5.5.3 Vegetation

This section summarizes the impacts to botanical resources due to implementing either the Proposed Program or any of the alternatives.

5.5.3.1 Significance Criteria

Appendix G of the CEQA Guidelines, the CEQA Environmental Checklist poses the following questions to be considered in determining whether the program/alternatives would cause significant impacts to botanical resources:

Would the program:

a) Have an adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status plant species or any of its lifeforms in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?
b) Have an adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?
c) Have a substantial adverse effect on federally protected wetlands, as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool coastal, etc.), through direct removal, filling, hydrological interruption, or other means;
d) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?
e) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan?

Under the Federal Endangered Species Act, activities may not result in the take, direct or indirect, of a listed species. Direct take involves the killing of a listed plant or animal. Indirect take includes the alteration of habitat, harassment and any other activity that may contribute to the reduction in numbers of a listed species.

5.5.3.2 Determination Threshold

For the purpose of this PEIR, the following thresholds are used to determine whether there is a substantial adverse effect to botanical resources as a result of implementation of treatments under the Program or any of the Alternatives. A significant effect occurs when there is a:

a) Threat to eliminate a plant community.
b) Violation of any state or federal wildlife protection law or
c) Contribution directly (through immediate mortality) or indirectly (through reduced productivity, survivorship, genetic diversity, or environmental carrying capacity) to a substantial, long-term reduction in the viability of any native species or subspecies at the state level.

5.5.3.3 Data and Assumptions

Section 4.5.3 provides the context for describing the potential impacts of implementing the Proposed Program or Alternatives on botanical resources and their associated habitats by describing the extent and location of the WHR vegetation types within the State of California. The Proposed

Program potential treatment acreage by bioregion is described in Tables 5.0.1, 5.0.4, and 5.0.5. Following these tables is a description of how potential treatments were allocated across the landscape for analysis purposes to create the affected landscape. This affected landscape of treated area by WHR lifeform and bioregion is the result of a GIS landscape analysis and modeling exercise that applied potential treatments to watersheds across the state.

In order to determine the acreage potentially treated in each WHR habitat type by treatment type and bioregion, which forms the basis of analysis in this subchapter, the proportional distribution of treatment types in each bioregion from the footnote in Table 2.4 was applied to the affected landscape to develop the % of Habitat Treated Tables 5.5.3.2 through 5.5.3.11.

Impacts to botanical resources were further analyzed by examining special status plants and communities listed in the BIOS database for each bioregion. "*BIOS is a system designed to enable the management, visualization, and analysis of biogeographic data collected by the Department of Fish and Game and its Partner Organizations. In addition, BIOS facilitates the sharing of those data within the BIOS community. BIOS integrates GIS, relational database management, and ESRI's ArcIMS technology to create a statewide, integrated information management tool that can be used on any computer with access to the Internet (CDF&G website*)" (see Section 5.5 Introduction for a further explanation of BIOS as it relates to CNDDB). Minimum Management Requirement #5 requires VTP applicants to use the most appropriate databases for biological information, including but not limited to CNDDB or BIOS, to check for occurrences of special status plants in their project area and provide this scoping information to the wildlife agencies. Therefore BIOS was used to get a sample of plants or communities to disclose in this EIR and determine whether any potential for significant adverse impacts to populations of the most common listed species could occur at the programmatic level.

Since it was not feasible to analyze every species in the BIOS database, it was decided to choose the ones that were most likely to be affected by VTP treatments. This was done by selecting species with the most element occurrences weighted by their location in the landscape. This is further explained in the Special Status Plants and Communities section later in this subchapter.

Oak Woodlands

Oak Woodlands cover approximately 10 million acres in California. About half of this acreage occurs in the foothills of the Sierra Nevada and North Coast/Klamath bioregions (Table 5.5.3.22). Oak woodlands in California have evolved in a Mediterranean climate where the dry summer seasons create typical fire return intervals of 30-50 years (McCreary, 2004). However, as with other vegetation types in the state, fire suppression activities have interrupted this cycle for most of the 20th century. Prior to fire suppression, frequent low-intensity fires initiated by American Indians or lightning burned through woodlands, killing understory brush and small trees and favoring retention of large diameter overstory trees (McCreary, 2004). Oak woodlands are the most biologically diverse habitat type in California, home to over 300 vertebrate wildlife species (Merelander and Crawford, 1998).

Blue oak (*Quercus douglasii*) is California's dominant oak species, representing more than one third of the state's oak woodlands. Live oaks (*Q. chrysolepsis, Q. wislizenii, Q. agrifola*) comprise another third of California's oak woodlands. However, on California's oak forestlands (as opposed to woodlands, and not analyzed in this section) tanoak (*Lithocarpus densiflorus*), black oak (*Q. kelloggii*) and canyon live oak (*Q. chrysolepsis*) account for 80 percent of the hardwoods (Gaman and Firman, 2006).

The most immediate and direct threat to oak woodlands is conversion to other uses. Since 1945 the extent of oak woodlands has decreased by 1.2 million acres (Bolsinger, 1988). Between 1945 and the early 1970's the primary reason for loss of woodlands was conversion to rangelands, but since then commercial and residential development has become the primary source of conversion (Bolsinger, 1988; Spero, 2002). More recently, conversion of oak woodlands to vineyards has also become a major impact (Merelander and Crawford, 1998). An additional 750,000 acres of oak woodlands are at risk of conversion before 2040 (Gaman and Firman, 2006).

A less immediate, but more widespread threat to the majority of oak woodlands, is lack of adequate oak regeneration. Regeneration of coast live oak and blue oak is sparse; and nearly non-existent for valley oak (*Q. lobata*) (Bolsinger, 1988). However, seedlings and saplings are abundant in canyon live oak stands and moderately abundant in interior live oak, black oak and white oak stands (Bolsinger, 1988). Altered fire regimes, grazing pressure from livestock, suppression by woody plants and invasion of European weedy annual grasses are considered to be likely culprits for poor regeneration (CalPIF, 2002; Swiecki et al., 1997).

In the North Coast Range of California (Sonoma, Mendocino, Humboldt and Del Norte Counties) invasion of Douglas-fir (*Pseudotsuga menziesii*) into Northern Oak Woodlands presents a threat to the continued dominance of Quercus species in these stands (Barnhart et al., 1996). Encroachment of Douglas-fir into these relatively mesic (wet) oak woodlands is the result of fire suppression since the early 1900's (Barnhart et al., 1996 and others). Prior to fire suppression, frequent low intensity fires killed most Douglas-fir regeneration before it grew large enough to become fire resistant. In the absence of fire or other controls on Douglas-fir regeneration in Northern Oak Woodlands it is likely that many of these stands will eventually convert to mixed evergreen forest, rather than oak dominated woodlands.

VTP treatments in oak woodlands have the goal of improving rangeland conditions for cattle, decreasing fuel loads, and controlling invasive or encroaching plant species. The annual acreage of oak woodlands likely to be treated by treatment type for each bioregion is presented for the Proposed Program in Table 5.5.3.22 (below). The acreages presented are modeled estimates of how the VTP is likely to be carried out in the future, not set targets for the Program (see Chapter 5.0 for background).

<u>Sudden Oak Death</u>

According to the SuddenOakDeath.org website:

> "*Phytophthora ramorum* is the cause of both Sudden Oak Death (SOD), a forest disease that has resulted in widespread dieback of several tree species in California and Oregon forests, and Ramorum blight, which affects the leaves and twigs of numerous other plants in forests and nurseries.
>
> Since the mid 1990s, *P. ramorum* has caused substantial mortality in tanoak trees and several oak tree species (coast live oak, California black oak, Shreve oak, and canyon live

> oak), as well as twig and foliar diseases in numerous other plant species, including California bay laurel, Douglas-fir, and coast redwood.
>
> *P. ramorum* thrives in cool, wet climates. In California, coastal evergreen forests and tanoak/redwood forests within the fog belt are the primary habitat. Research in California forests has shown that the greatest predictor of *P. ramorum* is the presence of California bay laurel (*Umbellularia californica*)."

SOD has been found in the Klamath/North Coast, Bay Area/Delta and Central Coast bioregions. In California, the pathogen is found from Monterey to Humboldt Counties, in redwood/tanoak and coastal evergreen forests. The disease is widespread in Marin, Sonoma, and Santa Cruz Counties, and in the Big Sur area of Monterey County. The infestations are concentrated in urban/wildland interface areas, but some portions of wildlands are heavily affected. As of October 2011, infected counties include Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Francisco, Santa Clara, Santa Cruz, San Mateo, Solano, Sonoma, and Curry County, Oregon. There is a state and federal quarantine preventing transport of infected materials from the infected 14 California counties (Zone of Infection or ZOI) to areas outside the infected counties.

5.5.3.4 Direct Effects Common to all Bioregions From Implementing the Program/Alternatives

Effects of prescribed fire, mechanical, hand and herbivory treatments are discussed in this section- effects due to herbicides are discussed in Section 5.17.

Plant communities to be treated under the VTP have been subject to fire for centuries. It has been the primary disturbance regime in most California ecosystems, and many plant species have evolved in the presence of recurrent fires. As a result, many plant species reproduce most successfully following fire, which makes their continued success and abundance dependent on fire. To the extent that VTP treatments mimic the natural disturbance patterns of the vegetation type to which they are applied, it is reasonable to expect the long-term impacts of treatments to be beneficial. However, at the individual project level, there is always the possibility of killing or damaging individuals of a species during treatment implementation. In many cases, the treatments in non-forested vegetation types will return all or a portion of the treated area to an early successional stage, killing off disturbance intolerant species, and freeing up resources such as light and nutrients for early successional species, such as perennial grasses and forbs (USDI BLM Programmatic ER, 2005).

In order to avoid direct take of individual special status plant taxa, MMR 5 will apply to each project ensuring that local CDF&G biologists and/or USFWS will have the opportunity to provide a site-specific evaluation and mitigation measures. At the programmatic scale the question for this EIR is whether or not the habitats of common natural communities and special status plants and communities are negatively impacted over the long-term? This can be determined by first analyzing the direct effects of the treatments from an individual project and then by expanding these effects to the bioregional scale to determine the proportion of the habitat types to be affected per decade. In order for an effect to be considered significant at the bioregional level, the species in question would have to be impacted enough to meet one of the Determination Thresholds stated above. The amount of habitat that would have to be adversely modified to cause a substantial adverse effect has not been scientifically determined for most species and is likely unknowable until the threshold has been crossed and the species is in jeopardy. However, professional judgment resulting from several years researching and writing this EIR leads to a habitat treatment limit in the range of 10-20% over a 10-year period (the threshold of significance).

Prescribed Fire

All of the common natural communities that might be treated under the proposed VTP have evolved under some degree of natural or human-induced fire. The Proposed Program will reintroduce fire into communities where fire has been excluded through past suppression or control efforts. Generally, prescribed fire is believed to benefit the overall health of fire adapted ecosystems (McKelvey et al., 1996). The reintroduction of a simulated natural fire regime will help maintain structural and species diversity, benefiting the overall habitat value of the community for plants and wildlife. When conducted at the appropriate time, prescribed fire can open up densely vegetated areas, encourage growth of suppressed species, contribute to nutrient cycling, increase species diversity, and increase the diversity of the vegetation's age structure.

The following list includes some adaptations to fire and examples of native California species that exhibit these adaptations (adapted from Biswell, 1989):

- Thick bark—ponderosa pine;
- Corky bark, which is a poor conductor of heat energy—Douglas-fir and white-fir;
- Epicormic branching (i.e., trunk and stem sprouts)—coast redwood;
- Basal sprouting—oaks;
- Serotinous cones, which drop seeds only when heated sufficiently—knobcone pine, Monterey pine, and some cypresses;
- Stump sprouting after fire—chamise and some manzanitas;
- New shoots from underground rhizomes—yerba santa;
- Seeds that can remain dormant for many years until heat of fire enables them to germinate—species of manzanita, flannelbush, and ceanothus;
- Location of growing points at or below ground level—some perennial grasses; and
- Sprouting from buried corms or bulbs—some perennial members of the lily family.

However, implementation of prescribed burn treatments could result in an alteration of the natural fire regime. Changes in burning patterns which affect the timing, intensity, frequency, or size of fires on the landscape could potentially have significant adverse effects to plants.

The responses of plants to fire can be divided into two broad categories – stimulated by fire or not stimulated by fire. "Fire-stimulated plants are further divided into fire-dependent and fire-enhanced categories, while plants not stimulated by fire are either fire-neutral or fire-inhibited. Fire dependent responses occur only with fire, such as seed germination requiring heat, smoke, or chemicals from charcoal. Fire-enhanced responses (e.g. sprouting) are those that are increased by fire but that also occur from other types of damage to the plant." (Fites-Kaufman et al., 2006)

Prescribed fires generally leave exposed bare mineral soil that is favorable to seedling establishment of fire-stimulated plants. Prescribed fire treatments that simulate the natural fire regime will cause the mortality of some individual plants; however, most woody plants and species with adaptations to fire will persist and the overall vegetative characteristic of the community will be maintained.

Prescribed fire treatments that do not mimic the natural regime may adversely affect the reproductive capability or viability of a natural community. The response of a plant community to fire is determined by the fire-response categories of its constituent plant species. The season of the burn can affect plants at a sensitive stage of development and may reduce seed production and recruitment that year. For example, each plant species in a community responds differently to the seasonal timing of prescribed burns or wildfires. Chamise (*Adenostema fasciculatum*) and red shank (*Adenostema sparsifolium)* are 2 shrub species commonly found in chaparral communities and they have different patterns of growth, flowering, and fruiting. This leads to early spring fires causing greater mortality in chamise than red shank and a potential shift in the species composition of that community. (Fites-Kaufman et al., 2006)

The spatial pattern of the burn or other treatment also affects the plant population response. Patterns of intensity and severity range from variable and complex to continuous and uniform. "At one extreme, a fire with uniform intensity will have uniform effects, either positive or negative, on the survival, age-class distribution, abundance, and distribution of individuals in a population. At the other extreme, a complex fire, with variable intensity, will have varied effects on a plant population within the area burned. Crown fires tend to be more uniform, whereas surface fires more complex." (Fites-Kaufman et al., 2006, p.108)

In addition, the existing distribution of individuals of a species – endemic, patchy, or continuous – greatly affects how the plant population responds to an individual fire event. Even fire neutral and fire-inhibited species can fare well if their distribution is continuous. This is particularly true if the spatial pattern of the burn is variable and complex as is more typical in an understory burn than a crown fire. (Fites-Kaufman et al., 2006)

Burn intensity is also an important factor in how a plant community responds to fire. "High-Intensity fires can often lead to plant communities with lower diversity and increased dominance of a few species." (Fites-Kaufman et al., 2006) This occurs by favoring species, which are fire-stimulated in reproduction and establishment, such as chamise. Under the program, these effects would only be expected under prescribed fire in the herbaceous and shrub types where burn intensity is similar to a wildfire (see the wildfire discussion in Section 5.2.).

Large burns have a greater chance of negatively affecting a plant population than small burns due to the potential of large burns to interrupt seed dispersal mechanisms (Fites-Kaufman et al., 2006). This fact makes wildfires have potentially much greater impact on plant populations than prescribed burns. Over the past 8 years 97.6% of the total acreage burned in wildfires was the result of fires greater than 300 acres. On the other hand, the average VTP project size of 260 acres is small in comparison to most wildfires, which often exceed 10,000 acres. Therefore VTP projects are unlikely to eliminate a sub-population, of even a fire-inhibited species, and prevent re-colonization of the area.

A change in the fire frequency in a community through either fire suppression or prescribed burning may change the species composition, spatial structure, nutrient cycling, and canopy structure of the community. For example, fire suppression in the 20th century has affected the ecological processes, spatial patterns, and species composition in some communities (Chang, 1996). In some cases, fire-inhibited species such as white fir (*Abies concolor*) are now dominant trees in forest stands that were historically dominated by fire-tolerant species such as ponderosa pine (*Pinus ponderosa*). This has significantly altered the spatial structure of these forests from a canopy of large trees with an open understory into dense thickets of young growth occupying the understory.

As described in Chapter 5, the changes in vegetative and ground cover from prescribed burning in surface/mixed fire regime habitat types are expected to be less than the impacts in habitats with a crown fire regime. Habitats with more than one canopy layer generally experience less intense fires than chaparral and grassland communities (see Table 5.0.2). In general, vegetation types with multiple canopy layers and vertical diversity, such as conifer and hardwood forests, are adapted to a high frequency/low intensity surface/mixed fire regime, and vegetation treatments tend to mimic this effect by focusing on understory treatments. Prescribed burning in the understory is generally low intensity with a patchy distribution making it very unlikely to have a significant long-term impact on even small populations of common plants or special status plants and communities.

On the other hand, grasslands and chaparral are adapted to a low frequency/high intensity crown fire regime. Many chaparral species germinate much better after stimulated by fire such as sugar bush (*Rhus ovata*), sumac (*Malosma laurina*), chamise, manzanita (*Arctostaphylos spp*), yerba santa (*Eriodictyon spp*.), and ceanothus (*Ceanothus spp*.) (CAL FIRE, 1981). "In general, there is a high proportion of species with fire-stimulated and fire-dependent germination (e.g. desert ceanothus) and species with strong fire response sprouting (e.g., chamise) in plant communities and bioregions with shrub crown fire regimes, such as chaparral in the Central Coast and South Coast Bioregions." (Fites-Kaufman et al., 2006) In these types VTP prescribed burning treatments have similar intensity and pattern as the natural fire regime, but they may be implemented more frequently than the plant community is naturally adapted to. One of the most significant areas of concern at the programmatic (state-wide) level is the potential effect of burning too often in the chaparral habitat type. The non-sprouting species may be eliminated from a stand by fires occurring at such short intervals that the seedlings germinating after the first fire do not have time to produce a crop of seed before the next fire (CAL FIRE, 1981).

The conventional wisdom used to be that chaparral types naturally burned every 10-15 years, and under the CMP it has been common to reburn chaparral types to maintain grazing lands at least this frequently. However, research published in the last 10 years indicates that the natural fire return interval in most chaparral types is much longer than previously thought. Keeley states that "historical records suggest a pre-suppression model of burning in chaparral landscapes of many modest-sized summer lightning-ignited fires that burned a relatively small portion of the landscape, punctuated one to two times a century by massive autumn Santa Ana wind-driven fires (Keeley, 2006, p.359)." This is also supported by the historical record of infrequent and large Santa Ana fires as well as the life history characteristics of many dominant woody species in chaparral that are favored by long fire-free intervals and inhibited by fire return intervals of a decade or less (Keeley, 2006).

Wildfires have resulted in vegetation type conversions where aggressive exotics were present prior to the fire and dominated the site after fire. Sagebrush (*Artemisia spp.*), low sage (*Artemisia arbuscula*), bitterbrush (*Purshia tridentata)*, juniper (*Juniperus spp.*), and pinyon-juniper vegetation types are particularly susceptible to type conversion if cheatgrass or medusa-head are well established in them. Type conversion is most likely when a high severity fire completely consumes the existing dominant vegetation (Billings, 1994; Peters and Bunting, 1994, Rasmussen, 1994). The aggressive nature of cheatgrass and medusa-head puts the native shrubs and trees at a competitive disadvantage, preventing them from successfully reestablishing (Billings, 1994; Monsen, 1994). Because of the widespread occurrence of cheatgrass in these community types, the potential exists for accidental type conversion. Therefore, treatment with prescribed fire in these community types could potentially have a substantial adverse effect, so a mitigation measure is included below to reduce the impact to less than significant.

In summary, habitat types in the VTP program and the plants within them generally are adapted to some pattern of wildfires. The main difference between wildfire and prescribed fire is the ability to control important parameters of the burn including the season, the size and the frequency. The potential for substantial adverse effects from prescribed fire are most likely to occur in the conifer and hardwood woodland, herbaceous and shrub habitat types due to problems with invasives, impacts to regeneration, burn intensity, canopy removal and burn frequency. The mitigation measures at the end of this sub-chapter are designed to reduce the potential impact to less than significant. Also, in most bioregions the small proportion of the lifeform being treated, as explained below, makes any long-term effects to plant communities and special status plant taxa highly unlikely.

Mechanical

Mechanical treatment involves the use of vehicles such as masticators, wheeled tractors, crawler-type tractors, or specially designed vehicles with attached implements designed to cut, uproot, or chop existing vegetation. The selection of a particular mechanical method is based upon access, and equipments availability, as well as characteristics of the vegetation, seedbed preparation and re-vegetation needs, topography and terrain, soil characteristics, and climatic conditions (Chapter 2).

Treatment by mechanical clearing of common natural communities will directly affect these communities through the removal or disturbance of natural vegetation, resulting in reduced cover in some areas. See Table 5.0.3 for a summary of the impacts from mechanical treatments.

Mechanical treatments will be applied to substantially fewer acres than will prescribed burns. In grasslands and shrublands, the construction of shaded fuelbreaks by disking, mowing, or mastication are examples of mechanical treatments. The majority of all vegetative cover would be removed when mechanically treating herbaceous or shrub habitat types, creating the potential for adverse effects to plant resources. The level of impacts will be proportional to the acres treated.

In areas of forested vegetation, mechanical fuels reduction will focus on removing ladder fuels formed by smaller trees and shrubs while maintaining large overstory trees. The reduction in ground level and mid-canopy vegetation may result in a change in species composition of groundcover where small trees (less than 10 inches dbh) and shrubs make a substantial contribution to canopy cover. Treatments that leave substantial amounts of litter and slash on the ground can inhibit establishment and growth of many herbaceous species – especially those that are fire-stimulated.

Mastication treatments in particular sometimes generate heavy loadings of woody fuel on the ground, which may inhibit the germination and establishment of shrubs, but also reduces richness of native understory species. Mastication of surface and ladder fuels results in a short to medium term increase in fire severity potential. In a recent mastication effects study, fuel treatments where the masticated material was partially removed by incorporation into the soil or prescribed burning, resulted in greater understory species establishment, but also resulted in higher abundance of fire-stimulated shrubs (Kane et al., *In Press*). If prescribed fire were planned to follow mastication, then the potential for colonization by exotic species would be high due to the more severe burn that would result (Bradley et al., 2006). Severe burns consume a much greater portion of the native vegetation increasing recovery time and creating opportunity for invasive species if they exist nearby. Research shows that time since fire is the most critical factor in alien invasion and colonization. Apparently, it is the closed canopy of pre-fire shrublands that reduces alien populations and thus limits the alien seed bank present at the time of fire (Bradley et al., 2006).

In summary, mechanical treatments have the potential for direct adverse effects in all lifeforms since there is no comparable natural disturbance to which individual plants or communities have adapted over time, and because of the high level of disturbance to canopy cover and the soil layer. Whether these adverse effects are significant at the program level depends on the proportion of a lifeform treated and the geographic distribution of the treatments. These are evaluated in the next section.

<u>Hand Treatments</u>

Treatment of common natural communities by hand clearing will directly affect these communities through the removal or disturbance of natural vegetation, resulting in reduced overall cover or greatly reduced understory with no impact to the canopy. Manual techniques can be used in many areas with minimal environmental impacts. Although they have limited value for weed control over a large area, manual techniques can be highly selective. Manual treatment can be used in sensitive habitats such as riparian areas, areas where burning or herbicide application would not be appropriate, and areas that are inaccessible to ground vehicles (USDI BLM, 1991a). Because of the expense of these treatments, hand clearing will be used on a limited basis. Hand treatments in areas with special status plants and communities will be limited to small areas scattered throughout the state.

Because of the lack of heavy equipment and the greater control workers have in implementing hand treatments, there is little chance of adverse effects from these treatments as long as the MMRs are complied with.

<u>Herbivory</u>

Herbivory is a natural process that has influenced the evolution of plants for millennia. Along with fire, it was the first vegetation management tool ever applied by humans. Herbivory, or grazing, is a constant influence on all natural plant communities. Every plant species varies in its ability to survive and prosper in a grazed ecosystem. Most established plants are not killed with a single grazing event that removes its foliage, flowers, and stems. Rather, plants have evolved mechanisms that reduce their likelihood of being grazed or promote their regrowth after grazing. (Hendrickson & Olsen, 2006)

The effects of grazing on individual plants can be difficult to predict because plants grow in complex ecosystems that are subject to seasonal and yearly fluctuations in weather and natural disturbances. Plants differ in their ability to tolerate or compensate for grazing. The ability of a plant to regrow after grazing depends on its age and physiological condition, stage of development, and carbohydrate allocation patterns. In addition, competition with other plants for space, soil nutrients, and water can influence how a plant responds to grazing (Hendrickson & Olsen, 2006).

A plant's ability to recover after grazing depends largely on its ability to reestablish leaves and renew photosynthesis. Plants tolerant of grazing generally have an abundant supply of viable meristems or buds that can be quickly activated to initiate regrowth if water and nutrients are available (Hendrickson & Olsen, 2006).

Grasses are different from forbs and shrubs in how they respond to grazing because of where their growing points or meristems are located. Grasses maintain apical and axillary buds near the base of the plant until flowering is initiated.

On the other hand, forbs and shrubs have axillary buds all along the stem and apical buds at the tips of branches. These meristems are readily available to herbivores and can be removed throughout the plant's life. Some forbs and shrubs have numerous growing points in the root crown at the base of the plant that can produce new shoots or underground runners called rhizomes. Shrubs and rhizomatous herbs would not be affected by short-term grazing since the plants would only be knocked back rather than killed.

Plant phenology, or how plants grow through the season, should be considered when using grazing to manage vegetation. A plant's growth stage will determine how it responds to grazing. For example, most grasses and forbs tolerate early-season grazing, a time when soil moisture and nutrients needed for regrowth are abundant (Hendrickson & Olsen, 2006).

There is ample research to indicate that grazing is actually beneficial to many native herbaceous species – including those linked with special habitats such as vernal pools (Hayes et al., 2006; Marty, 2005). Vernal pools are poorly drained depressional features that occur throughout California in grassland areas underlain by a hardpan or clay pan layer that restricts percolation of water through the soil. They are significant for special status plants and communities because they contain a very high degree of diversity with more than 100 species of endemic plants (Marty, 2005).

Research conducted on the effects to vernal pool habitat on the 12,362-acre Howard Ranch property in Eastern Sacramento County demonstrated that the relative cover of native plant species remained highest in continuously grazed plots, while declining in those where grazing was removed (Marty, 2005). Grazing removal did not affect the cover of native vegetation in the pools themselves but did negatively impact native cover in both the edge and upland zones.

It was also found that the change in native richness per quadrat over the first three years of the study was positive in grazed pools and negative in ungrazed pools. There was a decline in diversity with the removal of grazing after only three years, and this effect was most significant on the edge (Marty, 2005).

Another important habitat for native plants is the coastal prairie ecosystem. Over the last 20–30 years one quarter of the California coastline has been set aside in conservation status leading to the removal and cessation of livestock grazing. Now annual wildflowers, many of which are rare and endangered, are found more commonly on private lands adjoining conservation lands (Hayes et al., 2006).

Hayes found that annual forb species richness and cover increased significantly with grazing on the California coastal prairie sites analyzed. This may be due to decreased vegetation height and litter depth. Grasses show mixed responses to grazing, and exotic forb abundance increases with grazing (Hayes et al., 2006).

Overall, prescribed herbivory is not likely to have an adverse effect in any of the habitat types in the VTP, and in many cases will be beneficial to plant communities.

Oak Woodlands

The consequences on oak woodlands of implementing the Proposed Program are generally a function of the number of acres treated and the types of treatments. However, potentially adverse effects to oak woodlands are likely to be reduced due to:

1. Implementation of MMRs 8 and 9, which require measures to protect overstory oaks and provide for regeneration,
2. MMR 10, which helps to protect oaks in shrub vegetation types,
3. MMR 14, which reduces impacts to forest and range production caused by the introduction of non-native invasive species.

Under the Program approximately 60,000 acres of oak woodlands would be treated each year, which is 0.6% of the approximately 10 million acres of oak woodlands in the state (Table 5.5.3.22). Over a ten-year period this would amount to approximately 600,000 acres or 6% of the state's oak woodlands treated through VTP projects. The majority of acres treated are expected to take place in the Sierra Nevada, Sacramento Valley and Central Coast bioregions. The Sacramento Valley and San Joaquin bioregions are expected to have the highest proportion of their oak woodlands treated. Oak woodlands are extremely limited in the Mojave and Colorado Desert bioregions- the potential acreage treated values for those bioregions shown on Table 5.5.3.22 is due to an error in interpretation of WHR types and will not be further considered in this analysis (CalPIF 2002).

It is unlikely that any more than 6-10% of the State's oak woodlands would ever be in a "treated" condition due to VTP projects. Although treated areas accumulate over a 10 year period, vegetation will also regrow in a 10-15 year period, requiring follow up maintenance to keep woodlands in a "treated" condition. Thus, without continuous increases in funding, the cumulative extent of land in a "treated" condition cannot significantly exceed the amount treated in the first 10-year period.

Approximately 53% of all treatments under the Proposed Program would utilize prescribed fire including broadcast burning, underburning, pile burning, etc. Approximately 340,000 acres of oak woodlands (3.5% of total) would be subjected to prescribed fire each decade under the Proposed Program (Table 5.0.1). The majority of burning would occur in the Sacramento Valley, Sierra Nevada and Central Coast bioregions, 60,000 to 80,000+ acres per decade each.

Plant responses to fire vary greatly and are often determined by a complex interaction among external factors such as temperature, soil moisture, and heat duration and season of burn (Chang, 1996). For the first few years after a fire, vegetation is comprised of individuals from the following categories (Smith and Brown, 2000):

- Plants that survived the fire with their form intact
- Sprouts or suckers that grew from the base or buried parts of top-killed plants
- Plants that established from seed, which can be further subdivided into:
    - Plants that re-established from seed dispersed from surviving plants (usually trees)
    - Plants that re-established from seed dispersed from off of the burned site
    - Plants that re-established from fire-stimulated seed within the soil seed bank
    - Plants that re-establish from seed that developed on plants that resprouted after the fire

Oak trees primarily resprout from the base of top killed trees, making them resilient after fires. Most seedlings and many saplings, but very few mature oaks are top killed by fire. However there is variability among species as described below.

Prescribed fire in oak/hardwood woodlands can result in eventual mortality from fire-induced cavities through which rot can enter that can spread quickly along hardwood stems and lead to breakage (Brown and Smith, 2000). Fires are exceptionally damaging to live oak stands, because most species in these stands are susceptible to fire damage. In particular, canyon live oak, interior live oak (*Q. wislizenii*), sycamore (*Platanus spp*.), and cottonwood (*Populus spp.*) have fairly thin bark and are easily top killed by fire (Chang, 1996). However, live oaks are particularly vigorous resprouters compared to deciduous oaks, and will likely sprout back from their base even when all of the above ground portion has been killed (McCreary, 2004). In contrast to the live oaks, mature deciduous oaks (black oak, white oak, blue oak, valley oak, etc.) have thick fire resistant bark and are able to withstand low intensity burns (McCreary, 2004), but don't sprout as vigorously as live oaks when killed.

Small blue oaks (and perhaps other species) are susceptible to top kill during prescribed fire conditions. Bartolome et al., (2002) observed 100% top kill of blue oak regeneration that was between 40 and 70 cm tall and less than 10 years old. No stimulatory response of regeneration was observed when comparing burned to unburned sites; that is, sprouts recovering from burning did not grow faster or more vigorously than sprouts that had not been burned as has been hypothesized by some. Bartolome et al., (2002) concluded that at the study site "for successful regeneration into the sapling stage, small plants must be protected from burning and browsing for ten or more years."

Oak tree size (height and diameter) heavily influences the likelihood of surviving a fire, due to elevation of live foliage and bark thickness. Blue oak trees > 8 inches dbh were observed to have 75%-100% survival after wildfire, while trees 4-8 inches dbh had only 10-90% survival (Horney et al., 2002).

It should be noted that damage from wildfire or prescribed fire can create valuable wildlife habitat, such as cavities that can be used for denning and dead branches that provide foraging habitat for woodpeckers, etc. A small to moderate amount of damage to residual overstory trees can serve to increase rather than decrease the biological diversity within many vegetation types.

Prescribed fire in oak woodland rangelands is highly variable due to differences in oak bark thickness, tree structure, and sprouting response. Individual survival is also influenced by understory composition and the degree of fire intensity (Brown and Smith, 2000). Blue oak acorn survival and germination can be negatively affected by fire; however, the positive association between blue oak ages and fire dates suggests a temporal concentration of post-fire sprouting. The low rate of recruitment since the 1940s may be partly due to fire suppression and grazing (Brown and Smith, 2000).

In Northern Oak Woodlands (Holland, 1986) prescribed fire is likely to kill young Douglas-fir regeneration, which retards conversion to mixed evergreen stands and is beneficial to persistence of oak woodland habitats (Barhnhart et al., 1996). However, fire in oak woodlands is also likely to top kill most oak seedlings and saplings and retard oak regeneration by 10+ years- which is the time it will take oaks to resprout and grow to their pre-fire heights and diameters (Swiecke and Bernhardt, 2002). Spero (2002) characterized the effects of fire on woodland ecology as:

> *"Wildfire's role in hardwood ecology is unclear. Blue oak (Quercus douglasii), the most abundant hardwood forest type in California, has sapling populations that may be insufficient to maintain current stand densities (Bolsinger 1988, Muick and Bartolome 1987, Swiecki 1999). Although many species of native California oaks are relatively fire resistant, either due to innate low fuel conditions or to vegetative adaptation, fire may not play as much of a role in regeneration as once thought, neither enabling nor preventing regeneration (Bartolome and others 2002, Lang 1988). However, frequent fires can compromise re-sprouting from saplings and seedling advance regeneration. According to Swiecki: "A combination of frequent fires and annual livestock grazing would…be a prescription for eliminating blue oak regeneration."*

MMRs 8, 9, and 10 require project applicants to protect and enhance oak woodland rangelands. When properly implemented, these MMRs should help reduce the impacts of prescribed fire to these vegetation types. Prescribed fire in these types usually does not result in more than 20% canopy reduction in the overstory, and can often maintain or improve growth of remaining trees by reducing competition from understory trees and shrubs for scarce water resources.

Mechanical treatments are proposed for approximately 115,000 acres of oak woodlands per decade. Mechanical treatments include tractor piling slash created from handwork, mowing down understory herbaceous vegetation, and mastication of understory shrubby plants. None of these treatments are likely to have significant impacts on mature, overstory oak trees. All of them are likely to retard oak regeneration by removing aboveground portions of seedlings and saplings. Alert equipment operators may avoid large saplings and small trees, but significant damage is still likely.

Mastication can range from limited impacts where masticators move between trees and large shrubs grinding up vegetation in small openings, to treatments where substantial areas are treated and soil disturbance is relatively high. Impacts from mastication can be highly correlated to the amount of vegetation on-site prior to treatment. As noted in Table 5.0.3, mastication is expected to result in a 10-50% reduction in overstory canopy in Surface/mixed Fire regime Vegetation types. Oak woodland overstory canopy cover impacts would be on the low end of this range; however, understory brush, small trees and regeneration may be significantly reduced. MMRs 8, 9, and 10 are intended to help protect overstory cover of oaks in hardwood rangelands such that cover is not likely to be reduced by mechanical treatments more than 10-30% below already existing relatively low overstory cover in these types.

Mastication, when combined with prescribed burning or followed closely by wildfire may increase residual overstory mortality compared to leaving understory brush untreated. Bradley et al., (2006) reported that mastication of understory brush did not reduce fuels in the short term (<2 years) but rather rearranged them- resulting in a 200% increase in 1-hr and 1000-hr size classes and a 300% increase in 10-hr and 100-hr size classes in the fuel bed. The concentration of fuels in the fuel bed and hotter burn resulted in significantly increased overstory mortality of black oak and canyon live oak in the Pole (<8 inch) and overstory (>8 inch) size classes compared to adjacent areas that were not masticated prior to burning. However, where understory brush and small trees form "fuel ladders" to the overstory, prescribed burning without pre-treating the understory vegetation (reducing its height) can also result in significant damage to overstory trees. If understory fuels are removed or allowed to decompose prior to burning there is not likely to be significant damage to overstory trees.

Approximately 60,000 acres of hand treatments are expected to occur in oak woodlands each decade (Table 5.5.3.22). Impacts of hand treatments on forest and rangeland composition and structure are expected to be minimal, as most treatments are expected to selectively remove only non-oak species of understory shrubs, small trees, etc. As a result, impacts are expected to be positive since a decrease in competition for water and nutrients should improve forest and rangeland productivity. Hand treatments are expected to be especially beneficial to Northern Oak Woodlands by selectively removing Douglas-fir while retaining oak regeneration.

Approximately 60,000 acres per decade of prescribed herbivory are estimated to be applied to oak woodlands under the Proposed Program. In contrast to forested settings where goats are more likely to be used, cattle are more likely to be used in oak woodlands. The stock type, intensity, duration and season of use will vary in response to site conditions and project objectives.

Prescribed herbivory in oak woodlands can result in localized reduction in advance regeneration of oaks, but is not likely to result in impacts to overstory trees. In one study the authors concluded that, "in rangeland seasonally stocked with moderate cattle densities, planting sites must be protected from cattle browsing and trampling in order to successfully restock valley oak (Bernhardt and Swiecki, 1997)." In the same study though, the authors noted that cattle grazing on Harding grass, which competes for water and nutrients with oak seedlings, resulted in increased growth rates for oak seedlings that had been caged to protect them from cattle.

Timing of herbivory affects potential damage to oak seedlings and saplings. Generally late spring and summer grazing are most damaging to oak regeneration due to cattle preference for green living oak leaves rather than the dry forage that is available this time of year. In one study, early spring grazing (March) resulted in minimal grazing of oak regeneration compared to grazing later in the season (May, June, July) (Jansen et al., 1997).

In summary, VTP treatments in oak woodlands that reduce woody vegetation in the understory could improve rangeland conditions for cattle and decrease the risk of severe wildfire, but may retard oak regeneration by 10+ years. Approximately 80% of VTP treatments in the proposed program utilize prescribed fire, mechanical or herbivory, all of which are known to have some adverse effects on oak regeneration. No significant impacts to mature overstory oaks are expected from VTP treatments.

<u>Proposed Program Effects and Goals</u>

Botanical resources have the potential to experience substantial adverse effects only from prescribed burning and mechanical treatments while effects from hand and herbivory treatments will be negligible or beneficial. Mechanical treatments could have substantial adverse effects in any of the WHR lifeform habitat types if sufficient acres were to be treated. Out of the variety of prescribed burning techniques, only broadcast burning in conifer woodland, hardwood woodland, herbaceous or shrub types could have substantial adverse effects if sufficient acres were to be treated.

Table 5.5.3.1 summarizes the information from the remainder of this subchapter on the effects of implementing the Program across the state by bioregion in terms of effects to botanical resources. The direct and indirect effect of herbicides on plants is described in Section 5.17, however the acres treated by herbicides by the Proposed Program are included in the percentage of lifeform tables for each bioregion below.

Goals 1 and 4 directly relate to botanical resources. The Proposed Program would help to achieve these goals in areas where treatments are successfully implemented. Treatments in oak woodlands will enhance forest and rangeland resources wherever they are applied. Restoring the natural range of fire-adapted plant communities will take multiple treatments spread over a significant portion of a bioregion, but when accomplished, this would reduce the risk of large high intensity fires.

<u>Alternatives Effects and Goals</u>

Implementation of Alternative 2 would meet Goals 1 and 4 at approximately the same rate and to the same extent as the Proposed Program but at a higher cost per acre and with slightly greater adverse effects from more mechanical treatments. Alternative 3 would initially meet these goals at approximately the same rate and to the same extent as the Proposed Program. However, over the long term, Alternative 3 only treats about 13.7 million acres with prescribed fire and mechanical treatments, which is only about 40% of the acres that would be treated under the Program, thus, this Alternative over the long term would not meet Goals 1 and 4 as effectively as the Proposed Program. Alternative 1 would not meet Goal 1 or 4 at the same rate or to the same extent as the Proposed Program since it would treat so few acres and substantially more acres would likely burn at high intensity. Alternative 4, like Alternative 1 would not meet these goals at the same rate or to the same extent as the Proposed Program since it would treat so few acres and substantially more acres would likely burn at high intensity.

Table 5.5.3.1
Summary of Effects [1/] on Botanical Resources from Implementing the Proposed Program

Bioregion	Prescribed Fire	Mechanical	Hand	Herbivory
Klamath Northcoast	NA/NB	NA/NB	NA/NB	NA/NB
Modoc	NA/NB	NA/NB	NA/NB	NA/NB
Sacramento Valley	**MA**	**MA**	NA/NB	NA/NB
Sierra	NA/NB	NA/NB	NA/NB	NA/NB
Bay Area	NA/NB	NA/NB	NA/NB	NA/NB
San Joaquin	**MA**	**MA**	NA/NB	NA/NB
Central Coast	NA/NB	NA/NB	NA/NB	NA/NB
Mojave	NA/NB	NA/NB	NA/NB	NA/NB
South Coast	NA/NB	NA/NB	NA/NB	NA/NB
Colorado Desert	**MA**	NA/NB	NA/NB	NA/NB

1/ Key to effects; adverse effects are those effects which degrade the diversity, structure, size, integrity, abundance or number of; or are outside the natural range of variability, for the resource at issue. Beneficial effects are those effects that improve the diversity, structure, size, integrity, abundance or number of; or are within the natural range of variability, for the resource at issue. SA/SB – significant adverse effects are those effects that are substantial, highly noticeable, at the watershed scale; and often irreversible. MA/MB - moderately adverse or beneficial effects - those effects that can be detected beyond the affected area, but are transitory and usually reversible. NA/NB - negligible adverse or beneficial effects - those effects that are imperceptible or undetectable.

5.5.3.5 Bioregion Specific Direct Effects of Implementing the Program/Alternatives

Since the exact location of projects will not be known until a landowner application is received, this analysis focuses on assessing the broad scale impacts to special status plants and natural communities from implementing the program. On a programmatic level, the potential for negatively impacting botanical resources is really a function of the acres treated in a given habitat type compared to the total extent of that habitat type. For this EIR the WHR types were lumped into 8 WHR lifeforms to be included in the program (see Tables 2.1 and 2.2). The tables below show the potential acres treated in each bioregion in each WHR lifeform by treatment type. These data are the result of the landscape analysis and modeled treatment allocation as described in Chapter 5. The treatment and lifeform combinations that could have substantial adverse effects if sufficient acres were treated are highlighted.

Table 5.5.3.2 NORTH COAST
Percentage of Total Habitat Potentially Treated in Bioregion per Decade

	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	68,095	1,218	0	0	25,046	8,896	14,508	16,468
% of Lifeform Area	0.82%	0.99%	0.00%	0.00%	1.33%	1.27%	1.35%	1.04%
Mechanical Acres	23,082	413	0	0	8,490	3,015	4,918	5,582
% of Lifeform Area	0.28%	0.34%	0.00%	0.00%	0.45%	0.43%	0.46%	0.35%
Hand Treated Acres	12,698	227	0	0	4,670	1,659	2,705	3,071
% of Lifeform Area	0.15%	0.19%	0.00%	0.00%	0.25%	0.24%	0.25%	0.19%
Herbicide Acres	11,541	206	0	0	4,245	1,508	2,459	2,791
% of Lifeform Area	0.14%	0.17%	0.00%	0.00%	0.23%	0.21%	0.23%	0.18%
Herbivory Acres	13,190	236	0	0	4,851	1,723	2,810	3,190
% of Lifeform Area	0.16%	0.19%	0.00%	0.00%	0.26%	0.25%	0.26%	0.20%
TOTAL ACREAGE	**128,600**	**2,300**	**0**	**0**	**47,300**	**16,800**	**27,400**	**31,100**

Table 5.5.3.3 MODOC
Percentage of Total Habitat Potentially Treated in Bioregion per Decade

	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	63,069	3,975	265	0	5,830	13,780	5,830	25,704
% of Lifeform Area	2.24%	0.60%	0.24%	0.00%	4.79%	6.01%	2.84%	0.83%
Mechanical Acres	21,423	1,350	90	0	1,980	4,681	1,980	8,731
% of Lifeform Area	0.76%	0.21%	0.08%	0.00%	1.63%	2.04%	0.97%	0.28%
Hand Treated Acres	11,897	750	50	0	1,100	2,599	1,100	4,849
% of Lifeform Area	0.42%	0.11%	0.05%	0.00%	0.90%	1.13%	0.54%	0.16%
Herbicide Acres	10,714	675	45	0	990	2,341	990	4,367
% of Lifeform Area	0.38%	0.10%	0.04%	0.00%	0.81%	1.02%	0.48%	0.14%
Herbivory Acres	11,897	750	50	0	1,100	2,599	1,100	4,849
% of Lifeform Area	0.42%	0.11%	0.05%	0.00%	0.90%	1.13%	0.54%	0.16%
TOTAL ACREAGE	**119,000**	**7,500**	**500**	**0**	**11,000**	**26,000**	**11,000**	**48,500**

Table 5.5.3.4 SACRAMENTO VALLEY
Percentage of Total Habitat Potentially Treated in Bioregion per Decade

	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	0	0	0	0	11,543	72,381	75,399	5,666
% of Lifeform Area	0.00%	0.00%	0.00%	0.00%	64.19%	13.73%	7.72%	21.11%
Mechanical Acres	0	0	0	0	3,913	24,536	25,559	1,921
% of Lifeform Area	0.00%	0.00%	0.00%	0.00%	21.76%	4.65%	2.62%	7.16%
Hand Treated Acres	0	0	0	0	2,152	13,495	14,057	1,056
% of Lifeform Area	0.00%	0.00%	0.00%	0.00%	11.97%	2.56%	1.44%	3.94%
Herbicide Acres	0	0	0	0	1,956	12,268	12,779	960
% of Lifeform Area	0.00%	0.00%	0.00%	0.00%	10.88%	2.33%	1.31%	3.58%
Herbivory Acres	0	0	0	0	2,236	14,021	14,605	1,097
% of Lifeform Area	0.00%	0.00%	0.00%	0.00%	12.43%	2.66%	1.50%	4.09%
TOTAL ACREAGE	**0**	**0**	**0**	**0**	**21,800**	**136,700**	**142,400**	**10,700**

Table 5.5.3.5 SIERRA
Percentage of Total Habitat Potentially Treated in Bioregion per Decade

	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	60,044	1,165	2,436	0	44,742	41,988	54,167	22,609
% of Lifeform Area	0.86%	0.22%	0.44%	0.00%	2.62%	3.49%	2.81%	0.72%
Mechanical Acres	20,354	395	826	0	15,167	14,233	18,362	7,664
% of Lifeform Area	0.29%	0.07%	0.15%	0.00%	0.89%	1.18%	0.95%	0.24%
Hand Treated Acres	11,195	217	454	0	8,342	7,828	10,099	4,215
% of Lifeform Area	0.16%	0.04%	0.08%	0.00%	0.49%	0.65%	0.52%	0.13%
Herbicide Acres	10,177	197	413	0	7,583	7,117	9,181	3,832
% of Lifeform Area	0.15%	0.04%	0.07%	0.00%	0.44%	0.59%	0.48%	0.12%
Herbivory Acres	11,631	226	472	0	8,667	8,133	10,492	4,379
% of Lifeform Area	0.17%	0.04%	0.09%	0.00%	0.51%	0.68%	0.54%	0.14%
TOTAL ACREAGE	**113,400**	**2,200**	**4,600**	**0**	**84,500**	**79,300**	**102,300**	**42,700**

Table 5.5.3.6 BAY AREA Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	17,473	0	0	0	13,131	17,844	23,192	10,960
% of Lifeform Area	3.12%	0.00%	0.00%	0.00%	2.72%	2.77%	1.74%	2.63%
Mechanical Acres	5,923	0	0	0	4,451	6,049	7,862	3,715
% of Lifeform Area	1.06%	0.00%	0.00%	0.00%	0.92%	0.94%	0.59%	0.89%
Hand Treated Acres	3,258	0	0	0	2,448	3,327	4,324	2,043
% of Lifeform Area	0.58%	0.00%	0.00%	0.00%	0.51%	0.52%	0.32%	0.49%
Herbicide Acres	2,962	0	0	0	2,226	3,024	3,931	1,858
% of Lifeform Area	0.53%	0.00%	0.00%	0.00%	0.46%	0.47%	0.29%	0.45%
Herbivory Acres	3,385	0	0	0	2,544	3,456	4,492	2,123
% of Lifeform Area	0.60%	0.00%	0.00%	0.00%	0.53%	0.54%	0.34%	0.51%
TOTAL ACREAGE	**33,000**	**0**	**0**	**0**	**24,800**	**33,700**	**43,800**	**20,700**

Table 5.5.3.7 SAN JOAQUIN Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	159	1,006	1,906	0	159	6,513	47,919	4,342
% of Lifeform Area	0.66%	1.59%	0.72%	0.00%	3.13%	7.49%	2.55%	4.49%
Mechanical Acres	54	341	646	0	54	2,208	16,244	1,472
% of Lifeform Area	0.22%	0.54%	0.25%	0.00%	1.06%	2.54%	0.86%	1.52%
Hand Treated Acres	30	188	355	0	30	1,214	8,934	809
% of Lifeform Area	0.12%	0.30%	0.13%	0.00%	0.58%	1.40%	0.48%	0.84%
Herbicide Acres	27	171	323	0	27	1,104	8,122	736
% of Lifeform Area	0.11%	0.27%	0.12%	0.00%	0.53%	1.27%	0.43%	0.76%
Herbivory Acres	31	195	369	0	31	1,262	9,282	841
% of Lifeform Area	0.13%	0.31%	0.14%	0.00%	0.61%	1.45%	0.49%	0.87%
TOTAL ACREAGE	**300**	**1,900**	**3,600**	**0**	**300**	**12,300**	**90,500**	**8,200**

Table 5.5.3.8 CENTRAL COAST Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	2,228	543	326	54	3,641	60,211	88,360	51,136
% of Lifeform Area	1.32%	0.29%	3.67%	3.50%	2.26%	3.85%	3.43%	2.20%
Mechanical Acres	755	184	111	18	1,234	20,411	29,953	17,334
% of Lifeform Area	0.45%	0.10%	1.25%	1.19%	0.77%	1.30%	1.16%	0.74%
Hand Treated Acres	415	101	61	10	679	11,226	16,474	9,534
% of Lifeform Area	0.25%	0.05%	0.69%	0.65%	0.42%	0.72%	0.64%	0.41%
Herbicide Acres	378	92	55	9	617	10,205	14,976	8,667
% of Lifeform Area	0.22%	0.05%	0.62%	0.59%	0.38%	0.65%	0.58%	0.37%
Herbivory Acres	324	79	47	8	529	8,747	12,837	7,429
% of Lifeform Area	0.19%	0.04%	0.53%	0.51%	0.33%	0.56%	0.50%	0.32%
TOTAL ACREAGE	**4,100**	**1,000**	**600**	**100**	**6,700**	**110,800**	**162,600**	**94,100**

Table 5.5.3.9 MOJAVE Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	652	1,087	1,956	0	1,956	978	1,956	2,064
% of Lifeform Area	3.31%	0.17%	0.01%	0.00%	8.44%	4.29%	2.36%	0.40%
Mechanical Acres	221	369	664	0	664	332	664	701
% of Lifeform Area	1.12%	0.06%	0.00%	0.00%	2.87%	1.46%	0.80%	0.13%
Hand Treated Acres	123	205	369	0	369	185	369	390
% of Lifeform Area	0.62%	0.03%	0.00%	0.00%	1.59%	0.81%	0.45%	0.07%
Herbicide Acres	111	185	332	0	332	166	332	351
% of Lifeform Area	0.56%	0.03%	0.00%	0.00%	1.43%	0.73%	0.40%	0.07%
Herbivory Acres	123	205	369	0	369	185	369	390
% of Lifeform Area	0.62%	0.03%	0.00%	0.00%	1.59%	0.81%	0.45%	0.07%
TOTAL ACREAGE	**1,230**	**2,050**	**3,690**	**0**	**3,690**	**1,845**	**3,690**	**3,895**

Table 5.5.3.10 SOUTH COAST Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	1,922	372	1,674	0	1,674	8,681	17,362	77,137
% of Lifeform Area	0.49%	0.32%	1.64%	0.00%	0.99%	3.34%	2.69%	2.43%
Mechanical Acres	653	126	569	0	569	2,948	5,897	26,199
% of Lifeform Area	0.17%	0.11%	0.56%	0.00%	0.34%	1.13%	0.91%	0.83%
Hand Treated Acres	363	70	316	0	316	1,638	3,276	14,555
% of Lifeform Area	0.09%	0.06%	0.31%	0.00%	0.19%	0.63%	0.51%	0.46%
Herbicide Acres	327	63	284	0	284	1,475	2,949	13,103
% of Lifeform Area	0.08%	0.05%	0.28%	0.00%	0.17%	0.57%	0.46%	0.41%
Herbivory Acres	363	70	316	0	316	1,638	3,276	14,555
% of Lifeform Area	0.09%	0.06%	0.31%	0.00%	0.19%	0.63%	0.51%	0.46%
TOTAL ACREAGE	**3,627**	**702**	**3,159**	**0**	**3,159**	**16,380**	**32,760**	**145,548**

Table 5.5.3.11 COLORADO DESERT Percentage of Total Habitat Potentially Treated in Bioregion per Decade								
	Conifer Forest	Conifer Woodland	Desert Shrub	Desert Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub
Prescribed Fire Area	171	1,763	13,937	228	57	796	512	23,836
% of Lifeform Area	7.66%	2.26%	0.28%	1.12%	3.06%	11.39%	0.22%	8.52%
Mechanical Acres	58	598	4,725	77	19	270	174	8,080
% of Lifeform Area	2.60%	0.77%	0.09%	0.38%	1.04%	3.86%	0.08%	2.89%
Hand Treated Acres	32	329	2,598	42	11	148	95	4,444
% of Lifeform Area	1.43%	0.42%	0.05%	0.21%	0.57%	2.12%	0.04%	1.59%
Herbicide Acres	29	299	2,362	39	10	135	87	4,040
% of Lifeform Area	1.30%	0.38%	0.05%	0.19%	0.52%	1.93%	0.04%	1.44%
Herbivory Acres	11	111	877	14	4	50	32	1,501
% of Lifeform Area	0.48%	0.14%	0.02%	0.07%	0.19%	0.72%	0.01%	0.54%
TOTAL ACREAGE	**300**	**3,100**	**24,500**	**400**	**100**	**1,400**	**900**	**41,900**

Special Status Plants and Communities

In order to ensure that impacts to special status plants and communities would be less than significant, the BIOS database was used to obtain lists of species and communities with the most element occurrences by bioregion. Many plants in the database have very small, localized populations. These would not be impacted at the **programmatic** level because project level assessment carried out by local DFG biologists or other qualified botanists would identify these populations and lead to the application of necessary mitigations as stipulated in MMR 5. On private land in particular, where the extent of rare plant occurrences is largely unknown, the scoping process would likely lead to surveys being done prior to project implementation. California Rare Plant Rank 1B and 2 will be treated as state or federal listed species for the purposes of developing mitigations at the project level (see the BIOS/CNDDB Element Ranking Key later in this chapter). Special Status plants and communities with more widespread occurrences potentially could be adversely affected at the programmatic scale.

One community type that is well within the program landscape and also has a state rank of Threatened is Central Maritime Chaparral. A specific discussion is warranted here due to existing development threats and apparent sensitivity of the ecosystem. Maritime chaparral is associated with sandy substrates in level or rolling terrain within 10-20 km of the coast. There is a strong maritime climate characterized by frequent summer fog and low annual temperature range. Stands can be found scattered along the coast from Santa Barbara to Sonoma counties. "Maritime chaparral supports many rare and endemic plants and thus has received a fair amount of scientific study, especially in recent decades as the type has been heavily reduced and fragmented by coastal residential development and military operations (Davis et al., 2006, p.337)." It is usually dominated by chamise along with several endemic species of manzanita. In general, maritime chaparral communities show higher species diversity than other chaparral types. Sub shrub and herb layer diversity is high especially in the first 5 years after fire (Davis et al., 2006). Much of the manzanita and California lilac species are fire dependent. "Odion and Tyler observed high levels of fire-induced mortality in the soil seed bank of the endangered Morro manzanita and concluded that the species may require considerably longer than 40 years between burns in order to establish an adequate seed bank to replace adults killed during the fire" (Davis et al., 2006, p.338). The Morro manzanita type is also more susceptible to invasion by exotic species than other chaparral types, possibly because it is closer to development and more densely roaded (Davis et al., 2006). A mitigation measure is included below to ensure that impacts will be less than significant.

The following tables include one tenth of the number of plants or communities from the BIOS database, as there are potential projects in that bioregion. They represent those species with the most element occurrences weighted by their location in either the high or low probability landscape. Chapter 5.0 explains how watersheds within the available landscape were categorized based on their likelihood of having VTP projects.

Table 5.5.3.12 NORTH COAST
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank 1	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Pseudotsuga menziesii	Upland Douglas Fir Forest (Old-growth)	354	G4, S3.1	conifer forest	Old-growth Douglas-fir	yes
Sidalcea malachroides	Maple-leaved checkerbloom	536	4.2, G3G4, S3S4.2	perennial herb	conifer & hardwood forest, coastal scrub	yes
Astragalus umbraticus	Bald Mountain milk-vetch	204	G4, S2.3	annual herb	grassland	yes
Carex arcta	northern clustered sedge	257	G5, S1S2	perennial herb	conifer forest - bogs & fens	excluded
Carex lyngbyei	Lyngbye's sedge	132	2.2, G5, S2.2	rhizomatous herb	marshes & swamps	excluded
Gilia millefoliata	dark-eyed gilia	298	1B.2, G2, S2.2	annual herb	coastal dunes - shrub	yes
Northern Coastal Salt Marsh	salt marsh	270	G3, S3.2		saline emergent wetland	excluded
Sanguisorba officinalis	great burnet	172	2.2, G5, S2.2	rhizomatous herb	forests, meadows - wet areas	yes
Lycopodium clavatum	running pine	174	4.1, G5, S3S4.2	rhizomatous herb	conifer forests - edges, marshes	yes
Castilleja affinis ssp. litoralis	Oregon coast Indian paintbrush	244	2.2, G4G5T4, S2.2	perennial herb	coastal scrub, bluffs, and dunes	yes

Table 5.5.3.13 MODOC
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Potamogeton zosteriformis	eel-grass pondweed	113	2.2, G5, S2.2	annual herb aquatic	marshes & swamps	excluded
Fritillaria eastwoodiae	Butte County fritillary	91	3, G3Q, S3	bulbiferous herb	hardwood woodland, conifer forests, chaparral	yes
Silene oregana	Oregon campion	152	2.3, G5, S2.3	perennial herb	subalpine coniferous forest	yes
Calystegia atriplicifolia ssp. buttensis	Butte County morning-glory	56	4.2, G5T3, S3	rhizomatous herb	chaparral, lower montane coniferous forests/rocky	yes
Calochortus longebarbatus var. longebarbatus	long-haired star-tulip	112	1B.2, G4T4, S3.2	bulbiferous herb	Great Basin scrub, lower montane coniferous forests (openings & drainages), meadows & seeps, vernal pools/clay-mesic	yes
Clarkia gracilis ssp. albicaulis	white-stemmed clarkia	47	1B.2, G5T2, S2.2	annual herb	chaparral, cismontane woodland	yes
Stachys palustris ssp. pilosa	hairy marsh hedge-nettle	113	2.3, G5T5, S2.3	rhizomatous herb	Great Basin scrub, meadows & seeps	yes
Dimeresia howellii	doublet	121	2.3, G4?, S2.3	annual herb	lower montane coniferous forests, pinyon & juniper woodland/ volcanic & xeric	yes
Rupertia hallii	Hall's rupertia	53	1B.2, G3, S3.2	perennial herb	lower montane coniferous forests, cismontane woodland	yes

Table 5.5.3.14 SACRAMENTO VALLEY
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Great Valley Mixed Riparian Forest	riparian forest	358	G2, S2.2	forest	hardwood woodland	yes
Northern Hardpan Vernal Pool	vernal pool	415	G3, S3.1	pond	vernal pools	excluded
Great Valley Cottonwood Riparian Forest	riparian forest	256	G2, S2.1	forest	hardwood woodland	yes
Orcuttia tenuis	slender Orcutt grass	117	FT, CE, 1B.1, G3, S3.1	annual herb	vernal pools	excluded
Paronychia ahartii	Ahart's paronychia	81	1B.1, G2, S2.1	annual herb	hdwd woodland, grassland, vernal pools	yes
Hibiscus lasiocarpus	rose-mallow	149	1B.2, G4T2, S2.2	rhizomatous herb	marshes & swamps	excluded
Gratiola heterosepala	Boggs Lake hedge-hyssop	90	CE, 1B.2, G3, S3.1	annual herb	marshes & swamps, vernal pools	excluded
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	55	1B.1, G2T2, S2.2	annual herb	hdwd woodland, grassland, vernal pools, seeps, chaparral	yes
Cryptantha crinita	silky cryptantha	54	1B.2, G1, S1.1	annual herb	riparian forest & woodland, hardwood woodland, conifer forests, valley & foothill grassland	yes
Downingia pusilla	dwarf downingia	111	2.2, G3, S3.1	annual herb	Valley and foothill grassland, vernal pools	yes
Great Valley Valley Oak Riparian Forest	riparian forest	97	G1, S1.1	forest	Valley Foothill Riparian - hardwood woodland	yes
Great Valley Willow Scrub		90	G3, S3.2	scrub	Valley Foothill Riparian - hardwood woodland	yes

Riparian community types could be part of VTP projects but would be protected from adverse impacts by the MMRs. These include Great Valley Mixed Riparian Forest, Great Valley Cottonwood Riparian Forest, and Great Valley Oak riparian Forest.

Table 5.5.3.15 SIERRA
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Packera layneae (new name)	Layne's ragwort	186	FT, CR, 1B.2, G2, S2.1	perennial herb	chaparral, hardwood woodland	yes
Wyethia reticulata	El Dorado County mule ears	170	1B.2, G2, S2.2	perennial herb	hardwood woodland, conifer forests, chaparral	yes
Cryptantha mariposae	Mariposa cryptantha	158	1B.2, G2, S2.3	annual herb	chaparral (serpentinite, rocky)	yes
Helianthemum suffrutescens	Bisbee Peak rush-rose	146	3.2, G2Q, S2.2	evergreen shrub	chaparral (serpentinite)	yes
Ceanothus roderickii	Pine Hill ceanothus	150	FE, CR, 1.B2, G2, S2.1	evergreen shrub	hardwood woodland, chaparral	yes
Calystegia stebbinsii	Stebbins' morning-glory	117	FE, CE, 1B.1, G1, S1.1	rhizomatous herb	chaparral-openings, hdwd woodland	yes
Chlorogalum grandiflorum	Red Hills soaproot	102	1B.2, G2, S2.2	bulbiferous herb	hardwood woodland, conifer forests-serpentinite, chaparral	yes
Eryngium spinosepalum	spiny-sepaled button-celery	142	1B.2, G2, S2.2	annual/perennial herb	valley and foothill grassland, vernal pools	yes
Lupinus dalesiae	Quincy lupine	216	4.2, G3, S3.2	perennial herb	hardwood woodland, conifer forests, chaparral-openings	yes
Fremontodendron decumbens	Pine Hill flannelbush	94	FE, CR, 1B.2, G1, S1.2	evergreen shrub	chaparral, hardwood woodland-serpentinite, rocky	yes
Lomatium congdonii	Congdon's lomatium	94	1B.2, G2, S2.2	perennial herb	chaparral, hardwood woodland - serpentinite	yes
Clarkia biloba ssp. brandegeeae	Brandegee's clarkia	101	1B.2, G4G5T3, S3	annual herb	chaparral, hardwood woodland-often roadcuts	yes
Ivesia webberi	Webber's ivesia	158	1B.1, G2, S2.1	perennial herb	chaparral, conifer forests, conifer woodland	yes
Fritillaria eastwoodiae	Butte County fritillary	96	3, G3Q, S3	bulbiferous herb	hardwood woodland, conifer forests, chaparral	yes
Calochortus clavatus var. avius	Pleasant Valley mariposa lily	124	1B.2, G4T3, S3.2	bulbiferous herb	lower montane coniferous forests	yes
Lupinus citrinus var. citrinus	orange lupine	103	1B.2, G2T2, S2.2	annual herb	hardwood woodland, conifer forests, chaparral	yes

Table 5.5.3.16 BAY AREA
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Anomobryum julaceum	slender silver-moss	644	2.2, G4, S1.3	moss	montane hardwood, conifer forests-damp rock outcrops, roadcuts	yes
Eschscholzia rhombipetala	diamond-petaled California poppy	687	1B.1, G1, S1.1	annual herb	Valley and foothill grassland	yes
Coastal Brackish Marsh	marsh	880	G2, S2.1	marsh	saline emergent wetland	excluded
Arctostaphylos silvicola	Bonny Doon manzanita	681	1B.2, G2, S2.1	evergreen shrub	chaparral, conifer forest-inland marine sands	yes
Collinsia multicolor	San Francisco collinsia	462	1B.2, G2, S2.2	annual herb	conifer forest, coastal scrub	yes
Tropidocarpum capparideum	caper-fruited tropidocarpum	586	1B.1, G1, S1.1	annual herb	Valley and foothill grassland	yes

Bonny Doon manzanita has a very localized population whose presence would trigger consultation under MMR 5 and 6 at the project level.

Table 5.5.3.17 SAN JOAQUIN VALLEY
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Valley Sink Scrub	crosswalk to Alkali Desert Scrub	471	G1, S1.1	scrub	desert shrub	Unlikely
Delphinium recurvatum	recurved Larkspur	424	1B.2, G2, S2.2	perennial herb	chaparral, grassland/alkaline, hardwood woodland	yes
Valley Saltbush Scrub	crosswalk to Alkali Desert Scrub	412	G1, S2.1	scrub	desert shrub	Unlikely
Monolopia congdonii	San Joaquin woollythreads	244	1B.2, G3, S3.2	annual herb	chaparral, grassland	yes
Eremalche kernensis	Kern mallow	270	FE, 1B.1, G3?T1Q, S1.1	annual herb	chaparral, grassland	yes

Table 5.5.3.18 CENTRAL COAST
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Central Maritime Chaparral	chaparral	1284	G2, S2.2	shrub	chaparral	yes
Streptanthus albidus ssp. peramoenus	most beautiful jewel-flower	732	1B.2, G2T2, S2.2	annual herb	hardwood woodland, Valley & foothill grassland, chaparral	yes
Layia jonesii	Jones' layia	820	1B.2, G1, S1.1	annual herb	Valley & foothill grassland /serpentinite, chaparral	yes
Arctostaphylos cruzensis	Arroyo de la Cruz manzanita	639	1B.2, G2, S2.2	evergreen shrub	montane hardwood, coastal scrub, conifer forest, grassland, chaparral	yes
Carex obispoensis	San Luis Obispo Sedge	536	1B.2, G2, S2.2	rhizomatous herb	coastal prairie & scrub, conifer forest, grassland-serpentinite seeps, chaparral	yes
Monardella frutescens	San Luis Obispo monardella	889	1B.2, G2, S2.2	rhizomatous herb	coastal dunes, coastal scrub	yes
Arctostaphylos pumila	sandmat manzanita	1011	1B.2, G2, S2.2	evergreen shrub	coastal dunes, coastal scrub, conifer forest, chaparral, hardwood woodland	yes
Arctostaphylos montereyensis	Monterey manzanita	806	1B.2, G2, S2.1	evergreen shrub	chaparral, hardwood woodland, coastal scrub	yes
Monardella palmeri	Palmer's monardella	445	1B.2, G2, S2.2	rhizomatous herb	chaparral, hardwood woodland-serpentinite	yes
Chorizanthe pungens var. pungens	Monterey spineflower	929	FE, 1B.2, G2T2, S2.2	annual herb	hardwood woodland, grassland, coastal dunes, coastal scrub, chaparral	yes
Horkelia cuneata ssp. sericea	Kellogg's horkelia	889	1B.1, G4T1, S1.1	perennial herb	conifer forest, chaparral, coastal scrub-openings	yes
Castilleja densiflora ssp. obispoensis	Obispo Indian paintbrush	417	1B.2, G5T2, S2.2	annual herb	Valley & foothill grassland-serpentinite & seeps	yes
Baccharis plummerae ssp. glabrata	San Simeon baccharis	366	1B.2, G3T1, S1.2	deciduous shrub	coastal scrub	yes
Pinus radiata	Monterey pine	612	1B.1, G1, S1.1	evergreen tree	conifer forest, hardwood woodland	yes
Chorizanthe robusta var. robusta	robust spineflower	727	1B.1, G2T1, S1.1	annual herb	coastal dunes & scrub, hardwood woodland	yes

Table 5.5.3.19 MOJAVE
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Calochortus striatus	alkali mariposa lily	158	1B.2, G2, S2.2	bulbiferous herb	chaparral, desert shrub, meadows & seeps-alkaline	yes

Table 5.5.3.20 SOUTH COAST
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurrences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Tetracoccus dioicus	Parry's tetracoccus	1726	1B.2, G3, S2.2	deciduous shrub	chaparral, coastal scrub	yes
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	1741	1B.2, G5T2?, S2.2	annual herb	chaparral, coastal scrub	yes
Chorizanthe orcuttiana	Orcutt's spineflower	1460	FE, CE, 1B.1, G1, S1.1	annual herb	conifer forest, chaparral, coastal scrub-openings	yes
Ferocactus viridescens	San Diego barrel cactus	1572	2.1, G4, S3.1	stem succulent	grassland, coastal scrub, chaparral	yes
Ceanothus verrucosus	wart-stemmed ceanothus	1582	2.2, G3, S2.2	evergreen shrub	chaparral	yes
Southern Sycamore Alder Riparian Woodland	riparian forest	1103	G4, S4		Valley Foothill Riparian - hardwood woodland	yes
Dodecahema leptoceras	slender-horned spineflower	913	FE, CE, 1B.1, G1, S1.1	annual herb	chaparral, coastal scrub, hardwood woodland	yes
Chorizanthe parryi var. parryi	Parry's spineflower	778	1B.1, G3T3, S2S3	annual herb	chaparral, coastal scrub- sandy/rocky-openings	yes

Table 5.5.3.21 COLORADO DESERT
Special Status Plants & Community Types with the Most Element Occurrences

Species Scientific Name	Common Name	Element Occurences	Fed & State T&E Status; Rare Plant Rank, Global, State Rank	Growth Form	Habitat type or Lifeform	In Treatable Landscape
Desert Fan Palm Oasis Woodland	palm oasis	432	G3, S3.2		palm oasis	excluded
Selaginella eremophila	desert spike-moss	167	2.2, G4, S2.2?	rhizomatous herb	Sonoran desert scrub	yes
Ayenia compacta	ayenia	162	2.3, G4, S3.3	perennial herb	Sonoran desert scrub, Mojavean desert scrub	yes

1/ See descriptions of Federal and State T&E Status, Rare Plant Rank, Global and State Rank Definitions below.

BIOS/CNDDB ELEMENT RANKING

GLOBAL RANKING

The *global rank* (G-rank) is a reflection of the overall condition of an element throughout its global range.

SPECIES OR NATURAL COMMUNITY LEVEL

G1 = Less than 6 viable element occurrences (Eos) OR less than 1,000 individuals OR less than 2,000 acres.

G2 = 6-20 Eos OR 1,000-3,000 individuals OR 2,000-10,000 acres.

G3 = 21-80 Eos OR 3,000-10,000 individuals OR 10,000-50,000 acres.

G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.

G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

SUBSPECIES LEVEL

Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. For example: *Chorizanthe robusta* var. *hartwegii*. This plant is ranked G2T1. The G-rank refers to the whole species range i.e., *Chorizanthe robusta.* The T-rank refers only to the global condition of var. *hartwegii*.

STATE RANKING

The *state rank* (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank.

S1 = Less than 6 Eos OR less than 1,000 individuals OR less than 2,000 acres

- S1.1 = very threatened
- S1.2 = threatened
- S1.3 = no current threats known

S2 = 6-20 Eos OR 1,000-3,000 individuals OR 2,000-10,000 acres

- S2.1 = very threatened
- S2.2 = threatened
- S2.3 = no current threats known

S3 = 21-80 Eos or 3,000-10,000 individuals OR 10,000-50,000 acres

- S3.1 = very threatened
- S3.2 = threatened
- S3.3 = no current threats known

S4 = Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern; i.e. there is some threat, or somewhat narrow habitat. NO THREAT RANK.

S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK.

Notes:

1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a **bird's eye or aerial view** when ranking sensitive elements rather than simply counting element occurrences.
2. Uncertainty about the rank of an element is expressed in two major ways: By expressing the ranks as a **range** of values: e.g., S2S3 means the rank is somewhere between S2 and S3. By adding a ? to the rank: e.g., S2? This represents more certainty than S2S3, but less certainty than S2.

Other symbols:

GH All sites are **historical**; the element has not been seen for at least 20 years, but suitable habitat still exists (SH = All California sites are historical).

GX All sites are **extirpated**; this element is extinct in the wild (SX = All California sites are extirpated).

GXC Extinct in the wild; exists in cultivation.

G1Q The element is very rare, but there are **taxonomic questions** associated with it.

T Rank applies to a subspecies or variety.

CALIFORNIA RARE PLANT RANKING

List 1A: presumed extinct in California
List 1B: rare, threatened or endangered in California and elsewhere.
List 2: rare, threatened or endangered in California but more common elsewhere.
List 3: need more information about this plant
List 4: limited distribution (watch list)

The growth form of a plant is a key characteristic in determining whether it will be adversely affected by the treatments. Plants in these tables which are rhizomatous, perennial, or bulbiferous herbs all contain significant amounts of their biomass underground where it is protected from the potential impacts of prescribed burning explained earlier. Mechanical treatments could still impact underground portions of plants directly through tilling or brushraking and indirectly through compaction or the heat generated by large burn piles, but the areal extent of such effects is just a small portion of the mechanically treated area, which is itself a small portion of the habitat as a whole.

Also, many of the shrub species listed, such as the manzanita and ceanothus varieties are vigorous sprouters adapted to fire and would be very unlikely to suffer significant long-term effects from the treatments. All the community types listed, except Central Maritime Chaparral, are either unlikely to be in the treatable landscape or are specifically riparian associations that would be protected by the MMRs and mitigations. The annual herbs have the greatest chance of being adversely affected, and consequently these need to be the focus of any project level plant database searches, field surveys and ensuing mitigations.

The number of element occurrences in BIOS is strongly affected by the number of development projects requiring CEQA analysis that have occurred in that bioregion. This is why the Bay Area and South Coast have so many more occurrences than the Modoc, for example. It does not necessarily mean that individuals of that species would not be found in the Modoc. For this same reason, many of the special status plants in the tables above could occur within the program area beyond where they have been reported to date. If their specific habitat needs exist on a proposed project, there is the potential to adversely affect that plant unknowingly. The MMR's take this into account by requiring the applicant to conduct scoping including an appropriate database search. From this list, the project proponent determines whether suitable habitat is present and whether proposed actions may adversely affect rare plants should they occur. A botanical survey during the appropriate blooming period may be required to determine presence/absence and develop appropriate avoidance or mitigation strategies. This information will then be provided to the wildlife agencies for comments and recommendations.

Table 5.5.3.22
Total and Decadal Treated Acres in Oak Woodlands by Bioregion

	Klamath/ North Coast	Modoc	Sacramento Valley	Sierra Nevada	Bay Area / Delta	San Joaquin	Central Coast	Mojave	South Coast	Colorado Desert	Total for Bioregion
Total Acreage of Oak Woodlands	**2,588,162**	**351,117**	**545,100**	**2,912,009**	**1,128,614**	**92,062**	**1,725,077**	**45,951**	**429,828**	**8,851**	**9,826,772**
Prescribed Fire Acres	33,941	19,570	83,924	86,730	30,975	6,672	63,852	2,919	10,355	853	339,792
% of Lifeform Area	1.31%	5.57%	15.40%	2.98%	2.74%	7.25%	3.70%	6.35%	2.41%	9.64%	3.46%
Mechanical Acres	11,505	6,648	28,449	29,400	10,500	2,262	21,645	991	3,517	289	115,205
% of Lifeform Area	0.44%	1.89%	5.22%	1.01%	0.93%	2.46%	1.25%	2.16%	0.82%	3.27%	1.17%
Hand Treated Acres	6,329	3,692	15,647	16,170	5,775	1,244	11,905	551	1,954	159	63,425
% of Lifeform Area	0.24%	1.05%	2.87%	0.56%	0.51%	1.35%	0.69%	1.20%	0.45%	1.80%	0.65%
Herbicide Acres	5,753	3,325	14,224	14,700	5,250	1,131	10,822	496	1,759	145	57,604
% of Lifeform Area	0.22%	0.95%	2.61%	0.50%	0.47%	1.23%	0.63%	1.08%	0.41%	1.63%	0.59%
Herbivory Acres	6,574	3,692	16,256	16,800	6,000	1,292	9,276	551	1,954	54	62,450
% of Lifeform Area	0.25%	1.05%	2.98%	0.58%	0.53%	1.40%	0.54%	1.20%	0.45%	0.61%	0.64%
TOTAL ACREAGE	**64,103**	**36,926**	**158,500**	**163,800**	**58,500**	**12,600**	**117,500**	**5,508**	**19,539**	**1,500**	**638,476**
% of Lifeform Area	**2.48%**	**10.52%**	**29.08%**	**5.62%**	**5.18%**	**13.69%**	**6.81%**	**11.99%**	**4.55%**	**16.95%**	**6.50%**

Calculations of the area of “Oak Woodlands” in this table were based on WHR classification. The two WHR Life forms “Hardwood Woodland” and “Hardwood Forest” were combined for this representation of “Oak Woodlands”. The WHR Lifeform “Hardwood Woodland” includes the following vegetation types: Blue Oak Woodland, Blue Oak Foothill Pine, Coastal Oak Woodland, Eucalyptus, HDW, Valley Foothill Riparian, Valley Oak Woodland. The WHR Lifeform “Hardwood Forest” includes the following vegetation types: Aspen, Montane Hardwood, Montane Riparian.

Oak Woodlands

Although the effects of treatments are common between the bioregions, the extent of treatments between bioregions varies. The greatest number of acres of oak woodlands are likely to be treated in the Central Coast, Sacramento Valley and Sierra Nevada bioregions with over 115,000 acres treated in each bioregion over 10 years (Table 5.5.3.22). Proportionally, oak woodlands in the Sacramento Valley bioregion are likely to receive the most treatment at nearly 30% of the bioregion treated in a 10 year period, a significant portion (14%) of the San Joaquin bioregion will also be treated. The Modoc, San Joaquin, Sierra Nevada and Sacramento Valley bioregions are also home to a significant portion of the State's blue and valley oak populations, which are known to have regeneration problems.

In all bioregions[1] except the Modoc, San Joaquin and Sacramento Valley the proportion of oak woodlands treated is less than 7% of the total oak woodlands in the bioregion over a ten year period (Table 5.5.3.22). For the bioregions where a small proportion of the oak woodlands are treated, impacts to regeneration are likely to be insignificant at the bioregional level.

However, in the San Joaquin and Sacramento Valley bioregions, impacts to regeneration at the bioregional level could be significant due to the following factors:

- 15 to 30% of the oak woodlands in each bioregion could be treated in a ten year time period
- 80% of treatments used are likely to retard regeneration by 10+ years
- blue oak and valley oak woodlands are concentrated in these bioregions and are known to have especially poor natural regeneration rates.

Additionally, oak woodlands in the Sierra, Sacramento and San Joaquin bioregions are at the highest risk of conversion due to development and agriculture (Gaman and Firman, 2006)

Sudden Oak Death (SOD)

The main mechanism by which VTP treatments could affect the distribution of *P. ramorum* is through transport on equipment or personnel of spores, infected vegetative material, or drafted water to or from treatment sites. In VTP treatments all vegetative material typically is disposed of or left on site, but there could be accidental transport of vegetative materials off-site via chips, foliage, soil, water, etc. Burning vegetative material on site poses no risk of spread since the organism is killed in the fire. The risk of spreading the disease is higher if treatments are conducted during the wet season.

Although the primary mode of spreading *P. ramorum* is through the air (Rizzo et al., 2005), there is a significant risk of accidental transport of infected material between sites within the quarantine areas if equipment and personnel are not cleaned and disinfected before leaving any SOD infected site.

Eradicating SOD host species or infected individuals within a stand is not a stated goal of the VTP (Chapter 1) and is unlikely to inadvertently result from typical VTP treatments. However, VTP projects can be designed to intentionally target *P. ramorum* host species or infected individuals while meeting the goals of fuel hazard reduction or stand improvement. There is hope that reducing the density of host species, particularly California bay (*Umbellularia californica*), may reduce the rate of spread of the disease, which would be a beneficial effect of treatment (Rizzo et al., 2005).

[1] Mojave and Colorado Desert Bioregions were not considered in this analysis due to scarcity of oak woodlands in these bioregions.

There is a risk of injury to workers in areas infested with SOD due to high incidence of failure of both tanoak and coast live oak boles and branches. Boles and branches become weakened due to the presence of wood-decaying fungi associated with *P. ramorum* and require highly skilled operators to remove them safely.

Infested areas with high mortality rates typically result in high loading of dead fuels in the forest. Requests for VTP projects may be increased in these areas to reduce fuel hazards. This issue is likely to increase in the future as only 9.7% of the land area with susceptible host species in California was predicted to harbor *P. ramorum* as of 2007 and the disease is expected to continue to spread (Meentemeyer, 2007).

As of October 2011, the only bioregions where SOD is currently found are the Klamath/North Coast, Bay Area/Delta and Central Coast. There is a state and federal quarantine preventing transport of infected materials from the infected 14 counties to areas outside the infected counties. Despite the quarantine, it is possible that SOD could expand to other bioregions via movement of infested soil or plant parts by humans, as well as natural spread via wind or other dispersal routes.

Indirect Effects of Implementing the Program/Alternatives

Indirect effects of implementing the Program and Alternatives are potentially associated with improved forage conditions for the livestock industry through changes to oak woodland/rangeland understory species composition and extent. The effects are considered to be positive and minor.

There is hope that removing understory host vegetation and modifications to the microclimate will have a negative effect on *P. ramorum* survival. In one recent (2006) experiment where currently infested stands were treated with a modified fuel hazard reduction treatment that included removal of all bay trees (primary host) it is hypothesized that there will be a decrease in pathogen persistence/survival in these stands (Valachovic pers. comm. 2007). Therefore it is possible that VTP treatments may yield a positive outcome by decreasing survival of SOD in treated areas.

5.5.3.6 Effects of Alternatives

Alternative 1, Status Quo, would treat substantially fewer acres than the proposed program, but it lacks some of the MMRs and mitigations of the proposed program. However, since the impacts to botanical resources are primarily a function of the acres treated, the overall impact of Alternative 1 would still be less than the program since it only treats 47,000 acres annually as opposed to 216,910 acres.

Alternative 2 has all the same constraints as the proposed program and has about 6% more prescribed fire treatments and about 20% more mechanical treatments. This would lead to the potential for significantly greater effects from this alternative, but the extra 20% of mechanical treatments would be geographically dispersed throughout the state and would not affect the % of Lifeform numbers in Tables 5.5.3.12 through 5.5.3.21 in any one bioregion enough to cause significant effects in the long-term.

Alternative 3 has almost the same acres treated as the proposed program but with additional protections to reduce impacts on water quality and on special status species and communities and would therefore have less impact than the proposed program. Alternative 4 treats much fewer acres with prescribed fire and mechanical methods than does the proposed program and would therefore pose no long-term significant adverse effects.

Effects of implementing treatments on oak woodlands under implementation of any of the alternatives are similar to the Proposed Program. Alternative 3 includes the same mix of treatments and the same number of acres being treated as the Proposed Program but has additional protections to reduce impacts on water quality and on special status species and special status plant communities. Alternative 2 also is similar to the Proposed Program except that herbicides would not be used. As noted above, herbicide-treated acreage is included in the total acreage shown in Table 5.3.2 above, but the effects of treating forest and rangelands are described in Section 5.17. Alternatives 1 and 4 use the same treatments as the Proposed Program but they are applied to substantially fewer acres than either the Proposed Program or Alternatives 2 or 3.

5.5.3.7 Determinations Regarding Botanical Resources

Although it is difficult to specify exactly what proportion of a plant's habitat would have to receive adverse treatments in a given year or decade to cause substantial adverse long-term effects to the population, it is safe to say that the proposed program does not approach the threshold of 10-20% used in this analysis. In fact, most of the decadal acreages shown could increase significantly, and stay well below this threshold.

Only in the Sacramento Valley and the hardwood woodland type in the San Joaquin bioregion does the level of potentially adverse treatments in a lifeform exceed 1% in a single year or 10% in 10 years (as noted previously some hardwood forest and woodland acres were erroneously included in the Mojave and Colorado Desert bioregions, CalPIF, 2002). An important consideration in determining what level would trigger substantial adverse effects is that effects from an individual treatment are varied and may be positive, negative, or neutral within a plant community. Also, projects will be distributed amongst watersheds to ensure that the 1% or less of treatments in a lifeform will not be concentrated in a small section of a bioregion, as shown in Table 5.0.7.

Within the Colorado Desert bioregion, the shrub type is anticipated to receive 3,192 acres of prescribed fire and mechanical treatments on average annually, representing 1.14% of this habitat type. While this is possibly enough area to have a significant impact after a decade of treatments, the mitigation measures outlined below along with the MMRs will reduce the impacts to less than significant.

Within the San Joaquin bioregion, the shrub type is expected to receive 581 acres of prescribed fire and mechanical treatments on average annually, representing 0.6% of this habitat type. While this would not normally be enough area to cause concern, there are two community types within the shrub lifeform with a state rank of "very threatened" (Valley sink scrub & Valley salt-bush scrub) that deserve special consideration (see Table 5.5.3.17 and discussion following). It is expected that consultation with DFG at the project level will enable modifications to the project design which along with the MMRs and the mitigation measures outlined below will reduce the impacts to less than significant.

In the Sacramento Valley the proportion of habitats treated is consistently higher than for the other bioregions. This is due to the fact that the bioregion is much smaller than any other, yet it has the third most acres projected for treatment annually. CAL FIRE's vegetation management program has traditionally been more active in this region leading to greater landowner participation in the program, but some of the numbers are simply a modeling anomaly. Table 5.5.3.4 shows that 21,800 acres of Hardwood Forest type would be treated per decade. This equates to 120% treatment of the type in 10 years. In reality this would not happen due to program logistics and adherence to the required mitigation measures. The table also shows 28.3% of the shrub type being treated by either prescribed fire or mechanical methods per decade. While this would likely be enough area to have substantial adverse effects, the mitigation measures outlined below along with the MMRs would cause proposed projects to be shifted into other more abundant habitat types or adjusted such that the project avoided direct impacts to the plant community being treated. This will reduce the impacts to less than significant.

In summary, the program/alternatives will not have a substantial long-term adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status plant species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. Due to implementation of MMR 5 and the mitigation measures to protect particular habitats, VTP treatments will not adversely affect sufficient acres in any bioregion or habitat type to violate any state or federal wildlife protection law (a threshold of significance). As a result, the Program will have less than significant impacts to botanical resources.

The program/alternatives will not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service. Compliance with landscape constraints 1-3 dealing with riparian and wet areas and compliance with the mitigation measures to protect particular habitats, will ensure that VTP treatments do not adversely affect sufficient acres in any bioregion or habitat type to threaten to eliminate any plant community (a threshold of significance). As a result, the Program will have less than significant impacts to this resource.

Compliance with landscape constraints 1-3 dealing with riparian and wet areas will ensure that the program/alternatives will not have a substantial adverse effect on federally protected wetlands, as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.). As a result, the Program will have less than significant impacts to wetlands.

The program/alternatives will not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The program/alternatives will not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

Because of adherence to MMR 5 as well as the small proportion of habitats treated in most bioregions, the program/alternatives will not contribute directly (through immediate mortality) or indirectly (through reduced productivity, survivorship, genetic diversity, or environmental carrying capacity) to a substantial, long-term reduction in the viability of any native species or subspecies at the state level (a threshold of significance). Managers' control over the season, size and frequency of prescribed burning will also contribute to keeping any adverse effects below this threshold. Adverse effects on small portions of well-distributed populations will not affect the species as a whole and, therefore, the impact is considered less than significant. In the Sacramento and San Joaquin bioregions where the proportion of habitats treated is higher, mitigation measures specific to these regions will ensure that program/alternative impacts remain less than significant. These procedures combined with the geographically dispersed nature of the program mean that at the programmatic scale, the impact to special status plant populations as a whole will be less than significant.

Impacts to mature overstory oaks (> 8 inches dbh) due to implementing the program or alternatives is expected to be negligible or slightly positive. Reduced understory competition for site resources is expected to benefit overstory oak trees. Reduced volumes of shrub and ladder fuels in the understory are expected to reduce the risk of high severity wildfire injuring or killing overstory oaks.

Impacts to oak regeneration due to VTP treatments could be significant in oak woodlands that are known to have insufficient regeneration rates under current conditions: blue oak, valley oak and coast live oak. In bioregions where the proportion of oak woodlands treated is small this effect will not be significant at the bioregional level. However, in the San Joaquin and Sacramento Valley bioregions where the proportion of oak woodlands proposed for treatments is high, the impact to regeneration is likely to be significant, unless mitigated. Therefore, Mitigation Measures 5.5.3-6 and 5.5.3-7 were developed to reduce the impacts to less than significant.

If standard Best Management Practices (BMPs) are followed to prevent spread of Sudden Oak Death on personnel or equipment it is unlikely that implementation of VTP projects will have a significant impact on the spread of Sudden Oak Death.

5.5.3.8 Mitigation Measures and Checklist Items

The following mitigation measures will help ensure that impacts from VTP treatments remain less than significant:

Mitigation Measure 5.5.3-1. For fire-adapted special status plants, the timing or intensity of prescribed burns shall be adjusted and incorporated into Burn Plan prescriptions to simulate the natural fire regime. The project will be burned in a pattern to create and maintain a mosaic of old and young growth chaparral with diverse habitat structures.

Rationale: Prescribed fire treatments that do not mimic the natural regime may adversely affect the reproductive capability or viability of a plant community over the long-term or directly affect individual special status plants. Prescribed burning may result in direct mortality or lowered reproductive success of populations or individuals of plants if the burn treatment occurs during the flowering season of the species, at a greater frequency than under natural conditions, or among species that lack adaptations to fire (i.e., fire-inhibited). It is particularly important to avoid spring burns where there may be rare flowering plants. Adjusting firing patterns or installing control lines can protect individuals of these species. The loss of a substantial portion of a special status plant community would be a significant impact. Implementation of this mitigation measure will reduce impacts to a less-than-significant level.

Mitigation Measure 5.5.3-2. Prescribed fire ignition and timing techniques that result in "cool prescribed burns" shall be used for sagebrush, low sage, bitterbrush, pinyon-juniper, and juniper vegetation types with well-established associations of cheatgrass, medusa-head or other invasives in order to prevent type conversions to cheatgrass or medusa-head. These techniques shall be incorporated into Burn Plan prescriptions.

Rationale: The prescriptions will require that sufficient shrub or tree cover is maintained to ensure that the area will not be converted to a cheatgrass grassland. Implementing this mitigation measure will reduce the impact on these vegetation types to a less-than-significant level.

Mitigation Measure 5.5.3-3. Mechanical treatment shall be avoided to the greatest extent possible in special status plant communities with a state rank of 3.2 or lower. If mechanical treatment cannot be avoided, impacts will be mitigated on an acre-for-acre basis by enhancing or restoring the same community type elsewhere in the region.

Rationale: Implementing this mitigation measure will reduce the impact on special status communities to a less-than-significant level.

Mitigation Measure 5.5.3-4. A 50' equipment exclusion zone shall be established around vernal pools. DFG shall be notified of the existence of vernal pool habitat in the project area to alert them to the potential for special status plants.

Rationale: Implementing this mitigation measure will reduce the impact on vernal pools to a less-than-significant level.

Mitigation Measure 5.5.3-5. DFG or a qualified biologist shall be consulted during project development when treatments are proposed in maritime chaparral habitat.

Rationale: Due to the large number of endemic plants and the sensitivity of this habitat type to treatments, any projects proposed here need to be designed and approved by scientists knowledgeable about maritime chaparral. Implementing this mitigation measure will reduce the impact on maritime chaparral to a less-than-significant level.

Mitigation Measure 5.5.3–6. For oak woodland types known to have insufficient natural regeneration rates (blue oak, valley oak and coastal live oak as of 2007) implementation of VTP projects could have substantial adverse effects. In these cases prescriptions for VTP treatments shall require that no more than 25% of oak regeneration on site prior to treatment be top-killed during treatment. Mitigation measure effectiveness shall be verified with pre and post-treatment seedling/sapling surveys conducted by CAL FIRE.

Rationale: Measures to avoid damaging oak regeneration may include:

1) Identifying and buffering locations of seedling and saplings prior to treatment. Selective hand treatments to achieve VTP objectives can be used where the presence of seedlings makes other treatments infeasible. Areas determined to be lacking any seedlings could be treated using prescribed fire or mechanical methods.

2) In the case of grazing, cages or T-post staked tree shelters around established seedlings and saplings may be installed. Alternately, early season grazing could be used when the likelihood of browse damage to oak seedlings is minimal.

3) Where damage exceeded 10% top kill, regeneration could be augmented at a 4:1 ratio of top killed trees. First choice should be planting acorns collected on or near the site. Planted seedlings would need to be similar in size and of the same species as the top killed trees and maintained until they became established. CAL FIRE will be responsible for ensuring maintenance of planted seedlings.

Mitigation Measure 5.5.3-8. Current Best Management Practices (BMPs) shall be followed to prevent spread of sudden oak death on personnel or equipment. A list of current BMPs may be found at SuddenOakDeath.org or by linking directly to the following website: http://nature.berkeley.edu/comtf/pdf/forestry4-08.pdf

Mitigation Measure 5.5.3-9. For treatments in or near a sudden oak death-infested area the recommendations of the CAL FIRE state pathologist and/or the most recent recommendations of the California Oak Mortality Task Force shall be followed.

Checklist Item: Have wet areas within the project area been surveyed for and protected including bogs, fens, springs and vernal pools?

Checklist Item: Has the project area been surveyed for any serpentine inclusions? These need to be mapped for the possibility of special status plant occurrences.