Culvert and culvert plug condition	Culvert maintenance	High
Photo monitoring	Photo-Monitoring for Better Land Use Planning and Assessment	http://ucanr.edu/sites/UCCE_LR/files/180920.pdf	1. Before/after project implementation 2. Every spring	Erosion remediation monitoring	Erosion remediation of problem sites	High
Turbidity and/or Total Suspended Sediment Concentration	SWAMP - Clean Water Team Citizen Monitoring Program Guidance Compendium For Watershed Monitoring and Assessment	http://www.swrcb.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml	Early winter after storms have mobilized debris	Trend analysis of sediment impacts to aquatic habitat over long-term	Assessing ongoing sediment impacts to aquatic habitat	Low
Aquatic Bioassessment	Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessment in California	http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp_sop_bio.pdf	1. Baseline prior to implementation 2. Every spring	Trend analysis of sediment impacts to aquatic habitat over long-term	Assessing ongoing sediment impacts to aquatic habitat	Medium
STRATEGY: EXOTIC/ INVASIVE PLANT SPECIES MANAGEMENT						
Invasive plant population boundary mapping	Measuring and Monitoring Plant Populations	http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf	1. Baseline prior to implementation of management strategies 2. Every Spring	Invasive plant population control monitoring	Assessing success/ response of invasive plant removal efforts on a macro-scale	High
Photo monitoring	Photo-Monitoring for Better Land Use Planning and Assessment	http://ucanr.edu/sites/UCCE_LR/files/180920.pdf	1. Before/after project implementation 2. Every spring	Invasive plant population control monitoring	Assessing success/ response of invasive plant removal efforts on a macro-scale	High

MONITORING TYPE	PROTOCOL	RESOURCE HYPERLINK	IMPLEMENTATION TIME PERIOD	MONITORING OBJECTIVE	MANAGEMENT OUTCOMES	PRIORITY
Percent cover estimates (1 m^2 quadrats)	Measuring and Monitoring Plant Populations	http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf	1. Baseline prior to implementation of management strategies 2. Every Spring	Plant species composition in treated areas	Evaluation of species composition response to invasive plant removal efforts	High
SOD monitoring	Diagnosis and Monitoring of SOD, University of California Cooperative Extension. Pest Alert 6.	https://www.npdn.org/system/files/GPDN%20Ramorum%20blight-diagnosis%20and%20monitoring%20March%202002.pdf	Every spring	Trend analysis of Sudden Oak Death spread	Assessing SOD occurrence	Low
STRATEGY: SENSITIVE HABITAT ENHANCEMENT						
Survival monitoring revegetation projects, direct counts	Measuring and Monitoring Plant Populations	http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf	Every spring	Percent survival and resulting density of installed riparian plants	Planting maintenance adjustment to ensure survival and/or replanting to augment loss	High
Photo monitoring	Measuring and Monitoring Plant Populations	http://ucanr.edu/sites/UCCE_LR/files/180920.pdf	1. Before/after project implementation 2. Every spring	Monitor changes in vegetation composition in sensitive habitats	Assessing success of native plant revegetation efforts	High
Percent cover estimates (1 m^2 quadrats)	Measuring and Monitoring Plant Populations	http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf	1. Baseline prior to implementation of management strategies 2. Every Spring	Total percent cover and plant species composition in treated areas	Assessing success of native forb and grass seeding efforts	High
STRATEGY: SOD AND FIRE MANAGEMENT						

MONITORING TYPE	PROTOCOL	RESOURCE HYPERLINK	IMPLEMENTATION TIME PERIOD	MONITORING OBJECTIVE	MANAGEMENT OUTCOMES	PRIORITY
SOD Monitoring	Diagnosis and Monitoring of Sudden Oak Death. University of California Cooperative Extension. Pest Alert 6.	https://www.npdn.org/system/files/GPDN%20Ramorum%20blight-diagnosis%20and%20monitoring%20March%202002.pdf	Spring	Trend analysis of Sudden Oak Death spread	Assessing SOD occurrence	Low
Fuel Load Monitoring	Fuel Load Sampling Method. US Forest Service	http://www.treesearch.fs.fed.us/pubs/24059	Late summer / Fall	Measure fuel potential: duff profile; dead debris & cover	Assessing fire risk	Medium
STRATEGY: WATER QUALITY MONITORING						
Continuous Temperature Monitoring	Forest Science Project Stream Temperature Protocol	http://www.waterboards.ca.gov/water_issues/programs/tmdl/records/region_1/2003/ref1761.pdf	Continuous temperature loggers deployed during low-flow summer and fall months when stream temperatures limit aquatic habitats	Trend analysis of water temperature as a gauge of aquatic condition	Assess success of sensitive habitat enhancement projects e.g. riparian revegetation	Medium
Biological Monitoring	Standard Operating Procedures for Collecting BMI Samples and Associated Physical and Chemical Data for Ambient Bioassessment in CA	http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp_sop_bio.pdf	1. Baseline prior to implementation of management strategies 2. Every Spring	Trend analysis of biological integrity of aquatic habitat	Assess trends to aquatic habitat in response to Preserve management activities	Medium
Flow Monitoring	Standard Operating Procedure for Stream Flow Measurement	https://www.epa.gov/sites/production/files/2015-06/documents/module5.pdf	Continuous stage monitoring stations should be established year round and corresponding stream flow should be measured every 2-3 weeks throughout the year	Trend analysis of stream flow	Assess stream flow response to Preserve management activities	Medium

5. PRIORITY PROJECT IMPLEMENTATION

5.1 Erosion and Sediment Control Projects

Priority projects will focus on addressing issues that threaten the ecological integrity of the Preserve, as well as implementing public safety measures. Natural resource management issues that should be addressed in the immediate-term are (1) erosion from roads and other sources causing sediment delivery into the property's creeks, and (2) invasive plant species controls/ native plant community enhancement.

5.1.1 Erosion Remediation Projects

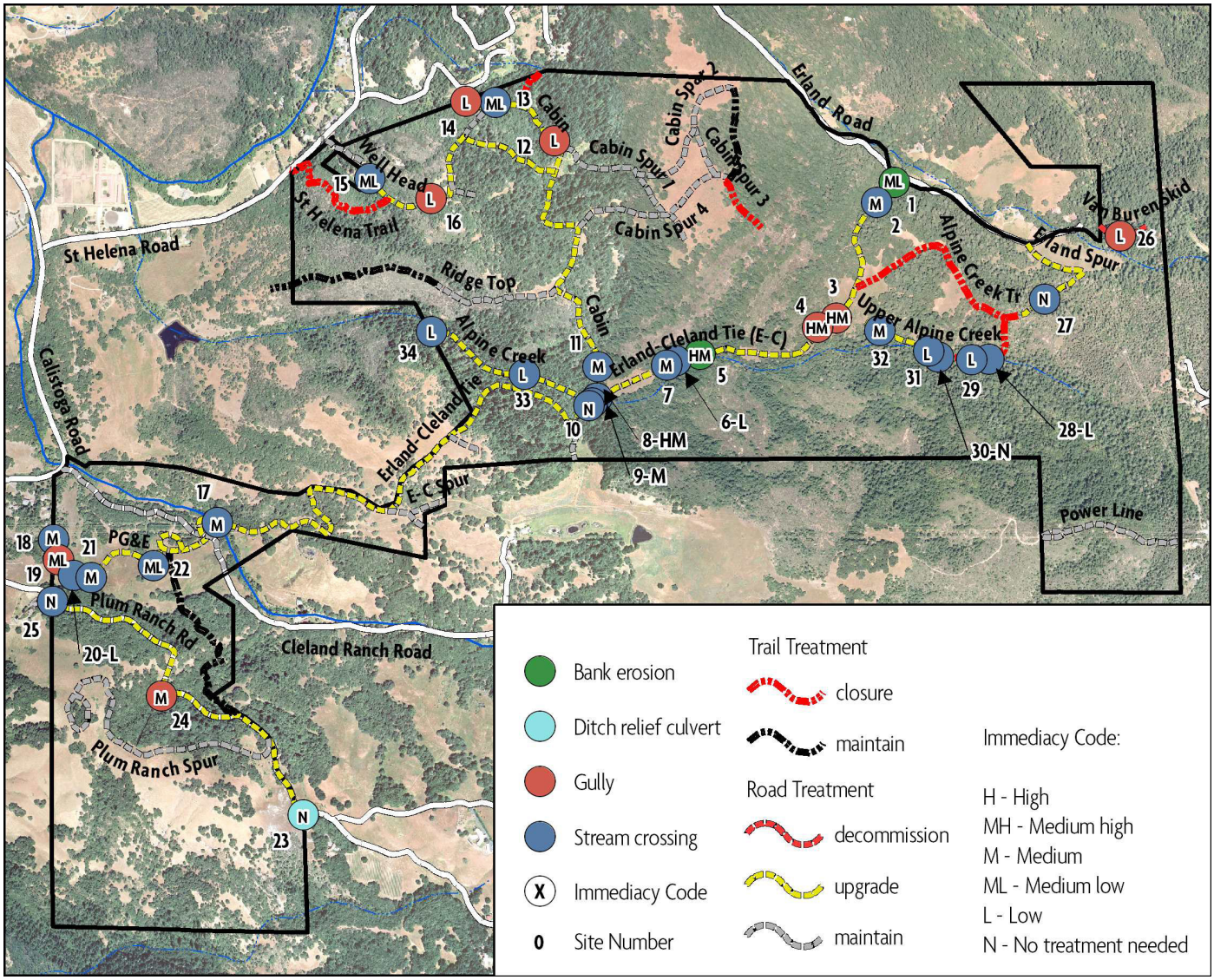


Figure 17. Road and Trail Treatment Areas

Recommendations from the PWA road assessment conducted on the Preserve in 2008 and reevaluated in 2015 include treating[9] 25 of the 36 identified road/trail sites and 3.10 miles of 3.35 hydrologically connected road/trail assessed for erosion control and erosion prevention. Individual road related treatment sites include 15 stream crossings located throughout the road network, six gullies on the Cabin, Erland-Cleland Tie, PG&E, and Wellhead roads, and two sites of bank erosion on the Erland-Cleland Tie Road. Due to access constraints, it is recommended that Alpine Creek Road, Alpine Creek Trail and Van Buren Skid be permanently closed and abandoned in place.

Stream crossing treatments are primarily implemented to reduce the risk of catastrophic failure and sediment delivery resulting from saturation of road fill or stream diversion along road surfaces. For the most part, armored fill crossings are prescribed throughout the project area because of the low volume of traffic and greater longevity. Armored fill crossings do not have the potential to plug like a culvert, and by design alleviate diversion potential. For the Preserve, it is recommended that one culvert be replaced on Plum Ranch Road and that 10 wet crossings (7 armored fill crossings and three fords) be constructed to minimize erosion potential. Approximately 90 cubic yards of rock armor will be required to build the 7 armored fill crossings.

Field measurements show that approximately 1,000 square feet of asphalt and 72 cubic yards of road rock will need to be replaced following treatment. An important final step to implementing the recommended erosion remediation for the Preserve will be replacing road pavement removed during installation of ditch relief culverts and culverts at stream crossings on Plum Ranch Road, as well as re-rocking the road surface on the northernmost section of the Erland-Cleland Tie Road. A summary of treatments advised for priority erosion sites at Saddle Mountain is presented below (Tables 5.1 and 5.2).

[9] All treatment prescriptions follow guidelines described in the Handbook for Forest, Ranch, and Rural Roads (Weaver, Weppner, and Hagans, 2014), as well as Parts IX and X of the California Department of Fish and Wildlife Salmonid Habitat Stream Restoration Manual (Taylor and Love, 2003; Weaver et al., 2006). Overviews of construction and installation techniques for the recommended erosion control and prevention treatments are provided in Appendix 7.

Table 5.1. Recommended treatments for sediment delivery sites and associated road segments, Saddle Mountain Road and Trail Erosion Assessment Project, Sonoma County, California.

TREATMENT TYPE			NO.	COMMENTS
SITE SPECIFIC TREATMENTS	Stream crossing treatments	Armor fill face	1	Armor the outboard fill face at site #1 using 2 yd^3 of riprap.
		Culvert (replace)	1	Replace an undersized, poorly installed, or worn out culvert (site #24).
		Trash rack	1	Install at culvert inlets to prevent plugging (site #24).
		Wet crossing	13	Construct 2 ford (site #11 and 15) and 11 armored fill crossings (site #2, 4, 7, 8, 13, 18, 20, 21, 22, 27, 34) using 80 yd^3 of rock armor.
		Critical dip	1	Install to prevent stream diversions (Site #24).
	Other	Soil excavation	18	At 18 sites, excavate and remove a total of 192 yd^3 of sediment, primarily at fillslopes and stream crossings (site #1, 2, 4, 7, 8, 11, 13, 15, 18, 20, 21, 22, 24, 26, 27, 31, 33, 34)

ROAD SURFACE TREATMENTS	Road drainage structures	Rolling dip	87	Install to improve road drainage.
		Cross road drain	2	Install to improve drainage on decommission roads
		Install ditch relief culvert	3	Install or replace ditch relief culverts to improve road surface drainage.
	Road shaping treatments	Outslope road and remove ditch	15	At 15 locations, outslope road and remove ditch for a total of 8,038 ft of road to improve road surface drainage
	Other	Paving	4	Repave a total of 900 ft^2 of road at 1 stream crossings, and 3 ditch relief culvert installations.
		Road rock (for road surfaces)	2	At 2 locations, use a total of 90 yd^3 of road rock to rock the road surface at 3 rolling dips and 520 ft of road outsloping.

Table 5.2. Recommended treatments for maintenance sites and associated road segments, Saddle Mountain Road and Trail Erosion Assessment Project, Sonoma County, California.

TREATMENT TYPE	NO.	COMMENTS
Clean culvert inlet	1	At Site #25, clean the inlet and outlet of the ditch relief culvert.
Rolling dip[1]	6	Install to improve road drainage.
Outslope road and remove ditch	1	At 1 location, outslope road and remove ditch for 150 ft of road to improve road surface drainage
Road rock (for road surfaces)	1	At 1 location, use a total of 15 yd^3 of road rock to surface the road at a location of road outsloping.

5.1.2 Water Quality Improvement Projects

Water quality is closely linked with erosion potential, and so is included herein. However, addressing "water quality" as a single issue is not a priority of this Plan. Water quality monitoring should be conducted in conjunction with sediment reduction efforts, to ensure efficacy of erosion control projects. Monitoring of indicators for three key attributes is advised: physio-chemical monitoring (e.g. turbidity), biological monitoring (e.g. benthic macroorganisms), and streamflow monitoring (e.g. stage gauges with continual data storage). A sample monitoring methodology is described in detail in Appendix 12, Water Quality and Habitat Assessment, Methods and Protocols.

5.1.3 Erosion Treatment Priorities and Needs

Treatment "immediacy" is a professional determination of the urgency of response necessary to alleviate a threat. Table 5.3 indicates that of the 25 inventoried sediment source sites recommended for treatment, six are assigned an immediacy rating of high-moderate, 12 are assigned an immediacy rating of moderate or moderate-low, and six are assigned an immediacy rating of low (includes maintenance site).

Table 5.3 ***Treatment immediacies and potential sediment delivery volumes for each recommended treatment site, Saddle Mountain Road and Trail Erosion Assessment Project, Sonoma County, California.***

SITE #	SITE TYPE	TREATMENT IMMEDIACY[A]	ESTIMATED FUTURE SEDIMENT DELIVERY FOR THE SITE (YD^3)[B]	LENGTH OF ADJACENT HYDROLOGICALLY CONNECTED ROAD (FT)[C]
1	Bank erosion	ML	5	220
2	Stream crossing	M	6	715
3	Gully	HM	24	1,800
4	Gully	HM	3	96
5	Bank erosion	HM	0	1,350
6	Stream crossing	L	0	289
7	Stream crossing	M	7	40
8	Stream crossing	HM	7	260
9	Stream crossing	M	0	2,380
11	Stream crossing	M	0	1,000
12	Gully	L	0	1,104
13	Stream crossing	ML	1	795
14	Gully (maintenance site)	L	-	-
15	Stream crossing	ML	17	1,420
16	Gully (maintenance site)	L	-	-
17	Stream crossing	M	0	1,246
18	Stream crossing	M	1	307
19	Gully (maintenance site)	L	-	-
20	Stream crossing	L	1	355
21	Stream crossing	M	7	25
22	Stream crossing	ML	4	60
24	Stream crossing	M	79	480
25	Ditch relief culvert (maintenance site)	L	-	-
26	Gully	L	1	200
27	Stream crossing	M	0	490
31	Stream crossing	L	4	90
32	Stream crossing	M	9	40
33	Stream crossing	L	0	100
34	Stream crossing	L	2	75

[a]H, high; HM, high-moderate; M, moderate; ML, moderate-low, L, low.

[b]Total sediment delivery for the site-specific problem. As shown above, most of the sediment delivery for the project area is from chronic erosion of hydrologically connected roads (1,710 yd^3).

[c]Includes hydrologically connected ditches, cutbanks, and road surfaces adjacent to the treatment site. Paved roads surfaces include ditches and cutbanks only.

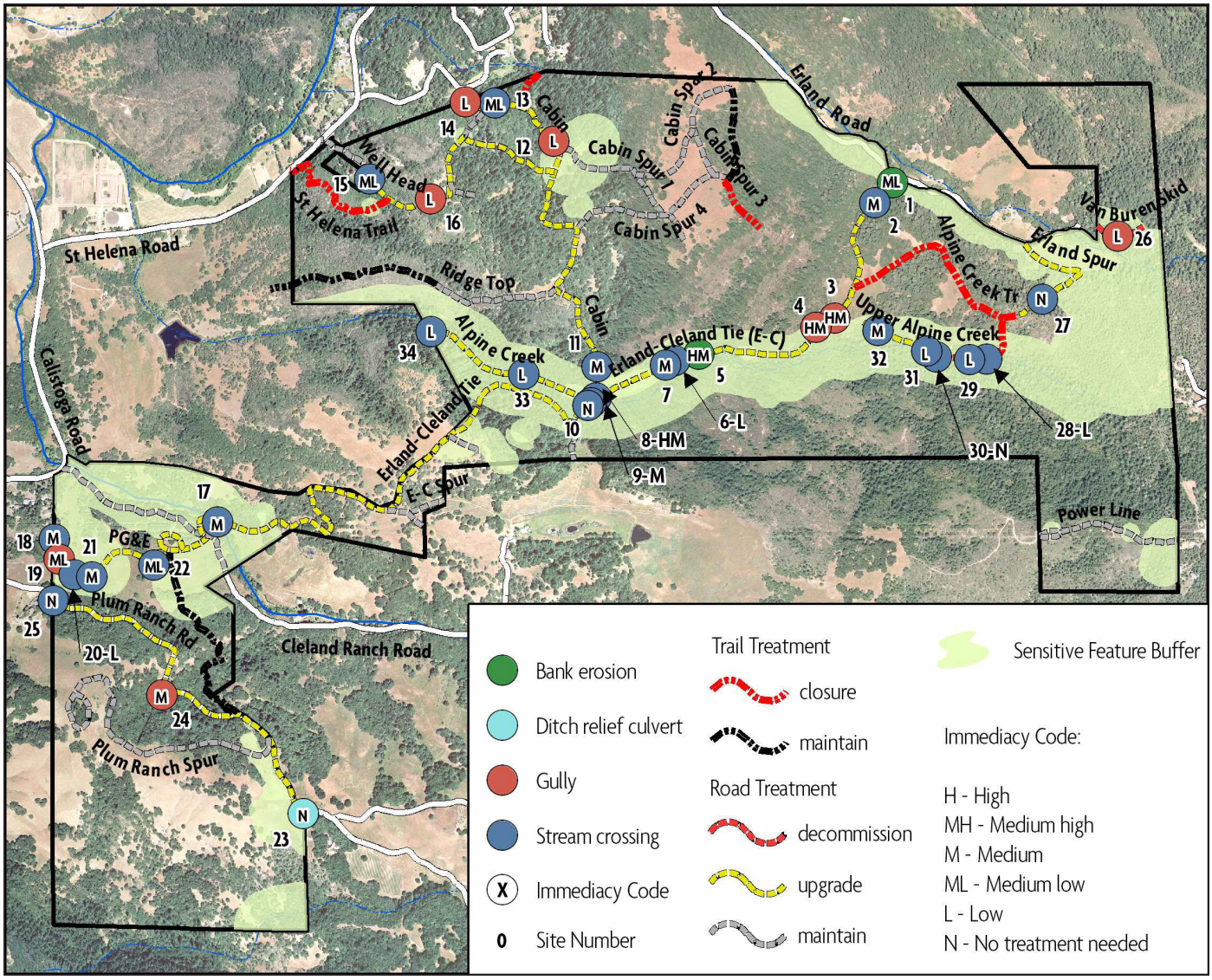


Figure 18. Road and Trail Treatment Analysis

Botanical and cultural resource surveys conducted in 2008/2009 identified a number of sensitive plant species and cultural features occurring along and in the vicinity of the Preserve roads and trails. Intensive road-related activities will avoid these areas. Table 5.4 lists roads inside buffer zones, sensitive features in their vicinity, and recommendations that afford protection while allowing for site maintenance.

Table 5.4 Road and Trail Treatment to Enhance Sensitive Features

ROAD / TRAIL NAME	SENSITIVE FEATURE	ROAD SURFACE TYPE	ROAD SITES IMPACTED BY SENSITIVE FEATURE BUFFER ZONE	TREATMENT RECOMMENDATION	TOTAL ROAD LENGTH (MI)
Alpine Creek Road	Riparian, Napa false indigo	Unsurfaced	2 stream crossings: #33, 34	Closure	0.37
Alpine Creek Trail	Riparian, Napa false indigo	Unsurfaced	2 stream crossings: #28, 29	Closure	0.6
Cabin Road	Riparian, FEW, Cultural	Unsurfaced	1 gully: #12	Upgrade/ Decommission	0.87
Cabin Spur 1	FEW, Cultural, Lobb's buttercup	Unsurfaced	None	None	0.26
Cleland Ranch Road	Riparian, Napa false indigo	Rock	None	None	0.42
Erland-Cleland Tie Road	Riparian, Cultural	Unsurfaced	6 stream crossings (#6, 7, 8, 9, 10, 17) 1 bank erosion (#5)	Upgrade	2.0
Erland-Cleland Tie Spur Roads 1	Riparian	Unsurfaced	None	None	0.1
Erland-Cleland Tie Spur Roads 2	Clara Hunt's milk-vetch	Unsurfaced	None	None	0.07
Erland Spur Road	Serpentine, Closed Cone Pine-Cypress Sonoma ceanothus	Unsurfaced	None	Upgrade	0.33
PGE Road	Serpentine, FEW, Wet Meadow	Unsurfaced	3 stream crossings (#18, 20, 21) 1 gully (#19)	Upgrade	0.51
Plum Ranch Road	Serpentine, Cultural, Napa false indigo	Pavement	1 DRC (#23)	Upgrade	0.78
Power Line Road	Closed Cone Pine-Cypress: Narrow-anthered brodiaea; Sonoma manzanita	Unsurfaced	None	None	0.34
St. Helena Trail	Napa false indigo	Unsurfaced	None	None	0.24
Upper Alpine Creek Road	Riparian	Unsurfaced	3 stream crossings (#30, 31, 32)	No treat, abandon in place	0.17
Van Buren Skid Road	Riparian	Unsurfaced	1 gully (#26)	No treat, abandon in place	0.10
Wellhead Road	Napa false indigo	Unsurfaced	None	Upgrade	0.5

5.2 Invasive Species Control Projects

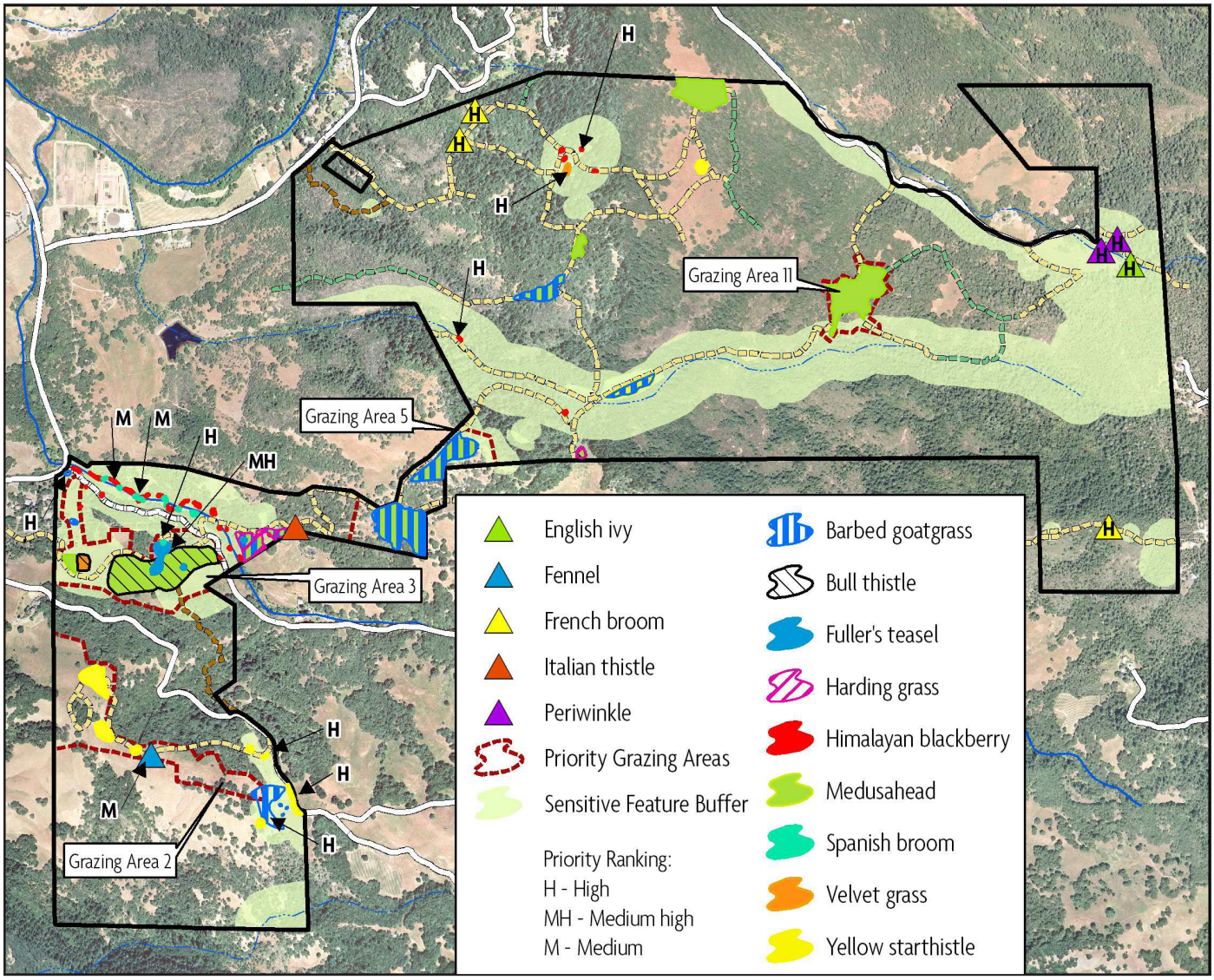


Figure 19. Invasive Plant Species Treatment Sites

Invasive species control programs within the sensitive areas on the property will be implemented as soon as possible. These areas include riparian zones, wetlands, serpentine chaparral and grasslands, and other grasslands that currently support significant concentrations of native perennial grasses. The highest priority projects are outlined below.

5.2.1 Priority Project Areas and Species

The focus of treatment efforts should be invasive plants listed as High and Moderate by Cal-IPC (Table 4.5, Priority Invasive Species to Control), and on the sensitive areas that are identified in this Plan as priority for protection. These include riparian zones; wetlands; serpentine grasslands; areas with suitable habitat for Sonoma ceanothus, narrow-anthered brodiaea, Napa false indigo, and Mt. St. Helena morning glory; and areas supporting other special status plant and animal species. In keeping with the Bradley method recommendation of prioritizing small satellite populations of invasive species, initial treatment areas should include the species at the sites specified in Table 5.6, Priority Areas for Treatment. On the other hand, significant stands of grassland invasives categorized by Cal-IPC as High or Medium (e.g. bull thistle, Italian thistle, medusahead, barbed goatgrass, hedgehog dogtail, velvet grass, and wild oat) occur within the Annual Grassland habitat type on the property, but they should be regarded as of lower priority for action, because infestations are fully established with widespread occurrences.

Table 5.6 Priority Areas for Treatment of Invasive Species

INVASIVE PLANT NAME	CAL-IPC RATING	LOCATION	SENSITIVE FEATURES BENEFITTED	SIZE OF AREA IMPACTED	TREATMENT PRIORITY	TARGET STATUS
Barbed goatgrass	High	Off Plum Ranch Road	Serpentine Bunchgrass	Small	High	10% annual decrease areal coverage
Barbed goatgrass	High	Near entrance to the Preserve off Cleland Ranch Road	Serpentine Bunchgrass	Small	High	10% annual decrease areal coverage
Bull thistle	Moderate	Uphill from the vernal pool near the hunting cabin	Valley Needlegrass Grassland	Small	High	100%
English ivy	High	Along Van Buren Creek in the northeast	Montane Riparian	Small	High	100% eradication
Fennel	High	Grassland near the "saddle" of Saddle Mountain		Few plants	Medium	100% eradication
French broom	High	Tower maintenance road in the southeastern portion of the Preserve	Serpentine Chaparral, Sonoma ceanothus & narrow-anthered brodiaea)	Small	High	100% eradication
French broom	High	Along several old roads east of St. Helena Road near the northern Preserve line	Napa false indigo	Small	High	100% eradication
Fuller's teasel	Moderate	Near the road on both sides of Weeks Creek	Fresh Emergent Marsh	Small	Medium High	100% eradication
Greater periwinkle	Moderate	Along Van Buren Creek downstream of English ivy	Montane Riparian	Small	High	100% eradication
Himalayan blackberry	High	Along Van Buren Creek	Montane Riparian	Small	High	100% eradication
Himalayan blackberry	High	Along Ducker Creek	Montane Riparian	Small	High	100% eradication
Himalayan blackberry	High	By the transmission lines north of Weeks Creek	Wetland	Small	High	100% eradication
Himalayan blackberry	High	Near the old hunting cabin in the northern portion of the Preserve		Small	High	100% eradication
Himalayan blackberry	High	Uphill from the vernal pool near the hunting cabin	Valley Needlegrass Grassland	Small	High	100% eradication
Himalayan Blackberry	High	Along Weeks Creek	Montane Riparian	Fairly large	Medium	10% annual decrease areal coverage
Pennyroyal	Moderate	Near the old hunting cabin in the northern portion of the Preserve	Vernal pool (including Lobb's buttercup)	Small	High	100% eradication
Spanish broom	High	Along the transmission line service road south of Cleland Ranch Road		One plant	High	100% eradication

INVASIVE PLANT NAME	CAL-IPC RATING	LOCATION	SENSITIVE FEATURES BENEFITTED	SIZE OF AREA IMPACTED	TREATMENT PRIORITY	TARGET STATUS
Spanish broom	High	Along Weeks Creek	Montane Riparian	Fairly large	Medium	10% annual decrease areal coverage
Velvet grass	Moderate	Uphill from the vernal pool near the hunting cabin	Valley Needlegrass Grassland	Small	High	100%
Yellow starthistle	High	Off Plum Ranch Road	Serpentine Bunchgrass	Small	High	10% annual decrease areal coverage

5.2.2 Protocols for Invasive Species Management

Methods recommended by Cal-IPC or The Nature Conservancy will be used to control priority invasive species found in the designated habitats of the Preserve[10]. A brief summary of recommended control methods is provided below for the priority invasive plants. Whichever control method is planned, implementation should be carefully managed by a qualified ecologist so that impacts to sensitive areas and special status species are kept to a minimum. If using herbicides, weed whackers, or mowers, the applicator or operator should be well trained and adept at identifying and distinguishing between native and non-native species. When using herbicides, the directions on the label should always be followed, and the applicator must know all state and local regulations. The Sonoma County Agricultural Commissioner's office is responsible for enforcing the regulations set by the California Department of Pesticide Regulation and is available for consultation. Section 6.4 presents a brief summary of applicable regulatory requirements for consideration. All project sites should be monitored by Ag + Open Space staff on an annual basis to assess the effectiveness of the control methods and need for retreatment.

Recommended Control Methods

Barbed goatgrass (*Aegilops triuncialis*): A single method usually does not give sustainable control of grassland weeds. A combination of methods is normally necessary to achieve the desired objective. Mowing can be an effective method of reducing seed production. However, the timing is critical. Mowing should occur after flowering, but before goatgrass seeds reach maturity. Late mowing will only spread viable seed. Hand pulling or hoeing small infestations is effective, if the roots are pulled and air-dried. The herbicide imazapic, not yet registered in California, has been effective experimentally on barbed goatgrass, without significantly injuring seedlings of many native grasses and forbs (Stromberg et al. 2007).

Medusahead (*Taeniatherum caput-medusae*): As with barbed goatgrass, a single method usually does not give sustainable control of grassland weeds. A combination of methods is normally necessary to achieve the desired objective. Thatch removal, performed by raking up thatch, can be effective in promoting more desirable species. The herbicide imazapic, not yet registered in California, has been effective experimentally on medusahead, without significantly injuring seedlings of many native grasses and forbs (Stromberg et al. 2007). Prescribed fire can be highly effective in reducing medusahead, with reductions up to 90% possible after a single-entry burn (S. Berleman, personal communication).

Yellow starthistle (*Centaurea solstitialis*): Yellow starthistle control requires a flexible and persistent adaptive weed management program, normally combining several control techniques. In established stands, any successful control strategy will require dramatic reduction or, preferably, elimination of new seed production and multiple years of follow-up treatment to prevent rapid reestablishment.

Properly timed mowing or weed-whacking can be an effective method of yellow starthistle management. Mowing should occur just when the plant has begun to flower and as close to the

[10] Additional information about various control methods and links to other resources can be found at: http://www.cal-ipc.org/ip/management/plant_profiles/index.php http://www.imapinvasives.org/ http://www.cdfa.ca.gov/plant/ipc/weedinfo/winfo_photogal-frameset.htm

soil level as possible. Mowing too early will stimulate more vigorous growth and higher seed production, and mowing too late, when the plant is in full flower will not prevent seed production. Results should be repeatedly monitored, as follow-up mowing may be necessary.

Herbicides are often used to treat yellow starthistle. Spot eradication is the least expensive and most effective method of preventing establishment of yellow starthistle (Bossard et al, 2000). Glyphosate can be effective when sprayed after natives have set seed but before the yellow starthistle produces viable seed, usually in May-June. Clopyralid (Transline®) provides excellent control with applications from December through April. A relatively new herbicide to California, aminopyralid (Milestone®) is reportedly very effective on yellow starthistle, as well as other thistles and broadleaf invasives (J. M. DiTomaso, personal communication, 2008).

Prescribed fire can be an effective means of control, if burns are conducted in the spring. Typically burning must be done for at least two consecutive years in order to deplete the seedbank (UC ANR, 2007).

Fennel (*Foeniculum vulgare*): The plant can be dug up with picks and/or shovels, preferably when the soil is moist so the roots can be more easily dug up intact. Cutting alone will not kill fennel as the deep taproot and bulb store the plant's energy. An alternative method used for controlling fennel is cutting and then spraying the bushy resprouts with glyphosate herbicide, or by spraying the new growth in the spring prior to bolting (The Watershed Council, California Invasive Plant Council. 2004). Repeated treatment during the next few years will likely be necessary.

English ivy (*Hedera helix*): Control of English ivy has not received sufficient attention or research. Research in the past has focused on establishing new cultivars rather than on controlling or eliminating the plant (Bossard et al, 2000). The best method for controlling English ivy may be pulling the plants up from the forest floor by hand and cutting the vines growing up trees at the base. Removing and killing vines that spread up into trees is especially important because the fertile branches grow primarily on upright portions of the vine. If vines are cut at the base of the tree the upper portions will die quickly but may persist on the tree for some time; vines on the ground around the tree should also be removed to prevent regrowth up the tree. Pulled plants should not be left on the ground as they may root and reinfest the area. Care should be taken to minimize disturbance during removal. If the forest floor becomes disrupted, appropriate native species should be planted on the site to inhibit reinfestation by English ivy or another invader (Bossard et al, 2000). Repeated treatment during the following 3-4 years will likely be necessary. A wax layer on the leaves often prevents herbicides, especially hydrophilic compounds such as glyphosate, from permeating the leaves.

Himalayan blackberry (*Rubus armeniacus*): Removing rootstocks by hand digging is a slow but effective way of destroying Himalayan blackberry, which resprouts from roots. The work must be thorough to be effective because every piece of root that breaks off and remains in the soil may produce a new plant. This technique is suitable only for small infestations and around trees and shrubs where other methods are not practical.

Most mechanical control techniques, such as cutting or using a weed wrench, are suitable for Himalayan blackberry. Care should be taken to prevent vegetative reproduction from cuttings. Burning slash piles at appropriate times of the year when wildfires are not a hazard is an effective method of biomass disposal. An advantage of cane removal over use of foliar herbicides is that cane removal does not stimulate sucker formation on lateral roots. However, removal of canes alone is insufficient to control Himalayan blackberry, as root crowns will resprout and produce more canes within weeks after the initial cut. Herbicides should be applied to the stump sprouts and new growth within one to two months after cutting, following the directions on the label. Herbicide should be applied before the above ground biomass becomes too tall to responsibly spray, minimizing herbicide drift onto adjacent native vegetation. Repeated treatment during the next few months will likely be necessary, until the underground rhizomes exhaust their reserve food supply.

An alternative method is to apply herbicide directly to the cambial area around the edges of freshly cut stumps. It must be applied within 5 minutes of cutting to ensure effectiveness. Fall is the recommended time of the year, as the herbicide is more likely to be translocated into the roots. Repeated treatment during the next few years will likely be necessary.

French broom (*Genista monspessulana*): When the ground is sufficiently moist, generally between January and April, plants can be pulled by hand or with a weed wrench. Large broom plants that cannot be pulled can be cut with a brush

cutter, saw or loppers approximately 2 inches above the ground level, roughing up the bark of the remaining stumps, to reduce resprouting. Soil disturbance should be kept to a minimum, as it exposes bare soil which is very conducive to broom seedling establishment. Many public parks and preserves use volunteer labor to perform physical control. An alternative method for initial treatment of French broom is spot spraying with glyphosate herbicide, following the directions on the herbicide label.

Dead standing biomass is a fire hazard and should be cut and removed from the site. If biomass from the removed plants is minimal, it can be placed in piles for wildlife habitat. If substantial, it should be chipped and hauled away. Broom removal after the seed has set is not recommended.

Repeated treatment during the next few years will likely be necessary. The density of the seedlings the following year is likely to be extensive and too small to effectively hand pull. The recommended treatment for these seedlings, generally several inches tall, is weed-whacking, cutting them as close to ground level as possible. An alternative treatment is spraying the seedlings with glyphosate herbicide, following the directions on the label. Another option for treatment of young seedlings several inches tall is to use a propane torch during the early spring months when fire is not a risk. A brief, single pass with a torch will wilt and kill the seedlings. If fire spread is a concern, this treatment can be done during a rain event.

Spanish broom (*Spartium junceum*): Manually operated tools such as brush cutters, machetes, or chain saws can be used to cut Spanish broom. Cutting the aboveground portion before the seeds are set and leaving the root intact is only partially successful; about half the remaining roots will resprout. If biomass from the removed plants is minimal, it can be placed in piles for wildlife habitat. If substantial, it should be chipped and hauled away. Broom removal after the seed has set is not recommended.

Soil disturbance should be kept to a minimum as it provides bare soil, which is very conducive to broom seedling establishment. Broom plants usually require several cuttings before the underground parts exhaust their reserve food supply. If only a single cutting can be made, the best time is when the plants begin to flower. At this stage, the reserve food supply in the roots has been nearly exhausted, and new seeds have not yet been produced. The stump sprouts can then be treated with glyphosate herbicide, following the directions on the label.

An alternative method is to apply herbicide directly to the cambial area around the edges of freshly cut stumps. The herbicide must be applied within 5 minutes of cutting to ensure effectiveness. This method is the most successful in late spring. In early spring, sap may flow to the surface of the cut and rinse the chemical off. At other times of the year, translocation is too poor to adequately distribute the chemical.

The density of the seedlings the following year is likely to be extensive and too small to effectively hand pull. The recommended treatment for these seedlings, generally several inches tall, is weed-whacking, cutting them as close to ground level as possible. An alternative treatment is spraying the seedlings with glyphosate herbicide, following the directions on the label. A single pass with a propane torch when fire is not a risk is another option for treatment of young seedlings.

Greater periwinkle (*Vinca major*): Control methods for greater periwinkle have not been well documented. Persistent manual removal can control the species (DiTomaso et al, 2007). Known as a Pierce disease host, some local wineries have used glyphosate (5%) mixed with a penetrating agent, so that the herbicide can penetrate the waxy cuticle of the leaves.

Fuller's teasel (*Dipsacus sativus*): Small infestations of Fullers teasel can be effectively controlled by manual removal of plant and root crown before flowering. Larger populations have been kept in check by mowing the flowering stems before seed development.

Pennyroyal (*Mentha pulegium*): There is a shortage of scientific literature about pennyroyal control (Bossard et al, 2000). Pennyroyal's brittle stems and propensity for resprouting probably rule out soil tilling or hand pulling as effective control methods. Late spring or early summer mowing, repeated over several years, may weaken plants by depleting photosynthetic reserves. Mature plants can be killed with label-recommended concentrations of glyphosate. However, herbicides pose hazards to non-target species in wetlands, including desirable plants, animals, and microorganisms. Cut-stem applications would be extremely labor-intensive. Flaming dense stands of pennyroyal with a propane torch may be an option.

Harding grass (*Phalaris aquatica*): Close mowing or clipping late in the growing season can greatly reduce the vigor of Harding grass. Mowing should be done when plants are still green but seasonal soil moisture is almost exhausted. Prescribed burns

made after mid-January were injurious to this species. Recovery from fire was slow.

Tarping is another control method that can be used on small patches. The plant is covered with black plastic or landscape fabric for at least 6 months to prevent it from photosynthesizing. Spot treatment with glyphosate applied as a foliar spray to actively growing plants has been effectively used to control Harding grass (Bossard et al, 2000). Ideal timing for this treatment is either at the early heading stage of development (mid- to late spring) or in early fall.

Bull thistle (*Cirsium arvense*): Bull thistle can be controlled by mowing, weed-whacking, or hand-pulling before plants flower; however, the uneven flowering times may make more than one treatment necessary. If cut too early in the season, plants are likely to resprout and flower. Even if some plants resprout, manual control may reduce bull thistle populations by limiting seed production. It should be noted that cut flower heads still develop viable seed (DiTomaso et al, 2007). Bull thistle is relatively easily controlled with herbicides (Bossard et al, 2000). Autumn or spring application is recommended to control rosettes.

Italian thistle (*Carduus pycnocephalus*): An integrated, long-term plan with persistent follow-up and twice-yearly monitoring is needed to eliminate this thistle (Bossard et al, 2000). Mowing or cutting Italian thistle is not reliable because plants often continue to grow and still produce seed. Repeated mowing may control Italian thistle somewhat by reducing the energy reserves (The Watershed Council, California Invasive Plant Council. 2004). Grazing management with sheep or goats demonstrated some promising results in control of Italian thistle populations in Australia (Bossard et al, 2000). The herbicide, Clopyralid (Transline®) at label-recommended concentrations has been effective in controlling Italian thistle in trials in Australia (Bossard et al, 2000). A relatively new herbicide to California, aminopyralid (Milestone®) is reportedly very effective on thistles (J. M. DiTomaso, personal communication, 2008).

Douglas-fir (*Pseudotsuga menziesii*): Douglas-fir can be controlled by cutting saplings down and girdling larger trees. When cuttings saplings down, the cuts should be made as close to the ground as possible to prevent new shoots from developing form the stumps and eventually growing into trees. When girdling, the chainsaw cuts need to be made deep enough to sever the cambium layer. If chainsaw cuts are deep enough, herbicide use is unnecessary. An alternative method is to make shallow cuts with a chainsaw, and apply herbicide to the cambium layer where the cut was made. All Douglas-fir trees should be treated in a given area, as the area is likely to be re-populated by seed production from trees left standing. The great majority of seed falls within 330 feet (100 meters) from the mother tree, but can range as far as 1.2 miles of greater (US Dept. of Agriculture, 1965).

5.3 Sensitive Habitat Enhancement Projects

The high priority projects for sensitive habitat enhancement overlap to a significant degree with those for invasive species and erosion treatment. In sensitive habitats, projects should focus on removal and population reduction of plant species that are encroaching on sensitive habitats and the revegetation of gully sites to stem the erosion and fine sediment delivery to adjacent streams. The potential impacts of removing vegetation prior to or in accordance with (i.e. thinning) sensitive habitat enhancement are related to increased erosion due to ground disturbance. Evaluation of erosion associated with plant removal should employ standard photo point monitoring strategy, particularly after storm events.

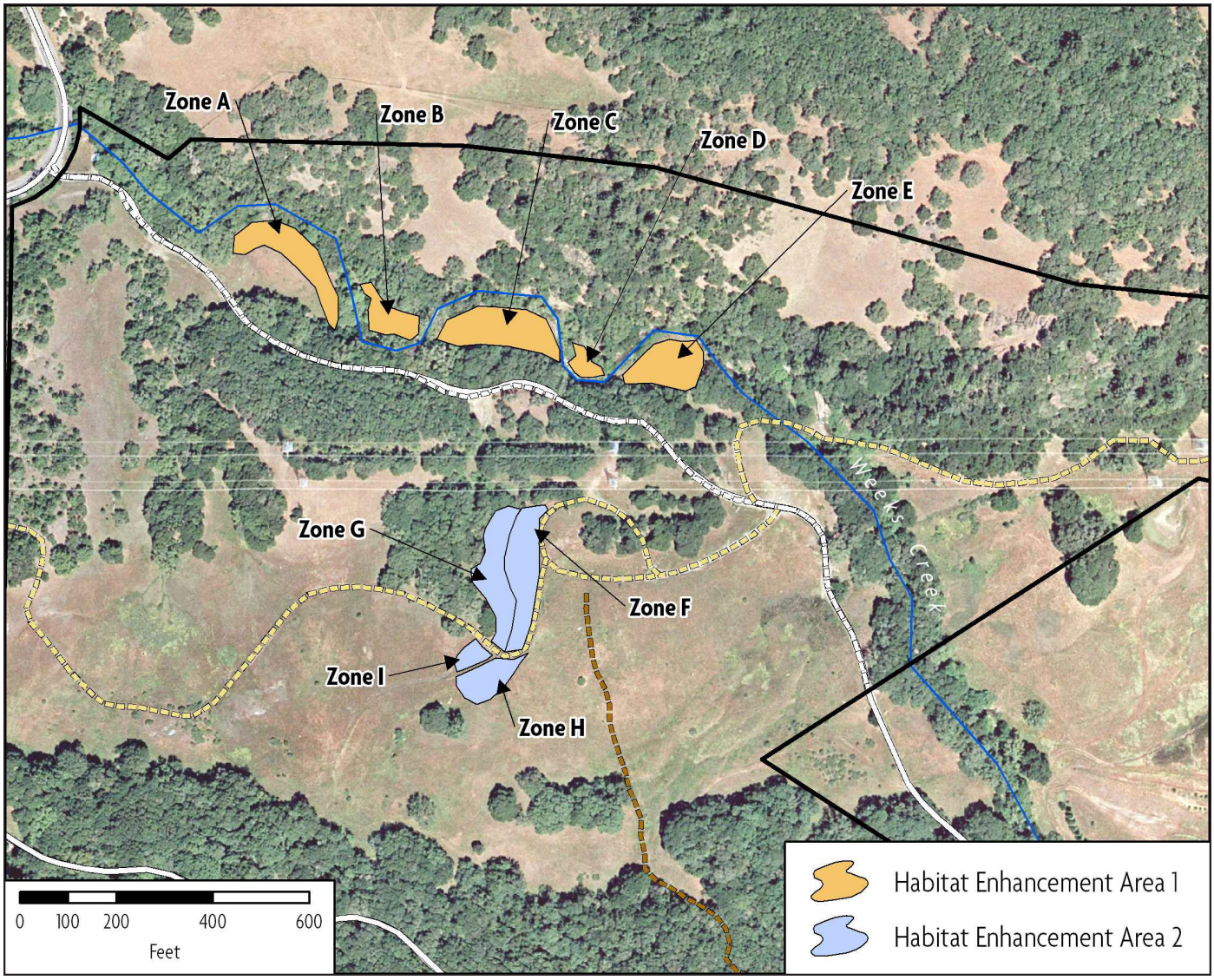


Figure 20. Habitat Enhancement Area Zone

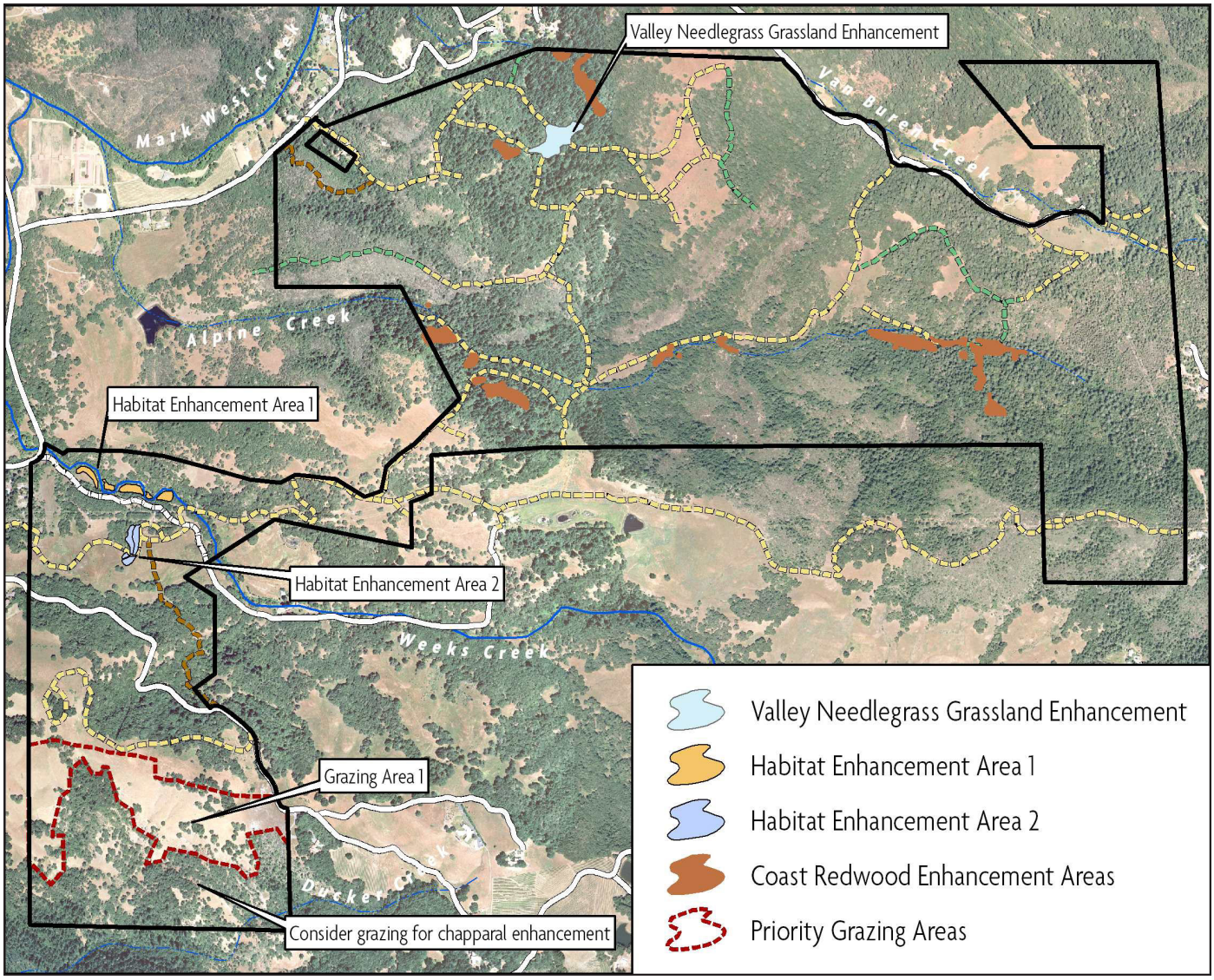


Figure 21. Habitat Enhancement Areas

Projects proposed as described below would benefit both erosion and invasive species control efforts. The location and distribution of these five projects is illustrated in Figure 21.

5.3.1 Habitat Enhancement Area 1: Weeks Creek

The stretch of Weeks Creek recommended for revegetation on the Preserve contains a fairly extensive amount of invasive species, including Spanish broom and Himalayan blackberry. In addition, the channel is incised, with several segments of the bank nearly vertical and highly susceptible to bank erosion and contributing fine sediment into the creek. The upper bank on the south side of Weeks Creek transitions into an open area that was most likely cleared of trees for agricultural use in the past. In Zone A, the intent of the revegetation design is primarily to widen the riparian corridor to approximately 50 feet from top of bank, leaving much of the existing Annual Grassland habitat intact. The open areas that include Zones B-E are much smaller and narrower. It is recommended that these open areas, consisting primarily of non-native grasses and forbs, be revegetated with drought tolerant tree species to expand the riparian corridor, provide habitat, and aid in bank stabilization (Appendix 13, Habitat Restoration Area 1: Details and Notes). These upper riparian zones would transition into existing upland habitat.

5.3.2 Habitat Enhancement Area 2: PG&E Road

A gully has been forming near the PG&E Road for some time in an upland drainage south of Cleland Road and Weeks Creek. Fuller's teasel, an invasive plant, is becoming established in the disturbed areas along the gully. Revegetation and biotechnical erosion control measures are recommended for this site. The intention of the revegetation effort is to provide restored habitat after the invasive Fuller's teasel is controlled, and to aid in bank

stabilization (Appendix 13, Habitat Restoration Area 2: Details and Notes). In an effort to minimize further erosion and curtail the delivery of fine sediment into Weeks Creek, installing brush check dams along the channel bottom is recommended, per methods in Gray and Leister (1989).

5.3.3 Coast Redwood Enhancement Area

The remnant stands of coast redwood along Alpine Creek would benefit from the thinning of Douglas-fir and bay-laurel saplings. The redwoods in this area consist primarily of scattered, sizeable second-growth stands that have stump-sprouted after being logged. There are a considerable amount of small saplings in between the established stands that would benefit from decreased competition for nutrients and light from neighboring Douglas-fir and bay-laurel saplings. Encouraging these coast redwood saplings to thrive should be a management priority.

5.3.4 Valley Needlegrass Grassland Enhancement Area

The Valley Needlegrass Grassland occurs just uphill from the Vernal Pool (Northen 1992). The grassland contains native bunchgrasses such as purple needlegrass (*Nassella pulchra*) and California oatgrass (*Danthonia californica*). It is being threatened by coyote brush encroachment as well as invasive species including, velvetgrass, Himalayan blackberry, and bull thistle.

5.4 Fire and Fuel Management

5.4.1 Mechanical Treatment

Mechanical treatment of vegetation and fuels, such as forest thinning, can serve as a valuable tool to manage, maintain, and enhance natural ecosystems on the Preserve. Many of the natural communities on the Preserve were historically shaped by relatively frequent fire, as well as other natural cycles such as periods of wet and dry conditions. When natural disturbance processes are halted, as through the policy of fire suppression during the past century, natural communities change, often leading to increased tree density in forests and dominance by shade-tolerant, late-successional species. These changes may result in a loss of both species and structural diversity and inhibit the establishment of certain native plant species, potentially reducing ecosystem benefits and habitat values for a wide range of wildlife. The increased vegetation and fuel density will tend to increase the risk of high-severity fire across the landscape, posing a hazard both to ecosystem health and community safety.

With fire having been long absent from the Preserve, Ag + Open Space could use mechanical management techniques to address the resultant habitat changes to improve the structure and composition of forest vegetation and decrease fire danger across the Preserve. Mechanical treatments may include targeted mowing in grasslands or mechanical thinning to improve forest conditions and to meet other management objectives across the Preserve. Ag + Open Space may use mowing to manage invasive species in grasslands. Mechanical forest thinning would involve selectively removing trees from an area to restore stand structure to an ecologically appropriate range, improve species and habitat diversity, reduce ladder fuels, and ensure health and resiliency across the forested landscape. Ag + Open Space may use mowing and mechanical thinning in conjunction with other techniques, such as prescribed fire (see below) or herbicide use for invasive species, to achieve vegetation and habitat management goals.

Habitat enhancement, forest health improvements, and fuel reduction opportunities may exist within the Douglas fir Forest, Mixed Hardwood-Conifer, and Coastal Oak Woodland habitat types on the Preserve. Ag + Open Space will evaluate vegetation management opportunities across approximately 780 acres of forested habitats, including some areas where coyote brush is encroaching into grasslands. Ag + Open Space will evaluate forest conditions to determine if mechanical treatment is necessary to thin overcrowded, even-aged Douglas fir and mixed hardwood conifer habitats, and along select corridors to establish shaded fuel breaks (see Shaded Fuel Breaks, below).

As part of the vegetation management analysis across the Preserve, Ag + Open Space will develop a Forest Management Plan to guide overall forest management and the use of mechanical removal of trees to improve forest health and reduce fire risk. The Forest Management Plan will be developed in cooperation with registered professional foresters, natural resource specialists, ecologists, and/or wildlife biologists to identify and describe the objectives of forest thinning, the specific locations proposed for thinning, the prescription to achieve the desired forest condition, and the target vegetation conditions, including species composition and basal area. Thinned trees may be pile burned or chipped on-site or lopped and scattered to retain material and nutrients within the vegetation community while also reducing fire hazards. The Forest Management Plan will guide fuels treatment following mechanical treatment activities.

Ag + Open Space will secure the appropriate authorizations from CalFire and other regulatory agencies before implementing proposed forest thinning opportunities.

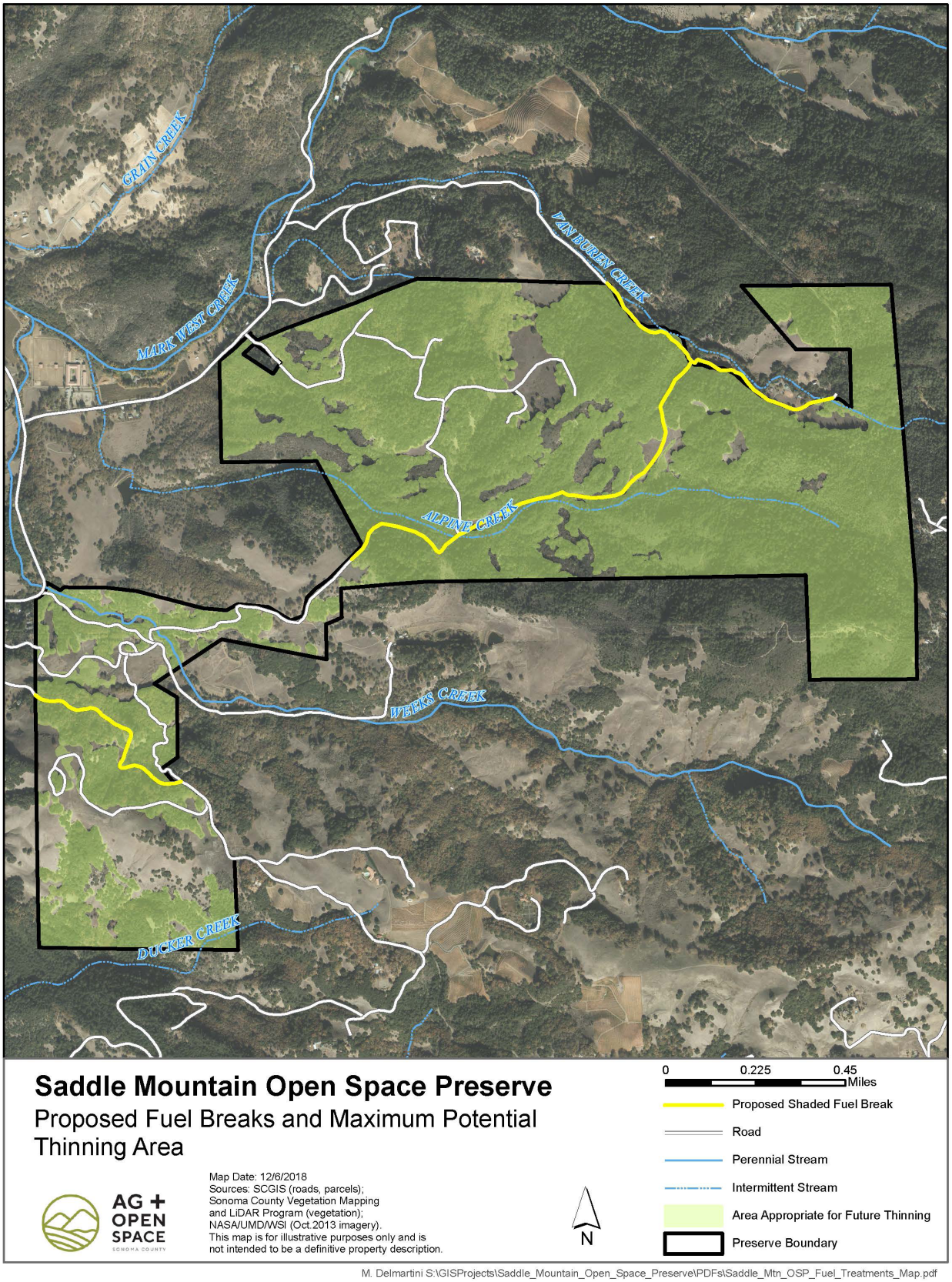


Figure 22. Proposed Fuel Breaks and Maximum Potential Thinning Area

5.4.2 Shaded Fuel Breaks

A shaded fuel break is a forest management strategy used to facilitate emergency access and establish safe locations for fire suppression activities in areas where natural fire regimes have been suppressed and where combustible vegetation has built up. Shaded fuel breaks provide an opportunity to reduce, modify, and manage fuels along designated corridors to enhance wildland fire protection and to inhibit the spread of wildfire in key areas across the landscape. Shaded fuel breaks are designed to meet the following goals:

- Modify fire behavior by reducing ladder fuels and increasing tree spacing
- Treat ground fuels
- Facilitate fire suppression efforts

By reducing and modifying vegetation to reduce fire rate of spread and intensity, shaded fuel breaks can provide a defensible location that can be used by firefighters to help suppress oncoming wildfires. Fuels within a shaded fuel break are reduced in volume through thinning or pruning, and the fuel breaks are generally constructed to protect both wildlands and neighboring communities and to facilitate safe ingress/egress along travel routes. They are commonly located along ridgelines and/or existing roads where firefighters often implement fire control efforts. The ideal location and design of shaded fuel breaks is determined after considering fuels, topography, weather, exposures, and other constructed or planned improvements. Soil stabilization, erosion prevention measures, and long-term maintenance requirements are considered during planning and construction phases.

Ag + Open Space has worked with CalFire to identify opportunities to create shaded fuel breaks across the Preserve along portions of Erland-Cleland Tie Road, the property frontage road along Erland Road, and a portion of Plum Ranch Road as shown on Figure 22. The shaded fuel break will be implemented as a short-term management activity on the Preserve.

The proposed shaded fuel breaks will be 2.43 miles long and approximately 50-200 feet wide, depending on terrain. Ag + Open Space will use mechanical thinning and pruning within an approximately 43-acre area to create the shaded fuel break, following a vegetation management prescription developed in conjunction with CalFire or a Registered Professional Forester. Mechanical treatments will be implemented to thin understory vegetation through the removal of shrubs and saplings; trim mature trees to reduce ladder fuels; and, in areas where forest stands are particularly dense, remove trees to open the canopy and reduce ladder fuels. Woody material will be lopped and scattered or chipped and left in place to form a mulch to protect the soil from compaction and erosion. Some larger woody material may be piled and burned on site.

In the long term, Ag + Open Space will re-treat the shaded fuel break every several years as needed to maintain reduced tree and fuel density.

Ag + Open Space may identify other shaded fuel break locations in the future, as further forest management reviews are conducted.

5.4.3 Prescribed Fire

Prescribed fire can be a valuable management tool both to protect and enhance natural resources and to reduce the risk of catastrophic wildfire. Carefully managed burns can help control invasive species, reduce fuel loads, and promote regeneration of fire-dependent species and maintenance of other desired habitat conditions. On the Preserve, Ag + Open Space plans to use prescribed fire in the short term for management of invasive species in grassland settings. In the long term, Ag + Open Space may also use fire for fuel reduction and management of woody habitats on the Preserve. A site-specific burn plan will be developed for individual prescribed fire projects. Burn planning will be conducted in cooperation with CalFire and local fire agencies, and burn operations will be conducted by CalFire and/or other qualified fire personnel.

Appendix 15 provides an overview of how each of the Preserve's vegetation types would be expected to respond to fire. Estimated typical fire return intervals are also provided. While California fire ecology is a topic of growing interest, scientific understanding of the effects of specific fire regimes on specific vegetation types is limited. Fire impacts are further complicated by ongoing changes to background conditions via climate change and other human-driven trends, such as habitat fragmentation and species invasions. Fire return intervals shown in the table generally reflect best estimates of pre-European settlement ranges. Prior to European settlement, North Bay grasslands and oak woodlands near human habitation were intentionally burned at relatively high frequencies; elsewhere they burned infrequently as a result of rare lightning strikes. Ranges shown are not necessarily recommended return intervals for the Preserve but provide a baseline for understanding the frequency of fire with which each vegetation type has persisted in the past. Target plant species'

modes of post-fire regeneration and timing to reproductive maturity are crucial considerations in planning prescribed fire regimes. Fire that is too frequent can preclude native species recovery and encourage invasive species. Wildlife needs, changing climate, understory fuel loads, adjacent vegetation types, soil and water protection needs, and risk to nearby human infrastructure will all influence prescribed burn location and seasonality and desirable fire return intervals for the Preserve in the future.

In general, fire has potential to provide the following benefits on the Preserve:

- Forest settings
    - reduce density of juvenile Douglas firs to encourage development of larger individual trees and/or facilitate other species (redwood, oak) to maintain on-site habitat diversity
    - reduce density of Douglas firs or other species contributing to high fuel loads that may pose a threat to human infrastructure or safety
    - reduce woody surface fuels and ladder fuels to reduce fire intensity
    - support natural regeneration of fire-dependent Sargent cypress forest species
- Woodland settings
    - reduce density of juvenile Douglas firs to facilitate oaks and maintain on-site habitat diversity
    - reduce high fuel loads that may pose a threat to human infrastructure or safety
- Shrubland settings
    - support natural regeneration of chaparral species
    - temporarily reduce high fuel loads that may pose a threat to human infrastructure or safety
- Herbaceous settings
    - reduce cover of invasive species and other non-native annuals
    - reduce high fuel loads that may pose a threat to human infrastructure or safety
    - maintain open character of meadows and reduce shrub and tree encroachment and succession

Coordination with Local Agencies

Ag + Open Space anticipates partnering with CalFire and local non-profit programs to conduct initial, small-scale burns on the Preserve. Ag + Open Space will coordinate with CalFire to explore the possibility of participating in CalFire's Vegetation Management Program (VMP)[11] or its potential future Vegetation Treatment Program (VTP). Ag + Open Space may also explore partnerships with the Prescribed Fire Training Exchange (TREX), which is a nationwide cooperative burning and collaborative fire training program designed to develop, and assist others to develop, burn plans and fire management plans. Participation in these programs will provide guidance for short- and long-term management of habitat and vegetation on the Preserve, including both mechanical and prescribed fire treatments, while also providing for further specific planning and resource review for each individual prescribed burn on the Preserve to evaluate potential site-specific impacts and to identify means to reduce or avoid them. Ag + Open Space will not develop individual burn plans without a commitment from CalFire, TREX, or other professional organization to implement prescribed burns on the Preserve.

Burn Plans and Smoke Plans

Once prescribed burn units are identified, the burn objectives are set, and Ag + Open Space is prepared to implement an individual prescribed fire, a burn plan will be developed for each specific prescribed fire project on the Preserve in coordination with CalFire. The burn plan will be developed by a qualified prescribed fire specialist and will include:

- a description of the burn area
- an analysis of the site-specific environmental setting and potentially affected resources
- a burn prescription designed to meet project objectives and protect resources
- fire behavior predictions
- contingency and medical plans

CalFire may require a site-specific cultural resources survey and botanical survey prior to approval of a prescribed burn plan. If a burn were to take place near sensitive resources, the burn plan will be subject to appropriate resource review, such as consultation with relevant agencies. Conditions and environmental protection measures may be included in the burn plan as a result of this environmental review process.

[11] CalFire Vegetation Management Program (VMP) is a cost-sharing program that allows public and private landowners to participate in wildland fuel reduction projects. The program focuses on the use of prescribed fire and some mechanical means, for addressing wildland fire fuel hazards and other resource management issues on State Responsibility Area (SRA) lands.

Typically, prescribed burns will be conducted in spring and fall, and potentially during winter if fuel moistures are low enough to carry fire. Required pre-burn actions may include construction of firelines, removal of ladder fuels, and/or thinning of brush as appropriate to reduce fire intensity and the risk of fire spreading outside the burn unit. When needed, measures will be taken to prevent erosion following burns, including rehabilitating firelines.

In addition to the burn plan, a smoke management plan will be developed for each prescribed fire project in accordance with Bay Area Air Quality Management District regulations and current smoke management guidelines for prescribed fire. The smoke management plan will include:

- emissions estimates
- wind prescriptions
- identification of smoke-sensitive areas
- any necessary mitigations or burn plan changes to reduce impacts on smoke-sensitive areas
- contingency plans
- public notification and complaint procedures

Finally, a "Go/No Go Checklist" will be developed for each prescribed fire project to confirm that all the conditions necessary for implementing a burn are met.

Prescribed Fire Public Outreach

After working with CalFire and others to identify conceptual burn units, ideal burn conditions, and the timeframes to achieve prescribed fire objectives, Ag + Open Space will engage with neighboring community members and other stakeholders to share Ag + Open Space's plans and objectives, solicit input, answer questions, and address concerns about proposed burning and smoke management. Ag + Open Space will initiate public outreach months in advance of any proposed burn and will continue coordinating with the public throughout the entire process of burn planning, implementation, and evaluation. Key target audiences will include property owners adjacent to the Preserve, public health officials, local elected officials, and members of the public. Ag + Open Space will provide the public with information regarding the goals and objectives of the proposed prescribed burn, predicted smoke emissions, and measures to minimize impacts and protect public health. Ag + Open Space will consider public comments in burn planning and smoke management decisions.

Prescribed Burning in the Short Term: Grassland Management

In the short term, prescribed fire will be used on a small scale within the Preserve's annual grassland habitats to manage invasive species and encourage native perennial grasses. Prescribed fire will specifically be used to treat populations of medusahead and barbed goatgrass, which can otherwise be difficult to control through traditional means once well established within annual grassland habitats. Burns in grasslands would ideally be conducted in late May and early June, when weather conditions are suitable and after the seeds for native grasses have dropped, but while the seeds for barbed goatgrass and medusahead are ripe but not yet dispersed (Berlemen et al. 2016). While medusahead can sometimes be substantially controlled with one burn, significant barbed goatgrass control typically requires two burns in consecutive years (DiTomaso et al. 2001). However, follow-up control of barbed goatgrass within the Preserve's annual grasslands may be accomplished with hoeing or hand pulling after the population is substantially reduced by initial burning.

Figure 23, Areas for Future Analysis and Planning of Prescribed Fire, below, shows the grassland and forest areas where prescribed burns could potentially be conducted in the short and long-term. The grassland areas encompass 117 acres of the total 131 acres of grassland on the Preserve. They represent the maximum spatial extent of grasslands that could be included in future planned burn units, not actual burn units or prescribed fire projects. Not all of these grasslands may be appropriate for prescribed fire use. The areas mapped in Figure 23 exclude some grassland areas due to characteristics such as the presence of listed vegetation species, difficulty of access, or very small vegetation patch size that would not be economical or efficient to burn, as well as extensive chaparral areas where Ag + Open Space does not plan to introduce fire. Invasive treatment needs, safety, terrain, fuel levels, neighboring properties, smoke dispersal, and other resource considerations will be considered when selecting individual burn areas through further analysis, planning, and consultation with CalFire and community residents. Individual burn units will be small scale, most likely not to exceed twenty acres per unit, although more than one burn unit may be burned in a single day if it is efficient and appropriate to do so. Each of these individual prescribed fire projects will be subject to the process described above, with development of specific burn and smoke management plans and associated review.

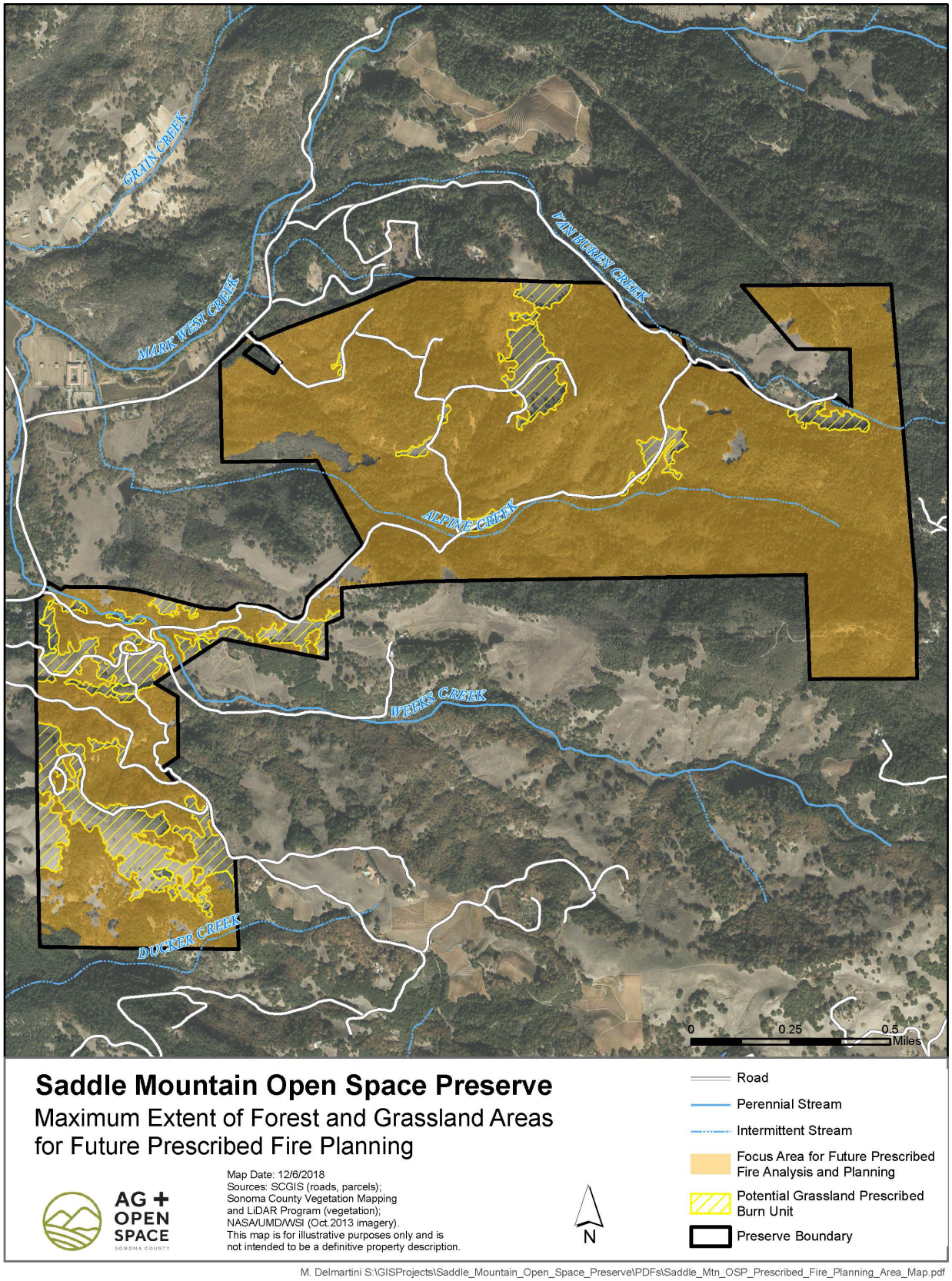


Figure 23. Areas for Future Analysis and Planning of Prescribed Fire.

Control lines will be established around individual burn units prior to conducting prescribed fire activities and natural firebreaks will be used whenever possible to control the spread of fire. Constructed control lines will be rehabilitated after the burn to restore original soil conditions including surface contours and soil cover. Erosion-control measures will be put in place where needed, and disturbed areas will be re-seeded with site-appropriate native species. Following rehabilitation, control lines should be monitored to ensure successful restoration.

Prescribed Burning in the Long Term: Grassland, Forest and Woodland Management

Ag + Open Space will explore the use of prescribed burns to address long-term habitat management needs by developing a formal Forest Management Plan (FMP); although if money becomes available, development of a Forest Management Plan may be completed in the short-term. This long-term plan could include continued burning in grasslands as described above, as well as burns in woody habitats to reduce ladder fuels, control encroachment of undesired species, and promote other desired habitat conditions. Prescribed burning in woody habitats will require additional steps, which will be addressed in the FMP. These may include mechanical fuel load reduction prior to burns and greater coordination with neighboring landowners and the public to address smoke concerns, as burning in woody habitats tends to generate more smoke than in grassland.

5.5 Regulatory Framework

California Government Code 65562 directs local governments to prepare and carry out open space plans. The Open Space Element of the 1989 Sonoma County General Plan called for the formation of an Open Space District to acquire and administer open space lands. In 1990, the passage of Measure A led to the formation of the Sonoma County Agricultural Preservation and Open Space District, while the passage of Measure C provided funding for the district through sales tax. This funding was renewed in 2006 through the passage of Measure F. The expenditure plan approved as part of this funding renewal gives Ag + Open Space the authority to spend funds on management of open space land holdings. Many of the management activities that may be undertaken by Ag + Open Space such as road and trail building and maintenance, invasive plant removal and streambank erosion control are subject to regulatory oversight. Below is an overview of permit requirements for land management activities related to erosion remediation, vegetation management, sensitive resources, and water quality.

Erosion Remediation

In order to implement the road-related erosion site treatments recommended for the property, the following permits might be required:

- US Army Corps of Engineers 404 Permit (enroll in Nationwide Permit 14 for Linear Transportation Projects) may trigger ESA Section 7 consultation
- Department of Fish and Wildlife 1600 Permit may trigger California Environmental Quality Act (CEQA) Environmental Review Requirements
- Regional Water Quality Control Board 401 Certification
- Sonoma County PRMD Grading Permit (request exemption for resource conservation, restoration, and enhancement projects)
- Sonoma County PRMD Roiling Permit

Exotic/ Invasive Plant Species Control

Recommended measures for regulatory compliance are described below for four common exotic/ invasive species control methods.

- ***Herbicide Application****:* The California Department of Pesticide Regulation (DPR) is responsible for the protection of human health and the environment through the regulation of pesticide sales and use. For the use of restricted pesticides, and for the use of pesticides by professional applicators, the applicator must be licensed by DPR. Additionally, for the use of herbicides in aquatic areas, the State Water Resources Control Board requires coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Enrollment in the Statewide General Permit for weed control is recommended prior to application of herbicides in aquatic environments.
- ***Invasive Plant Root Removal****:* If the removal of plant roots will result in disturbance of soil in a riparian area where sediment could be delivered to a stream channel, these activities are subject to the following permit requirements: (1) US Army Corps of Engineers 404 Permit (use Nationwide Permit 27); (2) Department of Fish and Wildlife 1600 Permit (e.g. small habitat restoration project exemption); and (3) Regional Water Quality Control Board 401 Certification (waiver if project has been declared exempt from CEQA).
- ***Livestock Grazing****:* Sonoma County does not require permits or design review for wire fences six feet or less in height. However, the statewide Food and Agricultural Code sets "lawful" livestock fence requirements.

California law requires that livestock be kept from public roads by the person who owns or controls them: "16902. Permitting livestock on highway. A person that owns or controls the possession of any livestock shall not willfully or negligently permit any of the livestock to stray upon, or remain unaccompanied by a person in charge or control of the livestock upon, a public highway, if both sides of the highway are adjoined by property which is separated from the highway by a fence, wall, hedge, sidewalk, curb, lawn, or building." Development of new groundwater wells (to supplement grazing livestock) is subject to permitting requirements of Sonoma County PRMD. Sonoma County PRMD does not have permitting requirements for spring development. Development of springs is not subject to water rights permitting through DWR if the spring has no natural outlet. If the spring contributes to a flowing stream, either by surface of subterranean means, then riparian rights are necessary for spring development.

- ***Prescribed Fire***: The Preserve is located within the Bay Area Air Quality Management District (BAAQMD). Open burning is generally prohibited within BAAQMD district, with some exceptions. Section 5-110.3 of the BAAQMD regulations exempts the following practice from regulation "The use of flame cultivation when the burning is performed with LPG or natural gas-fired burners designed and used to kill seedling grass and weeds and the growth is such that the combustion will not continue without the burner." Section 5-401.15 states that the following practice is allowable when the conditions of 5-111 et seq. are met "Wildland Vegetation Management: Prescribed burning by a state or federal agency, or through a cooperative agreement or contract involving the state or federal agency, conducted on land predominately covered with chaparral, trees, grass, coastal scrub, or standing brush. Any person seeking to set fires under this provision shall comply with the requirements of Section 5-408 and receive written approval of the smoke management plan by the APCO prior to any burn." Section 5-111 et seq. sets forth requirements for type and quantity of materials, time of day, wind velocity, material drying time, and ignition material and methods. BAAQMD and the local office of the California Department of Forestry and Fire Protection should be contacted prior to burning to verify that it is a permissible burn day. Consultation with Sonoma County PRMD should be undertaken to ensure that the updated fire management plan is consistent with zoning requirements. Fuel-load reduction activities may require permits.

Sensitive Resources Management

Saddle Mountain Open Space Preserve is documented to host several protected species and sensitive plant communities/habitats (Table 2.3, Rare Plant Species Documented in 2009). All management activities should be designed and implemented to minimize potential adverse impacts to these sensitive resources. The California Environmental Quality Act requires that impacts to biological communities be considered when assessing the environmental impacts of a project. For any project that is subject to CEQA, a survey of the project area should be performed to identify any sensitive plant resources present. If sensitive plants are found to be present in the project area, spatial and temporal mitigations must be incorporated in order to avoid, reduce, or compensate for negative impacts on these plants. The US Environmental Protection Agency (EPA) does not require special permits (e.g. Incidental Take Permit) for plant species. However, potential direct impacts to certain animal species (e.g. spotted owl, salmonids) can prompt regulatory requirements in egregious cases.

Water Quality Improvement

The Clean Water Act, under section 303 (d), gives the EPA and the State Water Resources Control Board the authority to establish Total Maximum Daily Loads (TMDLs). The process starts with listing of water bodies whose beneficial uses (such as cold water fish habitat, drinking water and recreation) are impaired by the presence of excessive pollutants. TMDLs are developed to address these water quality impairments by identifying the maximum amount of a pollutant that can be discharged into the water body without causing impairment (loading capacity). This maximum amount of pollutant is then budgeted out to different sources within the watershed (load allocation). These components are included in a technical support document, generally written by Regional Water Board staff. This document is then forwarded to the EPA who develops the official TMDL. Once the TMDL has been adopted, Regional Water Board staff is charged with the task of developing a strategy for achieving the goals of the TMDL. Implementation strategies generally include regulatory actions that can be taken by the Regional Water Board and/or other regulatory agencies, voluntary actions on the part of dischargers, and a monitoring plan to assess the success to TMDL implementation. The Regional Water Board and State Water Board adopt the implementation strategy, once completed.

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- Barry, Sheila. 2008. Telephone conversation between Sheila Barry, University of California Cooperative Extension, and Lisa Bush on January 22.
- DiTomaso, Joseph M. Conversation with Rob Evans at 2008 Cal-IPC Conference, October 2, 2008.
- Doran, Morgan. 2004. Telephone conversations between Morgan Doran, University of California Cooperative Extension Range and Livestock Advisor for Napa, Solano and Yolo Counties, and Lisa Bush, 17, 21, 22 September, and 6 October 2004.
- Hayes, Grey. Telephone conversation with Lisa Bush, February 9, 2006.
- Nelson, Tony. Written communication with Lisa Bush, May 8, 2006.
- Smith, Colin. Telephone conversation with Lisa Bush, January 24, 2008.

Appendix B

Air Quality and Greenhouse Gas Calculations

Saddle Mountain Management Plan Project-level Activities

San Francisco Bay Area Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	10.00	Acre	10.00	435,600.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Saddle Mountain Management Plan Project-level Activities - San Francisco Bay Area Air Basin, Annual

Project Characteristics -

Land Use - Approximately 4.3 miles of road treatments, 12 feet wide = 6.3 acres, rounded up to 10 to include work off of roads

Construction Phase - 45 total days work per PWA report

Off-road Equipment - Total hours required for each equipment type from PWA report

Off-road Equipment - 2 days for site preparation/move-in move-out and equipment requirements from PWA report

Trips and VMT - Hauling trips and worker trips estimate based on PWA report

On-road Fugitive Dust -

Grading - Total acres graded estimate based on total work recommended by PWA, rounded up

Road Dust - All roads except 0.8 miles of Plum Ranch Road are unpaved

Water And Wastewater -

Operational Off-Road Equipment - No change in ongoing management

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblGrading	AcresOfGrading	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	3.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	0.50
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	RoadPercentPave	100	5
tblTripsAndVMT	HaulingTripNumber	0.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0331	0.3474	0.1767	4.2000e-004	0.1101	0.0154	0.1254	0.0577	0.0141	0.0718	0.0000	38.4806	38.4806	0.0115	0.0000	38.7671
Maximum	**0.0331**	**0.3474**	**0.1767**	**4.2000e-004**	**0.1101**	**0.0154**	**0.1254**	**0.0577**	**0.0141**	**0.0718**	**0.0000**	**38.4806**	**38.4806**	**0.0115**	**0.0000**	**38.7671**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0331	0.3474	0.1767	4.2000e-004	0.0504	0.0154	0.0658	0.0262	0.0141	0.0403	0.0000	38.4805	38.4805	0.0115	0.0000	38.7670
Maximum	**0.0331**	**0.3474**	**0.1767**	**4.2000e-004**	**0.0504**	**0.0154**	**0.0658**	**0.0262**	**0.0141**	**0.0403**	**0.0000**	**38.4805**	**38.4805**	**0.0115**	**0.0000**	**38.7670**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**54.19**	**0.00**	**47.56**	**54.58**	**0.00**	**43.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**9-12-2018**	**9-30-2018**	0.2252	0.2252
		Highest	0.2252	0.2252

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.1000e-003	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0191	0.0936	0.2211	7.6000e-004	60.9683	7.1000e-004	60.9690	6.0745	6.6000e-004	6.0751	0.0000	69.7426	69.7426	2.6200e-003	0.0000	69.8080
Waste						0.0000	0.0000		0.0000	0.0000	0.1746	0.0000	0.1746	0.0103	0.0000	0.4325
Water						0.0000	0.0000		0.0000	0.0000	0.0000	12.1316	12.1316	5.5000e-004	1.1000e-004	12.1791
Total	**0.0232**	**0.0936**	**0.2211**	**7.6000e-004**	**60.9683**	**7.1000e-004**	**60.9690**	**6.0745**	**6.6000e-004**	**6.0751**	**0.1746**	**81.8744**	**82.0489**	**0.0135**	**1.1000e-004**	**82.4198**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.1000e-003	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0191	0.0936	0.2211	7.6000e-004	60.9683	7.1000e-004	60.9690	6.0745	6.6000e-004	6.0751	0.0000	69.7426	69.7426	2.6200e-003	0.0000	69.8080
Waste						0.0000	0.0000		0.0000	0.0000	0.1746	0.0000	0.1746	0.0103	0.0000	0.4325
Water						0.0000	0.0000		0.0000	0.0000	0.0000	12.1316	12.1316	5.5000e-004	1.1000e-004	12.1791
Total	**0.0232**	**0.0936**	**0.2211**	**7.6000e-004**	**60.9683**	**7.1000e-004**	**60.9690**	**6.0745**	**6.6000e-004**	**6.0751**	**0.1746**	**81.8744**	**82.0489**	**0.0135**	**1.1000e-004**	**82.4198**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	9/12/2018	9/25/2018	5	10	
2	Grading	Grading	9/26/2018	10/23/2018	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Off-Highway Trucks	2	8.00	402	0.38
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Dumpers/Tenders	1	1.00	16	0.38
Grading	Excavators	1	3.00	158	0.38
Grading	Graders	0	8.00	187	0.41
Grading	Off-Highway Trucks	1	6.00	402	0.38
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Scrapers	0	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	1	0.50	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	5	13.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	5	13.00	0.00	10.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0200e-003	0.0000	6.0200e-003	3.3100e-003	0.0000	3.3100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0163	0.1747	0.0920	2.2000e-004		7.7700e-003	7.7700e-003		7.1500e-003	7.1500e-003	0.0000	19.7393	19.7393	6.1500e-003	0.0000	19.8929
Total	**0.0163**	**0.1747**	**0.0920**	**2.2000e-004**	**6.0200e-003**	**7.7700e-003**	**0.0138**	**3.3100e-003**	**7.1500e-003**	**0.0105**	**0.0000**	**19.7393**	**19.7393**	**6.1500e-003**	**0.0000**	**19.8929**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	2.0000e-004	2.0100e-003	1.0000e-005	5.1000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4790	0.4790	1.0000e-005	0.0000	0.4793
Total	**2.6000e-004**	**2.0000e-004**	**2.0100e-003**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4790**	**0.4790**	**1.0000e-005**	**0.0000**	**0.4793**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7100e-003	0.0000	2.7100e-003	1.4900e-003	0.0000	1.4900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0163	0.1747	0.0920	2.2000e-004		7.7700e-003	7.7700e-003		7.1500e-003	7.1500e-003	0.0000	19.7393	19.7393	6.1500e-003	0.0000	19.8929
Total	**0.0163**	**0.1747**	**0.0920**	**2.2000e-004**	**2.7100e-003**	**7.7700e-003**	**0.0105**	**1.4900e-003**	**7.1500e-003**	**8.6400e-003**	**0.0000**	**19.7393**	**19.7393**	**6.1500e-003**	**0.0000**	**19.8929**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	2.0000e-004	2.0100e-003	1.0000e-005	5.1000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4790	0.4790	1.0000e-005	0.0000	0.4793
Total	**2.6000e-004**	**2.0000e-004**	**2.0100e-003**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4790**	**0.4790**	**1.0000e-005**	**0.0000**	**0.4793**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1024	0.0000	0.1024	0.0540	0.0000	0.0540	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1705	0.0784	1.9000e-004		7.5600e-003	7.5600e-003		6.9600e-003	6.9600e-003	0.0000	16.9131	16.9131	5.2500e-003	0.0000	17.0444
Total	**0.0159**	**0.1705**	**0.0784**	**1.9000e-004**	**0.1024**	**7.5600e-003**	**0.1100**	**0.0540**	**6.9600e-003**	**0.0609**	**0.0000**	**16.9131**	**16.9131**	**5.2500e-003**	**0.0000**	**17.0444**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-005	1.6500e-003	3.1000e-004	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3913	0.3913	2.0000e-005	0.0000	0.3918
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	4.0000e-004	4.0200e-003	1.0000e-005	1.0300e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.9579	0.9579	3.0000e-005	0.0000	0.9587
Total	**5.7000e-004**	**2.0500e-003**	**4.3300e-003**	**1.0000e-005**	**1.1100e-003**	**2.0000e-005**	**1.1200e-003**	**2.9000e-004**	**2.0000e-005**	**3.1000e-004**	**0.0000**	**1.3492**	**1.3492**	**5.0000e-005**	**0.0000**	**1.3504**

3.3 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0461	0.0000	0.0461	0.0243	0.0000	0.0243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1705	0.0784	1.9000e-004		7.5600e-003	7.5600e-003		6.9600e-003	6.9600e-003	0.0000	16.9131	16.9131	5.2500e-003	0.0000	17.0444
Total	**0.0159**	**0.1705**	**0.0784**	**1.9000e-004**	**0.0461**	**7.5600e-003**	**0.0536**	**0.0243**	**6.9600e-003**	**0.0312**	**0.0000**	**16.9131**	**16.9131**	**5.2500e-003**	**0.0000**	**17.0444**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-005	1.6500e-003	3.1000e-004	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3913	0.3913	2.0000e-005	0.0000	0.3918
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	4.0000e-004	4.0200e-003	1.0000e-005	1.0300e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.9579	0.9579	3.0000e-005	0.0000	0.9587
Total	**5.7000e-004**	**2.0500e-003**	**4.3300e-003**	**1.0000e-005**	**1.1100e-003**	**2.0000e-005**	**1.1200e-003**	**2.9000e-004**	**2.0000e-005**	**3.1000e-004**	**0.0000**	**1.3492**	**1.3492**	**5.0000e-005**	**0.0000**	**1.3504**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0191	0.0936	0.2211	7.6000e-004	60.9683	7.1000e-004	60.9690	6.0745	6.6000e-004	6.0751	0.0000	69.7426	69.7426	2.6200e-003	0.0000	69.8080
Unmitigated	0.0191	0.0936	0.2211	7.6000e-004	60.9683	7.1000e-004	60.9690	6.0745	6.6000e-004	6.0751	0.0000	69.7426	69.7426	2.6200e-003	0.0000	69.8080

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	18.90	227.50	167.40	172,423	172,423
Total	18.90	227.50	167.40	172,423	172,423

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	14.70	6.60	6.60	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.575198	0.040076	0.193827	0.113296	0.016988	0.005361	0.017552	0.025197	0.002581	0.002349	0.005904	0.000881	0.000789

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.1000e-003	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004
Unmitigated	4.1000e-003	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.1000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004
Total	**4.1100e-003**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.8000e-004**	**1.8000e-004**	**0.0000**	**0.0000**	**1.9000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.1000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e-004	1.8000e-004	0.0000	0.0000	1.9000e-004
Total	**4.1100e-003**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.8000e-004**	**1.8000e-004**	**0.0000**	**0.0000**	**1.9000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	12.1316	5.5000e-004	1.1000e-004	12.1791
Unmitigated	12.1316	5.5000e-004	1.1000e-004	12.1791

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 11.9148	12.1316	5.5000e-004	1.1000e-004	12.1791
Total		**12.1316**	**5.5000e-004**	**1.1000e-004**	**12.1791**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 11.9148	12.1316	5.5000e-004	1.1000e-004	12.1791
Total		**12.1316**	**5.5000e-004**	**1.1000e-004**	**12.1791**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.1746	0.0103	0.0000	0.4325
Unmitigated	0.1746	0.0103	0.0000	0.4325

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.86	0.1746	0.0103	0.0000	0.4325
Total		**0.1746**	**0.0103**	**0.0000**	**0.4325**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.86	0.1746	0.0103	0.0000	0.4325
Total		**0.1746**	**0.0103**	**0.0000**	**0.4325**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Saddle Mtn SFB

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	43.00	Acre	43.00	1,873,080.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Estimate 20 total work days for SFB creation

Off-road Equipment - Truck and dozer for SFB creation, most work to be done without heavy equipment.

Trips and VMT - Estimated 4 roundtrip worker trips per day, trip length increased to 15 with 10% unpaved to account for movement on Preserve roads. Estimated 4 haul trips (2 for each phase of SFB development) for equipment.

On-road Fugitive Dust - 10% of worker trips unpaved to account for movement on unsurfaced Preserve roads.

Vehicle Trips - SFB development only, not calculating visitation or ongoing operation.

Landscape Equipment - Estimated 20 worker days for SF development, doubled to capture more intensive use of landscaping equipment

Water And Wastewater - No irrigation proposed

Solid Waste - No solid waste generated

Land Use Change -

Construction Off-road Equipment Mitigation - BMPs to be implemented

Operational Off-Road Equipment - SFB development only, not calculating ongoing operation.

Saddle Mtn SFB - Bay Area AQMD Air District, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	30.00	20.00
tblLandscapeEquipment	NumberSummerDays	180	40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	2.00
tblOffRoadEquipment	UsageHours	8.00	2.00
tblOnRoadDust	WorkerPercentPave	100.00	90.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	3.70	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripLength	10.80	15.00
tblTripsAndVMT	WorkerTripNumber	5.00	8.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblWater	OutdoorWaterUseRate	51,233,698.04	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	3.8100e-003	0.0369	0.0195	4.0000e-005	0.1615	1.8700e-003	0.1634	0.0230	1.7200e-003	0.0248	0.0000	3.5575	3.5575	8.6000e-004	0.0000	3.5789
Maximum	**3.8100e-003**	**0.0369**	**0.0195**	**4.0000e-005**	**0.1615**	**1.8700e-003**	**0.1634**	**0.0230**	**1.7200e-003**	**0.0248**	**0.0000**	**3.5575**	**3.5575**	**8.6000e-004**	**0.0000**	**3.5789**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	3.8100e-003	0.0369	0.0195	4.0000e-005	0.0968	1.8700e-003	0.0987	0.0128	1.7200e-003	0.0146	0.0000	3.5575	3.5575	8.6000e-004	0.0000	3.5789
Maximum	**3.8100e-003**	**0.0369**	**0.0195**	**4.0000e-005**	**0.0968**	**1.8700e-003**	**0.0987**	**0.0128**	**1.7200e-003**	**0.0146**	**0.0000**	**3.5575**	**3.5575**	**8.6000e-004**	**0.0000**	**3.5789**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**40.09**	**0.00**	**39.63**	**44.29**	**0.00**	**41.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-1-2019	9-30-2019	0.0378	0.0378
		Highest	0.0378	0.0378

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0176	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0176**	**0.0000**	**9.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0176	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0176**	**0.0000**	**9.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/5/2019	8/30/2019	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	1	2.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	2.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	2	8.00	0.00	4.00	15.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0151	0.0000	0.0151	8.2800e-003	0.0000	8.2800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.4200e-003	0.0360	0.0165	3.0000e-005		1.8600e-003	1.8600e-003		1.7100e-003	1.7100e-003	0.0000	2.6149	2.6149	8.3000e-004	0.0000	2.6356
Total	**3.4200e-003**	**0.0360**	**0.0165**	**3.0000e-005**	**0.0151**	**1.8600e-003**	**0.0169**	**8.2800e-003**	**1.7100e-003**	**9.9900e-003**	**0.0000**	**2.6149**	**2.6149**	**8.3000e-004**	**0.0000**	**2.6356**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.3000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1549	0.1549	1.0000e-005	0.0000	0.1551
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	2.9000e-004	2.8700e-003	1.0000e-005	0.1464	1.0000e-005	0.1464	0.0148	1.0000e-005	0.0148	0.0000	0.7877	0.7877	2.0000e-005	0.0000	0.7882
Total	**3.9000e-004**	**9.2000e-004**	**2.9900e-003**	**1.0000e-005**	**0.1465**	**1.0000e-005**	**0.1465**	**0.0148**	**1.0000e-005**	**0.0148**	**0.0000**	**0.9426**	**0.9426**	**3.0000e-005**	**0.0000**	**0.9433**

3.2 Site Preparation - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7700e-003	0.0000	6.7700e-003	3.7200e-003	0.0000	3.7200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.4200e-003	0.0360	0.0165	3.0000e-005		1.8600e-003	1.8600e-003		1.7100e-003	1.7100e-003	0.0000	2.6149	2.6149	8.3000e-004	0.0000	2.6356
Total	**3.4200e-003**	**0.0360**	**0.0165**	**3.0000e-005**	**6.7700e-003**	**1.8600e-003**	**8.6300e-003**	**3.7200e-003**	**1.7100e-003**	**5.4300e-003**	**0.0000**	**2.6149**	**2.6149**	**8.3000e-004**	**0.0000**	**2.6356**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.3000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1549	0.1549	1.0000e-005	0.0000	0.1551
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	2.9000e-004	2.8700e-003	1.0000e-005	0.0900	1.0000e-005	0.0900	9.1000e-003	1.0000e-005	9.1100e-003	0.0000	0.7877	0.7877	2.0000e-005	0.0000	0.7882
Total	**3.9000e-004**	**9.2000e-004**	**2.9900e-003**	**1.0000e-005**	**0.0900**	**1.0000e-005**	**0.0900**	**9.1100e-003**	**1.0000e-005**	**9.1200e-003**	**0.0000**	**0.9426**	**0.9426**	**3.0000e-005**	**0.0000**	**0.9433**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	14.70	6.60	6.60	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.573139	0.040894	0.193976	0.114604	0.017740	0.005371	0.017133	0.024527	0.002545	0.002442	0.005942	0.000877	0.000812

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0176	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Unmitigated	0.0176	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0176					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Total	**0.0176**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0176					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Total	**0.0176**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Saddle Mountain Shaded Fuel Breaks

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	43.00	Acre	43.00	1,873,080.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics – 43 total acres of proposed shaded fuel breaks. This analysis will combine the construction outputs (for heavy equipment use and the movement of workers to, from, and within the site) with operational output for the use of landscaping equipment in shaded fuel break development.

Land Use -

Construction Phase - Estimate 20 total work days for SFB creation

Off-road Equipment - Truck and dozer for SFB creation, most work to be done without heavy equipment.

Trips and VMT - Estimated 4 roundtrip worker trips per day, trip length increased to 15 with 10% unpaved to account for movement on Preserve roads. Estimated 4 haul trips (2 for each phase of SFB development) for equipment.

Vehicle Trips - SFB development only, not calculating visitation or ongoing operation.

Landscape Equipment - Estimated 20 worker days for SF development, doubled to capture more intensive use of landscaping equipment

Water And Wastewater - No irrigation proposed

Solid Waste - No solid waste generated

Land Use Change -

Construction Off-road Equipment Mitigation - BMPs to be implemented

Operational Off-Road Equipment - SFB development only, not calculating ongoing operation.

On-road Fugitive Dust - 10% of worker trips unpaved to account for movement on unsurfaced Preserve roads.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	30.00	20.00
tblLandscapeEquipment	NumberSummerDays	180	40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	2.00
tblOffRoadEquipment	UsageHours	8.00	2.00
tblOnRoadDust	WorkerPercentPave	100.00	90.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	3.70	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripLength	10.80	15.00
tblTripsAndVMT	WorkerTripNumber	5.00	8.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblWater	OutdoorWaterUseRate	51,233,698.04	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.3854	3.6973	1.9524	3.9300e-003	19.2525	0.1870	19.4395	2.6130	0.1721	2.7851	0.0000	391.1764	391.1764	0.0944	0.0000	393.5358
Maximum	**0.3854**	**3.6973**	**1.9524**	**3.9300e-003**	**19.2525**	**0.1870**	**19.4395**	**2.6130**	**0.1721**	**2.7851**	**0.0000**	**391.1764**	**391.1764**	**0.0944**	**0.0000**	**393.5358**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.3854	3.6973	1.9524	3.9300e-003	11.5767	0.1870	11.7637	1.4731	0.1721	1.6452	0.0000	391.1764	391.1764	0.0944	0.0000	393.5358
Maximum	**0.3854**	**3.6973**	**1.9524**	**3.9300e-003**	**11.5767**	**0.1870**	**11.7637**	**1.4731**	**0.1721**	**1.6452**	**0.0000**	**391.1764**	**391.1764**	**0.0944**	**0.0000**	**393.5358**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**39.87**	**0.00**	**39.49**	**43.63**	**0.00**	**40.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0969	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0969**	**4.0000e-005**	**4.4200e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**9.4100e-003**	**9.4100e-003**	**3.0000e-005**	**0.0000**	**0.0100**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0969	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0969**	**4.0000e-005**	**4.4200e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**9.4100e-003**	**9.4100e-003**	**3.0000e-005**	**0.0000**	**0.0100**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/5/2019	8/30/2019	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Tractors/Loaders/Backhoes	1	2.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	2.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	2	8.00	0.00	4.00	15.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5055	0.0000	1.5055	0.8276	0.0000	0.8276			0.0000			0.0000
Off-Road	0.3419	3.6030	1.6467	2.9100e-003		0.1862	0.1862		0.1713	0.1713		288.2426	288.2426	0.0912		290.5225
Total	**0.3419**	**3.6030**	**1.6467**	**2.9100e-003**	**1.5055**	**0.1862**	**1.6917**	**0.8276**	**0.1713**	**0.9989**		**288.2426**	**288.2426**	**0.0912**		**290.5225**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.8600e-003	0.0629	0.0128	1.6000e-004	3.4900e-003	2.4000e-004	3.7400e-003	9.6000e-004	2.3000e-004	1.1900e-003		16.9117	16.9117	9.3000e-004		16.9349
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0417	0.0315	0.2929	8.6000e-004	17.7435	5.8000e-004	17.7440	1.7845	5.4000e-004	1.7851		86.0220	86.0220	2.2500e-003		86.0784
Total	**0.0436**	**0.0943**	**0.3057**	**1.0200e-003**	**17.7469**	**8.2000e-004**	**17.7478**	**1.7855**	**7.7000e-004**	**1.7862**		**102.9338**	**102.9338**	**3.1800e-003**		**103.0133**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6775	0.0000	0.6775	0.3724	0.0000	0.3724			0.0000			0.0000
Off-Road	0.3419	3.6030	1.6467	2.9100e-003		0.1862	0.1862		0.1713	0.1713	0.0000	288.2426	288.2426	0.0912		290.5225
Total	**0.3419**	**3.6030**	**1.6467**	**2.9100e-003**	**0.6775**	**0.1862**	**0.8637**	**0.3724**	**0.1713**	**0.5437**	**0.0000**	**288.2426**	**288.2426**	**0.0912**		**290.5225**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.8600e-003	0.0629	0.0128	1.6000e-004	3.4900e-003	2.4000e-004	3.7400e-003	9.6000e-004	2.3000e-004	1.1900e-003		16.9117	16.9117	9.3000e-004		16.9349
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0417	0.0315	0.2929	8.6000e-004	10.8957	5.8000e-004	10.8963	1.0997	5.4000e-004	1.1003		86.0220	86.0220	2.2500e-003		86.0784
Total	**0.0436**	**0.0943**	**0.3057**	**1.0200e-003**	**10.8992**	**8.2000e-004**	**10.9000**	**1.1007**	**7.7000e-004**	**1.1015**		**102.9338**	**102.9338**	**3.1800e-003**		**103.0133**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	14.70	6.60	6.60	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.573139	0.040894	0.193976	0.114604	0.017740	0.005371	0.017133	0.024527	0.002545	0.002442	0.005942	0.000877	0.000812

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0969	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100
Unmitigated	0.0969	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0965					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	4.2000e-004	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100
Total	**0.0969**	**4.0000e-005**	**4.4200e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**9.4100e-003**	**9.4100e-003**	**3.0000e-005**		**0.0100**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0965					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	4.2000e-004	4.0000e-005	4.4200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		9.4100e-003	9.4100e-003	3.0000e-005		0.0100

Total	**0.0969**	**4.0000e-005**	**4.4200e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**9.4100e-003**	**9.4100e-003**	**3.0000e-005**		**0.0100**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C

Biological Resources

The table below describes all special-status plants identified as having potential to occur on the Preserve, species known to be present or with high potential to occur are highlighted in gray.

Table 1, Appendix C. Special-status Plants Documented or with Potential to Occur on the Preserve

Scientific Name	Common Name	Listing Status[1] USFWS/CDFW/CNPS	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence[2][3]
Amorpha californica var. napensis	Napa false indigo	--/--/ 1B.2	Perennial deciduous shrub. Blooms April-July. Broadleafed upland forest (openings), chaparral, woodland. 120-2000 m.	Present in montane hardwood-conifer forest, montane riparian, and oak woodland habitats, often along road edges and other forest openings.
Anomobrym julaceum	slender silver moss	--/--/2.2	Moss. Broadleafed upland forest, lower montane coniferous forest, North Coast coniferous forest on damp rock and soil outcrops, usually roadcuts. 100-1000m.	Low. Undated record from Calistoga Road near St. Helena Road. No survey has been done for mosses.
Arctostaphylos canescens ssp. sonomensis	Sonoma canescent manzanita	--/--/ 1B.2	Chaparral, lower montane coniferous forest. Sometimes on serpentine. 180-1700 m.	May be present. Closely related A. canescens ssp. canescens observed and distinction between subspecies is difficult. In eastern portion of property in serpentine chaparral and Sargent cypress forest.
Arctostaphylos stanfordiana ssp. decumbens	Rincon Ridge manzanita	--/--/ 1B.1	Perennial evergreen shrub. Blooms February-April. Chaparral (rhyolitic), woodland. 75-370 m.	Low. Documented occurrences within 3 miles, but known only from Rincon Ridge.
Astragalus claranus	Clara Hunt's milk-vetch	FE/ST/ 1B.1	Annual herb. Blooms March-May. Chaparral, woodland, meadows and seeps, grassland (serpentinite or volcanic, rocky, or clay soils). 75-275 m.	Present in open, thin-soiled, lightly disturbed grassland at property boundary along road.

[1] Listing Status: FE-federally listed as endangered, FT-federally listed as threatened, BCC-Bird of Conservation Concern, SE-state listed as endangered, ST-state listed as threatened, Candidate SE-state candidate to be listed as endangered under CESA Candidate ST-state candidate to be listed as threatened under CESA, FP-State of California fully-protected species, SSC-California Species of Special Concern, and WL-Watch List.

[2] The following criteria were used to determine the potential for each species to occur within the Preserve:

Not Present – Suitable habitat is not present within the Preserve and/or Preserve is outside the range of the species.

Low – One or more key habitat components is absent from the Preserve; no known occurrences in vicinity, or habitat present but species not observed during field surveys that would be expected to discover species, if present, based on season and level of effort. Species is unlikely to occur within the Preserve.

Moderate – Some of the habitat components required by this species are present within the Preserve and/or marginally suitable habitat is present within surrounding areas. Species may occur within the Preserve.

High – All of the habitat components required by this species are present within the Preserve and/or it is known to occur in surrounding areas. Species is likely to occur within the Preserve.

Present – Species has reported occurrences within the project site and/or was observed within the Preserve during field surveys.

Table 1, Appendix C. Special-status Plants Documented or with Potential to Occur on the Preserve

Scientific Name	Common Name	Listing Status[1] USFWS/CDFW/CNPS	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence[2][3]
Brodiaea californica var. leptandra	narrow-anthered California brodiaea	--/--/ 1B.2	Perennial bulbiferous herb. Blooms May-July. Broadleafed upland forest, chaparral, woodland, lower montane coniferous forest, grassland (volcanic). 110-915 m.	Present in serpentine chaparral and Sargent cypress forest, southeastern part of property.
Calystegia collina ssp. oxyphylla	Mt. Saint Helena morning-glory	--/--/ 4.2	Rhizomatous herb. Blooms April-June. Chaparral, lower montane coniferous forest, and valley and foothill grassland (serpentinite). 279-1010 m.	Present in serpentine chaparral near Cleland Ranch Road entrance.
Ceanothus confusus	Rincon Ridge ceanothus	--/--/ 1B.1	Perennial evergreen shrub. Blooms February-June. Closed-cone coniferous forest, chaparral, woodland (volcanic or serpentinite). 75-1065 m.	High. Documented occurrences within one mile to east, and suitable habitat present.
Ceanothus divergens	Calistoga ceanothus	--/--/ 1B.2	Perennial evergreen shrub. Blooms February-March. Chaparral (volcanic or serpentinite). 170-950 m.	High. Documented occurrences within one mile, and suitable habitat present.
Ceanothus purpureus	holly-leaved ceanothus	--/--/ 1B.2	Evergreen shrub. Blooms February-June. Chaparral and cismontane woodland. 120-640 m.	Moderate. Historic record within 5 miles, in Oakmont area. Potentially suitable habitat present.
Ceanothus sonomensis	Sonoma ceanothus	--/--/ 1B.2	Evergreen shrub. Blooms February-April. Chaparral (sandy, serpentine, or volcanic). 215 - 800 m.	Present in serpentine chaparral and Sargent cypress forest, southeastern portion of Preserve.
Centromadia parryi ssp. parryi	pappose tarplant	--/--/ 1B.2	Annual herb. Blooms May-November. Chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, grassland (vernally mesic, often alkaline). 2-420 m.	Low. Historic occurrence within 5 miles but no suitable habitat present and species not observed. Impacts are unlikely.
Eryngium constancei	Loch Lomond coyote-thistle (=button-celery)	FE/SE/ 1B.1	Annual/perennial herb. Blooms April - June. Vernal pools. 460-855 m.	Low. One reported occurrence within 5 miles, but taxonomy in question. Species not observed in surveys of very limited habitat available on site.
Fritillaria liliacea	fragrant fritillary	--/--/ 1B.2	Perennial bulbiferous herb. Blooms February-April. Woodland, coastal prairie, coastal scrub, valley and foothill grassland (often serpentinite). 3-410 m.	Moderate. Reported occurrences within five miles in Annadel. Suitable habitat present on property but species not observed.
Hemizonia congesta ssp. congesta	white seaside tarplant	--/--/ 1B.2	Annual herb. Blooms April-November. Valley and foothill grassland, sometimes roadsides. 20-560 m.	Low. Potentially suitable habitat present but no records within 5 miles and species not observed to date.
Layia septentrionalis	Colusa layia	--/--/ 1B.2	Annual herb. Blooms April-May. Sandy or serpentinite soil in chaparral, woodland, and grassland.	Low. Potentially suitable habitat present and records within 5 miles, but species not observed to date.

Table 1, Appendix C. Special-status Plants Documented or with Potential to Occur on the Preserve

Scientific Name	Common Name	Listing Status[1] USFWS/CDFW/CNPS	Life Form, Blooming Period, and General Habitat	Potential for Species Occurrence[2,3]
Leptosiphon jepsonii	Jepson's leptosiphon	--/--/ 1B.2	Annual herb. Blooms March-May. Chaparral, woodland; open to partly shaded grassy slopes on volcanic soils or periphery of serpentine substrates. 100-500 m.	Low. Potentially suitable habitat present and records within 5 miles, but species not observed to date.
Lupinus sericatus	Cobb Mountain lupine	--/--/ 1B.2	Perennial herb. Blooms March-June. In stands of knobcone pine-oak woodland, on open wooded slopes in gravelly soils; sometimes on serpentine. 180-1500 m	Low. Several occurrences within 3 miles to the northeast, but no knobcone pine habitat present.
Navarretia leucocephala ssp. bakeri	Baker's navarretia	--/--/ 1B.1	Annual herb. Blooms April-July. Vernal pools and swales; adobe or alkaline soils, in woodland, lower montane coniferous forest, meadows/seeps, valley and foothill grassland. 5-1740 m.	Low. One extant occurrence within five miles, at Annadel State Park. Limited potentially suitable habitat present, but species not observed. Impacts are unlikely.
Penstemon newberryi var. sonomensis	Sonoma beardtongue	--/--/ 1B.3	Perennial herb. Blooms April-August. Rocky chaparral. 700-1370 m.	Moderate. Nearest reported occurrences at Hood Mountain. Potentially suitable habitat present.
Plagiobothrys strictus	Calistoga allocarya (popcorn-flower)	FE/ST/ 1B.1	Annual herb. Blooms March-June. Meadows and seeps, valley and foothill grassland, and vernal pools (alkaline, near thermal springs).	Low. Sensitive occurrences in Calistoga quad, which includes part of property. No suitable habitat present.
Ranunculus lobbii	*Lobb's aquatic buttercup*	--/--/4.2	Annual aquatic herb. Blooms February-May. Vernal pools. 15-470 m.	Present in both the vernal pool and pond.
Sidalcea hickmanii spp. napensis	Napa checkerbloom	--/--/ 1B.1	Perennial herb. Blooms April-June. Rhyolitic chaparral. 415-610 m.	Moderate. One historic occurrence within 5 miles. Potentially suitable habitat present.
Trifolium hydrophilum	saline clover	--/--/ 1B.2	Annual herb. Blooms April-June. Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools. 0-300 m.	Low. Extirpated historic record within 5 miles. No suitable habitat present.
Triquetrella californica	coastal triquetrella	--/--/ 1B.2	Moss. Soil in coastal scrub and coastal bluff scrub. 10 - 100 m.	Low. Recorded within 5 miles to south, but no suitable habitat present.
Viburnum ellipticum	oval-leaved viburnum	--/--/ 2.3	Perennial deciduous shrub. Blooms May-June. Chaparral, woodland, lower montane coniferous forest. 215-1400 m.	Low. Historic record from within 5 miles, and potentially suitable habitat present, but species not observed to date.

The table below describes all special-status animals identified as having potential to occur on the Preserve; species known to be present or with high potential to occur are indicated in bold.

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
Amphibians			
California Giant Salamander *Dicamptodon ensatus*	--/SSC	Occur in wet coastal forests near permanent and semi-permanent streams and springs. This species is one of the largest terrestrial salamanders in North America. Breeding occurs mostly in spring, but sometimes fall. Eggs are laid in water and larvae exhibit an enlarged tail fin for swimming with external gills. They transform into land dwelling salamanders with lungs around 18 to 24 months. They consume a wide variety of animals from small invertebrates to salamanders, rodents, and lizard – they exhibit a sit and wait feeding style. This species is endemic to California.	High. According to the CNDDB, giant salamanders are reported in Mark West Creek downstream of the Preserve. Salamanders may breed in creeks on the Preserve and use upland habitats during the non-breeding season.
California Red-legged Frog *Rana draytonii*	FT/ SSC	Breeding habitat includes marshes, streams, lakes, reservoirs, ponds, and other water sources with plant cover. Breeding occurs in deep, slow-moving waters with dense, shrubby, or emergent vegetation. Breeds November through April depending on location. During the non-breeding season, frogs can remain at the breeding site (in the presence or absence of water) or move into surrounding non-breeding habitats. Radio tracking of frogs in Marin County by Fellers and Kleeman (2007) noted the dispersal of frogs at a median distance of 150m	Low. There are no documented occurrences of California red-legged frog within the Mark West Creek watershed. The nearest documented occurrences are approximately 6 miles from the Preserve in Annadel State Park and Talyor Mountain. Suitable habitat may be present within the Preserve (potential breeding habitat at the hunting shack), but given the lack of documented occurrences within the watershed, likely presence within the Preserve is low.

[4] Listing Status: FE-federally listed as endangered, FT-federally listed as threatened, BCC-Bird of Conservation Concern, SE-state listed as endangered, ST-state listed as threatened, Candidate SE-state candidate to be listed as endangered under CESA Candidate ST-state candidate to be listed as threatened under CESA, FP-State of California fully-protected species, SSC-California Species of Special Concern, and WL-Watch List..

[5] California Department of Fish and Wildlife (CDFW). 2018a. Special Animals List – August 2018. Periodic publication.

[6] The following criteria were used to determine the potential for each species to occur within the Preserve:

Not Present – Suitable habitat is not present within the Preserve and/or Preserve is outside the range of the species.

Low – One or more key habitat components is absent from the Preserve; no known occurrences in vicinity, or habitat present but species not observed during field surveys that would be expected to discover species, if present, based on season and level of effort. Species is unlikely to occur within the Preserve.

Moderate – Some of the habitat components required by this species are present within the Preserve and/or marginally suitable habitat is present within surrounding areas. Species may occur within the Preserve.

High – All of the habitat components required by this species are present within the Preserve and/or it is known to occur in surrounding areas. Species is likely to occur within the Preserve.

Present – Species has reported occurrences within the project site and/or was observed within the Preserve during field surveys.

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
		from breeding sites (range of 30 to 1,400 meters). They also noted year-round small-scale (<30m) movements around breeding sites. These results indicate the importance of uplands for non-breeding season and migratory corridor habitat.	
Foothill Yellow-legged Frog *Rana boylii*	--/Candidate ST, SSC	Found in or near partly shaded rocky streams from near sea level to 6,300 feet in a variety of habitats. Breeding generally occurs from mid-March to early June after high winter flows have subsided. Egg masses are attached to the downstream side of rock and gravel in shallow, slow, or moderate-sized streams. Tadpoles require 3 to 4 months to attain metamorphosis. Adults take aquatic and terrestrial invertebrates, and tadpoles graze along rocky stream bottoms on algae and diatoms. During all seasons, this species is generally found in or within close proximity to streams. Primary threats to this species include water management practices, non-native predators, pesticides, recreational activities along streams, habitat loss, and disease.	Present. According to the CNDDB, there is a mapped occurrence of foothill yellow-legged frog on Weeks Creek near Calistoga Road at the edge of the Preserve. Frogs are also reported downstream of the Preserve in Mark West Creek. Suitable habitat aquatic habitat is present within Weeks, Alpine, and Van Buren Creeks within the Preserve.
Red-bellied Newt *Taricha rivularis*	--/SSC	Red-bellied newts are a stocky, medium sized salamander of coastal woodlands and redwood forests. Breeding occurs in stream and rivers; newts typically enter breeding sites in February and can breed into May. Clusters of 10 eggs are attached to rocks and roots within a stream. Egg development is temperature depended and can take up to one month. Larvae transform in 4 to 6 months in late summer or early fall. Adults are terrestrial during the non-breeding season. They consume a variety of invertebrates. This species is endemic to California with the most limited distribution of our three species of *Taricha*. Impacts to streams and vehicular mortality are the primary threats to this species.	High. According to the CNDDB, red-bellied newts are reported in Mark West Creek downstream of the Preserve. Newts may breed in the pond and riparian habitats on the Preserve and use upland habitats during the non-breeding season.
Reptiles			
Northwestern Pond Turtle	--/SSC	Turtles are found in or near permanent or semi-permanent water sources (e.g., ponds, lakes, rivers, streams) with suitable basking sites and	High. An adult pond turtle was observed in a seasonal pond on the adjacent property from the Preserve fence line. The pond is located on the

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
Actinemys marmorata		underwater retreats. Eggs are laid in shallow holes dug by the female from April through August. Eggs hatch in late summer or fall. In northern California, hatchlings can remain buried until the following spring. Turtles may use uplands for overland migration (movements up to 5 km) and nesting sites (nesting can occur over 500 m from water).	Hayfork Ranch Open Space Easement just to the east of the Weeks Creek crossing. Pond turtles may use aquatic habitats (pond at the hunting cabin, riparian corridors) and nest in uplands on the Preserve.
Birds			
Sharp-shinned Hawk ***Accipiter striatus***	--/WL (nesting)	Nests in mixed forest and woodland habitats, typically in conifers within mixed forests. Forages over a variety of habitats, primarily on small birds. Sharp-shinned hawks are a year-round resident in Sonoma County, becoming more abundant in winter. Sharpies are known to nest in small numbers in oak woodland and mixed forests within the county.	Present. Species documented on the Preserve by PCI in 2018. Suitable foraging and nesting habitat is present.
Oak Titmouse ***Baeolophus inornatus***	BCC/--	Small, gray-brown bird of oak woodlands. Characterized by small pointed crest and nasal tsick-a-dee-dee call that resonates through woodland habitats. Forages for insects and seeds, hopping from branch to branch. Nests in cavities in trees or nest boxes. Oak titmice are a year-round resident in Sonoma County.	Present. Species documented on the Preserve by PCI in 2018. Suitable foraging and nesting habitat is present.
Wrentit ***Chamaea fasciata***	BCC/--	Small, grayish-brown bird of hilly brushland, chaparral, scrub, and riparian habitats. Characterized by small, dark bill, long tail that is often cocked up, and yellowish eyes. Very secretive bird, staying concealed in dense vegetation. Mate for life, does not migrate. Open cup nest constructed of bark and cobwebs. Forages for insects and berries. Wrentits are a year-round resident in Sonoma County.	Present. Species documented on the Preserve by PCI in 2018. Suitable foraging and nesting habitat is present.
American Peregrine Falcon ***Falco peregrinus anatum***	Delisted, BCC/ Delisted, FP	Forages in woodlands, wetlands, forest and coastal habitats as well as agricultural areas and cities. Sleek and swift predator feeding primarily on birds. Nests are typically constructed on cliff ledges and manmade structures. Peregrines are a rare year-round resident in Sonoma County.	Moderate. Species documented nearby in similar habitats. Falcons may use the rock cliffs present within the Preserve on limited basis for nesting. Suitable foraging habitat is present in limited locations.

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
Nuttall's Woodpecker ***Picoides nuttallii***	BCC/--	Permanent, resident woodpecker of woodland habitats, prefers oak and streamside habitats. Characterized by black and white barring on backside. Probes for insects in tree bark and crevices. Nests in live or dead tree cavities excavated by males of the species, typically. Nuttall's woodpeckers are a year-round resident in Sonoma County.	Present. Species documented on the Preserve by PCI in 2018 Suitable foraging and nesting habitat is present.
Northern Spotted Owl ***Strix occidentalis caurina***	FT/ ST, SSC	Dense forest habitats in northern California. Requires multi-layered canopy cover for roosting sites. Breeding sites include tree or snag cavities or broken tops of large trees. Nocturnal hunter eating mostly small mammals. Year-round resident in Sonoma County where it is known from breeding occurrences in old-growth and mixed forest habitats. Species occupies a large territory, approximately 5 square miles. A pair of owls may utilize the same breeding site for five to 10 year.	Present. According to CNDDB, species observed and seen on the Preserve in 1993 during owl survey by Ted Wooster. Suitable habitat is present within the Preserve.
Mammals			
Pallid Bat ***Antrozous pallidus***	--/SSC	Grassland, shrubland, forest, and woodland habitats at low elevations up through mixed coniferous forests. A social species forming small colonies. Roosting sites include caves, mines, crevices, buildings, and hollow trees during day, more open sites used at night. Pallid bats feed on large flightless arthropods. A yearlong resident throughout most of its range. During non-breeding season, both sexes may be found roosting in groups of 20 or more individuals. One to three (typically twins) pups born from April to July.	High. According to the CNDDB, pallid bats are reported within 4 miles northeast of the project site from a 1945 collection, 3.5 miles to the south in a house from 1997, and 4.5 miles to the northwest under Porter Creek Bridge in 1999. Suitable foraging and roosting habitat present within the Preserve.
Townsend's Big-eared Bat ***Corynorhinus townsendii***	--/SSC	Low to mid-elevation mesic habitats including riparian, mixed forest, coniferous forest, prairies, and agricultural lands. Utilizes edge habitats for foraging. Roosting sites include caves, mines, tunnels, buildings, and other man-made structures. Mating typically occurs in winter with a single young born in May or June. Maternal roosts consist of a small number of females with young, typically less than 100 individuals.	High. According to the CNDDB, Townsend's big-eared bats are reported within 5.25 miles northeast of the project site from a 1955 observation in a building. Suitable foraging and roosting habitat present within the Preserve.

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
Invertebrates			
San Bruno Elfin Butterfly *Callophrys mossii bayensis*	FE/--	Coastal, mountainous areas with grassy ground cover. All known locations restricted to San Mateo County. Host plant is Pacific sedum (*Sedum spathulifolium*) (eggs laid on plant and caterpillars feed on sedum). Adult flight season is late February to mid-April.	Not Present. The Preserve is outside the range of this species.
California Freshwater Shrimp *Syncaris pacifica*	FE/SE	A small, 10-legged crustacean occurring in low-elevation and gradient (less than 1%) perennial streams in Marin, Sonoma, and Napa counties. They occur in shallow pools away from the main current where they feed primarily on detritus and, to a lesser extent, on decomposing vegetation, dead fish, and invertebrates. Most shrimp appear opaque to nearly transparent with colored flecks across their bodies. Females can appear dark brown to purple under certain conditions. Breeding occurs in the autumn, but young do not hatch until the following May or early June. After breeding, female shrimp carry the fertilized eggs attached to their abdominal swimming legs throughout the winter.	Not Present. There are no documented occurrences of California freshwater shrimp within the Mark West Creek watershed. Suitable habitat may be present within the Preserve, but given the lack of documented occurrences within the watershed, presence within the Preserve is unlikely.
Fish			
Coho Salmon – Central California Coast ESU ***Oncorhynchus kisutch***	FE/SE	Coho salmon spend their adult life in the ocean, migrate up freshwater streams to spawn, rear at least partially in freshwater, and migrate to the ocean as juveniles. Unlike other Pacific salmon in California, their reproductive strategy is completed over a three-year cycle and is fairly rigid. Spawning years with relatively poor reproductive success can result in poor spawning runs three years later. They prefer cold, low gradient stream with dense riparian canopy. Adult coho salmon start to arrive in late summer and fall to begin acclimation to freshwater before they migrate upstream. Upstream migration is usually triggered by an increase in flow from a winter storm event and typically occurs in November and December with peak spawning activity in December and January. Coho die soon after spawning. Juvenile	Moderate. Coho salmon have experienced a precipitous decline in recent years and are now know to only occur in limited numbers within the Russian River watershed. Historically, coho salmon were documented in 32 streams in the Russian River watershed (SCWA 2008). However, only a handful of those persisted in the early 2000s. In an effort to reestablish coho in the watershed, a captive brood stock program was undertaken in 2001 at Warm Springs Hatchery with the first releases in 2004. Through on-going introductions and monitoring, coho salmon are now know to occupy a number of Russian River tributary streams including Mark West Creek. Coho salmon may stray into tributaries to Mark West Creek including Weeks, Alpine, and Van Buren Creeks on the Preserve.

Table 2 Appendix C. Special-status Animals Documented or with Potential to Occur on the Preserve

Common Name *Scientific Name*	Listing Status[4] USFWS/ CDFW[5]	Habitat Requirements	Potential for Species Occurrence[6]
		coho salmon emerge from the gravel the following spring and usually rear in the stream for one year before migrating to the ocean. Within the Russian River watershed, smolt emigration typically occurs from March through May.	
Steelhead – Central California Coast DPS ***Oncorhynchus mykiss irideus***	FT/--	Spawn in fresh water and mature at sea. Steelhead generally spend their first and sometimes second year of life in freshwater creeks and then one to four years at sea. They return to spawn in their natal streams as many as four times as they do not always die after spawning like other salmonids. Juvenile steelhead generally occupy glides and riffles and less frequently pools. Adult steelhead spawn from December through April in cool, clear, well-oxygenated streams with pea to apple-sized gravel, usually at the head of a riffle. Federal listing applies to all coastal runs from Russian River south to Soquel Creek; it includes San Francisco and San Pablo Bay basins but excludes the Sacramento-San Joaquin Rivers.	Present. Steelhead are the most widely distributed salmonid in the Russian River watershed, inhabiting most permanent streams in the basin. Relatively healthy populations have been documented in many of the tributaries. Steelhead have been documented in Alpine Creek by PCI. Suitable habitat may also be present in Weeks and Van Buren Creeks within the Preserve.

Appendix D

Cultural Resource Reports

The cultural and historical resources studies for the Saddle Mountain Open Space Preserve contain information about the locations of archaeological sites. For the protection of these resources, the reports, and such location information, are not publically circulated.