Restoration/Enhancement/Conservation Plan

Chandon: Carneros
Sonoma and Napa County, CA

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Restoration/Enhancement/Conservation Plan
Domaine Chandon: Carneros

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SUMMARY

This report presents a Restoration/Enhancement/Conservation Plan for the Domaine Chandon Carneros regions, which is located in both Sonoma and Napa counties. The 26885 Ramal Road proposed project is located southeast of the City of Sonoma and includes over 969 acres, comprised of vineyards, fallow and unplantable areas, of the Carneros Ranch, owned and operated by Domaine Chandon. The blocks are in various stages of being fallow, having been cleared recently (in 2015) to over 20 years ago (in 2002). For the purposes of this report, the ranch is split between the northern areas, (north of Ramal Road) and the southern areas (south of Ramal Road, but north of the Southern Pacific railroad tracks).

We have prepared this Plan that presents the existing habitats on the site, including soils, upland habitats, stream habitats and pond habitats. We have identified potential movement corridors at the grand scale (5-mile radius), at the parcel level (1-mile radius) and at the small scale (500 feet). We also identify existing management on the parcel, included land, grazing, pond and commercial apiaries.

This Plan presents the findings of our literature review (including scientific literature and previous reports detailing studies conducted in the area or in other vineyards) and the California Department of Fish and Wildlife's (CDFW) BIOS (CNDDB) for reported occurrences of regionally identified movement corridors.

Based on our site visit, five vegetation communities, classified corresponding to *The Manual of California Vegetation Second Edition* (Sawyer, et. al. 2009), occur within the parcel. These vegetation communities are 1) non-native grassland; 2) willow and cottonwood riparian woodland; 3) perennial wetlands within the blue-line drainages; 4) existing vineyard; and 5) coyote bush scrub. There are also approximately three non-blue line ephemeral drainages but these do not have any tree riparian canopy, although they do have seasonal wetlands in portions of the drainages. Most of the wetlands occur below the top of bank of the creeks/drainages. The riparian and wetland areas will be avoided with appropriate setbacks as required under the VESCO ordinance.

Based on these findings we have provided Recommendations, including cover cropping, fallow field retention, stream plantings, dry area plantings, native bee plantings, wet area plantings, bird nest boxes, raptor perch poles, and bat boxes.

We have prepared a summary table of biological resources that may be affected from the proposed project and the seasonal timing to determine occupancy and prevent take of individuals.

Biological Resource	Actions/Seasons to determine occupancy	Action/Seasonality to prevent take of individuals
Riparian drainages and wetlands		50-foot buffer for blue-line drainages 25-foot buffer for non-blue-line drainages 50-foot buffer for wetlands
Nesting birds	February 15 and August 15	Late August – end of January
Roosting bats	All year	March 1 – April 15 September 1 – October 15

INTRODUCTION

Domaine Chandon contracted with Wildlife Research Associates and Jane Valerius Environmental Consulting to conduct a Restoration/Enhancement/Conservation Plan of the Carneros Ranch, totaling approximately 969 acres. The 26885 Ramal Road project is located southeast of the City of Sonoma, in the southeastern portion of Sonoma County, California. This Restoration/Enhancement/Conservation Plan (Plan) was conducted to identify the potential for retaining/restoring a wide variety of ecological features (riparian buffers, hedgerows, shrubland edges, and other remnant vegetation) around agricultural areas to benefit functional biodiversity that can increase the density of natural enemies and enhance their impact on pests.

This Plan is a preliminary analysis of both the existing environment and on-going management methods that occur on the Carneros Ranch. The recommendations identified in this report must adhere to federal and State laws. Federal and state agencies that have purview over biological resources include the following:

- U.S. Army Corps of Engineers (USACE) - regulates the discharge of dredged or fill material into waters of the United States,
- U.S. Fish and Wildlife Service (USFWS) - authority over federally listed plant and animal species,
- National Marine Fisheries Service (NMFS) - authority over essential fish habitat, which is habitat necessary to maintain sustainable fisheries,
- California Regional Water Quality Control Board (RWQCB) - protects all waters with special responsibility for wetlands, riparian areas, and headwaters, and the
- California Department of Fish and Wildlife (CDFW) - authority over state listed plants and animals as well as streams and lakes within the State.

Please refer to Appendix A for details on regulations protecting special status species and sensitive vegetation communities.

Site Location

The vineyard blocks are located south of Carneros Highway 121/Highway 12, north of Skaggs Island, east of Sonoma Creek and west of the Napa River. The Carneros Ranch is located within the Hudeman Slough watershed and is located west of Huichica Creek and north of Hudeman Slough (Figure 1).

Located on the south side of Arrowhead Mountain, the site is on a west- and south-facing slope. The site is in various stages of being fallow. Some blocks are currently planted. Surrounding land uses include vineyards.

METHODS

Botanical nomenclature used in this report conforms to Baldwin, et al. (2012) for plants and to *The Manual of California Vegetation*, 2nd Edition (Sawyer, et al. 2008) for vegetation communities. Nomenclature for special status animal species conforms to CDFW (2021).

Site Survey: Trish Tatarian, Wildlife Research Associates, and Jane Valerius, Jane Valerius Environmental Consulting, conducted a survey on January 4, 2022, comparing earthworm densities between vineyard plantings and native vegetation communities within the same soil complex. The weather was overcast and drizzling and cool (~55° Fahrenheit). Earthworm species were surveyed for in surface soils and litter, and in the upper soil within a 12” x 12” x 12” area. No deep burrowing species were surveyed for as this requires special mixtures to draw the worms out of their burrows. Six sites, three natural and three vineyard sites, were surveyed, noting the habitat type, depth of leaf litter and slope aspect

Trish Tatarian and Jane Valerius conducted a general survey of the ranch on October 27, 2021. The weather was overcast and cool (~65° F) to warm (~72° F) and clear. This survey was an overall evaluation of the site and was not intended for determining presence or absence of any species because October is outside the blooming season for plants and breeding season for most wildlife species.

Previous surveys for special status plants were conducted on March 30, April 1, April 20 and June 1, 2021 for blocks 155, 156, 157, 161, 166, 168, 178 and 179. As required by CDFW protocols, a representative sampling of each of the vineyard blocks was walked using random transects including walking the perimeter. Because the blocks are large and mostly homogenous in vegetation composition, the focus of the surveys was to identify areas with the highest potential for special status plants based on visual observations of flowers and changes in soils or topography. All plant species identifiable at the time of the site visit were recorded by Jane. Table 1 provides a list of plant species observed.

A previous survey was conducted by Trish on March 30 and April, 12021, where she evaluated the parcel for small mammal burrows and surveyed for suitable potential habitat for nesting birds and roosting bat habitat using 8 x 42 roof-prism binoculars, noting presence of cavities, old bird nests and squirrel nests in trees. The reconnaissance-level site visit was intended only as an evaluation of on-site and adjacent habitat types, and no special status animal species surveys were conducted as part of this effort. Table 2 provides a list of wildlife species observed.

EXISTING CONDITIONS

Regional Description

The project area is located within the Bay Delta Province (CDFW 2015). This province has two subregions: the San Francisco Bay Area and the Delta. The San Francisco Bay Area subregion is the most densely populated area of the state outside of the Southern California metropolitan region (CDFW 2015). It consists of the low-lying baylands, aquatic environments, and watersheds that drain into San Francisco Bay, surrounded by low coastal mountains, with several peaks rising above 3,000 feet (CDFW 2015). The region receives 90 percent of its surface water from the Sierra Nevada via major Central Valley creeks and rivers that feed the Delta. Other rivers draining into the Bay include the Napa, Petaluma, and Guadalupe rivers and Sonoma, Petaluma, Alameda, and Coyote creeks. The Bay Area has relatively cool, often foggy summers and cool winters, strongly influenced by marine air masses (CDFW 2015).

The Bay supports a variety of different habitats because of the topography (CDFW 2015). Within the Bay, both deep and shallow estuarine (mixed freshwater and saltwater) environments occur (CDFW 2015). The shorelines contain coastal salt marsh, coastal scrub, tidal mudflats, and salt ponds. Freshwater creeks and marshes are home to aquatic invertebrates and freshwater fish, especially along those few that still support riparian vegetation (CDFW 2015). Upland areas support a mixture of grasslands, chamise chaparral, and live oak and blue oak woodlands. Small stands of redwood, Douglas fir, and tanoak grow in moister areas along the coastal mountains (CDFW 2015).

The Carneros Ranch site is located within the northeastern portion of the Sears Point topographic quadrangle, in the unsectioned portion of the Huichica Rancheria, Township 5N and Range 5W. Topographically, the ranch is located on a west-and south-facing slope between approximately 52 feet (30 meters) in elevation in the southwest and 246 feet (75 m) in elevation in the northeast.

For the purposes of this report, the ranch is split between the northern areas (north of Ramal Road) and the southern areas (south of Ramal Road, but north of the Southern Pacific railroad tracks).

Soils

Northern Area – Several soil types occur within the north area as mapped by the Natural Resources Conservation Service (NRCS 2021). Haire clay loam comprises the largest portion of this area. Other soil series include Hambright rock-Outcrop complex and Kidd stony loam. Haire series soils consist of moderately well-drained clay loams that have a clay subsoil and are underlain by old terrace-alluvium from mixed sedimentary and basic rock sources. These soils occur on terraces and rolling hills. Hambright series soils consist of well drained soils on uplands. These soils formed in material weathered from basic volcanic rock. Kidd series soils consists of somewhat excessively drained gravelly loams that are underlain at a depth of 5 to 20 inches by rhyolite rock and rhyolitic tuff. These soils typically occur on mountainous uplands.

Soils series descriptions were obtained from the Soil Survey of Sonoma County (USDA 1990) and Soil Survey of Napa County (USDA 1978).

Southern Area – South of Ramal road the dominant soil series is Haire clay loam and Haire gravelly loam and Alluvial land, clayey with some Pajaro clay loam, Cortina very gravelly loam and Reyes silty clay. Haire series soils are described above. Pajaro series soils consist of somewhat poorly drained fine sandy loams underlain by mixed alluvial material derived from a variety of sedimentary sources. These soils occur on low terraces and alluvial flood plains and fans in valley areas. Cortina series soils consists of excessively drained, very gravelly and sandy loams formed in recently deposited alluvium from mixed sedimentary and basic rock. These soils occur on channel stream bottoms. Reyes series soils consist of poorly drained silty clays that formed I mixed bay and stream alluvium. These soils are in salt water marshes adjacent to bodies of sea water. Soils series descriptions were obtained from the Soil Survey of Sonoma County (USDA 1990) and Soil Survey of Napa County (USDA 1978).

Vegetation Communities and Wildlife Habitats

The following paragraphs present the vegetation and wildlife habitats that are present on the parcel. For the purposes of this report, habitat is considered an area that has the appropriate combination of resources (i.e., food, cover, water) and environmental conditions for the survival and reproduction of a species, either plants and/or animals. The following habitats have broken down into general habitats, such as upland and mesic habitats, with specific vegetation communities, corresponding to *The Manual of California Vegetation Second Edition* (Sawyer, et. al. 2009), identified per habitat. The vegetation communities descriptor includes plant species either observed in the field or commonly associated with the vegetation community. See Table 1, at the end of the vegetation descriptions, for a list of the species observed during the 2021 surveys.

Below each vegetation community paragraph are the associated wildlife habitats, as described by *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988) and the California Wildlife Habitat Relationship habitat classification scheme developed by the CDFW, a wildlife information system and predictive model for California's regularly occurring wildlife. The wildlife habitat descriptor includes animal species either observed in the field or commonly associated with the wildlife habitat. The value of a site to wildlife is influenced by a combination of the physical and biological features of the immediate environment. Species diversity is a function of diversity of abiotic and biotic conditions and is greatly affected by human use of the land. The wildlife habitat quality of an area, therefore, is ultimately determined by the type, size, and diversity of vegetation communities present and their degree of disturbance. Wildlife habitats are typically distinguished by vegetation type, with varying combinations of plant species providing different resources for use by wildlife. See Table 2 for a list of the 32 species observed during the surveys and the habitats in which they were observed.

Upland (Xeric) Habitats

Grasslands **-** This habitat is primarily in areas that are not planted as vineyard blocks and along riparian corridors beyond the top of bank.

Non-Native Grassland/Avena (barbata, fatua) Semi-Natural Stand or Wild Oats Grassland: Vegetation in this habitat is comprised of fallow non-native grassland that is dominated in many areas by wild oats (*Avena barbata* and *A. fatua*) along with other non-native grasses and forbs (Fig. 3 and 4). The undeveloped vineyard blocks are very weedy and plant species noted on the site include non-native grasses such as wild oats, bromes (*Bromus hordaeceus, B. diandrus*), hare barley (*Hordeum murinum* ssp. *leporinum*), ryegrass (*Festuca perennis*), and rattail fescue (*Festuca myuros*) as well as weedy non-native forbs such as milk thistle (*Silybum marinum*), chicory (*Cichorium intybus*), bristly ox-tongue (*Helminthotheca echioides*), prickly lettuce (*Lactuca serriola*), fennel (*Foeniculum vulgare*), Queen Anne's lace (*Daucus carota*), and mustard (*Brassica nigra*). A few native species were noted and include common fiddleneck (*Amsinckia intermedia, A. menziesii*), lupines (*Lupinus bicolor, L. nanus*), Spanish lotus (*Acmispon americanus*), narrow leaf milkweed (*Aesclepias fascicularis*), and little tarweed (*Madia exigua*).

Annual grasslands: Non-native grasslands typically provide foraging, hunting and nesting habitat for a wide variety of wildlife species. California grasslands, once comprised of a wide variety of perennial grasses, riparian forests, vernal pools, wetlands, chaparral shrub, and open oak woodlands, are now at less than one percent of pre-settlement following cropland conversion and urbanization, which has seen an increase since the 2000's (Audubon 2019). Small species using this habitat as primary habitat include reptiles and amphibians, such as southern alligator lizard (*Gerrhonotus multicarinatus*), western fence lizard and Pacific slender salamander (*Batrachoseps attenuatus*), which feed on invertebrates found within and beneath vegetation and rocks within the vegetation community. The grasslands on the site are typical of non-native grasslands and provide habitat for small mammals, such as meadow vole (*Microtis californicus*), and Botta's pocket gopher (*Thomomys bottae*), the evidence of which was observed throughout the blocks. Other species potentially occurring on the site include opportunistic small mammals, such as western harvest mice (*Reithrodontomys megalotis*) and house mice (*Mus musculus*), which are attracted to nearby anthropogenic structures. Ground nesting passerines (perching birds), such as California quail (*Lophortyx californicus*), mourning dove (*Zenaidura macroura*), grasshopper sparrow (*Ammodramus savannarum*) and meadowlark (*Sturnella neglecta*) are a few seed-eaters that nest and forage in grasslands and were observed in the grasslands at the time of the survey. Avian species inured to human habitation, such as California towhee (*Pipilo crissalis*), Anna's hummingbird (*Calypte anna*), American crow (*Corvus brachyrhynchos*), forage and hunt in the grasslands but may nests in the trees, were observed on the property and likely nest on the parcel.

Shrubs - These habitats are located in the northwestern corner and in the northeast central portion of the ranch north of Ramal Road. A small isolated area is located on the southwest side of Skaggs Island Road.

Baccharis pilularis Shrubland Alliance or Coyote Brush Scrub: This habitat is dominated by coyote brush with grassland in open areas (Fig. X and X). The coyote brush scrub area south of Block 166 and north of Block 164 was walked during the initial March 30, 2021 site visit but no special status plant surveys were conducted for this area. This area does also appear to have a small seep-type wetland with rushes and sedges.

Coastal Scrub: Along the mesic coast this habitat is more varied in plant species composition than in the more xeric inland habitats, such as the project area. In this portion of Sonoma County, the site, although influenced by the marine layer off the San Pablo Bay, it is still considered more xeric than the coastal habitats, which is reflected in the coyote bush dominated habitat with a simple understory. Most of the wildlife species observed in the grasslands were also observed in this coastal scrub habitat.

Vineyard – The majority of the ranch is planted in vineyard and has been since 1985.

Vineyard: The majority of the ranch is existing vineyard, planted in grapes (*Vitis vinifera*) and include Pinot meunier, pinot noir, and chardonnay grapevines. The Existing Management paragraph provides additional details on the management of the vineyards.

Vineyards: Wildlife occupancy in vineyards is determined by the management practices. Typically, in areas that are heavily managed (e.g., frequent tilling and/or use of plant protection products) wildlife occupancy is low due to a lack of cover, food sources and frequent disturbance levels. Vertebrates using vineyards are deer, pocket gophers (*Thomomys bottae*), California ground squirrel (*Otospermophilus beecheyi*), black-tailed jack rabbits *(Lepus californicus*), and seed eating birds, such as robins (*Turdus migratorius*).

Stream/Wetland (Mesic) Habitats **–** These habitats are located along the western portion of the ranch that flows from north to south, with east-west flowing tributaries feeding into the main channel. In the southern portion of the ranch, there are several tributaries that flow north-south and only connect further south past the railroad tracks.

Riparian and Freshwater Wetland Drainages: Riparian and wetland drainages occur adjacent to most of the vineyard blocks (Figure 5 and 6). The main creek drainage, which is a blue-line drainage, supports a willow riparian tree and shrub community as well as in-stream wetland vegetation. The willow riparian includes a variety of willow species including arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and sandbar willow (*Salix exigua*) as well as cottonwood (*Populus fremontii*), and valley oak (*Quercus lobata*). Along the main road the creek top of bank has been planted with cottonwood trees and these occur in a straight row. The creek bed supports a wetland vegetation community including cattails (*Typha latifolia*), water plantain (*Alisma lanceolatum*), Santa Barbara sedge (*Carex barbarae*), scouring rush (*Equisetum arvense*), and iris-leaved rush (*Juncus xiphioides*). In some area a native grass species, creeping wildrye (*Elymus triticoides*) was observed growing along the top of bank. The drainage along the southern end of Blocks 155, 156 and 157 is primarily a wetland drainage with a few willow trees.

There are six blue line ephemeral drainage within the ranch (Figure X). In general, the drainages south of Ramal Road do not support a tree riparian cover with the exception of the occasional oak tree. However, portions of the drainages do support wetlands.

A formal delineation of wetlands and waters was not conducted as part of this report. As required by VESCO all wetlands and waters will be avoided and the appropriate setback maintained.

There are approximately three non-blue line drainages within the study area (Figure X). These drainages would have a 25-foot setback except for areas where wetlands were identified. A 50-foot setback will be maintained for all areas where wetlands were mapped.

All of the drainage on the site are identified as riverine on the National Wetland Inventory Maps produced by the U.S. Fish & Wildlife Service at www. fws.gov/wetlands/data/mapper. Only the blue-line drainages are identified on the Sonoma County Riparian Ordinance as having a 50-foot buffer. There are no designated wetlands based on the Sonoma County General Plan Biotic Resources Map for the Sonoma Valley (Sonoma County Permit and Resource Development Department 2016).

Fresh Emergent Wetland: None of the wetlands supported ponding water at the time of the survey; however, 2021 was considered the second year of a drought with only 40% of the normal rainfall, as shown on the website of Sonoma Water (https://www.sonomawater.org/current-water-supply-levels) (Sonoma Water 2021). Rather they provided an above-ground moisture that is important to amphibians as they move across a landscape. Amphibian species potentially using the fresh emergent wetland associated with the main channels and tributaries include the Pacific chorus frog (*Pseudacris regilla*) and western toad (*Anaxyrus boreas*); however, no tadpoles or even invertebrate were observed in any of the channels or ponds. Vertebrate species that may opportunistically forage within the fresh emergent wetland within the study area include great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), and raccoon (*Procyon lotor*), among others, feeding on amphibians. Aerial foraging species that hunt over marshy areas that supported winged insects include various swallow species, such as violet-green swallow (*Tachycineta thalassina*), and bat species, such as myotis (*Myotis* sp.).

Individual Trees: Individual trees are foraging and nesting habitat for passerines and raptors, and roosting habitat for bats. Smaller passerines, such as bushtit (*Psaltriparus minimus*), were observed nesting and foraging in the larger trees, feeding on insects on the bark. Several stick nests were observed in the poplar trees along the tributary to the main channel, and two were occupied by red-tailed hawks (*Buteo jamaicensis*) (Fig. 10). Although a great horned owl (*Bubo virginianus*) was observed in the copse of coast live oak trees outside the planting area, no large cavities or large stick nests in the trees to support nesting were observed. A great horned owl was observed nesting on a shelf in the barn.

Bats that use trees fall into three categories: 1) solitary, obligate tree-roosting bats that roost in the foliage or bark such as western red-bat (*Lasiurus blossevillii*), or hoary bat (*Lasiurus cinereus*); 2) colonial tree-roosting bats that form groups of varying size in tree cavities or beneath exfoliating bark, such as silver-

haired bats (*Lasionycteris noctivagans*), and 3) more versatile bat species that will use a wide variety of roosts from buildings to bridges to trees, such as various *Myotis* species, pallid bat (*Antrozous pallidus*), and others.

Solitary-roosting bats consist either of females either alone or with young, or solitary males. Colonial-roosting bats may form maternity colonies in tree cavities or crevices, caves, mines, bridges, or other man-made structures. During the day, these roosts provide shelter and protection for adult females and their young, which remain in the roost while females forage at night, returning to nurse and care for their young. Greater impacts to bats can occur as a result of removal of trees that support cavity-roosting bat species than those that provide habitat for solitary foliage-roosting species.

Reservoirs: There are five reservoirs on the ranch. The reservoirs are for irrigation purposes and do not have any riparian or wetland vegetation. The majority of the reservoirs are all man-made feature and not likely to be jurisdictional. There is only one in-stream reservoir, located south of Ramal Road.

Water depth is greater than 5 feet in these reservoirs. The northern most reservoir receives water from Sonoma County to which is added copper sulphate, which kills bacteria, algae, roots, plants, snails and fungi, resulting in little to no insect or invertebrate presence. No amphibians were observed in the water or downstream drainages and is likely due to the copper sulphate treating the recycled water at the central reservoir.

As stated earlier, the following tables, Table 1 and Table 2, present the various species observed on the ranch during the surveys. The plant species (Table 1) were observed during specific rare plant surveys of the ranch for specific blocks to be planted. The wildlife species observed (Table 2) were opportunistically observed over several discrete days. No focused survey were conducted for wildlife species.

Table 1: Plant species observed on March 30, April 1, April 20, and June 1, 2021.

Scientific Name	Common Name
Acmispon americanus	Spanish lotus
Aesculus californica	California buckeye
Alisma lanceolatum	Water plantain*
Amaranthus sp.	Amaranthus*
Amsinckia intermedia	Common fiddleneck
Amsinckia menziesii	Fiddleneck
Anthemis cotula	Mayweed*
Asclepias fascicularis	Narrow leaf milkweed
Avena barbata	Wild oats*
Avena fatua	Oats*a
Baccharis pilularis	Coyote brush
Brassica nigra	Black mustard*
Bromus diandrus	Ripgut brome*
Bromus hordaceus	Soft chess*
Calendula arvensis	Calendula*
Capsella bursa-pastoris	Shepherd's purse*
Carduus pycnocephalus	Italian thistle*
Carex barbarae	Santa Barbara sedge
Carex densa	Dense sedge
Centaurea solstitialis	Yellow star thistle*
Chlorogalum pomeridianum	Soaproot
Cichorium intybus	Chicory*
Cisium vulgare	Bull thistle*
Conium maculatum	Poison hemlock*
Convolvulus arvensis	Bindweed*
Cyperus eragrostis	Tall flat sedge
Daucus carota	Queen Anne's lace*

Scientific Name	Common Name
Dipsacus fullonum	Teasel*
Dittrichia graveolens	Stinkwort*
Eleocharis macrostachya	Spike rush
Elymus caput-medusae	Medusa head grass*
Elymus triticoides	Creeping wildrye
Epilobium brachycarpum	Willow herb
Equisetum arvense	Scouring rush
Erodium botrys	Filaree*
Eryngium sp.	Coyote thistle
Festuca arundinacea	Tall fescue*
Festuca myuros	Rattail fescue*
Festuca perennis	Wildrye*
Foeniculum vulgare	Fennel*
Gallium aparine	Cleavers
Geranium dissectum	Cut-leaf geranium*
Helminthotheca echioides	Bristly ox-tongue*
Hirschfeldia incana	Short podded mustard*
Hordeum brachyantherum	Meadow barley
Hordeum marinum ssp. *gussoneaum*	Mediterranean barley*
Hordeum murinum ssp. *leporinum*	Hare barley*
Hordeum sp.	Cultivated barley*
Hypochaeris glabra	Smooth cat's-ear*
Hypochaeris radicata	Rough cat's-ear*
Juncus patens	Spreading rush
Juncus xiphioides	Iris-leaved rush
Lactuca serriola	Prickly lettuce*
Lepidium nitidum	Shining pepperweed
Lotus corniculatus	Bird's-foot trefoil*
Lupinus bicolor	Dwarf lupine
Lupinus nanus	Sky lupine
Lythrum hyssopifolia	Hyssop loosestrife*
Madia exigua	Little tarweed
Malva parviflora	Mallow*
Medicago polymorpha	Bur clover*
Mentha pulegium	Pennyroyal*
Opuntia sp.	Cactus – planted*
Phalaris aquatica	Harding grass*
Phorodendron sp.	Mistletoe
Plantago lanceolata	English plantain*
Poa annua	Annual bluegrass*
Polygonum aviculare	Knotweed*
Polypogon monspeliensis	Rabbitsfoot grass*
Populus fremontii	Fremont cottonwood
Prunus sp.	Fruit tree*
Quercus lobata	Valley oak – planted
Raphanus raphanistrum	Jointed charlock*
Raphanus sativus	Wild radish*
Rubus armeniacus	Himalayan blackberry*
Rumex acetosella	Sheep sorrel*
Rumex cripsus	Curly dock*
Rumex pulcher	Fiddle dock*
Salix exigua	Sandbar willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Schoenoplectus acutus	Bulrush
Senecio vulgaris	Common groundsel*
Sequoia sempervirens	Redwood -planted
Silybum marinum	Milk thistle*

Scientific Name	Common Name
Sisrynchium bellum	Blue-eyed grass
Sonchus asper	Sow thistle*
Spergularia rubra	Red sand spurrey*
Stipa pulchra	Purple needlegrass
Toxicodendron diversilobum	Poison oak
Tragopogon porrifolius	Salsify*
Trifolilum hirtum	Rose clover*
Typha latifolia	Cattail
Vicia sativa	Vetch*
Vicia villosa	Hair vetch*
Vitis vinifera	Grapes*
Wyethia angustifolia	Mule's ears
Zeltnera sp.	Centaury

Species with an * are non-native.

Table 2: Wildlife species observed on March 30, April 1 and October 27, 2021.

Scientific Name	**Common Name**	NNG	Coastal scrub	Riparian	Reservoir
Birds					
Accipiter striatus	Sharp-shinned hawk		X	X	
Agelaius phoeniceus	Red-winged blackbird	X		X	
Ammodramus savannarum	Grasshopper sparrow	X			
Anas platyrhynchos	mallard				X
Branta canadensis	Canada geese				X
Bubo virginianus	Great horned owl			X	
Bucephala albeola	bufflehead				X
Buteo jamaicensis	Red-tailed hawk			X	
Callipepla californica	California quail	X	X		
Calypte anna	Anna's hummingbird		X	X	
Circus hudsonius	Northern harrier	X			
Colaptes auratus	Northern flicker			X	
Corvus brachyrhynchos	American crow	X	X	X	
Corvus corax	Common raven	X	X	X	
Gallinago gallinago	Common snipe			X	X
Haemorhous mexicanus	House finch		X	X	
Junco hyemalis	Dark-eyed junco			X	
Lanius ludovicianus	Loggerhead shrike	X			
Meleagris gallopavo	Wild Turkey	X	X	X	
Melospiza melodius	Song sparrow	X	X	X	
Mimus polyglottus	mockingbird	X	X	X	
Phasianus colchicus	Ring-necked pheasant*	X			
Psaltriparus minimus	bushtit			X	
Sayornis nigricans	Black phoebe			X	
Setophaga coronata	Yellow-rumped warbler			X	
Sialia mexicana	Western bluebird			X	
Spinus tristis	American goldfinch	X	X	X	
Sturnella neglecta	Western meadowlark	X			
Tachycineta thalassin	Violet-green swallows			X	
Thryomanes bewickii	Bewick's wren	X	X	X	
Turdus migratorius	American robin			X	
Zenaida macroura	Mourning dove	X		X	
Zonotrichia leucophrys	White-crowned sparrow		X	X	

Mammals					
Canis latrans	coyote	X	X	x	
Lepus californicus	Black-tailed Jackrabbit	X	X		
Mephitis mephitis	skunk	X	X	x	
Odoicoileus hemionius californicus	Black-tailed deer	X	X	X	
Thomomys bottae	Botta's pocket gopher	X			

Species with an * are non-native

Earthworm Density Comparison

To provide baseline data for a comparison of occupancy of earthworms between vineyards and native habitats sampling was conducted after winter rains. The results are presented in Table 3.

Table 3: Carneros Ranch Earthworm Population Comparison - January 4, 2022

Site	Location	Slope Aspect	Habitat Type	Soils Mapping	Soils in field	# of earthworms/ others
North of Ramal Road						
A	First drainage E of W Road (Block 172)	W facing and south trending	Vineyard	HcD2 – Haire clay loam, eroded	Loamy	9
B	First drainage E of W road (South of Blocks 172)	E facing and south trending	Coyote brush/oak/grassland along drainage	HcD2 – Haire clay loam, eroded	Loamy	12 2 centipedes
C	S side of drainage (Block 167)	W facing	Vineyard	HcE – Haire clay loam	Clay/loam soils with sandy soils	12
D	S side of drainage (Block 166)	W facing	Non-native grassland fallow	HcE - Haire clay loam	Clay	0
South of Ramal Road						
E	NE side of field (W of Block 105)	W facing	Non-native grassland fallow	HbC – Haire gravelly loam	Clay/loam with water at bottom	5
F	NW corner of vineyard 15' in from edge between rows 5 and 6 (Block 105)	W facing	Vineyard	HbC - Haire gravelly loam	Loamy	24

The results of the simple soils sampling for earthworms showed a small correlation between the presence of clay soils and fewer earthworms (Sites D and E) and a small correlation of a higher number of earthworms in the in-between rows of the vineyards that support clovers as a cover crop (Sites A, C and F). Earthworms are major decomposers of dead and decomposing organic matter and derive their nutrition from the bacteria and fungi that grow upon these materials (NRCS 2021). Heavy clay soils have less organic matter in them than loamy soils. Earthworm populations tend to increase with soil organic matter levels and decrease with soil disturbances, such as tillage and potentially harmful chemicals (NRCS 2021). Populations will also increase in irrigated soil (NRCS 2021) and decrease in areas that are compacted by agricultural traffic (Werner 1990). Earthworms prefer materials with a low carbohydrate and nitrogen (C/N) ratio, such as clovers, to grasses which have a higher C/N ratio (Werner 1990). Colonization of litter residues by microorganisms also increases palatability (Werner 1990).

If the cover crop changes in the future these results can be used as a comparison of occupancy.

Movement Corridors

Wildlife movement includes migration (i.e., usually one way per season), inter-population movement (i.e., long-term genetic flow) and small travel pathways (i.e., daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow among populations.

These linkages among habitat types can extend for miles between primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement among populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, which is often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages, migration corridors and movement corridors. Depending on the condition of the corridor, genetic flow between populations may be high in frequency, thus allowing high genetic diversity within the population, or may be low in frequency. Potentially low frequency genetic flow may lead to complete isolation, and if pressures are strong, potential extinction (McCullough 1996; Whittaker 1998).

If a corridor provides suitable habitat, it will facilitate dispersal (Hess and Fischer 2001). There is a distinction between a corridor that provides movement between habitats, a conduit function, and a corridor that provides resources for survivorship, reproduction and movement, a habitat function (Hess and Fischer 2001). This document will identify corridors between these two descriptors. Additional corridor descriptors, such as filters, barriers and source and sink corridors, are not identified in this report but are none the less important when discussing corridors (Hess and Fischer 2001).

Regionally: Looking at the ranch within the San Francisco Bay Area, the study area is located in Bay Area Ecoregion, as described in the California Essential Connectivity Project (Spencer, et al. 2010). The natural drainages in the area (e.g., Hudeman Creek) flow from the north to the south into the San Pablo Bay and west into the Pacific Ocean. The Study Area is not within a Natural Landscape Block (defined as relatively natural habitat blocks that support native biodiversity). The study area is not located in an Essential Connectivity Area (defined as areas that are essential for ecological connectivity between blocks) (Spencer et al. 2010). This parcel in in direct alignment between the saltmarshes associated with the northern end of San Pablo Bay and the oak woodlands on the southern end of Arrowhead Mountain, located north of HWY 121/12. As such, there is likely a strong north-south migration between these two undeveloped areas.

Locally: The drainages on the parcel flow into a main drainage that flows south into Hudeman Slough, off which several ponds/reservoirs have been created. These drainages are likely used for daily migrations of flocks of passerines as they forage on the site. The main blue-line drainage is the important connector between the two coyote brush scrub habitats on the northwest side and on the northeast side of the ranch.

The undeveloped portions of the ranch (i.e., fallow grasslands and shrub habitats) provide winter foraging habitat for migrating raptors such as white-tailed kites (*Elanus leucurus*), sharp-shinned hawks (*Accipiter striatus*), red-tailed hawks (*Buteo jamaisensis*) and northern harrier (*Circus hudsonius*), as well as smaller birds, such as loggerhead shrikes. These aerial hunters are using these habitats for foraging and as movement corridors.

Within the Ranch: The main drainage that flows from north to south on the northern part of the ranch connects to the southern part of the ranch. However, the drainages do not connect hydrologically until further south, below the railroad tracks. As a result, there is more corridor value along the main channel in the northern part of the ranch than along the small channels in the southern part of the ranch. The western fence-

line north of Ramal Road provides a corridor along which small birds will move. The fallow fields of blocks 103 and 112 provide non-native grasslands habitat that is adjacent to the on-stream reservoir. The main drainage is used both as habitat by smaller birds and as a conduit by larger mammals, such as deer. The lack of smaller shrubs in the southern part of the northern parcel lessens the habitat component of this drainage. The lack of shrubs along the drainages on the southern portion also reduces the habitat values of the drainages.

The existing perimeter fencing does not exclude wildlife moving around the ranch. If the entire perimeter of the ranch were to be deer fenced then this would create a problem for movement of wildlife. At this time, however, it seems highly unlikely that this is an option. If, in the future, deer fencing is to be installed around specific blocks this will not impede the movement corridors described above.

EXISTING MANAGEMENT

The current land management at the Carneros ranch includes sustainable farming (i.e., Fish Friendly Farming, California Sustainable Wine Alliance), with a "zero herbicide policy", whereby herbicides are only used in developing blocks (up to 3 years since the vineyard is established) and around reservoirs, along with weed-whacking. The ranch uses beneficial insect release to combat vine mealybug issues, as well as small mammal predator control through the installation of 80 barn owl nest boxes. Cover crops are used between vine rows which are mowed. Commercial apiaries are used and, in 2021, they were installed on the northwestern corner, in the central western portion near a reservoir and in the southern western portion near a reservoir.

RECOMMENDATIONS

The following paragraphs identify recommendations for improving biodiversity on the site, as well as erosion control, weed control and wildlife enhancement. It should be noted that this type of farmscape planting, whether a hedgerow, windbreak, filter strip, grassed waterway, beetle bank or riparian area, is a distinct farming operation and should be managed as a separate crop with specific maintenance timings and should be integrated within the farm production plan. Successful establishment of these various plantings will be based on well-timed maintenance and watering. The details should be worked out in a separate report.

For the purposes of this report, we have identified several areas for preservation, enhancement and restoration and are presented in an associated KMZ file. The following are definitions of these actions.

> Preservation – retain areas for ecological role (i.e., source population for native insects, plants)
> Enhancement – improvement to the ecological condition of an area through native plantings
> Restoration – removal of invasive, non-native plant species and planting native species

Areas of enhancement and restoration have been identified for their benefits to wildlife to provide refuges, hibernation sites, alternative host animals, prey for the juveniles stages of predators, nectar, pollen and honeydew for the maturation and reproduction of all parasitoids, many predators and pollinators (e.g. bees) (Stefanucci et al. 2018).

We have created a table at the end of this section that provides a summary of acreages for the various recommendations. As stated before, a Google Earth KMZ file has been created that identifies the following locations for each of the recommended actions identified below.

Creation of retention basin in northern portion of ranch

Channel incision is a significant fine sediment source and is the primary mechanism for habitat simplification in the drainages in Sonoma and Napa counties (RWQCB 2017). Storm runoff increases resulting from infiltration losses in vineyards and roads are two of several causes for channel incision (RWQCB 2017). These effects were observed in the area located in the northern portion of the ranch where two culverts pass

under HWY 121/12 and flow into the ranch. Erosion was observed both in the non-planted area and at the upper reach of the main tributary.

A shallow retention basin, similar to the basins located downstream, would be beneficial in this area as it would decrease the loss of sediment in the upland and prevent the flow of it downstream into the main drainage. This approximately 0.5- acre retention basin could be planted with native species that would retain the loose soils and would provide a seasonal cover crop for beneficial insects. Native bunch grasses could be used that would retain the soils and, once established, would allow for use of the area for parking when the soils have dried.

Stream bank configuration

To achieve equilibrium within the erosional stream channel in the northern portion of the ranch a terrace should be created outside the bankfull width. Creation of a floodplain can be achieved within the hydrologic floodplain. This terrace can be planted with trees and then shrubs on the upper terrace that allows for bank stability. Vertical banks within a channel confines the floodwater to the channel and increases the velocities and scour of the channel.

This northern area could use extensive weed control, specifically for teasel (*Dipsacus* sp.) as this had taken over a larger area including the small ponded area west of Block 174 as well as the southern portion of the main drainage on the north side of the ranch.

Retention of Natural Areas, Fallow Field and Wildlife Habitat Creation

Preservation of existing natural areas, such as the existing coyote brush scrub area between Blocks 164 and 166, should be retained to provide refuges for wildlife and opportunities for native plant restoration. It is recommended that the existing coyote brush area in the northwestern corner of the study area west of Block 174 be kept as natural and not planted. This area could use some weed control and seeding of native forbs and grasses and will provide excellent wildlife habitat. There is approximately 34.59 acres that can be preserved as natural habitat.

If there is room, establish corridors that cut across the vineyard that connect to riparian or other natural areas (Altieri 2010). These corridors will provide both habitat functions and conduit functions. This can also be achieved through cover cropping with natives. In addition, in new vineyard plantings, create an island of flowering annuals and perennial s herbaceous plants that can act as a hub for beneficials to move out into the vineyard rows and provide a stable undisturbed area for spiders to emigrate from (Altieri 2010).

Leave areas of the farm untouched or purposely plant with flowering shrubs and herbs, such as Blocks 103 and 112, to provide habitat for plant and animal diversity (Altieri 2010).

We also recommend retaining the existing native cottonwoods along the northern drainages. These trees provide valuable habitat for wildlife in terms of nesting habitat for passerines (e.g., oak titmouse) and raptors (e.g., red-tailed hawks) and maternity roosting habitat for solitary foliage roosting bats. Although the trees are linear along the drainages and act as a hedgerow, compared to a riparian forest like condition, their age and resultant height provides important habitat.

Wildlife water friendly water sources can be placed away from the reservoirs and streams for summer season water for wildlife. Other habitat can be created from downed wood or old vines lumped together to provide refugia for smaller passerines, which can be placed in fallow fields.

Stream Plantings

Several of the streams on the ranch could be enhanced while other areas need to have restoration to remove invasive plant species. We have identified approximately 6.94 acres of riparian habitat that can be restored. We recommend a mixture of trees, shrubs and herbs be planted for maximum habitat values. Table 4 presents a list of trees shrubs and herbs we recommend for riparian plantings along the drainages of the Carneros study area.

Table 4: List of trees, shrubs and herbs for stream plantings

Scientific Name	Common Name	Spacing (on center)	Planting location
Trees			
Acer marcrophyllum	Big-leaf maple	20-feet	Mid to top of bank
Aesculus californica	California buckeye	20-feet	Top of bank
Fraxinus latifolia	Oregon ash	20-feet	Mid to top of bank
Populus fremontii	Fremont cottonwood	20-feet	Mid to top of bank
Quercus lobata	Valley oak	20-feet	Top of bank
Salix exigua	Sandbar willow	15 to 20-feet	Toe to mid-bank
Salix laevigata	Red willow	20-feet	Toe to mid-bank
Salix lasiolepis	Arroyo willow	15 to 20-feet	Toe to mid-band
Shrubs/Vines			
Baccharis pilularis	Coyote brush	10 to 15 feet	Top of bank
Cercis occidentalis	Western redbud	10 to 15 feet	Mid to top of bank
Cornus sericea	Western dogwood	10 to 15 feet	Mid to top of bank
Frangula californica	California coffeeberry	10 to 15 feet	Top of bank
Ribes divaricatum	Straggly gooseberry	10 to 15 feet	Mid to top of bank
Ribes sanguineum	Pink-flowering currant	10 to 15 feet	Mid to top of bank
Rosa californica	California rose	10 to 15 feet	Mid to top of bank
Rubus ursinus	Pacific blackberry	6 to 10 feet	Mid to top of bank
Rubust parviflorus	thimbleberry	6 to 10 feet	Mid to top of bank
Sambucus nigra ssp. *caerulea*	Blue elderberry	10 to 15 feet	Mid to top of bank
Symphoricarpos mollis	Creeping snowberry	6 to 10 feet	Mid to top of bank
Herbs (seed mix)			
Artemisia douglasiana	Mugwort	Use 3 to 5 lbs per acre	Slope to top of bank
Bidens frondosa	sticktight		
Epilobium canum	California fuschia		
Erythranthe guttata	Seep monkey flower		
Euthamia occidentalis	Western goldenrod		
Phacelia nemoralis	Woods phacelia		
Ranunculus californica	California buttercup		
Sisrynchium bellum	Blue-eyed grass		
Stachys ajugoides	Hedge nettle		
Symphyotrichum chilense	California aster		
Grasses, Rushes and Sedges			
Carex barbarae	Santa Barbara sedge	Plant as plugs	Toe of slope to top of bank
Carex densa	Dense sedge	Plant as plugs	
Danthonia californica	California oatgrass	Use in seed mix 5 to 6 lbs per acre	
Elymus triticoides	Creeping wildrye	Use in seed mix 3 to 5 lbs per acre or plant as plugs	
Hordeum brachyantherum	Meadow barley	Use in seed mix 5 to 6 lbs per acre	
Juncus effusus	Pacifica rush	Plant as plugs or use in seed mix if available	
Juncus patens	Spreading rush	Plant as plugs or use in seed mix if available	

Table 5 provides a list of native grasses and forbs that can be planted along riparian corridors of the drainages in the Carneros study area.

Table 5: Example Riparian Native Grass and Forb Seed Mix

Species*	Seeding Rate (pure live seed)
California oatgrass (*Danthonia californa*)	5 lbs
Creeping wildrye (*Elymus triticoides*)	5 lbs
Meadow Barley (*Hordeum brachyantherum*)	10 lbs
Mugwort (*Artemisia douglasiana*)	5 lbs
California fuschia (*Epilobium canum*)	5 lbs
California buttercup (*Ranunculus californica*)	5 lbs
Blue-eyed grass (*Sisrynchium bellum*)	5 lbs
Hedge nettle *(Stachys ajugoides*)	5 lbs
TOTAL LBS/ACRE OF PURE LIVE SEEDS	**45 lbs/acre**

**Substitutions can be made for grasses and forbs if these species are not commercially available. Any substitutions must be native and appropriate for the site conditions. Ideally the seed mix shall include at least one species in the legume family such as lupine (Lupinus spp.) or clover (Trifolium spp.).*

Dry Area Plantings

Dry area plantings are recommended to enhance wildlife habitat, and the following plantings will benefit both invertebrates and vertebrates. For example, *Farming for Bees Guidelines* (Vaughan et al 2015) provides an excellent list of native plants for hedgerows and provides soil conditions, max height of growth and water needs. Planting of native hedgerows will benefit native bees. We have identified approximately 3.19 acres that can be planted as insectiaries. Species to be used include California fuchsia (*Epilobium canum*) and coyote bush (*Baccharis pilularis*), among others, in the upland habitats (Vaughan, et al. 2015). The native (*Arctostaphylos* spp.), madrones (*Arbutus menziesii*) and toyons (*Heteromeles arbutifolia*) are also good bee food. Plantings of shrubs and trees with provide addition bird nesting and foraging habitat, from which the birds will then move into the associated rows of vines to forage on insects.

Vegetational corridors composed of flowering species that cut across the vineyard can serve as a biological highway for the movement and dispersal of natural enemies from a riparian corridor into the center of the vineyard (Altieri 2010). Alternatively, undisturbed habitat supporting perennials distributed around the vineyards can also provide resources for beneficial predators to move from and into the vineyard (Altieri 2010).

Besides planting for beneficial insects, filter strips and vegetated buffers can be used to protect soil from runoff and erosion. Table 6 provides a list of tree, shrubs and herbs suitable for dry planting areas.

Table 6: List of trees, shrubs and herbs for upland areas

Scientific Name	Common Name	Spacing (on center)	Planting Location
Trees			
Quercus agrioflia	Coast live oak	20 foot	Upland slopes
Shrubs/Vines			
Arctostaphylos manzanita	Common manzanita	10 to 15 feet	Slopes, rocky places
Baccharis pilularis	Coyote brush	10 to 15 feet	Bluffs, hills, foothills and flats
Ceanothus cuneatus	Buck brush	10 to 15 feet	Dry fans, slopes, ridges
Ceanothus jepsonii	Jepson ceanothus	10 to 15 feet	Dry rocky slopes

Scientific Name	Common Name	Spacing (on center)	Planting Location
Diplacus aurantiacus	Bush monkey flower	10 to 15 feet	Rocky or sandy hillsides, cliffs, canyon slopes, disturbed places
Eriogonum giganteum	Giant buckwheat	10 to 15 feet	Upland slopes in full sun
Eriogonum nudum	Nude buckwheat	6 to 10 feet	Dry open places
Heteromeles arbutifolia	Toyon	10 to 15 feet	Along creekbanks, bottoms of slopes, north facing slopes and canyons
Lonicera hispidula	Hairy honeysuckle	6 to 10 feet	Slopes and streambanks, protected canyons, foothills
Lupinus albifrons	Silver lupine	6 to 10 feet	Many habitats, prefers fast drainage and moderately dry conditions
Salvia clevelandii	Cleveland sage	6 to 10 feet	Good drainage in full sun
Sambucus nigra	Blue elderberry	10 to 15 feet	Streambanks, slope bottoms, canyons, moist areas.
Herbs (seed mix)			
Achillea millefolium	Yarrow	5 to 6 lbs per acre	Open places in grasslands and shrublands.
Ascelpias fascicularis	Narrow leaf milkweed	5 to 6 lbs per acre	Tolerates clay and sandy soils on slopes, bluffs or canyons, in shrublands
Asclepias speciosa	Showy milkweed	5 to 6 lbs per acre	Tolerates clay soils but performs best with good drainage, occurs in flats, meadows, seasonal moist soils.
Epilobium canum	California fuschia	5 to 6 lbs per acre	Tolerates clay and sandy soils on slopes, bluffs or canyons, in shrublands
Eschscholzia californica	California poppy	5 to 6 lbs per acre	Sunny, open areas
Lupinus bicolor	Miniature lupine	5 to 6 lbs per acre	Dry meadows, grasslands, open or disturbed places
Sisrynchium bellum	Blue-eyed grass	5 to 6 lbs per acre	Meadows, mesic areas, grassy openings in shrublands,
Wyethia angustifolia	Mules ears	5 to 6 lbs per acre	Open places in grassland and shrublands
Grasses (seed mix)			
Bromus carinatus	California brome	5 to 6 lbs per acre	Open places in grassland and shrublands
Elymus glaucus	Blue wildrye	5 to 6 lbs per acre	Open places in grassland and shrublands
Festuca californica	California fescue	5 to 6 lbs per acre	Open places in grassland and shrublands
Stipa pulchra	Purple needlegrass	5 to 6 lbs per acre	Open places in grassland and shrublands

Source: Frankie et al 2014 Xerces

Table 7 provides a list of native grasses and forb seed mixtures that can be used in upland areas. We have identified approximately 3.65 acres of grasslands that can be enhanced.

Table 7: Example Upland Native Grass and Forb Seed Mix

Species*	Seeding Rate
California brome (*Bromus carinatus*)	5 lbs
Blue wildrye (*Elymus glaucus*)	10 lbs
California fescue (*Festuca californica*)	5 lbs
Purple needlegrass (*Stipa pulchra*)	5 lbs
Blue-eyed grass (*Sisrynchium bellum*)	3 lbs
Mules ears (*Wyethia angustifolia*)	2 lbs
California poppy (*Eschscholzia californica*)	5 lbs
Miniature lupine *(Lupinus bicolor*)	5 lbs
TOTAL LBS/ACRE OF PURE LIVE SEEDS	**45 lbs/acre**

**Substitutions can be made for grasses and forbs if these species are not commercially available. Any substitutions must be native and appropriate for the site conditions.*

General Planting and Maintenance Guidelines

The final planting design will be developed in the field by a professional qualified ecological restoration specialist or contractor. Plant material shall be supercells, d-pots, treepots or 1 gallon to 5 gallon size stock or larger, depending on what is available commercially. All plants shall receive protective hardware unless adequate fencing is provided to prevent browsing of the plants. Plant protection hardware shall consist of "collar and screen" or Tubex and and Propex weed control fabric that is made of biodegradable fabric. Plant protection hardware will be removed once the plants are 3 feet or taller and no longer requiring browse protection.

Protective screens shall be opened during the later portion of the first growing season to allow the plant to grow beyond the confines of the screen enclosure. Open screens shall appear as an open cylinder to provide continued browse protection to the lower portion of the plant. Screens, collars and weed control fabric shall remain in place for 3 to 5 years following plant installation unless the plant has outgrown the protective screen.

Trees and shrubs will be planted at their mature size distance on center. This will be at the discretion of the restoration contractor. The recommended spacing is typically 6 to 10 feet apart on center for shrubs and 20 to 30 feet on center for trees. The plantings will be placed to simulate the nature random nature of tree and shrub occurrences to provide as natural a look as possible. This means that plants will be staggered and the planting pattern will avoid, the extent possible, planting rows or straight lines.

Planting: Ideally, planting should occur between early November and early April, when the ground is moist and temperatures are moderate. Planting locations should be marked with color-coded pin flags prior to installation; the flags shall be left in place to aid identification during maintenance and monitoring visits.

Plants will be approved by the restoration ecologist prior to planting, and preferably prior to purchase and delivery to the site. Plants are to be of natural habit, that is free-form, unpruned, and unstaked. Support stakes are not allowed. The trees should be 1 to 5-gallon size, shrubs should be either 5- or1-gallon, depending on availability, and grasses and sedges shall be 4-inch size when plug plantings are used.

Planting holes shall not be over-excavated or pre-dug, but carefully dug to one-half inch less than the height of the rootball and two times wider than the rootball. Planting holes shall be filled with water and allowed to drain before planting. Since the backfill soil and the plants will settle over time, planting holes that are over-excavated will end up below grade, so will be abandoned. The goal is to have the crown of the plant very slightly above grade after planting. Only native site soil will be used as backfill, with a single Bio Pak of 16-6-8 per plant.

Watering berms should be created around each plant or group of plants to facilitate watering; berms should be a minimum of 4 feet in diameter for 5-gallon plants, and 3 feet in diameter for 1-gallon plants. Berms should be at least 6 inches tall and able to hold 2-3 inches of water without breaking. Grass and sedge plantings should have one overall watering berm per group of plants. Plants shall be thoroughly watered in by hand after planting.

Seeding: Table 5 provides a proposed seed mix to be broadcast seeded for riparian areas and Table 7 provides a recommended seed mix for upland areas. Grasses and herbs from Tables 5 and 7 should be selected. The total rate of application recommended is 45 lbs. seed per acre.

Mulch: Mulch (arbor mulch or approved equal) shall be spread around each new plant after planting and installation of the browse screening. Mulch shall be a chipped material such as arbor mulch, spread two inches deep, in a four-foot diameter circle around each woody plant, but not sedges or grasses. Mulch may not touch the stem or crown of the plant but brought to the edge of the slightly above-grade rootball.

Browse Screening: The final planting design will be developed in the field by a professional qualified ecological restoration specialist or contractor. Each planting spot shall be marked in the field with a color coded (to species) surveyor flag. Flags shall remain at each planting spot after plant installation.

Plant material shall be supercells, d-pots, treepots or 1 gallon to 5 gallon size stock, depending on what is available commercially. All plants shall receive protective hardware unless adequate fencing is provided to prevent browsing of the plants. Plant protection hardware shall consist of "collar and screen" or Tubex and Propex weed control fabric that is made of biodegradable fabric. Plant protection hardware will be removed once the plants are 3 feet or taller and no longer requiring browse protection. The flagging will remain until the end of the monitoring period to allow for an accurate species count. Weed control fabric shall only be used on plant locations outside of the rock slope protection areas.

Protective screens shall be opened during the later portion of the first growing season to allow the plant to grow beyond the confines of the screen enclosure. Open screens shall appear as an open cylinder to provide continued browse protection to the lower portion of the plant. Screens, collars and weed control fabric shall remain in place for 3 to 5 years following plant installation unless the plant has outgrown the protective screen.

Trees and shrubs will be planted at their mature size distance on center. This will be at the discretion of the restoration contractor. The recommended spacing is typically 6 to 10 feet apart on center for shrubs and 20 to 30 feet on center for trees. The plantings will be placed to simulate the nature random nature of tree and shrub occurrences to provide as natural a look as possible. This means that plants will be staggered and the planting pattern will avoid, the extent possible, planting rows or straight lines. It is recommended that shrubs be planted in groups of 3 to 5 where appropriate.

Irrigation: The plants will be irrigated from mobile water tanks or drip lines. Plants will require watering for a minimum of three years. Plants shall be watered during the dry season, normally April through November. Plants may require supplemental water from November through April should there be lower than average rainfall, or per recommendations from the consulting restoration contractor.

Plants shall receive approximately 2 gallons of water per application. Watering frequency during the first dry season following installation shall be every 7-10 days, depending on weather conditions. Grass and sedge group plantings will require enough water to cover the soil to a depth of approximately one inch per watering event. Dry season watering frequency thereafter will be every 2-3 weeks, depending on weather conditions and recommendations from the monitoring restoration contractor

Weed Control and Maintenance: Invasive exotic weedy plants will be eradicated from within the planting areas during the pre-planting phase. Table 8 provides a list of invasive species to be targeted for weed

control. If allowed by CDFW and the County, after the initial biomass is removed, a glyphosate herbicide formulation appropriate for use near aquatic environments may be applied to regrowth for riparian areas. If herbicides are used to eradicate invasive species, the application will be supervised by a qualified licensed applicator and all required laws and label directions will be followed in accordance with California State Department of Pesticide Regulation and the permitting agencies. Herbicide application will occur in the late summer or early fall to coincide with nutrient transfer within the plant tissue. Follow-up herbicide spot treatments may be necessary during the five-year maintenance period. Care will be taken to avoid drift onto native vegetation and any surface water that is present at the time of application. If herbicide application is not allowed then weeds shall be removed by mechanical means such as hand-pulling, weed wrench or pruning.

Weeds and grasses (except native grasses) within the mulched 4-foot planting circles will be hand-pulled and removed from the site. Weeds and grasses must be pulled before seed set and/or before they reach 8 inches tall or set seed.

Table 8: Invasive Plant Species List

Scientific Name	**Common Name**
Brassica nigra	Black mustard
Carduus pycnocephalus	Italian thistle
Centaurea solstitialis	Yellow star thistle
Cichorium intybus	Chicory
Cisium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Convolvulus arvensis	Bindweed
Dipsacus fullonum	Teasel
Dittrichia graveolens	Stinkwort
Elymus caput-medusae	Medusa head grass
Erodium spp.	Filaree
Foeniculum vulgare	Fennel
Helminthotheca echioides	Bristly ox-tongue
Hirschfeldia incana	Short podded mustard
Lactuca serriola	Prickly lettuce
Malva parviflora	Mallow
Polygonum aviculare	Knotweed
Raphanus raphanistrum	Jointed charlock
Raphanus sativus	Wild radish
Rubus armeniacus	Himalayan blackberry
Silybum marinum	Milk thistle
Sonchus asper, S. oleraceus	Sow thistle
Vicia sativa, V. villosa	Vetch

Reservoirs

These habitats provide the important water that wildlife need. We do not recommend changing the surface of the water (i.e., plastic balls, placement of solar panels) to cut down on aquatic vegetation, such as algae. We recommend using an aerator to keep the water moving to prevent algal build-up but still allowing for animals (birds and bats) to use the surface area.

Other methos of vegetation control of the larger emergent vegetation, such as bulrushes (*Scirpus* sp.) and cattails (*Typha* sp.) include redesigning the reservoir walls (e.g., steeper walls prevents vegetation growth) but construction in a reservoir will need permits from the RWQCB and CDFW if the reservoir is an on-streams reservoir. We recommend grazing to control the emergent vegetation. Cattle will move into the

shallow water areas to eat but sheep typically stay on the harder packed soils. Cattle can be used earlier in the season and sheep can be used later in the season, when the water levels are lower.

Reservoirs typically provide habitat for western pond turtle (*Emys marmorata*) that will feed on the mosquitofish planted by the County vector control. This species is native and responds readily to enhancement actions in reservoirs (i.e., flotation sites with ramps). A western pond turtle enhancement plan can be created for this ranch as a separate report.

Native Bee Plantings and Habitats (Figure b)

The California buckeye flower pollen and nectar contain alkaloids, which are toxic to honeybees. It's not only the flowers that contain toxins, but the fruit, leaves, and shoots, too (Thorp 2014). As a result, we have based our plantings of this important native plant away from the commercial apiaries, which are typically located near the reservoirs.

Native plantings can be used to avoid Piece's disease from getting access to the site. The distribution and abundance of natural enemies in the crop field is determined by the distance to which natural enemies disperse into the crop from the borders (Altieri 2010). The role of riparian habitats near vineyards in enhancing the effectiveness of the wasp *Anagrus epos* in parasitizing the grape leafhopper is well known (Altieri 2010) and has been documented that the beneficials stay in the riparian habitat in the fall and winter and move into the vineyard in the spring and summer. Recent information from the North Coast Region shows that coyote bush, an upland species, is an overwintering host plant utilized by the *Anagrus epos* (Wilson et al 2016). Table 9 presents examples of perennial plant species to attract beneficial insects to manage some pests. This is not an exhaustive list of beneficials attracted nor of pests managed.

The focus of native bee plantings are within the 50-foot minimum setback from top of bank for blue line streams and edges of wetlands, and within the 25-foot minimum setback from top of bank of seasonal drainages. We have identified approximately 3.19 acres of insectiary plantings. However, Stefanucci et al. (2018), recommend planting shrubs at the ends of each row, in places where they do not interfere with work and recommend there should be at least two 20-metre (65 feet) hedges per hectare (2.5 acres).

Table 9: Plant species attractive to beneficial insects that manage certain pests.

Plant	Beneficials Attracted	Pest Managed	Blooming Season
Common yarrow *Achillea millefolium*	Hoverflies, wasp, lady beetles, native bees	Mites, scales	Apr-Jul
Narrow-leaf milkweed *Ascelpias fascicularis*	Monarch butterfly, Hoverflies, wasp, lady beetles	Mites, scales	Jul-Oct
Coyote bush *Baccharis pilularis*	Wasps, tachinid flies, hoverflies, native bees, Anagrus parasitoids, green lacewings	Caterpillars, whitefly, mites, mealy bugs	Oct-Jan
California lilac *Ceanothus* sp.	Wasps, lady beetles, hoverflies, native bees	whitefly, mites, thrips	Mar-Apr
Giant buckwheat *Eriogonum giganteum*	Wasps, lady beetles, hoverflies, minute pirate bug, tachinid flies, native bees, Orius, green lacewings	Caterpillars, whitefly, mites, mealy bugs	Jun-Nov
Toyon *Heteromeles arbutifolia*	Hoverflies, tachinid flies, wasps	caterpillars	May-Jun
Coffeeberry *Frangula californica*	Wasps, lady beetles, hoverflies, native bees	caterpillars	Apr - May
Blue elderberry *Sambucus nigra*	Hoverflies, wasps, native bees	Mites, scale	May-Jun

Source: CAFF Hedgerow Manual (2018).

Other native plants can be used and include manzanita (*Arctostaphylos manzanita*), California buckthorn, showy milkweed (*Asclepias speciosa*), western redbud (*Cercis occidentalis*), bush lupine (*Lupinus* sp.), and others. Wildflowers like California poppy (*Eschscholzia californica*), lacy phacelia (*Phacelia* sp.), and Bolander's sunflower (*Helianthus bolanderi*), can be direct-seeded to further stabilize the soil and expand the plant diversity (Vaughan et al 2015).

Although many of the native bees are solitary ground nesters that likely inhabit the untilled native areas of coyote bush scrub, rock piles, rocky embankments, rock walls, and similar structures provide important habitat for a diversity of beneficial insects and other wildlife. Leafcutter bees (*Megachile* spp.) will nest in cracks or crevices in some types of rocks. Other tunnel-nesting bees (i.e., digger bees (*Anthophora* spp). Use water to soften sandstone and excavate into the rock. Bumble bees will nest in pre-existing cavities (hollow logs, spaces in rock walls, under bunchgrasses, in bird nest boxes if vacant).

To create a rock wall or pile, choose a diversity of rock types and sizes and assemble with a "messy" configuration (Xerces 2018). The dry wall construction method is recommended as this will provide more crevices for insect shelter. Incorporate native bunchgrasses around the pile, as well as native flowers for nectar and pollen sources. In addition, the numerous cavities and crevices provide favorable conditions for many species of reptiles (e.g., western fence lizards (*Sceloporus occidentlis*), gopher snakes (*Pituophis catenifer*).

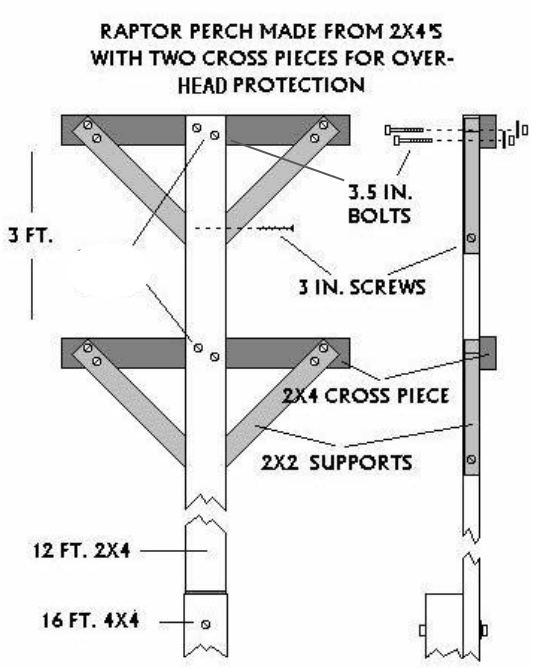
Bird nest boxes and perch poles (passerine and raptors) in vineyards

In addition to the use of native plantings to increase beneficial insects as pest control, we also recommend the use of bird nest boxes for pest control. A study of nest boxes in vineyards in Mendocino County found that larval insect removal rates averaged 3.5 times greater than in control sites without nest boxes (Jedlicka et al. 2011). While the most numerous bird pests in California vineyards are the fruit eating birds, such as American robin (*Turdus migratorious*), the European starling (*Sturnus vulgaris*), and the house finch (*Carpodacus mexicanus*) (Berge et al 2007), none of these birds use nest boxes. We have identified approximately 133 locations for establishing nesting bird boxes.

The size of the nest boxes is the key to attracting nesting birds. Western blue birds prefer to have their nest boxes in an east facing direction, between 4-6 feet in height and approximately 215 feet from nearby boxes. If the box in full sun then orient the opening to the south (nestwatch.org - Cornell Lab of Ornithology). Entrance hole should be 1 1/2 inch diameter. If predation by raccoons or hawks, a Noel Guard can be placed around the entrance.

Violet green swallows prefer their nests in a south or east facing direction, between 9-15 feet in height and approximately 30 feet from nearby nest boxes (nestwatch.org - Cornell Lab of Ornithology). Entrance hole should be 1 3/8 inch diameter. Tree swallows will also occupy nest boxes made for violet-green swallows.

To support birds of prey hunting for small mammals, such as Botta's pocket gopher (*Thomomys bottae*), we recommend perch poles be placed as near to the vineyard rows as possible but won't interfere with the workings of the vineyard. We have identified blue arrows for perch poles and they can be established every 100 feet. We recommend the perch be 15' - 20' above the ground. The spacing between perch crossbeams can be 2'-6", or 3' as shown in the figure below. The bolt length for the crossbeams to be used is 3.5" (as shown on the right side of the figure), not 5.5" (as shown on the left part of the drawing), if a vertical 2 x 4 is used to support the 2 x 4 crossbeams. These perch poles are strong enough to prevent swaying if larger birds land on them. Although many of the perch poles are located along the riparian corridors the sightings are not exact and all regulations protection wetlands and riparian corridors shall be followed (Appendix A).



Bat boxes

Bats have been shown to provide important ecological services to humans worldwide, which include the vast numbers of insect prey they consume, their role in pollination of plants, distribution of seeds and nutrients by depositing guano throughout the landscape, and more. In California, all 25 species of bats consume insects, and various studies have assessed the monetary benefits of pest insect consumption by bats in the U.S. billions of dollars annually (Boyles et al. 2011). Insect prey of bat species in California include grasshoppers, moths, flies, katydids, centipedes, caddis flies, alder flies, mayflies, and grape insect pests that fly at night are all likely prey. Most comprise a large group of agricultural pest insects, including various cutworms, leafrollers, acorn moths, codling moths and more as well as many species of beetles (Maslo and Kerwin 2020).

Bat populations have been declining rapidly due in part to loss of roosting and foraging habitat, reductions in insect populations, non-endemic disease such as White Nose Syndrome in the United States, and wind energy projects that cause direct mortality of bats as well as birds. Bats in this and many regions are considered roost-limited; colonial bats rely on roosts that protect them from excessive light and airflow, predators, and other disturbances throughout the year, while obligate tree-roosting bats depend on availability of suitable tree foliage and stand density, as well as interconnectivity to foraging habitat and other tree roost habitat.

Tatarian has observed and bioacoustically recorded 13 species of bats in Napa and Sonoma Counties, and a total of perhaps 16 species are expected to occur in these areas. Bat species have evolved to fill different ecological niches, and though there is some overlap in use of foraging and roosting habitat types and conditions, or insect prey selection, not all bat species will occur in a particular location. Habitat diversity, both for foraging and roosting, increases bat species diversity, as well as population size by increasing abundance of available insect prey. One study of Sonoma and Napa County vineyards found that total bat activity was 2.3 times higher near blocks of remnant vegetation along vineyard edges as compared to within the vineyards (Kelley et al 2016). The more ubiquitous species that can adapt to human development were also the most common species found to be foraging in vineyards in that study; Brazilian free-tailed bat (*Tadarida brasiliensis*) and Yuma myotis (*Myotis yumanensis*), as well as big brown bat (*Eptesicus fuscus*) that forms smaller colonies but is found in buildings, trees, bridges and other roosts. A study of 14 vineyards in San Luis Obispo County found that bat activity by hoary bat (*Lasiurus cinereus*), western red bat (*Lasiurus blossevillii*), Brazilian free-tailed bat and canyon bat (*Parastrellus hesperus*) was greater over

vineyards with associated trees than in areas of treeless vineyards (Polyakov et al. 2019). Significantly more insects from the order Hemiptera (containing common vineyard pests such as planthoppers, mealybugs and the western grape leafhopper (*Erythroneura elegantula)* were captured in open areas without trees (i.e., vineyards) (Polyakov et al. 2019). Unpublished radio telemetry and bio-acoustic studies by Tatarian showed greater activity along treelines, access roads, driveways, and vineyard edges adjoining woodland habitat compared to the interiors of large vineyard blocks. *M. yumanensis* typically prefers to roost within about 1/2 mile from available water for both drinking and foraging on aquatic insects, while *T. brasiliensis* can travel tens of miles or further to forage. Bat activity was greater where cover crops and trap crops were incorporated in and around vineyards compared to tilled vineyard rows. Although bats fly sometimes many miles from their roosts to foraging areas each night, some species travel only short distances (e.g., from just hundreds of feet) while others travel long distances (e.g., 1-3 miles typical of *T. brasiliensis).*

Bat populations can be attracted to natural roost features in suitable trees with cavities, crevices, or exfoliating bark, or to human-made roosts such as bridges, buildings, culverts, and to some extent, bat houses. Two species that typically form very large colonies and adapt well to human-made roosts such as bat houses are *T. brasiliensis* and *M. yumanensis*, although other species such as *Antrozous pallidus* are also attracted to properly designed, built, and installed bat houses in Napa and Sonoma Counties. In 1995, Tatarian was first reported to have designed, built and constructed a bat house successfully occupied by a maternity colony of *A. pallidus*, as well as *T. brasiliensis* and *M. yumanensis*.

In addition to providing diversity of vegetation in and around vineyard blocks to enhance the area for foraging bats, several species of roosting bats including *T. brasiliensis*, *M. yumanensis* and *A. pallidus* can be attracted to properly designed, built and installed bat houses, and all species will readily forage in, around, and above vineyards and associated vegetation. Unlike nest boxes for insectivorous birds and barn owls, a properly designed and built bat house requires little to no maintenance. Small, single panel bat houses typically available from various vendors do not have suitable roost area and thermal stability to provide safe, effective roost habitat for larger colonies and in some cases can actually create population sinks if bats can't survive in the bat house due to temperature extremes, so are not recommended for most vineyard habitat enhancement projects in Napa and Sonoma Counties. Instead, bat houses should be large enough to support several hundred individuals, be comprised of multiple roost crevices provided by interior panels, and have additional features that promote longer periods of occupancy throughout the year and protect bats from temperature extremes while providing the necessary interior warmth for successful maternity season usage. We have identified 4 unique locations for establishing bat houses in the areas of preservation. They should be placed in areas of full sun, at least 15 feet off the ground and optimally within 1/2 mile of a water source. The authors of this report can provide a detailed set of plans for a substantial-sized bat house (approx. 40" tall and 50" wide) which requires installation on either metal or heavy wood supports but can accommodate up to 600 individual *T. brasiliensis* or *M. yumanensis*, and smaller numbers of *A. pallidus* or *E. fuscus* and perhaps other species depending on installed location. This report provides specific locations where bat houses would be most effectively installed.

Table 10 provides a synopsis of the acreages of preservation (areas to be retained for ecological roles (i.e., source population for native insects, plants), enhancement (areas to be improved through native plantings) and restoration (removal of invasive, non-native plant species and planting native species).

Table 10: Acreages of Preservation, Enhancement and Restoration

Action	Habitat	KMZ color	Acreage	Numbers
Preservation	Coyote bush scrub	Magenta	34.59	
Enhancement	Grassland	Yellow	3.65	
	Insectiary	Dark blue	3.19	
	Bat Houses	Pink		4
	Bird Boxes	Red		133
Restoration	Upland	Orange	1.67	

	Riparian	Turquoise	6.94	
	Retention basin	Light turquoise	0.58	

Waters of the U.S. and State, Including Wetlands
The VESCO ordinance of Sonoma County requires that vineyards maintain a 50-foot no-touch buffer between any wetlands and the vineyard plantings, as well as 50- feet from top of bank of all blue line drainages. These areas can be planted but a California Department of Fish & Wildlife (CDFW) Streambed Alteration Agreement for restoration plantings would need to be obtained. A 25-foot no-touch buffer occurs around all non-blue-line drainages.

Special Status Wildlife
There is potential for impacts to nesting passerines, nesting raptors, and roosting bats if maintenance is to occur during sensitive breeding seasons. Table 11, below, presents a synopsis of the habitat assessments and focused surveys recommended to determine if special status species are present. The information is for planning purposes to prevent take of individuals.

Table 11: Protected Wildlife Species and Recommended Dates for Site Assessments, Focused Survey Dates and Pre-construction Surveys.

	Passerines	Raptors	Bats
Site Assessment	All year – evaluate habitats on site both natural and anthropogenic	All year – evaluate habitats on site both natural and anthropogenic	All year – evaluate habitats on site both natural and anthropogenic
Spring Survey	February 1 – August 30	February 1 – August 30	Habitat Removal (based on Habitat Assess) Between March 1 and April 15 (or after evening temperatures rise above 45°F and/or no more than 1/2" of rainfall within 24 hours occurs)
Fall Survey	None	None	Habitat Removal (based on Habitat Assess) Between Sept 1 and Oct 15 (or before evening temperatures fall below 45°F and/or more than 1/2" of rainfall within 24 hours occurs)
Preconstruction Survey	Within 3 days of groundbreaking **Buffers:** 75 – 100 feet	Within 3 days of groundbreaking **Buffers:** 200 feet or more	Based on Habitat Assessment **Buffers:** 100 feet or more

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QUALIFICATIONS OF BIOLOGISTS

Exhibit A: **Professional Biologist Qualifications Declaration for Biotic Resource Assessments and Focused Species Assessments**

Development Name: Domaine Chandon Carneros Blocks
Name of Professional Biologist: Jane Valerius
Firm: Jane Valerius Environmental Consulting
Contact Information: jane@jvenvironmental.com

I am the primary/lead field biologist for the above-referenced development. I have the following minimum qualifications for preparing biotic resource and focused species assessments:

I am a seasoned biologist, with over 40 years of experience working as project manager and technical biologist for consulting firms in the environmental consulting field. I am a the founder and principal of Jane Valerius Environmental Consulting in business for myself since 1998. I have experience in conducting special status plant surveys and wetland delineations throughout California with 80 to 90% of my work in the Bay Area counties of Sonoma, Napa, Marin, Lake, Mendocino, Alameda, and Contra Costa counties. I am familiar with the local rules and regulations and permitting agencies, including issues related to the Santa Rosa Plain.

Please describe your education and experience with regard to general botanical, wetland, and wildlife habitat as it pertains to biotic resource and/or focused species assessments:

I have a BA in Environmental Biology and MS in Range Ecology, both with an emphasis in plant taxonomy, both vascular and non-vascular plants, grass systematics, and plant ecology. I have taken classes through the UC Berkeley Jepson Herbarium for the plants in the Asteraceae, Cyperaceae and for byrophytes. I have also taken the vegetation mapping field class through CNPS. I was an at-large member of the Society for Ecological Restoration for California (SERCAL). I have taken workshops at CNPS conferences on vernal pools and other plant taxonomy/ecology related topics.

I have previously conducted independent field work and reporting, and have demonstrated the following:

- ✓ Specific knowledge and experience in identification of habitats and vegetation associations found in Sonoma County;
- ✓ Specific knowledge of local plant and animal species;
- ✓ Specific knowledge and experience in identifying potential impacts to plants, animals, and habitats;
- ✓ Specific knowledge and experience in recommending measures designed to minimize and avoid impacts to plants, animals, and habitats;
- ✓ Specific knowledge and experience in monitoring for compliance with biological mitigation measures;
- ✓ Specific knowledge and experience in writing complete, concise, and comprehensive technical reports following applicable survey protocols;
- ✓ Specific knowledge and experience in the various state and federal statutes, regulations, and procedures related to animal and plant surveys and collection; and
- ✓ Specific knowledge and experience with current state and federal survey protocols, guidelines, and manuals required for the resource being evaluated.

With my signature, I confirm that I meet all of the above qualifications and that the statements furnished in this biotic resource assessment/focused species assessment and associated maps are true and correct to the best of my knowledge.

Signature of Professional Biologist: Jane Valerius Date: 9/13/2021

Exhibit A: **Professional Biologist Qualifications Declaration for Biotic Resource Assessments and Focused Species Assessments**

Development Name: Domain Chandon
Name of Professional Biologist: Trish Tatarian
Firm: Wildlife Research Associates **Contact Information:** trish@wildliferesearchassoc.com

I am the primary/lead field biologist for the above-referenced development. I have the following minimum qualifications for preparing biotic resource and focused species assessments:

I am a seasoned biologist, with 30 years of experience working as project manager and technical biologist for consulting firms in the environmental consulting field. I am a co-founder of Wildlife Research Associates and have been an independent wildlife consultant since 2001. I have built consensus with agency personnel and a variety of clients ranging from federal agencies to independent developers. I am a widely-experienced general ecologist, who focuses on conducting surveys for special status amphibians, birds, and mammals, conducting vegetation community and wildlife habitat characterization, and aerial photograph interpretation.

Please describe your education and experience with regard to general botanical, wetland, and wildlife habitat as it pertains to biotic resource and/or focused species assessments:

I obtained my M.Sc., Biology, at Sonoma State University in 2005 and my B.S., Ecology, at San Francisco State University in 1992. I have a 10(A)1(a) USFWS permit, since 1998, and conduct research on the federally-listed Threatened California red-legged frog (*Rana draytonii*) and the Endangered Sonoma County population of the California tiger salamander (*Ambystoma californiense*). I also have a CDFW Scientific Collecting permit, since 1992, and I hold a permit for foothill yellow-legged frog (*Rana boylii*).

I have previously conducted independent field work and reporting, and have demonstrated the following:

- ✓ Specific knowledge and experience in identification of habitats and vegetation associations found in Sonoma County;
- ✓ Specific knowledge of local plant and animal species;
- ✓ Specific knowledge and experience in identifying potential impacts to plants, animals, and habitats;
- ✓ Specific knowledge and experience in recommending measures designed to minimize and avoid impacts to plants, animals, and habitats;
- ✓ Specific knowledge and experience in monitoring for compliance with biological mitigation measures;
- ✓ Specific knowledge and experience in writing complete, concise, and comprehensive technical reports following applicable survey protocols;
- ✓ Specific knowledge and experience in the various state and federal statutes, regulations, and procedures related to animal and plant surveys and collection; and
- ✓ Specific knowledge and experience with current state and federal survey protocols, guidelines, and manuals required for the resource being evaluated.

With my signature, I confirm that I meet all of the above qualifications and that the statements furnished in this biotic resource assessment/focused species assessment and associated maps are true and correct to the best of my knowledge.

Signature of Professional Biologist: Trish Tatarian Date: 9/13/2021

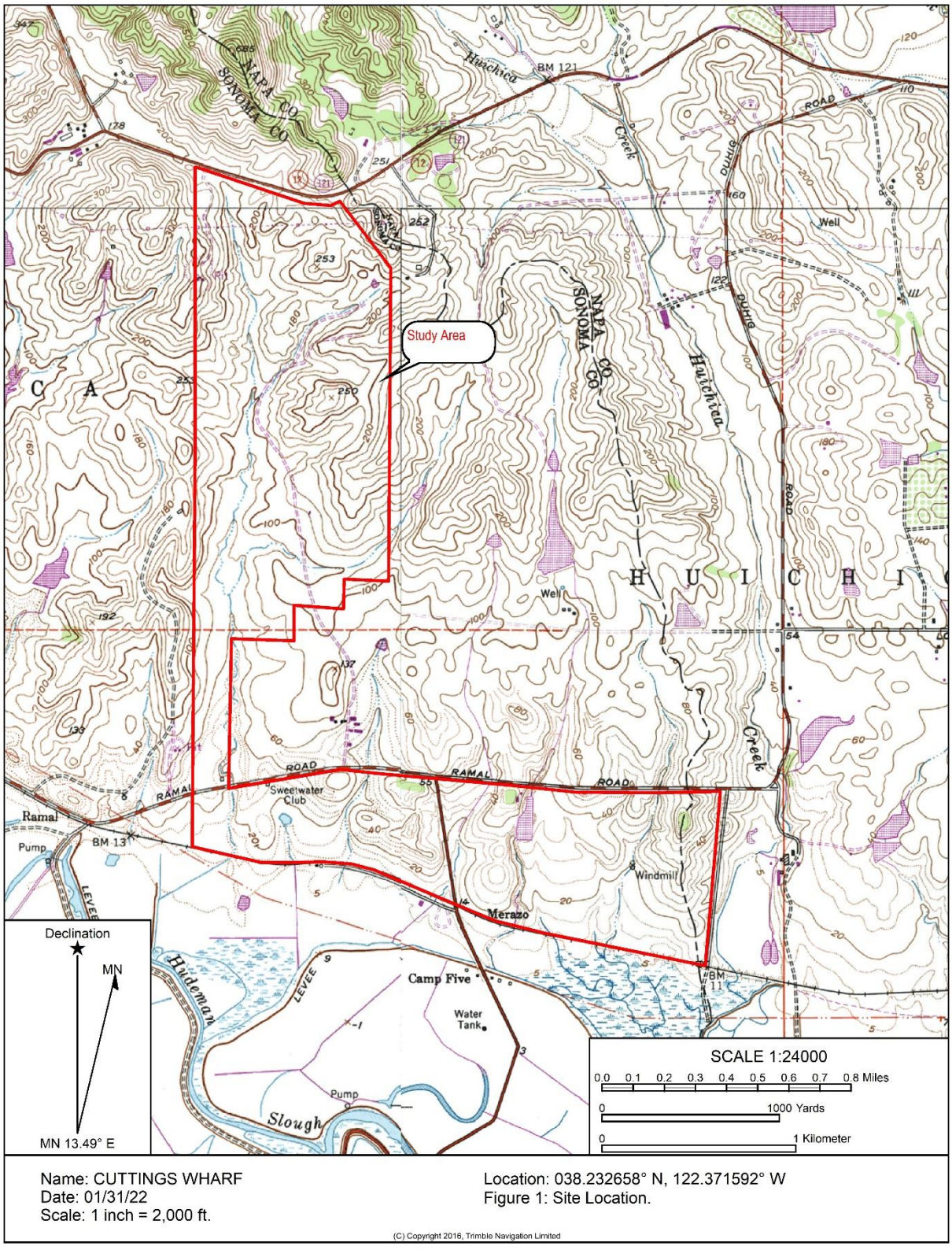

FIGURE 1: LOCATION MAP

Figure 2. Non-native grasslands.

Figure 3. Non-native grasslands looking south.

Figure 4. Cottonwood trees along main riparian corridor adjacent to access road.

Figure 5: Riparian habitat with willows and sedges.

Figure 6: Coyote brush scrub above riparian corridor.

Figure 7: Non-native grassland overlooking coyote bush and coast live oak grove.

Figure 8: Reservoir showing blue copper color in water.

Figure 9: Red-tailed hawk sitting in nest in a riparian tree.

APPENDIX A: FEDERAL, STATE AND LOCAL PLANS, POLICIES, REGULATIONS AND ORDINANCES

Federal Endangered Species Act (FESA) - U.S. Fish and Wildlife Service

Pursuant to ESA, the U.S. Fish and Wildlife Service (USFWS) has regulatory authority over federally listed species. Under ESA, a permit to "take" a listed species is required for any federal action that may harm an individual of that species. Take is defined under Section 9 of ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Under federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Section 7 of ESA requires all federal agencies to consult with USFWS to ensure that their actions are not likely to "jeopardize the continued existence" of any listed species or "result in the destruction or adverse modification" of designated critical habitat. No federal approvals or other actions are anticipated as being required to implement the project at this time. Therefore, consultation under Section 7 of ESA is not expected. However, if USACE determines that wetlands and/or other waters of the United States on the project site are subject to protection under Section 404 of the CWA, or any other federal action becomes necessary, consultation under Section 7 of ESA would be required.

For projects where federal action is not involved and take of a listed species may occur, the project proponent may seek to obtain a permit for incidental take under Section 10(a) of ESA. Section 10(a) of ESA allows USFWS to permit the incidental take of listed species if such take is accompanied by a habitat conservation plan (HCP) that includes components to minimize and mitigate impacts associated with the take. The permit is known as an incidental take permit. The project proponent must obtain a permit before conducting any otherwise-lawful activities that would result in the incidental take of a federally listed species.

Clean Water Act Sections 404 and 401 - U.S. Army Corps of Engineers

USACE regulates the discharge of dredged or fill material into waters of the United States under Section 404 of the CWA. Waters of the United States are defined as waters where use, degradation, or destruction could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are somehow connected to any of these waters or their tributaries. Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands falling under USACE jurisdiction must demonstrate the presence of three specific wetland parameters: hydric soils, hydrophytic vegetation, and sufficient wetland hydrology. Generally, wetlands include swamps, marshes, bogs, and similar areas. Lakes, rivers, and streams are defined as "other waters." Jurisdictional limits of these features are typically noted by the ordinary high-water mark (OHWM). The OHWM is the line on the shore or bank that is established by the fluctuations of water and indicated by physical characteristics, such as a clear, natural line impressed on the bank, shelving, changes in soils, lack of woody or terrestrial vegetation, the presence of litter or debris, or other characteristics of the surrounding areas.

Isolated ponds or seasonal depressions had been previously regulated as waters of the United States. However, in Solid Waste Agency of Northwestern Cook County (SWANCC) v. United States Army Corps of Engineers et al. (January 8, 2001), the U.S. Supreme Court ruled that certain "isolated" wetlands (e.g., non-navigable, isolated, and intrastate) do not fall under the jurisdiction of the CWA and are no longer under USACE jurisdiction (although isolated wetlands are regulated by the State of California under the Porter-Cologne Water Quality Control Act—see discussion below). Some circuit courts (e.g., U.S. v. Deaton, 2003; U.S. v. Rapanos, 2003; Northern California River Watch v. City of Healdsburg, 2006), however, have ruled that the SWANCC opinion does not prevent CWA jurisdiction if a "significant nexus" such as a hydrologic connection exists, whether it be human-made (e.g., roadside ditch) or natural tributary to navigable waters, or direct seepage from the wetland to the navigable water, a surface or underground hydraulic connection, an ecological connection (e.g., the same bird, mammal, and fish populations are supported by both the wetland

and the navigable water), and changes to chemical concentrations in the navigable water due to water from the wetland.

Section 404 prohibits the discharge of dredged or fill material into waters of the United States (including wetlands) without a permit from USACE. With respect to the proposed project, the discharge of dredged or fill material includes the following activities:

- placement of fill that is necessary for the construction of any structure or infrastructure in a water of the United States;
- the building of any structure, infrastructure, or impoundment requiring rock, sand, dirt, or other material for its construction;
- site-development fills for recreational, industrial, commercial, residential, or other uses; and
- construction of causeways or road fills.

The regulations and policies of USACE, the U.S. Environmental Protection Agency (EPA), and USFWS mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives (to filling wetlands) exist. If the placement of fill into waters of the U.S., including wetlands, meets certain criteria the project be permitted under one of the Nation Wide Permits (NWP), which is an expedited permit process.

Section 401 of the CWA requires an applicant for any federal permit that may result in a discharge into waters of the United States to obtain a certification from the state that the discharge will comply with provisions of the CWA. The regional water quality control boards (RWQCBs) administer this program. Any condition of water quality certification would be incorporated into the USACE permit. The state has a policy of no net loss of wetlands and typically requires mitigation for impacts on wetlands before it will issue a water quality certification.

Essential Fish Habitat - National Marine Fisheries Service

Essential Fish Habitat (EFH) is regulated through the National Marine Fisheries Service (NMFS), a division of the National Oceanic and Atmospheric Administration (NOAA). Protection of EFH is mandated through changes implemented in 1996 to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to protect the loss of habitat necessary to maintain sustainable fisheries in the United States. The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). NMFS further defines essential fish habitat as areas that "contain habitat essential to the long-term survival and health of our nation's fisheries" (NMFS 2007). EFH can include the water column, bottom substrate types such as gravels suitable in size for salmonid spawning, and vegetation and woody structures that provided habitat for rearing. Under regulatory guidelines issued by NMFS, any federal agency that authorizes, funds, or undertakes action that may affect EFH is required to consult with NMFS (50 CFR 600.920).

California Environmental Quality Act (CEQA)

CEQA is a California statute passed in 1970, shortly after the United States federal government passed NEPA, to institute a statewide policy of environmental protection. CEQA does not directly regulate land uses, but instead requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects and adopt all feasible measures to mitigate those impacts.

The CEQA statute, California Public Resources Code § 21000 et seq., codifies a statewide policy of environmental protection. According to CEQA, all state and local agencies must give major consideration to environmental protection in regulating public and private activities, and should not approve projects for which there exist feasible and environmentally superior mitigation measures or alternatives.

California Endangered Species Act (CESA) – California Department of Fish and Wildlife

The California Endangered Species Act (CESA) (FGC §§ 2050–2116) is administered by the California Department of Fish and Wildlife. The CESA prohibits the "taking" of listed species except as otherwise provided in state law. The CESA includes FGC Sections 2050–2116, and policy of the state to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The CESA requires mitigation measures or alternatives to a proposed project to address impacts to any State listed endangered, threatened or candidate species, or if a project would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat which would prevent jeopardy. Section 86 of the FGC defines take as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Unlike the ESA, CESA applies the take prohibitions to species under petition for listing (state candidates) in addition to listed species. Section 2081 of the FGC expressly allows DFW to authorize the incidental take of endangered, threatened, and candidate species if all of the following conditions are met:

- The take is incidental to an otherwise lawful activity.
- The impacts of the authorized take are minimized and fully mitigated.
- Issuance of the permit will not jeopardize the continued existence of the species.
- The permit is consistent with any regulations adopted in accordance with §§ 2112 and 2114 (legislature-funded recovery strategy pilot programs in the affected area).
- The applicant ensures that adequate funding is provided for implementing mitigation measures and monitoring compliance with these measures and their effectiveness.

The CESA provides that if a person obtains an incidental take permit under specified provisions of the ESA for species also listed under the CESA, no further authorization is necessary under CESA if the federal permit satisfies all the requirements of CESA and the person follows specified steps (FGC § 2080.1).

Species Protection under California Department of Fish and Wildlife

The CDFW is established under the Fish and Game Code (FGC) (FGC § 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through CDFW (FGC § 711.7(a)). All licenses, permits, tag reservations and other entitlements for the take of fish and game authorized by FGC are prepared and issued by CDFW (FGC § 1050 (a)).

Provisions of the FGC provide special protection to certain enumerated species such as:

§ 3503 protects eggs and nests of all birds.
§ 3503.5 protects birds of prey and their nests.
§ 3511 lists fully protected birds.
§ 3513 protects all birds covered under the federal Migratory Bird Treaty Act.
§ 3800 defines nongame birds.
§ 4150 defines nongame mammals.
§ 4700 lists fully protected mammals.
§ 5050 lists fully protected amphibians and reptiles.
§ 5515 lists fully protected fish species.

In addition, the Native Plant Protection Act (NPPA), directs the CDFW to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this State." As a result, the NPPA allows the California Fish and Game Commission to designate native plants as endangered or rare, and to require permits for collecting, transporting, or selling such plants.

Waters of the State - California Regional Water Quality Control Board

The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope, but has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes "isolated" wetlands and waters

that may not be regulated by the USACE under Section 404. "Waters of the State" are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act. Projects that require a USACE permit, or fall under other federal jurisdiction, and have the potential to impact "Waters of the State," are required to comply with the terms of the Water Quality Certification determination.

If a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to "Waters of the State," the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

Streams, Lakes, and Riparian Habitat - California Department of Fish and Wildlife
Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by CDFW under Sections 1600-1616 of the State Fish and Wildlife Code. Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term stream, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as follows: "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation" (14 CCR 1.72). In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG ESD 1994). Riparian is defined as, "on, or pertaining to, the banks of a stream;" therefore, riparian vegetation is defined as, "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG ESD 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

California Native Plant Society (CNPS)
The California Native Plant Society (CNPS) is a statewide non-profit organization dedicated to the monitoring and protection of sensitive species in California. The CNPS publishes and maintains an Inventory of Rare and Endangered Vascular Plants of California, focusing on geographic distribution and qualitative characterization of rare, threatened, or endangered vascular plant species of California. The list serves as the candidate list for listing as threatened and endangered by the CDFG. The Inventory assigns plants to the following categories:

A. Presumed Extinct in California
B. Rare or endangered in California and elsewhere
Rare or endangered in California, more common elsewhere
Plants for which more information is needed
Plants of limited distribution.

Additional rarity, endangerment, and distribution codes are assigned to each taxa.

Plants on Ranks 1A, 1B, and 2 of the CNPS Inventory consist of plants that may qualify for listing, and the Department recommends they be addressed in CEQA projects (CEQA Guidelines Section 15380). However, a plant need not be in the Inventory to be considered a rare, threatened, or endangered species under CEQA. In addition, the DFG recommends, and local governments may require, protection of plants which are regionally significant, such as locally rare species, disjunct populations of more common plants, or plants on the CNPS Ranks 3 and 4.