Staff Summary for April 16-17, 2025

13. Morro Manzanita

Today's Item **Information ☐** **Action ☒**

Consider and potentially act on the petition, Department's evaluation report, and comments received to determine whether listing morro manzanita (*Arctostaphylos morroensis*) as endangered under the California Endangered Species Act may be warranted.

Summary of Previous/Future Actions

• Received petition	July 20, 2024
• Transmitted petition to Department	July 30, 2024
• Public receipt of petition	August 14-15, 2024
• Approved Department's request for 30-day extension	October 9-10, 2024
• Received Department's 90-day evaluation report	November 14, 2024
• Received presentations and public comment, discussed petition, and continued public hearing to April meeting	February 12-13, 2025
• **Today potentially determine petitioned action may be warranted**	**April 16-17, 2025**

Background

In July 2024, the Commission received a CESA petition to list morro manzanita as endangered from Dr. Christopher Kofron and Dr. Claudia Tyler. The Commission publicly received the Department's evaluation report (Exhibit 3) at its December 2024 meeting. The evaluation report delineates each of the categories of information required for a petition, evaluates the sufficiency of the available scientific information for each of the required components, and incorporates additional relevant information that the Department possessed or received during the review period. Based on the information contained in the petition and other relevant information, the Department concludes that there is sufficient information to indicate the petitioned action may be warranted.

During the February 2025 meeting, Supervisor Gibson from the county of San Luis Obispo expressed concerns regarding the accuracy of information in the petition and the potential candidacy of morro manzanita. The county also submitted a letter to the Commission stating that the protections the plant would receive if it becomes a candidate species under CESA could impact the progress of certain county projects currently underway (February 11 letter in Exhibit 4). The Commission continued its decision regarding candidacy of morro manzanita to this meeting to allow time for the Department to have conversations with the county about its concerns and to allow the county additional time to bring certain information to the attention of the Commission.

Updates Since February Meeting

The county of San Luis Obispo submitted a second letter in advance of this meeting (April 1 letter in Exhibit 4). In that letter, the county asserts the petition is inadequate and urges the

Commission to deny the petition. The letter primarily relies on its attachments: a habitat conservation plan (HCP), biological opinion, and incidental take permit findings, all associated with the county's request to the U.S. Fish and Wildlife Service for authorization to impact morro manzanita. While the HCP does lay out valuable conservation actions for morro manzanita – including measures for avoidance, minimization and mitigation of impacts – the HCP does not eliminate the substantial possibility that the species could be listed after a status review of the species by the Department. The Department's evaluation report evaluates the petition in light of the same HCP. Commission staff also considered the HCP prior to making the staff recommendation for both the February meeting and today's agenda item.

At today's meeting, the Department will provide a verbal update regarding its conversations with San Luis Obispo County. The Commission is also scheduled to consider and potentially determine if the listing may be warranted. If the Commission determines listing may be warranted, pursuant to Section 2074.2 of the California Fish and Game Code, the Department will undertake a one-year status review before the Commission can make a final decision on listing.

Significant Public Comments

The County of San Luis Obispo submitted two letters opposing the morro manzanita listing petition due to insufficient notice, inadequate information, and the petition's failure to acknowledge the Los Osos Habitat Conservation Plan (LOHCP) and its mitigation efforts. The County argues the petition relies on outdated data and disregards existing, effective conservation measures, potentially disrupting ongoing preservation efforts. Furthermore, the county contends the petition lacks legally required information regarding the LOHCP's impact, ignores the U.S. Fish and Wildlife Service's findings that the LOHCP benefits morro manzanita, and undermines the LOHCP's active habitat protection and restoration efforts. Included with the county's letter is the LOHCP and associated documentation (Exhibit 4).

Recommendation

Commission staff: Determine that listing may be warranted; direct staff to issue a notice reflecting this finding and indicating that morro manzanita is a candidate for endangered species status.

Department: Accept the petition for further consideration under CESA.

Exhibits

1. Staff summary from the February 12-13, 2025 Commission meeting, Agenda Item 13 (*for background purposes only*)
2. Petition, received July 22, 2024
3. Department 90-day evaluation report, dated November 2024
4. Letters and attachments from Trevor Keith and John Diodati, County of San Luis Obispo, received February 11, 2025 and April 1, 2025

Staff Summary for April 16-17, 2025

Motion

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the California Fish and Game Code, finds that the petition to list morro manzanita (*Arctostaphylos morroensis*) as an endangered species does provide sufficient information to indicate that the petitioned action may be warranted based on the information in the record before the Commission, and directs staff to issue a notice reflecting this finding and indicating that morro manzanita is a candidate for endangered species status.

OR

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the California Fish and Game Code, finds that the petition to list morro manzanita (*Arctostaphylos morroensis*) as an endangered species does not provide sufficient information to indicate that the petitioned action may be warranted based on the information in the record before the Commission.

Staff Summary for February 12-13, 2025
(*For background purposes only*)

13. Morro Manzanita

Today's Item **Information ☐** **Action ☒**

Consider and potentially act on the petition, Department's evaluation report, and comments received to determine whether listing morro manzanita (*Arctostaphylos morroensis*) as endangered under the California Endangered Species Act (CESA) may be warranted.

Summary of Previous/Future Actions

• Received petition	July 20, 2024
• Transmitted petition to Department	July 30, 2024
• Public receipt of petition	August 14-15, 2024
• Approved Department's request for 30-day extension	October 9-10, 2024
• Received Department's 90-day evaluation report	November 14, 2024
• **Today potentially determine petitioned action may be warranted**	**February 12-13, 2025**

Background

In July 2024, the Commission received a CESA petition to list morro manzanita as endangered from Dr. Christopher Kofron and Dr. Claudia Tyler; The Commission transmitted the petition to the Department for an evaluation and recommendation.

California Fish and Game Code Section 2073.5 requires that the Department evaluate the petition and submit a written evaluation with a recommendation to the Commission; the Commission publicly received the Department's evaluation report (exhibits 2 and 3) at its December 2024 meeting. The evaluation report delineates each of the categories of information required for a petition, evaluates the sufficiency of the available scientific information for each of the required components, and incorporates additional relevant information that the Department possessed or received during the review period. Based on the information contained in the petition and other relevant information, the Department concludes that there is sufficient information to indicate the petitioned action may be warranted.

At today's meeting, the Commission will receive a presentation on the Department's petition evaluation, receive a presentation from the petitioners, and hold a public hearing to receive oral testimony. If the Commission determines listing may be warranted, pursuant to Section 2074.2 of the Fish and Game Code the Department will undertake a one-year status review before the Commission can make a final decision on listing.

CESA and the Commission's listing regulation require that the petition contain specific scientific information related to the status of the species. CESA and case law interpreting it make clear that the Commission must accept a petition when the petition contains sufficient information to lead a reasonable person to conclude there is a substantial possibility the requested listing could occur; the requested listing is tied to the species' status, that is, whether the species' continued

existence is in serious danger or is threatened by a number of factors, and in no way relates to economic consequences that might result from listing.

If the Commission determines the petitioned action may be warranted, morro manzanita becomes a candidate for listing as endangered pursuant to Fish and Game Code Section 2074.2. Candidate species are protected during the remainder of the listing process pursuant to Fish and Game Code Section 2085.

Significant Public Comments (N/A)

Recommendation

Commission staff: Determine that listing may be warranted; direct staff to issue a notice reflecting this finding and indicating that morro manzanita is a candidate for endangered species status.

Department: Accept the petition for further consideration under CESA.

Exhibits

1. Petition, received July 22, 2024
2. Department memo, received November 14, 2024
3. Department 90-day evaluation report, dated November 2024
4. Department presentation
5. Petitioner presentation

Motion

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the California Fish and Game Code, finds that the petition to list morro manzanita (*Arctostaphylos morroensis*) as an endangered species does provide sufficient information to indicate that the petitioned action may be warranted based on the information in the record before the Commission, and directs staff to issue a notice reflecting this finding and indicating that morro manzanita is a candidate for endangered species status.

OR

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the California Fish and Game Code, finds that the petition to list morro manzanita (*Arctostaphylos morroensis*) as an endangered species does not provide sufficient information to indicate that the petitioned action may be warranted based on the information in the record before the Commission.

PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION
SUPPORTING INFORMATION FOR

Morro manzanita (*Arctostaphylos morroensis)*

Dense stand of Morro manzanita *Arctostaphylos morroensis* in Montaña de Oro State Park. In the background is a *Eucalyptus* grove.

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EXECUTIVE SUMMARY

We recommend that Morro manzanita *Arctostaphylos morroensis* be listed as endangered. This plant species is endemic to the Los Osos area, San Luis Obispo County, California, occurring predominantly on Baywood fine sand. The area has a Mediterranean climate, with cool moist winters and warm dry summers. Fog is common. Temperatures range from ~ 6.5° to 23.5°C, and mean annual rainfall (recorded at Morro Bay Fire Station) is 42.1 cm, with 75% occurring between November and April (Tyler and Kofron 2024). Morro manzanita occurs at elevations <200 m (Parker et al. 2012). The historic geographic range was estimated to comprise 800 to 1,100 ha (USFWS 1994), and approximately 75% of this area is now developed (USFWS 2013). After a fire, Morro manzanita must re-establish from seeds in the soil seed bank, where the proportion of viable seeds to total seeds is very low with an average of 4% (Tyler and Odion 2020). The clearing of Morro manzanita and its habitat for residential development is the primary threat to Morro manzanita. This is an immediate threat. The Los Osos HCP and U.S. Endangered Species Act provide only limited protection for Morro manzanita on private land. Homebuilding would convert portions of the remaining, intact parcels into residential development, likely along with subsequent firebreaks for protection. Fragmentation of the remaining, high density, intact stands for residences, permissible under the Los Osos HCP, would be an irreversible loss of Morro manzanita and habitat (Tyler and Kofron 2024).

1. INTRODUCTION

Morro manzanita *Arctostaphylos morroensis* Wies. & Schreib. is a long-lived, perennial shrub endemic to San Luis Obispo County, southern California, USA. It is an erect evergreen shrub in the heath family, Ericaceae (Fig. 1). It can be distinguished from other species of manzanitas in the vicinity by its persistent shreddy gray bark, densely hairy lower leaf surfaces and leaf bases that are truncate to somewhat cordate (Kauffmann et al. 2021). Individuals, normally one to four meters in height, can become arborescent with old age (Fig 1). In some stands of maritime chaparral where it occurs, Morro manzanita can be the dominant shrub species, but its highly localized distribution has been further reduced to a small portion of coastal California in habitat that is fragmented by development.

The species was listed as threatened under the U.S. Endangered Species Act in 1994 (USFWS 1994) with identified threats being residential and urban development, including lack of protection on private land and lack of management on public lands, competition with invasive non-native plants, and risks of extinction associated with small and isolated populations. It is recognized also as a 1 B.1 rare plant (seriously threatened) by the California Native Plant Society. Research has been conducted on the reproductive ecology (Tyler et al. 2023), germination cues and seedbank dynamics (Tyler and Odion 2020), and early responses to prescribed burning (Odion and Tyler 2002). A recent comprehensive review summarizes what is known about the ecology and current conservation status of the species (Tyler and Kofron 2024).

A continuing threat to the persistence of Morro manzanita is clearing of habitat for conversion to residential development. USFWS (1994) stated "the restricted range and narrow habitat requirements of *A. morroensis*, coupled with continuing alteration, destruction, and fragmentation of habitat, make it vulnerable to becoming endangered in the near future." Although progress has been made in protecting maritime chaparral and coastal scrub with Morro manzanita through establishment of preserves, and federal listing under the ESA, threats by development on private lands remain. In addition, existing management to protect the species on public land is limited. In this petition, we present information to support listing Morro manzanita as an "endangered" species under the California Endangered Species Act (CESA). The protections afforded by CESA would be key to ensuring this species' persistence into the future.

2. RANGE, DISTRIBUTION, AND ABUNDANCE.

Morro manzanita is restricted to a small portion of coastal area in and near Los Osos, San Luis Obispo County, California (Fig. 2). Its distribution is predominantly correlated with the Pleistocene eolian sand mapped as Baywood fine sand (Carpenter and Storie 1928; Soil Conservation Service 1984; Wiegers 2009), where there is no slope to moderate slope (Fig. 3).

The current range of this species has been estimated to comprise ~ 350 ha based on mapped polygons that contain the species at various cover classes (Mullany 1990; LSA Associates 1992). However, Tyler and Odion (1996) pointed out this was an over-representation of the actual existing cover of Morro manzanita because individuals are often present in low-density patches

within a matrix of associated plant communities. In order to estimate the aerial cover of the species alone, Tyler and Odion (1996) recalculated to account for stands with a sparse cover having been equally weighted with stand with high cover. Using previously reported cover classes and estimated acreage of each (from Mullany 1990 and McGuire and Morey 1992) they estimated the species itself actually covered less than 162 ha (Tyler and Odion 1996). As a shrub with multiple stems at the base, sometimes present in dense stands, it is difficult to accurately determine counts of individual Morro manzanitas. However, LSA Associates (1992) used an estimated average individual size of 9 m^2 to propose a total population size of ~153,000. Crawford et al. (2004) estimated number of individuals range from 86,000 to 153,000.

The primary source of information on the geographic range of the species is the CNDDB (CDFW 2021). For Morro manzanita there are six known occurrences, each with an assigned number by CNDDB, which are not in sequence. As knowledge of the species' distribution improved, some previously recognized occurrences have been combined with other occurrences, maintaining the criteria that separate occurrences are >0.4 km from any other occurrence. Thus, the assigned numbers for Morro manzanita occurrences are 1, 4, 9, 18, 20 and 21 (Fig 2). Detailed information on these occurrences, and one new occurrence, were reported in Tyler and Kofron (2024) and summarized below.

For occurrence 1, Wieslander and Schreiber (1939) give the location for paratype specimen (UC1334951/Ben Bolt 644/VTM14631) as "Valencia Peak", collected 23 March 1936. They state the distribution of Morro manzanita as "sandy hills south of Morro Bay, 100 — 400 feet", but Valencia Peak (Montaña de Oro State Park) is 1,345 ft/410 m elevation with soils defined as Lopez very shaly clay loam, 30-75% slope (Soil Conservation Service 1984). Data in the pocket of the herbarium sheet give the following information: 1 mile east-northeast Valencia Peak; verbatim elevation as "400" ft; and habitat as woodland, north slope, and small type Monterey shale. CNDDB states "exact location unknown. mapped as best guess 1 air mile ENE of Valencia Peak". Recent field surveys, reported in Tyler and Kofron (2024), were unsuccessful in locating any Morro manzanita at this location. They suggest "Valencia Peak" or 1 mile east-northeast Valencia Peak are erroneous data and that the presence of Morro manzanita south of Valencia Peak should be investigated to determine if this occurrence remains valid.

Occurrence 4 is in north Los Osos. It is comprised of the Elfin Forest Preserve, the adjacent part of Morro Bay State Park, and private land (CDFW 2021). It is mapped as 16 polygons, mostly according to data from 1980 and 1990 to 1992. Where Morro manzanita is present in this occurrence it is at very low cover, from <1% to 25% cover (Mullany 1990). Estimates of abundance are not available. The majority of private land are residential parcels; here some individual Morro manzanitas are incorporated into residential landscaping (CDFW 2021) but total numbers are likely substantially reduced and their ecological function is unknown.

Occurrence 9 is west of Pecho Valley Road, and south of the west end of Los Osos Valley Road extending to ridges south of Hazard Canyon. This occurrence includes multiple preserve properties as well as private land. It is mapped as 15 polygons, mostly according to map data from 1980 and 1990–1992, with an estimate of >152,200 plants. It comprises the largest occurrence (CDFW 2021).

Occurrence 18 is in Morro Bay State Park. We observed ~ 12 individuals on 28 January 2023. We also observed here Oso manzanita *A. osoensis*. This is the northmost occurrence for Morro manzanita. The rocky, volcanic exposure of porphyritic dacite (igneous rock; Wiegers 2009) is an unusual substrate for the species. The underlying substrate is mapped as Rock outcrop-Lithic Haploxerolls complex (Soil Conservation Service 1984). The only previous observation here was in 1989 (Mullany 1990) with one or a few individuals reported.

Occurrence 20 is/was at coordinates 35.31398, -120.81615, as mapped by Mullany (1990) at the eastern terminus of Freeman Lane in east Los Osos. Tyler and Kofron (2024) reported that this occurrence is now likely extirpated as a result of house and facilities construction at this site in 2005

Occurrence 21 is in Morro Bay State Park. It is 19 m south of the Crespi Trail, on a south facing outcrop of shale (Nelson 2015). Soil Conservation Service (1984) mapped the underlying substrate as Rock outcrop-Lithic Haploxerolls complex. In 2023 Tyler and Kofron (2024) observed ~ 20 individuals at this occurrence, some with flowers and growing with Oso manzanita. The only previous observation of this occurrence was by Nelson (2015), who reported many plants.

Tyler and Kofron (2024) reported one new occurrence in their 2023 field surveys. They confirmed the presence of Morro manzanita along the Manzanita Trail and East Boundary Trail in Montaña de Oro State Park (described in Mullany 1990) at three localities not recorded in CNDDB (CDFW 2021). These were: 35.29106, -120.85267; 35.28797, -120.84735; and 35.29085, -120.84406. The first new locality with ~ 10 individuals is 0.37 km from occurrence 9, and thus would be included in this occurrence. The latter two (eastmost) comprise a new occurrence. The second new locality is 0.59 km from occurrence 9 (thus a new occurrence), and the third with one individual is 0.66 km from occurrence 9. At the second locality, which was at the periphery of a rocky outcrop, we observed ~ 12 individuals of Morro manzanita and several brittle leaf manzanita *A. crustacea* subsp. *crustacea*. The underlying soil type for all three new localities is mapped as Santa Lucia shaly clay loam (Soil Conservation Service 1984). Data for these localities were submitted through online field survey forms to CNDDB, and voucher specimens were deposited in the herbarium at UC Santa Barbara's Cheadle Center for Biodiversity and Ecological Restoration.

Summarizing the findings based on data for all occurrences of Morro manzanita from the CNDDB (CDFW 2021) and their field surveys, Tyler and Kofron (2024) proposed that the location of occurrence 1 was based on erroneous data, and that occurrence 20 is no longer extant. Three of the remaining three occurrences - 18, 21 and the one new occurrence - are small but significant outlying stands at the edges of the species' range. Occurrences 9 and 4 represent at least 98% of this species' area of occupancy, but these include land that has been converted to residential development. This is especially evident in occurrence 4 where many polygons mapped as Morro manzanita in north Los Osos are clearly lined by streets and dominated by houses (Fig 4.) This is also the case for some outlying polygons in occurrence 9 east of Morro Dunes Ecological Reserve Bayview Unit, and west of the Broderson Site. However, occurrence 9 also includes the largest remaining contiguous stands with highest cover (75 to 100%) of Morro manzanita (Mullany 1990). Especially noteworthy from a conservation perspective is that most

of these intact high cover stands are on private land south of the Broderson Site and southwest of Cabrillo Estates.

3. POPULATION TRENDS

The historical geographical range of Morro manzanita was estimated to comprise 800 to 1,100 ha (USFWS 1994). However, by the early 1990's, the area of occupancy was estimated to remain at only ~ 350 ha (Mullany 1990; LSA Associates 1992). This represented a loss of two-thirds of the species' historical geographic range, due to removal of individuals and habitat elimination (Odion and Tyler 2002). By 2013~ three-fourths of the historical habitat had been converted for residential use, resulting in highly fragmented populations (USFWS 2013) (Fig. 4).

Tyler and Odion (1996) Using previously reported cover classes and estimated acreage of each (Mullany 1990; McGuire and Morey 1992), they estimated the species area actually covered less than 162 ha (Tyler and Odion 1996). Whether considering area occupied by the species alone (~162 ha) or the habitat area of occupancy (~350 ha), it is clear that this is a significant reduction from the historical range for Morro manzanita. This substantial reduction in extent of the species, as well as the planned residential development that would lead to further local extirpation, was highlighted in the listing of the species as threatened in 1994 under the US Endangered Species Act (USFWS 1994).

4. LIFE HISTORY

4.1 Species Description. Wieslander and Schreiber (1939) first named and described Morro manzanita, referencing specimens collected in 1936 and 1938 in and near Hazard Canyon south of Morro Bay, an area now in Montaña de Oro State Park. The three collections, including holotype, are filed in the Herbarium at the University of California Berkeley (Wieslander and Schreiber 1939). Additional specimens used by Wieslander and Schreiber (1939) to verify the range are in the herbaria at Stanford University and the California Academy of Sciences.

Morro manzanita is an erect spreading shrub, generally 1 to 4 m in height (Parker et al. 2012), with some older individuals reaching 8.5 m tall. This manzanita species lacks a basal burl, which is both a distinguishing taxonomic characteristic, and indicative of its postfire recovery response (Jepson 1916; Wieslander and Schreiber 1939; Keeley and Zedler 1978). Some woody or shrub species - those with underground/basal burls - have the ability to resprout following fire, while others are non-sprouters that rely on postfire establishment of seedlings from a long-lived dormant seed bank (Wells 1969; Keeley 1991; Whelan 1995). The latter are "obligate seeders", a relatively uncommon life history type found mostly among shrubs in semiarid areas in California, Australia, and South Africa (Bond and van Wilgen 1996). Since the adults are consumed by fire, the persistence of populations of obligate seeders is dependent on the sufficient accumulation of viable seed in the soil seed bank in the interval between fires. Morro manzanita is an obligate-seeding species.

Other distinctive morphological traits include its bark and leaf morphologies. The grayish-brown bark on mature stems is shreddy but persistent. Its leaves are oblong to oblong elliptic (1.5 to 3 cm long), truncate to subcordate at the base (not auriculate clasping), with short petioles (2 to 5 mm). Notably, the leaf surfaces are unlike: dark green, shiny and lacking stomata above, while gray-tomentose on the lower surface (Hoover 1970; Wells 2000; Parker et al. 2012). Wells (1968) determined that Morro manzanita has a base chromosome number of 13 and it is diploid (2n = 26).

4.2 Lifespan. Morro manzanita is slow-growing and long-lived. While maximum lifespan has not been reported, Tyler and Odion (1996) estimated stand ages using historical aerial photographs from the collection in the Map and Imagery Library at the University of California, Santa Barbara. They examined images from 1949 to 1992 to identify areas that had been cleared and/or burned. In addition, cross-sections of co-occurring wedgeleaf ceanothus were collected from the areas where stand age was estimated; this species is an obligate seeder and thus would have germinated following fire, at the same time as the manzanitas present in the stand. The annual ring counts from cross-sections confirmed the minimum stand ages based on aerial photos. In 1996, the stand ages ranged from 37 to >47 years old, with the large tree-like (arborescent) individuals in the Elfin Forest Preserve estimated to be substantially older than 47 years; as described above, some of these individuals are exceptionally large. Since that 1996 report, there has been only one fire in all sites surveyed, a prescribed burn conducted in 1998. Thus, at present the youngest stand is 25 years old, and the oldest stand is a minimum of 74 years old (though most likely it is much older).

4.3 Flowering and pollination. One of the distinctive and distinguishing characteristics of species in the genus *Arctostaphylos* are the "nascent" or immature inflorescences, developed many months before flowering (Jepson 1938; Keeley 1997). In Morro manzanita, these immature panicles are pendent and campanulate (Wieslander and Schreiber 1939; Parker et al. 2012). Small urn-shaped flowers, which are white and occasionally tinged with pink, appear in January through March.

Similar to other obligate-seeding manzanita species (Keeley 1977; Fulton and Carpenter 1979; Mahall et al. 2010), Morro manzanita produces abundant flowers. Tyler et al. (2023) recorded an average of 50 to 135 flowers per stem across a two-year period. Flower production (number of flowers per stem) varies among sites and among years with much higher (two times the average) flower production across sites in a very wet year (1998) compared to a year with below- average rainfall (1999) (Tyler et al. 2023). In Morro manzanita flower production was most strongly related to present year resources (rainfall) (Tyler et al. 2023), which is similar to observations reported for pointleaf manzanita *A. pungens* (Richardson and Bronstein 2012).

Reproduction of Morro manzanita is **dependent on pollinators**. Tyler et al. (2023) found that when inflorescences were bagged to exclude animal pollinators, fruits were not produced. Bees are the most common pollinators of Morro manzanita, and include yellow-faced bumblebees *Bombus vosnesenskii*, the common anthophorid bee *Anthophora urbana*, halictid bees, *Colletes* sp., and European honey bees *Apis mellifera*. Other pollinators observed visiting Morro manzanita flowers include syrphid flies, monarch butterflies *Danus plexxipus*, bee flies

Bombylius sp. and Anna's hummingbird *Calypte anna* (Tyler et al. 2023). This is consistent with research on congeners that demonstrated self-compatibility and reliance on pollinators for successful reproduction – pink bracted manzanita *A. pringlei* var. *drupacea* and *A. glauca* (Brum 1975) and *A. pungens* (Richardson and Bronstein 2012). Bees have also been found to be important pollinators of other manzanita species (Gankin and Major 1964; Brum 1975; Fulton and Carpenter 1979). Morro manzanita's dependence on pollinators, especially insects, has important implications for conservation. The impacts of habitat loss and fragmentation are both direct and indirect, as small populations or isolated stands may experience pollinator limitation and low seed production (Agren 1996; Cunningham 2000; Tyler et al. 2023).

4.4. Fruiting. Fruit set, or the percent of flowers producing a fruit, varies among sites and years, ranging from an annual average of 10 to 18% (Tyler et al. 2023). These data were reported for two adjacent years (1998, 1999), with fruit set being consistent across years for some sites, and varying significantly (5 times higher in one year) at another site. To our knowledge, the only other reported data on fruit set in manzanitas are for *A. pungens* (Richardson and Bronstein 2012), in which highest values for fruit set in control/natural conditions was 36% in 1998, and no fruit set observed in the following year. Thus, although we suspect fruit set is comparatively low in Morro manzanita, longer-term data and data on congeners are lacking in order for this to be confirmed. Seed set, as determined by viable seed to ovule ratios, has been investigated in several species of manzanita by Kelly and Parker (1991). They reported that Morro manzanita has an average of 7.3 ovules per ovary/fruit (each flower contains one ovary in the Ericaceae), and that seed set is relatively high at 73% (Kelly and Parker 1991). This suggests that once pollinated, Morro manzanita successfully produces viable seeds, and that low fruit set may indicate pollinator limitation (Tyler et al. 2023.)

The fruits mature in spring-summer. They are reddish-brown and spherical to slightly flattened, or depressed globose. Morro manzanita fruits are drupes, covered by a thin exocarp, and containing a dry, mealy mesocarp surrounding multiple hard stones or "nutlets" (Meyer 2008; Parker et al. 2012). They contain an average of five (Kelly and Parker 1991) to eight (Tyler and Odion 1996) nutlets (i.e., seeds) per fruit. The nutlets are free to strongly adherent (i.e., partially fused.) Fruit drop occurs in late spring to late fall, though the timing can vary annually. Tyler et al. (2023) found that the majority of fruits fell from the plants during June and early July one year (1998), and August to early October in the following year (1999.)

4.5. Fruit predation. Dropped fruits of Morro manzanita are removed quickly by predators. Tyler et al. (2023) conducted studies of fruit removal rates by vertebrate predators, carried out in two years (1998, 1999). They found that in both years, predators, most likely small mammals and birds, removed a majority of fruits and did it relatively quickly. From 60 to 70% of fruits were removed within 1.5 months in both years. High predation rates have been reported for other species of manzanita (Keeley 1977; Kelly and Parker 1990).

Fruit removal alone does not mean all seeds are eliminated from the site, as some animals may scatter-hoard or cache seeds that could be incorporated into the soil seed bank (Parker 2015; Crowe and Parker 2023). However, in Morro manzanita it is unknown if such a mutualistic relationship exists, and some evidence points to consumers as seed predators rather than planters. For example, sites where seed bank density is exceptionally low (Elfin Forest) have the highest

rates of fruit removal (Tyler and Odion 2020; Tyler et al. 2023). In addition, relatively few Morro manzanita seeds are found in the soil away from the shrub canopies, and overall viable seed densities can be very low (Tyler and Odion 2020), suggesting that predation of a large fraction of fruits, even if some were buried and forgotten, could have a net negative impact.

4.6. Seed input and seed banks. Based on seed drop, seed predation rates, and estimates of the number of seeds per fruit for Morro manzanita, Tyler et al. (2023), estimated annual seed input to the soil seed bank over two years (1998 and 1999). The relative addition of seeds across years was similar at all sites (i.e., about 1.5 times greater in 1998 compared to 1999). However, seed input varied considerably among sites, and **rates appear to decline with stand age**. Annual seed input was at least 4 times lower at the oldest-aged stand at the Elfin Forest (316 seeds per m^2 in 1998) compared to the youngest stand in Montaña de Oro State Park (1,608 seeds per m^2 in 1998). The intermediate-aged stand had an intermediate value with an estimated seed input of 912 seeds per m^2 in this same year.

Tyler and Odion (2020) examined soil seed banks in different-aged stands, predicting that seed densities would be positively correlated with stand age. Soil cores (10 cm depth) were collected under multiple shrubs across three sites. Morro manzanita seed density in the soil varied greatly among sites, from 1,326 to 62,251 seeds per m^2. However, contrary to expectations, the oldest had especially low seed densities (Tyler and Odion 2020). Since seed input, as described above, was particularly low in the oldest stand, seed densities in the soil seedbank may decline even further. There has been one other study (Parker and Ingalls 2022) that reported seed bank densities of Morro manzanita. In their comparative study of ten *Arctostaphylos* species to investigate the relationship between seed size and seed bank density, Parker and Ingalls (2022) collected Morro manzanita seed and estimated the seed bank density (for 5 cm deep cores) to be an average of 1,900 per m^2. Although the location of their collections is not reported, if this value is doubled to make an equivalent comparison to results reported by Tyler and Odion (2020), their finding of a seed density of ~ 3,800 per m^2 is within the same range. Further study is warranted to investigate change in soil seedbanks over time. In addition, understanding the dynamics of fruits and seed accumulation in the litter layer would be useful as this may be a potential seed source for restoration efforts.

4.7. Seed viability and germination cues. Percent viability of Morro manzanita seeds, i.e., the proportion of viable to total seeds, within the soil seed bank is **very low** across all stands, with an average of 4% (Tyler and Odion 2020). The oldest stand (the Elfin Forest) has exceptionally low seed viability averaging 2%. Viability of fresh seeds has not been recorded in the literature, so rates of change with seed age are unknown.

Morro manzanita is an obligate-seeder, meaning that it does not resprout when the crown and stem are burned, and thus must re-establish from seeds in the soil seed bank. Seeds of obligate-seeders are mainly or even completely refractory (Sweeney 1956; Keeley 1987; Keeley 1991); that is, germination is inhibited until primary dormancy is released by a specific mechanism. Fire-related cues such as heat and by-products of combustion have been identified as principal mechanisms that break seed dormancy of fire recruiters that rely on soil-stored seed (Keeley 1991). In other manzanita species, germination rates are low, but enhanced with smoke, charate, heat shock, or some combination of these treatments (Odion 2000; Keeley et al. 2005; Jurado et

al. 2011). Tyler and Odion (2020) examined germination of Morro manzanita seeds in response to various cues, and confirmed that germination, while very low on average (1 to 4%), was greatest in treatments that combined heat and charred wood. However, neither heat nor charred wood alone enhanced germination (Tyler and Odion 2020.) One factor responsible for low germination is that seed viability is very low – from 3 to 6%. Germination as a percentage of estimated viable seeds was found to be relatively high (23 to 100%). Unexpectedly, ~ 40% of viable seeds from the soil seed bank germinated with no fire treatments. Viability and germinabilty of fresh Morro manzanita seed has not been investigated. Although fresh and litter-stored seeds are unlikely to contribute to post-fire seedling establishment, as they would be consumed in a burn, this seed source might be used in restoration purposes; thus, study of its viability rates and germination cues is recommended.

4.8. Response to and recovery from fire. To assess the effects of burning on seedling establishment in Morro manzanita, a prescribed fire was conducted by California State Parks in Montaña de Oro State Park in 1998. At the time of the burn, the stand was 40 years-old. The total area burned was ~ 2.3 ha. Odion and Tyler (2002) recorded pre-burn seed densities and seed viabilities, seed mortality due to fire, and postfire germination and seedling survivorship for three years, to compare the population that established after the burn with the one present before.

Prior to the burn, there was abundant soil-stored seed, ~ 11,000 seeds per m^2, though seed viability in this stand (and all others) was low, resulting in an average of 334 viable seeds per m^2 before the fire (Odion and Tyler 2002). As was expected, seed mortality through the burn was high, and following the experimental fire only about a third remained, leaving an average of 99 viable seeds per m^2. Germination was recorded in the first two wet seasons after the fire, though most seedlings did not survive their initial summer drought. After three years, the density of Morro manzanita seedling was less than half the estimated density of the adult shrubs present before the fire. The authors speculated that the most likely factors responsible for the low number of seedling recruits were low numbers of viable seed in the soil, and relatively high mortality of both germinants and young seedlings. Based on early postfire observations, Odion and Tyler (2002) suggested that with further mortality of the remaining seedlings and no additional germination, the 40-year-old stand may not have had an adequate seed bank to compensate for mortality and thus prevent population decline.

To improve understanding of long-term post-fire recovery of Morro manzanita, Tyler and Kofron (2024) resampled the stand burned in 1998. Twenty-five years post-burn they found that cover of Morro manzanita along the original vegetation transects was high, ranging from 30% to 100%, with a median of 93%, and mean of 83% cover Morro manzanita. This was substantially greater than three years after the burn, when Morro manzanita seedlings accounted for < 1% cover. This longer-term survey suggests that this stand is recovering slowly but successfully from the fire, at least in terms of percent cover of Morro manzanita.

While this stand was relatively young (40 years old) at the time of the prescribed fire, seedbank densities and subsequent seedling recruits may have indeed been adequate to restore cover of adults killed in the burn. Findings reported by Tyler and Kofron (2024) highlight that while early post-fire sampling is appropriate and useful, to accurately determine the response to fire in long-lived obligate-seeding species, much longer time scales of observation, on the order of decades,

are required. Their recent survey also indicates that burning should not be avoided as a management tool in supporting restoration of Morro manzanita, though stand age should be an important factor in considering the appropriate use of fire for a particular area. Odion and Tyler (2002) and Tyler and Kofron (2024) recommend against burning stands that are much younger than 40 years; another decade or so of seed input may have substantially increased the viable seed and thus potential seedling recruits in the prescribed burn stand. At this time, since nearly all stands containing Morro manzanita are at least 74 years old, with the exception of the 2 ha area described above, prescribed fire may be one of the most effective tools in ensuring the regeneration of new individuals in aging stands. This approach may not be feasible in some sites where there is close proximity to residential development, such as the Elfin Forest Preserve, even though these oldest stands may be experiencing declining soil seedbanks over time (Tyler and Odion 2022). In such sites, exposing seedbanks to fire-related cues to stimulate germination, using small scale approaches such as burn boxes, or treating soil off-site could be suitable alternatives.

5. KIND OF HABITAT NECESSARY FOR SURVIVAL

Morro manzanita is found only along a small portion of the Central California coast at elevations <200 m (Parker et al. 2012), primarily on stabilized sand dunes of Baywood fine sand (Carpenter and Storie 1928; Soil Conservation Service 1984; Wiegers 2009), with few outlying locations on outcrop shale or volcanic igneous substrate. The climate is Mediterranean, with cool moist winters and warm dry summers. Fog is common, and has been found to play a key role in determining the physiological performance of *Arctostaphylos* species (Vasey et al. 2014). Temperatures range from ~ 6.5º to 23.5ºC, and mean annual rainfall (recorded at Morro Bay Fire Station) is 42.1 cm, with 75% occurring between November and April (Tyler and Kofron 2024). The factors influencing species composition in the community types hosting Morro manzanita have not been investigated, but likely include soil characteristics, fog frequency, patch size, time since fire, and extent of soil disturbance or mechanical clearing.

6. FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE

6.1. Seedbank density and seed viability. Morro manzanita is an obligate-seeder, meaning that it does not resprout when the crown and stem are burned, and thus must re-establish from seeds in the soil seed bank. Percent viability of Morro manzanita seeds, i.e., the proportion of viable to total seeds, within the soil seed bank is very low across all stands, with an average of 4% (Tyler and Odion 2020).

6.2. Reproductive issues in isolated stands. Tyler and Odion (2020) found that seed from Morro manzanita in the most isolated stand, the Elfin Forest Preserve, had significantly lower seed viability compared to other stands, 2% vs. 4%, respectively. They hypothesized that low seed viability and high ‘‘infertility’’ (no evidence of embryo development) at the isolated stand may have been caused by inbreeding effects. Tyler et al. (2023) also reported especially low fruit

set at this isolated stand. Given the dependence of Morro manzanita on pollinators for successful reproduction (Tyler et al. 2023), the authors suggest that pollinator limitation may pose a threat to adequate fruit and seed production, particularly in small, isolated stands.

6.3. Clearing of habitat for residential development. Clearing of habitat for residential development, including the direct removal of Morro manzanitas is the **primary threat** to this species. Conversion of the remaining, high density, intact stands to residences under the Los Osos HCP would be an irreversible loss of Morro manzanita and habitat. In addition, clearing exacerbates the negative impacts of existing fragmentation by further reducing the patch sizes of and connections among the remaining stands (Tyler er al. 2023).

7. DEGREE AND IMMEDIACY OF THREAT

7.1. Clearing of habitat for residential development. A threat to the persistence of Morro manzanita and a primary factor in its Federal listing is clearing of habitat for residential development. USFWS (1994) stated "the restricted range and narrow habitat requirements of *A. morroensis*, coupled with continuing alteration, destruction, and fragmentation of habitat, make it vulnerable to becoming endangered in the near future." Although progress has been made in protecting maritime chaparral and coastal scrub with Morro manzanita through establishment of preserves, threats by development on private lands remain. One of the largest remaining intact areas with high cover of Morro manzanita is on private land. Conversion of these stands to residences would be an irreversible loss of both Morro manzanita individuals and habitat capable of supporting this species. Such loss of habitat exacerbates the current negative impacts of fragmentation including reduced movement of pollinators and other associated species.

In addition, alteration of the habitat on private land adjacent to housing, due to current fire management practices, extends negative impacts into intact Morro manzanita stands. California's new code section 51179 requires homeowners in areas at high risk of wildfire to maintain a defensible space around their homes, which is an area free of excess or dead vegetation. Ninety-five percent of occurrence 9 is an area designated very high risk, which is the most severe category. This includes the following housing estates in Los Osos: Vista Court, Cabrillo Estates, the Seascape Place/Rodman Drive area, Bayview Heights, and Marguerite Drive mobile homes area. A homeowner must maintain a combustible-free zone of 1.5 m from the house, a lean/clean/green zone within 9 m feet of the house, and reduce potential fuel within 30 m feet of the house (Kerstein 2021; Calif. Dept. Forestry Fire Prevention 2023). In 2019, a fire break (30 m wide) was constructed around the eastern edge of Cabrillo Estates, in which most vegetation was cleared and Morro manzanita severely pruned, removing the majority of shrub canopies and removing low branches contacting the ground. CA Department of Forestry and Fire Prevention is currently proposing to extend this firebreak to encompass the Seascape Place/Rodman Drive area along Pecho Valley Road, and construct another firebreak from Cabrillo Estates eastward to the vicinity of Los Osos Oaks State Natural Reserve. Such intensive removal of manzanita biomass converts this former maritime chaparral habitat to open landscaping with denuded shrub-like specimens. The functional ecological value of these pruned manzanitas is unknown, though without doubt their reproductive output will be substantially reduced and habitat for associated

wildlife will be altered. The original listing for Morro manzanita (USFWS 1994) acknowledged the past and future potential for such deleterious impacts stating that "in addition to direct removal of habitat, development has had secondary effects on quality of adjacent remaining habitat, such as fragmentation, deterioration of habitat due to increased recreational activity, and the introduction of non-native species." Clearing for firebreaks around residences that are adjacent to high cover Morro manzanita stands is another such secondary impact that poses a potential threat to the species. While maintaining defensible space is an important and valid public safety concern, it would be beneficial to explore alternatives to severe thinning of manzanitas beyond the 9 m requisite border, or to consider mitigation of impacts off-site.

7.2. Non-native, invasive plant species. Non-native, invasive plant species remain a threat to Morro Manzanita since listing in 1994 (USFWS 1994). Species include iceplant *Carpobrotus* sp., veldt grass *Ehrharta calcina*, and *Eucalyptus* spp. The latter is especially problematic. *Eucalyptus* plantations, as well as small stands, were planted in the early 1900's in Los Osos and within what is now Montaña de Oro State Park (Hook 1988). Based on soils, Baywood fine sands, and adjacent vegetation, it is very likely these were planted in sites formerly occupied by Morro manzanita (Mullany 1990). Where extensive *Eucalyptus* plantings abut dense Morro manzanita stands, few mature manzanitas remain under *Eucalyptus* canopy and there is no regeneration there, perhaps due to competition for water or other biotic factors (Mullany 1990.) Also concerning is that expansion of *Eucalyptus* has been documented. In 1949 *Eucalyptus* covered 48.3 ha, by 1986 it had expanded to 73.5 ha (Bicknell 1990), and by 2021 it had further expanded to 141.6 ha (McFadden 2021). Finally, the extensive *Eucalyptus* plantations in Montaña de Oro State Park are highly flammable, and thus pose a wildfire risk. While Morro manzanita is adapted to fire, burning at increased frequencies (i.e., fire intervals under 40 years) could lead to population declines. Dense cover of veldt grass poses a similar risk of altering fire regimes to the detriment of both Morro manzanita and other components of maritime chaparral and dune scrub; similar impacts of invasive species have been documented across a variety of plant communities (Brooks et al. 2004). At the same time, the current *Eucalyptus* plantations offer opportunities for restoration and expansion of Morro manzanita. Removal of at least portions of these plantations followed by seeding or planting with Morro manzanita would allow for re-establishment of this species into its former habitat. Potential locations for the initiation of such efforts would be the edges of *Eucalyptus* stands that have been recently thinned, such as along the East Cable Trail east of Pecho Valley Road in Montaña de Oro State Park. Here, intact Morro manzanita stands persist at the outer edges of the plantations, and removal of 10 to 20 *Eucalyptus* could provide 100 m^2 of area to replant manzanitas, gradually reducing the area occupied by the plantations along the accessible periphery.

7.3. Stochastic events. Stochastic events was identified as a main threat for Morro manzanita at listing (USFWS 1994) because of the negative effects that impact small, isolated populations. Environmental stochastic events that could reduce abundance of Morro manzanita would include wildfires that occur at intervals too short for adequate seedbank stores to accumulate. Frequent fires have not been observed in the area, but increased spread of invasive grasses or flammable *Eucalyptus* species could alter the natural fire regime. Demographic stochasticity refers to random fluctuations in reproduction and mortality, and in small populations these fluctuations can result in reduced growth rates (e.g., allee effect). Although further study is warranted, Tyler and Odion (2020) found that seed from Morro manzanita in the most isolated stand, the Elfin

Forest Preserve, had significantly lower seed viability compared to other stands, 2% vs. 4%, respectively. They hypothesized that low seed viability and high ‘‘infertility’’ (no evidence of embryo development) at the isolated stand may have been caused by inbreeding effects. Small, fragmented plant populations are susceptible to increased genetic drift and inbreeding (Sampson et al. 2016), which compromises plant reproduction (Aguilar et al. 2006). This may be particularly true for Morro manzanita, which is dependent on localized insect pollination (Tyler et al. 2023).

7.4. Climate change. Climate change may present a new threat to Morro manzanita. Langridge (2018) provided a comprehensive assessment of how climate change will affect California's Central Coast, including increased maximum/minimum temperatures, uncertainty in fog, slightly increased precipitation with substantially increased variability, increased extreme rainfall events, accelerated sea level rise, increased drought, and frequent and sometimes large wildfires. Mortality and stem die-off of several large Morro manzanitas in the Elfin Forest Preserve were observed since 2015, which may have been associated with the extremely low rainfall (P. Sarafian pers. comm. 2021) The tolerance of Morro manzanita to climate change is unknown, however, it is a habitat specialist in the coastal zone with marine fog. Morro manzanita cannot disperse to distant locations because it has a small geographic range and endemic soil requirements.

7.5. Sudden Oak Death pathogen *Phytophthora ramorum*. Lee et al. (2019) and Frankel et al. (2020) reported the sudden oak death pathogen affecting multiple species of *Arctostaphylos*, including Morro manzanita in the botanic gardens of the University of California Santa Cruz in 2017 (M. Garbelotto pers. comm. 2022). In 35 years, this disease had killed more than 50,000,000 trees in California and Oregon, primarily tanoak *Lithocarpus densiforus* and coast live oak. Among eight species of *Arctostaphylos* tested for susceptibility, Morro manzanita was intermediate (Garbelotto et al. 2020). Although no infected plants of any species have been found in the wild in San Luis Obispo County, the nearest infections are 3 km north of the county line in Salmon Creek Canyon, southwest Monterey County (M. Garbelotto pers. comm. 2022), which is 72 km north of the nearest occurrence of Morro manzanita (occurrence 18). However, since 2019 the pathogen has been detected by polymerase chain reaction in four streams in coastal San Luis Obispo County: Santa Rosa Creek (also known as Old Creek), 14.8 km north of occurrence 18 (6.6 km northwest of Cayucos); 34 km northwest of occurrence 18; San Simeon Creek, 38 km northwest of occurrence 18; and San Carpoforo Creek, 63 km northwest of occurrence 18. Despite intensive searches, no infected vegetation has been found in the watersheds (K. Corella pers. comm. 2023). Continued monitoring for the presence of this pathogen would be prudent since the potential consequences could be substantial.

8. IMPACT OF EXISTING MANAGEMENT ACTIONS

Since the listing of Morro manzanita in 1994, California State Parks and CDFW have acquired substantial amounts of land for conservation in the vicinity of Morro Bay, including lands occupied by Morro manzanita. There are currently eight preserves that include significant cover of the species, and these are managed by three different agencies – California State Parks,

California Department of Fish and Wildlife, and the County of San Luis Obispo. The preserves are distributed across the Conservation Planning Areas. Approximately half of this area with Morro manzanita is managed by California State Parks, with their largest preserve (Montaña de Oro State Park) included within the South Los Osos and West Pecho Conservation Areas.

The private land south of the Broderson Site and southwest of Cabrillo Estates supports high cover (75 to 100%) of Morro manzanita (Mullany 1990). This encompasses the most substantial portion of remaining unfragmented, intact hectares of Morro manzanita outside of preserves. Protecting these existing core high-density stands from human-induced threats would contribute greatly toward conservation of this species. The Los Osos HCP and U.S. Endangered Species Act can provide only limited protection for Morro manzanita on private land. Homebuilding would convert portions of the remaining, intact parcels into residential development, along with likely subsequent firebreaks for protection. This is an **immediate threat**.

9. SUGGESTIONS FOR FUTURE MANAGEMENT

(1) Conserve and protect existing stands of Morro manzanita, with an emphasis on the largest remaining intact areas with high cover of Morro manzanita. The Los Osos HCP and U.S. Endangered Species Act can provide only limited protection for Morro manzanita on private land. The remaining, intact parcels with Morro manzanita in occurrence 9 should be acquired for conservation management by California State Parks, California Department of Fish and Wildlife, or local land trust.
(2) Encourage discussion with USFWS prior to fuel reduction impacting intact Morro manzanita stands in Los Osos, such as that conducted by CA Department of Forestry and Fire Prevention.
(3) Conduct field surveys to improve the data on current distribution and abundance for Morro manzanita. This should include verifying presence/absence of Morro manzanita in isolated patches mapped across Los Osos residential areas and others, as well as recording new locations. Submit these findings to CNDDB.
(4) Develop and implement site-specific management plans for Morro manzanita within preserves, including success criteria for evaluating effectiveness of management.
(5) Develop protocols for long-term restoration success of Morro manzanita. Conduct research on viability and germination requirements of freshly collected manzanita seed to aid in restoration efforts.
(6) Identify potential restoration sites across conservation planning areas both within protected areas to direct the management efforts there, and within private land to be considered within potential habitat conservation plans. Investigate options for restoring connectivity between fragmented stands, including re-establishment of associated native plant and animal species.
(7) Conduct research to describe the genetic diversity within and among existing stands/patches. If warranted by results of genetic diversity, when planting Morro manzanita for restoration, consider introducing some individuals, generated from seed or cuttings, from non-adjacent stands to enhance gene flow and genetic diversity, especially for isolated stands.
(8) Remove *Eucalyptus* and re-establish Morro manzanita where feasible in the southwest part of the range including sites along Pecho Valley Road. Potential *Eucalyptus* selected for removal

would exclude those individuals identified as Monarch butterfly roost sites or important wind breaks.
(9) Coordinate and share information between agencies, researchers and citizen groups including the San Luis Obispo Chapter of the California Native Plant Society, and Friends of El Moro Elfin Forest, who are involved with outreach and conservation of Morro manzanita.
(10) Continue studies of the relationship of Morro manzanita with fire.
(11) Conduct prescribed burns of vegetation in Los Osos to reduce the risk of wildfire. This would also benefit Morro manzanita by stimulating germination and establishment of new seedlings.
(12) Conduct modeling to anticipate effects of climate change on distribution and abundance of Morro manzanita, including changes in temperature, precipitation, amount and extent of marine fog, and sea level rise.
(13) Collect seeds of Morro manzanita for conservation seed banking.
(14) Introduce Morro manzanita (with representative genetic diversity) into living collections at several botanic gardens.

10. REFERENCES AND SOURCES OF INFORMATION

Agren, J. 1996. Population size, pollinator limitation, and seed set in the self-incompatible herb *Lythrum salicaria.* Ecology 77(6):1779-1790.

Aguilar, R., L. Ashworth, L. Galetto and M.A. Aizen. 2006. Plant reproduction susceptibility to habitat fragmentation: review and synthesis through a meta-analysis. Ecology Letters 9:968-980.

Bicknell, S.H. 1990. Montaña de Oro State Park presettlement vegetation mapping and ecological status of *Eucalyptus*: final report. Submitted to Calif. Dept. Parks Recreation. 80 pp.

Bond, W.J. and B.W. van Wilgen. 1996. Fire and plants. Chapman and Hall, New York, New York.

Brooks, M.L., C.M. D'Antonio, D.M. Richardson, J.B. Grace, J.E. Keeley, J.M. DiTomaso, R.J. Hobbs, M. Pellant and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. BioScience 54(7):677-688.

Brum, G.D. 1975. Floral biology and pollination strategies of *Arctostaphylos glauca* and *A. pringlei* var. *drupacea* (Ericaceae). Ph.D. dissertation. University of California, Riverside, CA. 134 pp.

California Department of Fish and Wildlife (CDFW). 2021. California Natural Diversity Database: Special vascular plants, bryophytes, and lichens list. Sacramento, CA. 156 pp.

California Department of Forestry and Fire Prevention. 2023. Defensible space: practical ways to protect your home from wildfire. https://www.fire.ca.gov/dspace [accessed 28 July 2023].

Carpenter, E.J. and R.E. Storie. 1928. Soil survey of the San Luis Obispo area, California. Bureau of Chemistry and Soils, U.S. Department of Agriculture. Washington, D.C. 60 pp.

Crawford, Multari, Clark Associates. 2004. Los Osos Habitat Conservation Plan, Species Accounts, Appendix D [draft]. Prepared for Los Osos Community Services District, San Luis Obispo County, California. San Luis Obispo, Calif. 309 pp.

Crowe, R. and V. Parker. 2023. The morphological and ecological variation of *Arctostaphylos* (Ericaceae) fruit: a link between plant ecology and animal foraging behavior. Ecology and Evolution 13(3): e9801.
Cunningham, S.A. 2000. Effects of habitat fragmentation on the reproductive ecology of four plant species in Mallee woodland. Conservation Biology 14(3):758-768.
Frankel, S.J., J. Alexander, D. Benner, J. Hillman and A. Shor. 2020. *Phytophthora* pathogens threaten rare habitats and conservation plantings. Sibbaldia, International Journal of Botanic Garden Horticulture 18:53–65.
Fulton, R.E. and F.L. Carpenter. 1979. Pollination, reproduction, and fire in *Arctostaphylos*. Oecologia 38:147-157.
Gankin, R. and J. Major. 1964. *Arctostaphylos myrtifolia*, its biology and relationship to the problem of endemism. Ecology 45(4):792-808.
Garbelotto, M., T. Popenuck, B. Hall, W. Schweigkofler, F. Dovana, R. Goldstein de Salazar, D. Schmidt and L.L. Sims. 2020. Citizen science uncovers *Phytophthora ramorum* as a threat to several rare or endangered California manzanita species. Plant Disease 104:3173–3182.
Hook, D. 1988. Montaña de Oro State Park General Plan. Prepared for California Department of State Parks and Recreation. 212 pp.
Hoover, R.F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. 350 pp. "*Arctostaphylos morroensis*" pp. 215-216.
Jepson, W.L. 1916. Regeneration in manzanita. Madroño 1(1): 3-12.
Jepson, W.L. 1938. Embryonic panicles in *Arctostaphylos*. Erythea 8: 97-99.
Jurado, E., M. Márquez-Linares and J. Flores. 2011. Effect of cold storage, heat, smoke and charcoal on breaking seed dormancy of *Arctostaphylos pungens* HBK (Ericaceae). Phyton-Revista Internacional de Botanica Experimental 80:4-11.
Kauffmann, M., V.T. Parker and M. Vasey. 2021. Field Guide to Manzanitas: California, North America, and Mexico. Backcountry Press. 176 pp.
Keeley, J.E. 1977. Seed production, seed populations in soil, and seedling production after fire for two congeneric pairs of sprouting and nonsprouting chaparral shrubs. Ecology 58:820-829.
Keeley, J.E. 1987. Role of fire in seed germination of woody taxa in California chaparral. Ecology 68(2):434-443.
Keeley, J.E. 1991. Seed germination and life history syndromes in the California chaparral. The Botanical Review 57:81-116.
Keeley, J.E. 1997. Absence of nascent inflorescences in *Arctostaphylos pringlei*. Madroño 44(1):109-111.
Keeley, J.E., T.W. McGinnis and K.A. Bollens. 2005. Seed germination of Sierra Nevada postfire chaparral species. Madroño 52(3):175-181.
Keeley, J.E. and P.H. Zedler. 1978. Reproduction of chaparral shrubs after fire: a comparison of sprouting and seeding strategies. American Midland Naturalist 99(1):142-161.
Kelly, V.R. and V.T. Parker. 1990. Seed bank survival and dynamics in sprouting and nonsprouting *Arctostaphylos* species. American Midland Naturalist 124:114-123.
Kelly, V.R. and V.T. Parker. 1991. Percentage seed set, sprouting habit and ploidy level in *Arctostaphylos* (Ericaceae). Madroño 38(4):227-232.
Kerstein, H. 2021. Reducing the destructiveness of wildfires: promoting defensible space in California. Sacramento, Calif. 38 pp.

Langridge R. 2018. Central Coast Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-006. University of California, Santa Cruz. 115 pp.
Lee C.A., S.J. Frankel and D.M. Rizzo. 2019. *Phytophthora ramorum* and congenerics: global threats to oaks. International Oaks (30):349–356.
LSA Associates, Inc. 1992. An assessment of the status of the Morro manzanita (*Arctostaphylos morroensis*). Prepared for Central Coast Engineering, San Luis Obispo, California. Irvine, Calif. 9 pp.
Mahall, B.E., L.K. Thwing and C.M. Tyler. 2010. A quantitative comparison of two extremes in chaparral shrub phenology. Flora-Morphology, Distribution, Functional Ecology of Plants 205(8):513-526.
McGuire, T. and S.C. Morey. 1992. Report to the Fish and Game Commission on the status of Morro Bay Manzanita (*Arctostaphylos morroensis*). State of California, The Resources Agency, Department of Fish and Game. 47 pp.
Meyer, S.E. 2008. *Arctostaphylos* Adans. manzanita. Pp. 266-270 in The Woody Plant Seed Manual. (Bonner, F. T., R.P. Karrfalt & United States Forest Service, ed.). Washington, D.C.: U.S. Dept. of Agriculture, Forest Service. 1228 pp.
Mullany, M. 1990. The distribution and variation of *Arctostaphylos morroensis* (Ericaceae). Master's thesis, California Polytechnic State University, San Luis Obispo, CA. 101 pp.
Nelson, K. 2015. California Native Species Survey Form: *Arctostaphylos morroensis*, date of field work 06/20/2015. Record in California Natural Diversity Database, Calif. Depart. Fish And Wildlife, Sacramento, CA.
Odion, D.C. 2000. Seed banks of long-unburned stands of maritime chaparral: composition, germination behavior, and survival with fire. Madroño 47(3):195-203.
Odion, D. and C. Tyler. 2002. Are long 1147 fire-free periods needed to maintain the endangered, fire-recruiting shrub *Arctostaphylos morroensis* (Ericaceae)? Conservation Ecology 6(2):4.
Parker, V.T. 2015. Dispersal mutualism incorporated into large-scale, infrequent disturbances. PLoS One 10(7):e0132625.
Parker, V.T. and S.B. Ingalls. 2022. Seed size–seed number trade-offs: influence of seed size on the density of fire- stimulated persistent soil seed banks. American Journal of Botany 109(3):486-493.
Parker, V.T., M.C. Vasey and J.E. Keeley. 2012. *Arctostaphylos*. Pp. 686-702 in The Jepson manual: vascular plants of California, 2nd edition. University of California Press. 1568 pp.
Richardson, L. and J.L. Bronstein. 2012. Reproductive biology of pointleaf manzanita (*Arctostaphylos pungens*) and the pollinator-nectar robber spectrum. Journal of Pollination Ecology 9:115-123.
Sampson, J., M. Byrne, N. Gibson and C. Yates. 2016. Limiting inbreeding in disjunct and isolated populations of a woody shrub. Ecology and Evolution 6:5867-5880.
Soil Conservation Service. 1984. General soil map. San Luis Obispo Co., California, coastal part. United States Department of Agriculture.
Sweeney, J.R. 1956. Response of vegetation to fire. UC Pub. Bot. 28:143-250.
Tyler, C.M. and C.P. Kofron. 2024. Ecology and conservation status of Morro manzanita *Arctostaphylos morroensis*: a threatened plant endemic to Los Osos, San Luis Obispo

County, California. Bulletin of the Southern California Academy of Sciences 123(1):25-52.
Tyler, C.M., D.E. Meade and D.C. Odion. 2023. Flowering, fruit set and seed predation in *Arctostaphylos morroensis,* a rare obligate-seeding shrub. Madroño 70(4):197-209.
Tyler, C.M and D.C Odion. 1996. Ecological studies of Morro Manzanita (*Arctostaphylos morroensis*). Report prepared for the California Department of Fish and Game, Endangered Plant Program. 46 pp.
Tyler, C.M. and D.C. Odion. 2020. Seed banks, seed germination, and implications for conservation of the endangered, fire-dependent shrub, *Arctostaphylos morroensis*. Natural Areas Journal 40(2):155-167.
U.S. Fish and Wildlife Service (USFWS). 1994. Endangered and threatened wildlife and plants; endangered or threatened status for five plants and the Morro shoulderband snail from western San Luis Obispo County, California. Fed. Register 59:64613–64623.
U.S. Fish and Wildlife Service (USFWS). 2013. *Arctostaphylos morroensis* (Morro manzanita). 5-year review: summary and evaluation. Ventura, Calif. 21 pp.
Vasey, M.C., V.T. Parker, K.D. Holl, M.E. Loik and S. Hiatt. 2014. Maritime climate influence on chaparral composition and diversity in the coast range of central California. Ecology and Evolution 4(18):3662-3674.
Wells, P.V. 1968. New taxa, combinations, and chromosome numbers in *Arctostaphylos* (Ericaceae). Madroño 19(6):193-210.
Wells, P.V. 1969 The relation between mode of reproduction and extent of speciation in the woody genera of the California chaparral. Evolution 23:264-267.
Wells, P.V. 2000. The manzanitas of California: also of Mexico and the world. Published by the author. 151 pp.
Whelan, R.J. 1995. The ecology of fire. Cambridge University Press, Cambridge, Great Britian.
Wiegers, M.O. 2009. Geologic map of the Morro Bay south 7.5' quadrangle, San Luis Obispo County, California: a digital database (version 1.0). Sacramento: California Geological Survey.
Wieslander, A. E. and B.O. Schreiber. 1939. Notes on the genus *Arctostaphylos*. Madroño 5(1):38-47.

11. FIGURES AND DETAILED DISTRIBUTION MAPS

Figure 1. Morro manzanita *Arctostaphylos morroensis*: top, in coastal maritime community at Montaña de Oro State Park; and bottom, tree-like individual on the north-facing slopes of the Morro Dunes Ecological Reserve Bayview Unit. The person standing in the bottom photo is 1.86 m tall.

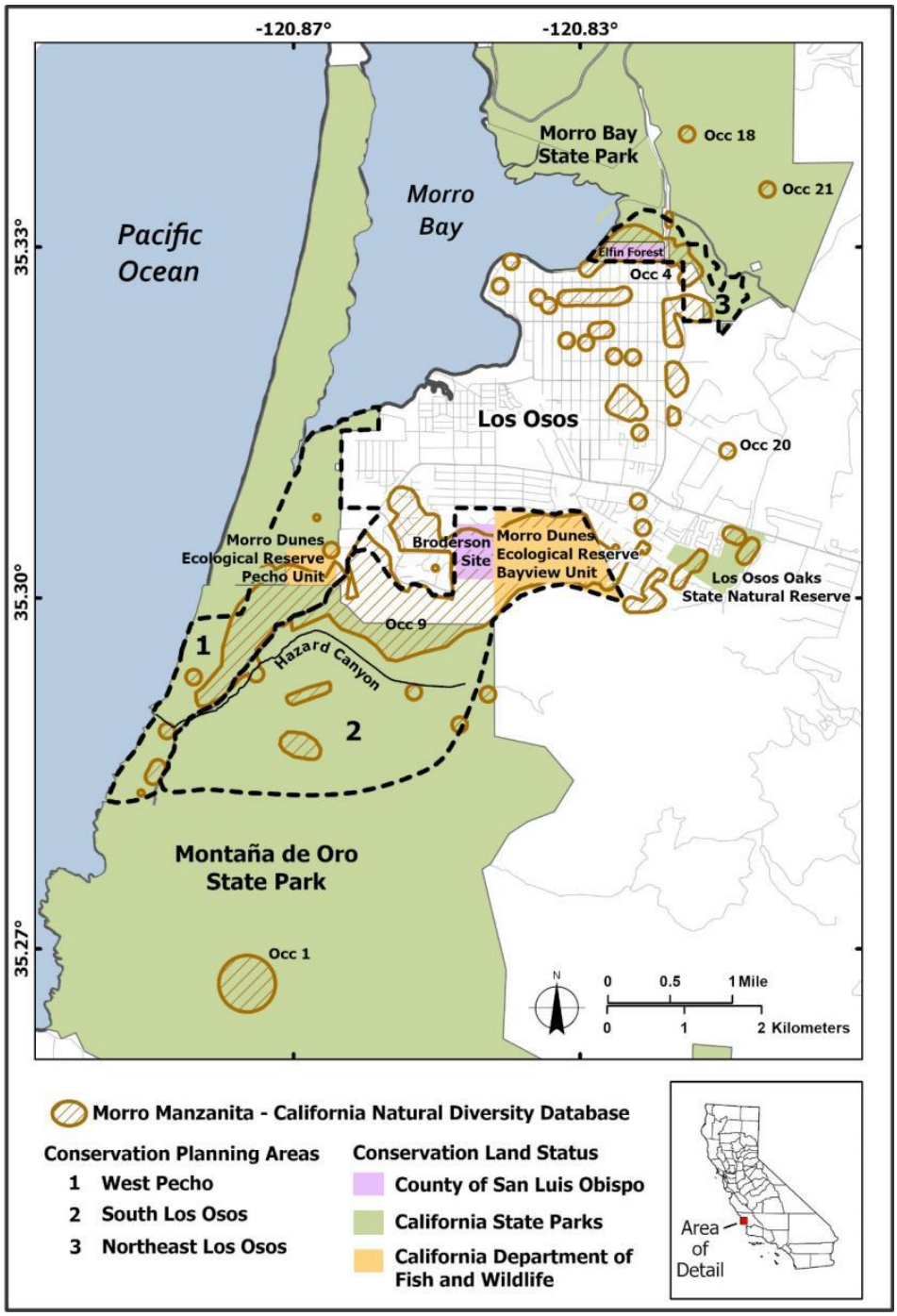

Figure 2. Geographic distribution of Morro manzanita *Arctostaphylos morroensis* in west San Luis Obispo County, California, showing conservation land status (i.e., managing agency). We used GIS map layers for species occurrences in the California Natural Diversity Database (CDFW 2021), which are mostly from maps dated 1980 and 1990 to 1992.

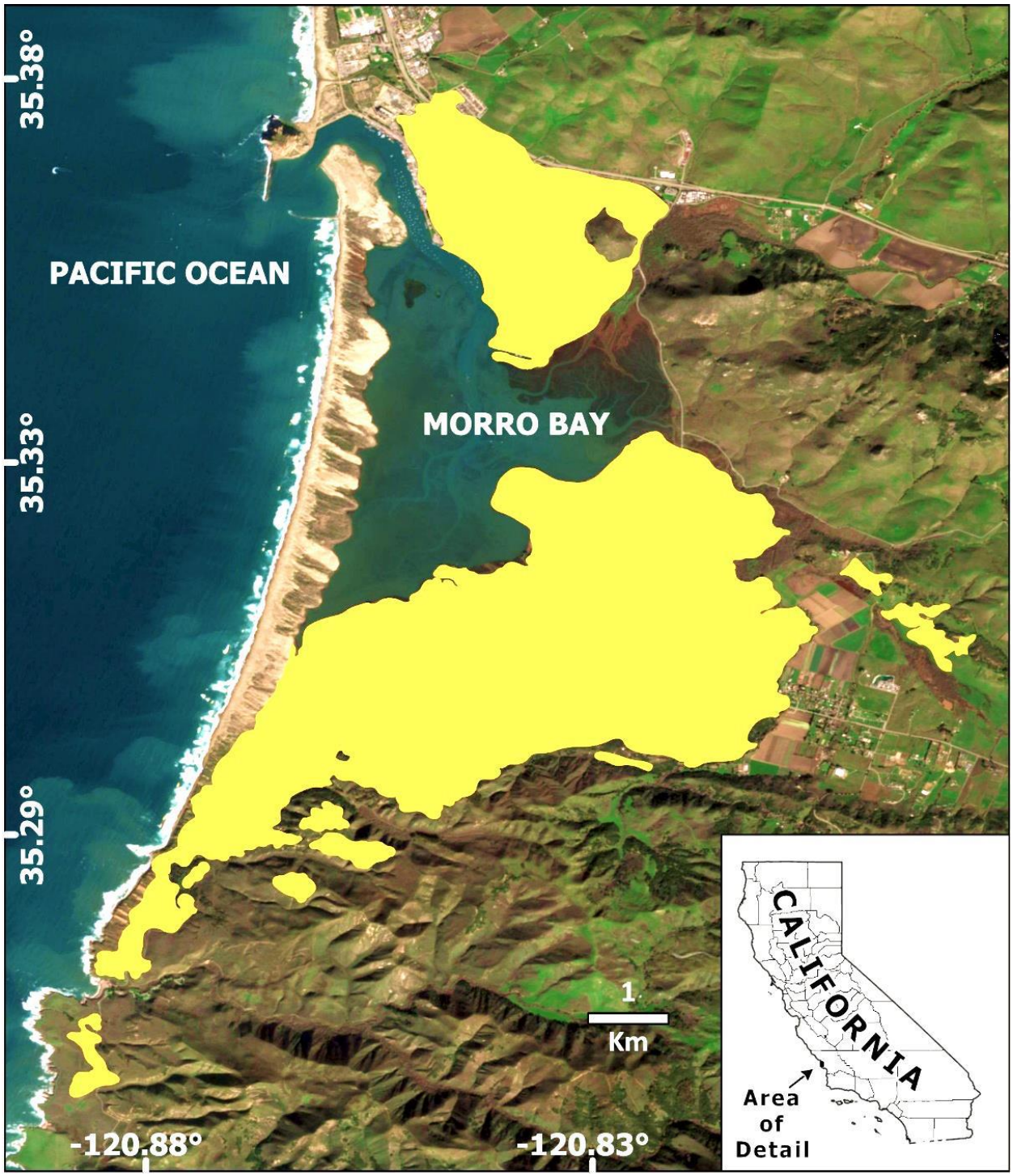

Figure 3. Distribution of Baywood fine sand (shown in yellow) in the Los Osos area, San Luis Obispo County, California.

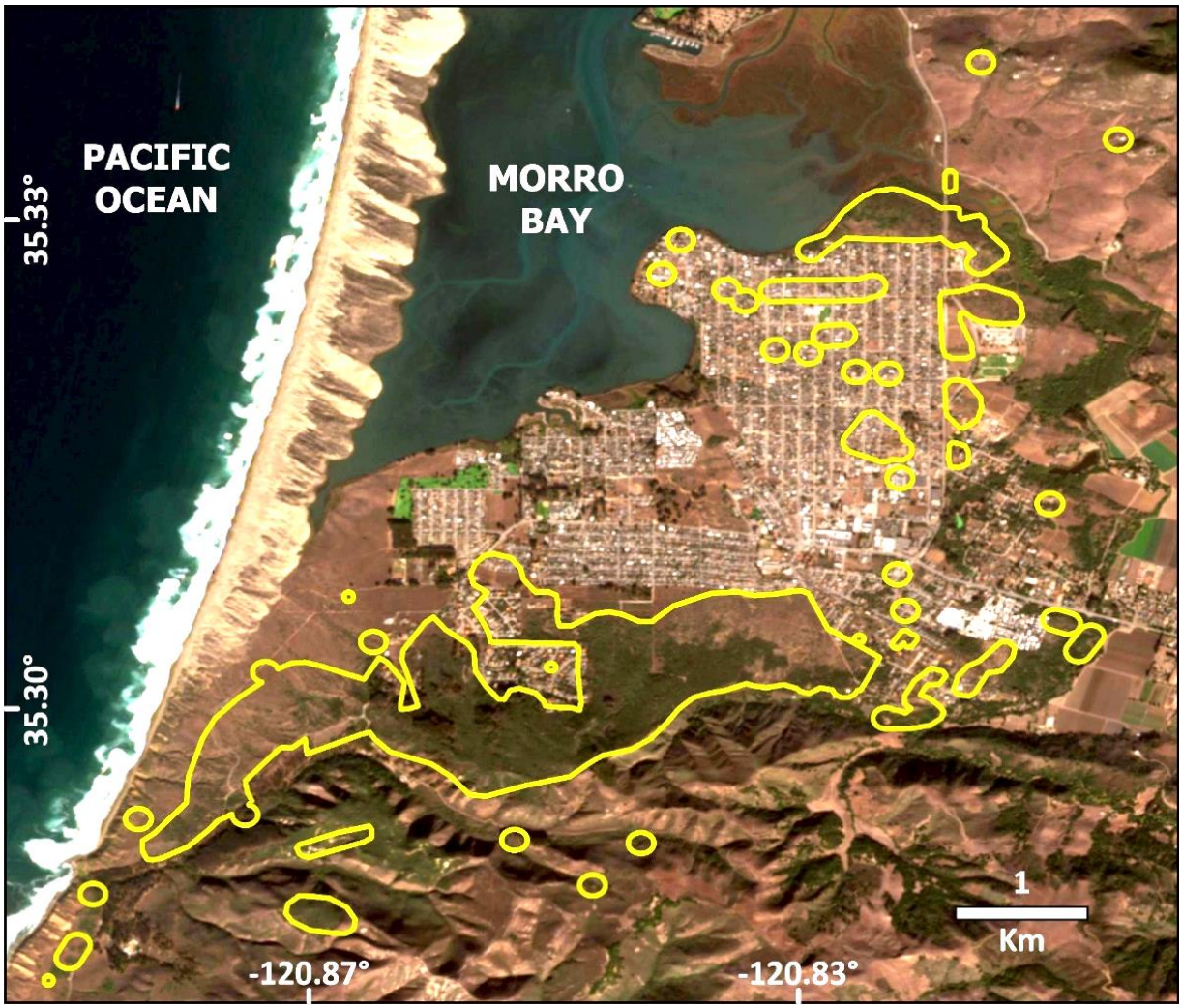

Figure 4. Geographic distribution of Morro manzanita *Arctostaphylos morroensis*, using GIS map layers of California Natural Diversity Database (CDFW 2021), excluding Valencia Peak, and underlain with 2023 Google Earth aerial image. Map credit: Mark Metevier, USFWS.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

California Endangered Species Act

Petition Evaluation for Morro manzanita (*Arctostaphylos morroensis*)

Report to the Fish and Game Commission
November 2024

Cover page photo of Morro manzanita by Kristi Lazar (2024)

Suggested citation: California Department of Fish and Wildlife (CDFW). 2024. Report to the Fish and Game Commission, petition evaluation for Morro manzanita (*Arctostaphylos morroensis*). California Natural Resources Agency, Sacramento CA. 16 pp.

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List of Figures

List of Abbreviations, Acronyms, and Terms

CESA – California Endangered Species Act
CNDDB – California Natural Diversity Database
CRPR – California Rare Plant Rank
Commission – California Fish and Game Commission
Department – California Department of Fish and Wildlife
ESA – Federal Endangered Species Act
et al. – "and others"
HCP – Habitat Conservation Plan
PRISM – Parameter-elevation Regressions on Independent Slopes Model
USFWS – United States Fish and Wildlife Service

Executive Summary

On July 20, 2024, Dr. Christopher Kofron and Dr. Claudia Tyler submitted a petition to the California Fish and Game Commission (Commission) to list Morro manzanita (*Arctostaphylos morroensis*) as endangered pursuant to the California Endangered Species Act (CESA).

On July 30, 2024, the Commission referred the petition to the California Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2024, No. 32-Z, p. 1016). Pursuant to Fish and Game Code section 2073.5 and California Code of Regulations, title 14, section 670.1, the Department prepared this petition evaluation within 120 days of receiving the petition. The purpose of the petition evaluation is to evaluate the sufficiency of the scientific information contained in the petition in relation to other relevant information possessed or received by the Department during the evaluation period, and to recommend to the Commission whether the petition should be accepted and considered.

Morro manzanita is an erect, evergreen shrub in the heath family (Ericaceae). The petition indicates that Morro manzanita is restricted to seven occurrences in and around the town of Los Osos in San Luis Obispo County and occurs primarily on stabilized sand dunes associated with Baywood fine sand. The petition provides information on abundance estimates and declining population trends. The petition highlights five threats to Morro manzanita: (1) clearing of habitat for residential development, (2) non-native, invasive plant species, (3) stochastic events, (4) climate change, and (5) sudden oak death pathogen *Phytophthora ramorum*. Existing management efforts were reviewed and suggestions for future management actions discussed. The petition also includes information sources and provides a detailed distribution map.

After reviewing the petition and other relevant information, the Department has determined that the petition meets the requirements in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1). In completing its petition evaluation, the Department has determined that there is sufficient scientific information to indicate that the petitioned action to list Morro manzanita as endangered under CESA may be warranted. Therefore, the Department recommends that the Commission accept the petition for further consideration pursuant to CESA.

1 Introduction

1.1 Petition Evaluation Overview

This petition evaluation serves as the basis for the California Department of Fish and Wildlife's (Department) recommendation to the California Fish and Game Commission (Commission) on whether the petition to list Morro manzanita (*Arctostaphylos morroensis*) as endangered under the California Endangered Species Act (CESA) should be accepted and considered. The recommendation is based on the sufficiency of scientific information in the petition, as well as other relevant information possessed or received by the Department during the evaluation period.

A petition to list a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant" (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Once a petition is submitted to the Commission, the Department prepares a petition evaluation that evaluates each of the petition components and makes a recommendation to the Commission as to whether there is sufficient scientific information to indicate that the petitioned action to list the species under CESA may be warranted (Fish & G. Code, § 2073.5, subds. (a)-(b)). The petition evaluation is placed on the agenda for receipt at the next available meeting of the Commission after delivery. At that time, the petition evaluation will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition. The Commission then considers the petition, the Department's petition evaluation, written comments received, and oral testimony to make a finding as to whether the petition provides "sufficient information to indicate that the petitioned action may be warranted" (Fish & G. Code, § 2074.2, subd. (e)(2)). The standard for accepting a petition for consideration and assessing sufficiency of information is addressed in *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597.

If the Commission determines that the petitioned action may be warranted, it accepts the petition, and the species becomes a candidate for CESA listing and proceeds to the status review stage of the CESA process. Within 12 months of the Commission's acceptance of the petition, the Department is required to produce a peer-reviewed report that advises the Commission on whether the petitioned action is warranted, based upon the best scientific information available (Fish & G. Code, § 2074.6). Finally,

the Commission determines whether the petitioned action to list the species as threatened or endangered is warranted, based on the Department's status review and other information in the administrative record (Fish & G. Code, § 2075.5).

1.2 CESA Petition History

On February 19, 1991, Dr. Malcolm McLeod of the California Native Plant Society submitted a petition to the Commission to list Morro manzanita as threatened under CESA (McLeod 1991; McGuire and Morey 1992). On December 5, 1991, the Commission designated Morro manzanita as a candidate for CESA listing (Cochrane 1996). On January 5, 1993, the Department recommended to the Commission that Morro manzanita be listed as threatened under CESA (McGuire and Morey 1992; Cochrane 1996). The Commission then voted on whether Morro manzanita should be listed under CESA and the vote was a tie (Cochrane 1996). The Commission directed the Department to work with local government, environmental groups, and landowners to initiate a management plan while Morro manzanita remained a candidate species (Cochrane 1996). On August 5, 1993, the Commission voted again and determined that, based on regional planning efforts that were underway, CESA listing was not warranted at that time (Cochrane 1996).

On July 20, 2024, Dr. Christopher Kofron and Dr. Claudia Tyler submitted a petition to the Commission to list Morro manzanita as endangered under CESA (Kofron and Tyler 2024). On July 30, 2024, the Commission referred the petition to the Department for evaluation. At its meeting on August 14-15, 2024, the Commission officially acknowledged receipt of the petition. At its meeting on October 10, 2024, the Commission granted the Department's request for a 30-day extension of the period to review the petition and prepare this petition evaluation.

1.3 Federal Status

On December 15, 1994, Morro manzanita was listed as a threatened species under the Federal Endangered Species Act (ESA) (USFWS 1994). In 2008, 2013, and 2022, the United States Fish and Wildlife Service (USFWS) conducted 5-year reviews for Morro manzanita to ensure that its classification as a threatened species under the ESA provided the appropriate level of protection (USFWS 2008, 2013, 2022). All three USFWS 5-year reviews concluded that Morro manzanita still met the definition of a threatened species under the ESA.

In 1998, the USFWS published a recovery plan for the Morro shoulderband snail and four plant species, including Morro manzanita (USFWS 1998). The recovery plan provided delisting criteria for Morro manzanita that required: (1) 90 percent of existing high and medium cover stands and 85 to 90 percent of low cover stands be preserved,

(2) evidence that the acreage and cover classes of Morro manzanita in preserves can be maintained over time, and (3) site-specific management plans to have been successfully implemented for the preserves (USFWS 1998). As of 2022, the first recovery criterion was close to being met with 70% of existing high and medium cover Morro manzanita stands and 89% of low cover stands protected in preserves (USFWS 2022). The second and third criteria have not been met as there are no monitoring programs in place to track the maintenance of Morro manzanita stands over time and site-specific management plans have only been developed for two of the five relevant preserves (USFWS 2022).

1.4 Additional Species Status Designations

1.4.1 NatureServe Conservation Status Ranks

NatureServe's conservation status ranks consist of a global conservation status rank (global rank or G rank), describing the status of a given taxon over its entire global distribution, and a subnational conservation status rank (subnational rank or S rank), describing the status of a given taxon over its state distribution (Master et al. 2012). Morro manzanita has been assigned a NatureServe conservation status rank of G1 S1, indicating that the species is critically imperiled both globally and within California, with a very high risk of extirpation due to one or more of the following: very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors (CNDDB 2020, 2024).

1.4.2 California Rare Plant Rank

The California Native Plant Society works in collaboration with botanical experts throughout the state, including Department biologists, to assign rare plants a California Rare Plant Rank (CRPR) reflective of their rarity status (CNDDB and CNPS 2020). Morro manzanita has been assigned a CRPR of 1B.1 (CNPS 2024). Plants with a CRPR of "1B" are considered rare, threatened, or endangered throughout their range with the majority endemic to California (CNDDB and CNPS 2020). The threat code extension of ".1" indicates that the species is seriously threatened in California, with over 80 percent of occurrences threatened and a high degree and immediacy of threat (CNDDB and CNPS 2020).

2 Species Description and Taxonomy

The Commission has the authority to list certain species or subspecies as endangered or threatened under CESA (Fish & G. Code, §§ 2062, 2067, 2070). The listing process is the same for species and subspecies (Fish & G. Code, §§ 2070-2079.1).

2.1 Species Taxonomy

Morro manzanita (*Arctostaphylos morroensis* Wiesl. & B. Schreib.) was first described by Wieslander and Schreiber in 1939 (Wieslander and Schreiber 1939). The original description was based on collections from 1936 and 1938 from the vicinity of Hazard Canyon in what is now Montaña de Oro State Park in San Luis Obispo County (Wieslander and Schreiber 1939). Morro manzanita has been recognized in all relevant floras since it was originally described, including The Jepson Manual and the Flora of North America (Parker et al. 2009, 2023).

2.2 Species Description

Morro manzanita is an erect, evergreen shrub in the heath family (Ericaceae) (Parker et al. 2023). Morro manzanita typically grows from 0.5 m to over 4 m (1.6 to 13.1 ft) tall, with leaves that are covered with matted hairs on the lower leaf surface (especially when leaves are young) and generally without hairs on the upper leaf surface (Wieslander and Schreiber 1939; Mullany 1990; Parker et al. 2023). Leaf blades are oblong-ovate to elliptic, 1.5 to 3.5 cm (0.6 to 1.4 in) long, and 1 to 2.6 cm (0.4 to 1 in) wide (Mullany 1990; Parker et al. 2023). Stomata (pores) are present on the lower leaf surface but generally absent or sparse on the upper leaf surface (Mullany 1990).

Like all manzanita species, Morro manzanita flowers have petals fused into an urn-shape and are white to pink in color. There are five sepals (outermost whorl of flower parts) below the fused petals (Parker et al. 2023). Flowers are arranged in clusters called inflorescences and inflorescences hang down when they are young (Parker et al. 2023). Beneath the inflorescences are bracts that are leaf-like, lanceolate to linear in shape, and minutely hairy (Wieslander and Schreiber 1939; Parker et al. 2023). Fruits are 7 to 10 mm (0.3 to 0.4 in) wide, berry-like, and shaped as spheres that have been flattened on the top and bottom (Parker et al. 2023).

Morro manzanita stems have gray, shredding bark on older stems and both short and long, white, non-glandular hairs on twigs and young inflorescences (Parker et al. 2023). One characteristic of many manzanita species is the presence of a basal burl (woody growth) which allows the species to resprout after fire. Morro manzanita does not have a basal burl, meaning that when a fire burns a Morro manzanita population, Morro manzanita shrubs are unable to resprout and rely solely on their seed bank in the soil to germinate and replenish the population (Wells 1969; Parker et al. 2023).

3 Summary of Petition Components

Pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), the Department evaluated whether the petition contained information on each of the following petition components:

- Life history;
- Range;
- Distribution;
- Detailed distribution map
- Kind of habitat necessary for survival;
- Abundance;
- Population trend;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of threat;
- Impact of existing management efforts;
- Suggestions for future management; and
- Availability and sources of information.

The Commission did not receive new information from the public during the petition evaluation period (Fish & G. Code, § 2073.4). Pursuant to Fish and Game Code section 2073.5, the Department evaluated the information contained in the petition to determine whether there is, or is not, sufficient information to indicate that the petitioned action may be warranted. A summary of the relevant information from the petition for each of the petition components is presented below. In some instances, the Department has grouped similar components together and renamed components to create a more cohesive and readable document.

3.1 Life History

This section summarizes the information in the petition regarding the species' life history (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.1.1 Scientific Information in the Petition

The petition discusses the life history of Morro manzanita in the "Life History" section on pages 8 through 13. The petition describes Morro manzanita as an erect, spreading shrub, generally 1 to 4 m (3.3 to 13.1 ft) in height. The petition indicates that Morro manzanita produces abundant flowers in January through March and is dependent on pollinators to reproduce. After flowering, the petition notes that Morro manzanita produces fruits that mature in spring and summer, with each fruit containing five to

eight seeds. The petition discusses studies that found a low percent (10 to 18%) of Morro manzanita flowers produced fruit, but that the fruits contained a high percentage (73%) of viable seeds (Kelly and Parker 1991; Tyler et al. 2023). The petition notes that fruits fall from Morro manzanita shrubs in late spring to late fall, with the majority of the fruits removed by animals (such as small mammals and birds).

The petition discusses how the lack of a basal burl means Morro manzanita does not resprout when burned by fire and the species relies on a dormant seed bank in the soil to persist in the landscape. The petition cites a study that examined Morro manzanita seed germination in response to fire-related cues and found that these cues, specifically heat and charred wood, enhanced seed germination but seed germination was very low overall, with only 1 to 4% of all seeds germinating on average (Tyler and Odion 2020). The petition also mentions that, based on a study of three Morro manzanita stands, the older the stand, the fewer seeds being added to the soil seed bank each year (Tyler and Odion 2020; Tyler et al. 2023).

3.2 Range, Distribution, and Detailed Distribution Map

This section summarizes the information in the petition regarding the species' range and distribution and provides a detailed distribution map (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). A species' range for the purposes of CESA and this status review is the species' California range (Cal. Forestry Assn. v. Cal. Fish and Game Com. (2007) 156 Cal.App.4th 1535, 1551). Range describes the general geographical area in which a species occurs. Distribution describes the actual sites where individuals and populations of the species occur within the species' range.

3.2.1 Scientific Information in the Petition

The petition discusses the range and distribution of Morro manzanita in the "Range, Distribution, and Abundance" section on pages 5 through 8. The petition also provides two detailed distribution maps for Morro manzanita as Figures 2 and 4 on pages 23 and 25, respectively. Figure 4 of the petition is included as Figure 1 on page 8 of this petition evaluation.

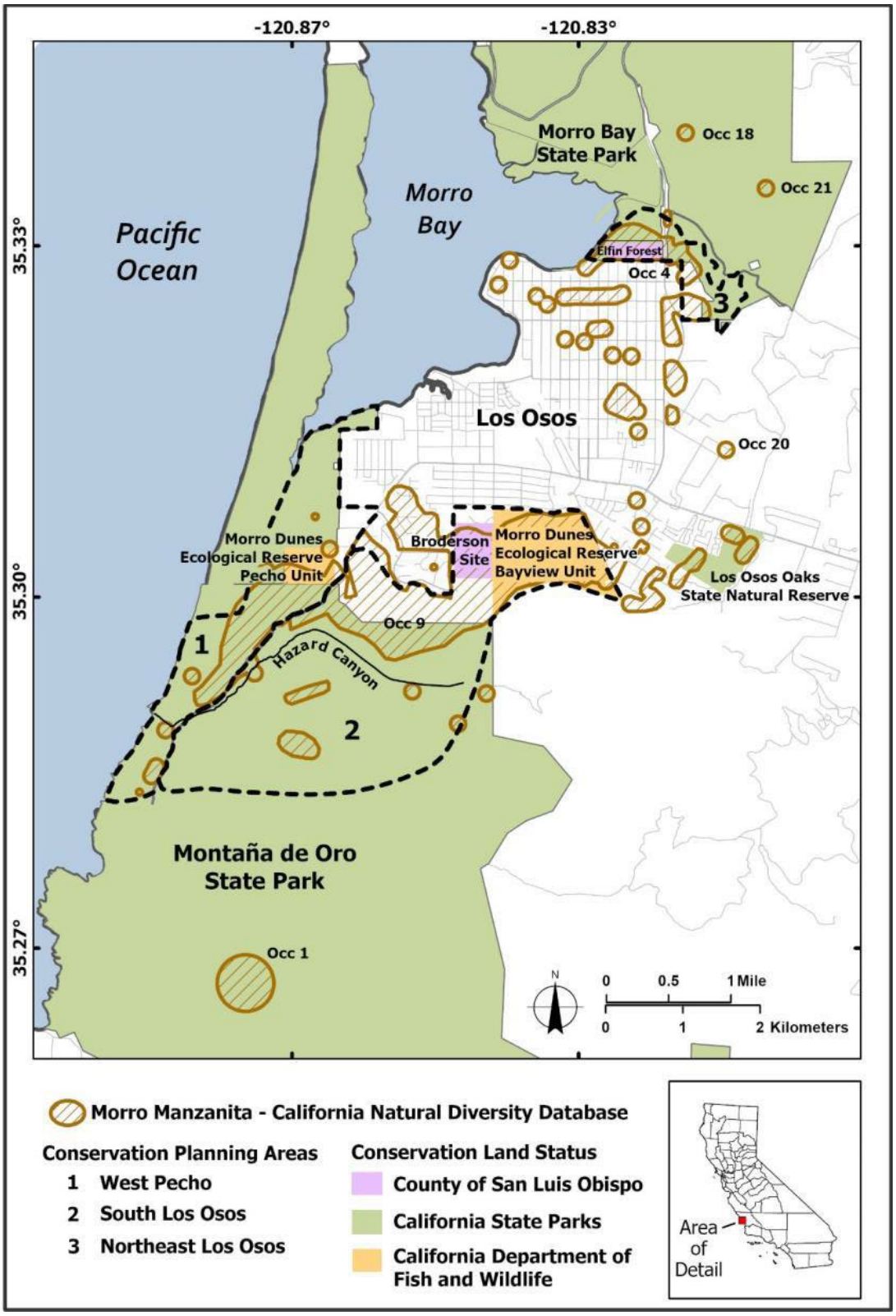


Figure 1. Map of the range and distribution of Morro manzanita as provided in Figure 4 of the petition. Occurrences from the California Natural Diversity Database (CNDDB) are labeled with CNDDB occurrence numbers. Some occurrences consist of multiple polygons.

The petition describes Morro manzanita as being restricted to the coastal area of San Luis Obispo County, in and around the town of Los Osos. There are six occurrences of Morro manzanita documented in the California Natural Diversity Database (CNDDB). The petition notes that an additional occurrence, not yet reflected in the CNDDB, was found in 2023 for a total of seven documented occurrences of Morro manzanita. The petition states that one of the occurrences is based on a historic collection that may be erroneous (CNDDB occurrence 1), one occurrence is likely extirpated (CNDDB occurrence 20), three occurrences are small and consist of a single or small number of polygons (CNDDB occurrences 18, 21, and the new occurrence), and the remaining two occurrences consist of multiple polygons representing at least 98% of the distribution of Morro manzanita (CNDDB occurrences 4 and 9).

3.3 Habitat

This section summarizes the information in the petition regarding the kind of habitat necessary for species survival (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.3.1 Scientific Information in the Petition

The petition discusses the kind of habitat necessary for Morro manzanita survival in the "Kind of Habitat Necessary for Survival" section on page 13. The petition describes Morro manzanita as being restricted to coastal San Luis Obispo County at elevations below 200 m (656 ft). The petition notes that Morro manzanita primarily occurs on stabilized sand dunes of Baywood fine sand, with a few outlying populations growing on shale or volcanic igneous substrates. The petition states that temperatures in the vicinity of Morro manzanita occurrences range from 6.5 to 23.5°C (43.7 to 74.3°F) and mean annual rainfall is 42.1 cm (16.6 in).

3.4 Abundance and Population Trend

This section summarizes the information in the petition regarding the species' abundance and population trend (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.4.1 Scientific Information in the Petition

The petition discusses abundance for Morro manzanita in the "Range, Distribution, and Abundance" section on pages 5 through 8, and discusses population trend in the "Population Trends" section on page 8.

The petition indicates that abundance of Morro manzanita is difficult to estimate due to its growth form and habit. Morro manzanita shrubs can have multiple stems at the base

of the plant and often occur in dense stands that are difficult to access. However, the petition mentions that the population size of Morro manzanita has been extrapolated from measures of area occupied, percent cover, and shrub size. Using this method, Morro manzanita has been estimated to have a total population size of 86,000 to 153,000 individuals (LSA Associates, Inc. 1992; McGuire and Morey 1992; Crawford, Multari & Clark Associates 2004).

The petition indicates Morro manzanita is experiencing a declining population trend based on a reduction in its historical range and based on its current known distribution. The petition discusses how the historical range of Morro manzanita was estimated by the USFWS to be between 800 and 1,100 ha (1,977 and 2,718 ac) based on the distribution of Morro manzanita's preferred substrate, Baywood fine sand (USFWS 1994). By 2013, the USFWS estimated that development had eliminated as much as 75% of historically suitable habitat (USFWS 2013). The petition also compares the historical range of Morro manzanita with more recent estimates of occupied area that indicate Morro manzanita currently occupies less than 162 ha (400 ac) (Tyler and Odion 1996).

3.5 Threats

This section summarizes the information in the petition regarding the factors affecting the ability of the species to survive and reproduce, and the degree and immediacy of threat (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.5.1 Scientific Information in the Petition

The petition discusses threats affecting Morro manzanita's ability to survive and reproduce in the "Factors Affecting Ability to Survive and Reproduce" section on pages 13 through 14 and discusses the degree and immediacy of threat for Morro manzanita in the "Degree and Immediacy of Threat" section on pages 14 through 16.

The petition identifies the following factors as threats to Morro manzanita: (1) clearing of habitat for residential development, (2) non-native, invasive plant species, (3) stochastic events, (4) climate change, and (5) sudden oak death pathogen *Phytophthora ramorum*.

Clearing of habitat for residential development

The petition describes clearing of habitat for residential development as an immediate and ongoing threat to Morro manzanita. There are large Morro manzanita stands that occur on private lands threatened with development. Development would require the direct removal of Morro manzanita shrubs, reducing the population size and contributing to habitat fragmentation. In addition, clearing of excess or dead vegetation around existing residences may negatively impact Morro manzanita. The petition also

notes that the California Department of Forestry and Fire Prevention has constructed a firebreak near a housing estate in the vicinity of a Morro manzanita stand and has proposed an extension to the firebreak.

Non-native, invasive plant species

The petition indicates that non-native, invasive plant species are an ongoing threat to Morro manzanita. In particular, *Eucalyptus* trees, as explained in the petition, were planted throughout the Los Osos area in the early 1900s with many of these trees presumably planted in areas that once contained Morro manzanita. The petition notes that the *Eucalyptus* stands continue to expand and few Morro manzanita persist under the trees. The petition discusses how *Eucalyptus* and other non-native invasive plant species in the area, such as veldt grass (*Ehrharta calycina*), are highly flammable and could result in altered fire regimes that are detrimental to Morro manzanita.

Stochastic events

The petition indicates that environmental and demographic stochastic events are a threat to Morro manzanita mainly due to the species' low seedbank density, poor seed viability, and small, isolated populations. As discussed in the petition, an environmental stochastic event of particular concern for Morro manzanita is wildfire. If wildfires occur at too frequent intervals, there may not be enough time post-fire for a Morro manzanita stand to re-establish, become reproductive, and build up an adequate seedbank between fires to sustain the population. The petition discusses how demographic stochastic events (related to fluctuations in reproduction and mortality) are especially detrimental for small, fragmented populations like those present in Morro manzanita. If pollinators are not able to move between populations (and cross-pollinate), Morro manzanita may experience increased genetic drift and inbreeding effects. The petition mentions that Morro manzanita may already be experiencing negative genetic effects from its small, isolated populations as evidenced by low seed viability in an isolated Morro manzanita stand at the Elfin Forest Preserve (part of CNDDB occurrence 4).

Climate change

The petition indicates that Morro manzanita may not be able to tolerate or adapt to the increase in temperatures, drought, and wildfires that are expected to occur on the central California coast in the future as a result of climate change. The petition notes that low rainfall may be the reason for mortality and stem die-off of several large Morro manzanita shrubs at the Elfin Forest Preserve since 2015. The petition also indicates that Morro manzanita is a habitat specialist which will likely restrict the species' ability to disperse to other locations in the face of a warming climate.

Sudden oak death pathogen *Phytophthora ramorum*

The petition indicates that, while not an immediate threat, the sudden oak death pathogen (*Phytophthora ramorum*) is a potential future threat to Morro manzanita. The sudden oak death pathogen, as discussed in the petition, is responsible for the killing of over 50 million trees in California and Oregon and while it primarily targets tanoak and coast live oak, studies have shown that the sudden oak death pathogen can infect manzanita. In a study that tested the susceptibility of several manzanita species to the sudden oak death pathogen, Morro manzanita showed an intermediate susceptibility (Garbelotto et al. 2020). The petition notes that no Morro manzanita have yet been identified as being infected with the sudden oak death pathogen in the wild; however, the pathogen is present in the area and has been documented to occur in several streams in coastal San Luis Obispo County. Since the sudden oak death pathogen can be carried through air, water, soil, and litter, spread of the pathogen to areas with Morro manzanita is a possibility in the future (Peterson et al. 2014; Grunwald et al. 2019).

3.6 Existing Management

This section summarizes the information in the petition regarding the impact of existing management efforts on the species (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.6.1 Scientific Information in the Petition

The petition discusses existing management for Morro manzanita in the "Impact of Existing Management Actions" section on pages 16 and 17. The petition indicates that current regulatory mechanisms are not adequate to protect Morro manzanita from immediate and ongoing threats. Morro manzanita is listed as threatened under the ESA; however, the ESA provides little protection for federally listed species on private land. The petition discusses how various private properties with Morro manzanita have been purchased and protected from development since the species was federally listed in 1994, but a substantial portion of the remaining Morro manzanita stands still occur on private land. In addition, Morro manzanita is a covered species in the Los Osos Habitat Conservation Plan (HCP). The Los Osos HCP was approved in February 2024 and the USFWS has issued an incidental take permit to the County of San Luis Obispo to authorize take/impacts to covered species associated with covered activities (Jodi McGraw Consulting 2022). The petition indicates that the Los Osos HCP would allow residential development and construction of firebreaks on private lands that currently contain dense, intact Morro manzanita stands.

3.7 Future Management

This section summarizes the information in the petition regarding suggestions for future management (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.7.1 Scientific Information in the Petition

The petition suggests future management actions for Morro manzanita in the "Suggestion for Future Management" section on pages 17 and 18. The petition recommends the following specific actions:

- Conserve and protect existing stands of Morro manzanita.
- Discuss fuel reduction activities impacting Morro manzanita stands in Los Osos with the USFWS.
- Survey for Morro manzanita across its range and collect data on abundance.
- Develop and implement site specific management plans for Morro manzanita within preserves.
- Develop protocols for long-term restoration of Morro manzanita, including conducting research on seed viability and germination requirements to aid in restoration.
- Identify potential restoration sites and investigate options for restoring connectivity between fragmented populations.
- Conduct research on the genetic diversity within and among Morro manzanita stands.
- Remove *Eucalyptus* and re-establish Morro manzanita stands where feasible.
- Coordinate and share information across agencies, researchers, and citizen groups who are involved with outreach and conservation of Morro manzanita.
- Further study the relationship of Morro manzanita with fire.
- Conduct prescribed burns in the Los Osos area.
- Conduct modeling to anticipate the effects of climate change on Morro manzanita.
- Collect seeds of Morro manzanita for conservation seed banking.
- Introduce Morro manzanita into living collections at botanic gardens.

3.8 Availability and Sources of Information

This section summarizes the information in the petition regarding availability and sources of information (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

3.8.1 Scientific Information in the Petition

The petition provides a list of sources for Morro manzanita in the "References and Sources of Information" section on pages 18 through 21. The petitioners provided electronic copies of sources from the petition to the Commission.

3.8.2 Other Relevant Scientific Information

The Department evaluated additional sources of information in its possession as it relates to the petition. The Department concluded that none of the additional information contradicts or undercuts the conclusions made in the petition at this juncture of the listing process. These sources can be found in the Literature Cited section of this document.

4 Sufficiency of Scientific Information to Indicate the Petitioned Action May Be Warranted

The Department evaluated the petition components set forth in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1) for sufficiency of information pursuant to Fish and Game Code section 2073.5. The Department finds that sufficient scientific information was provided for the petition components.

5 Recommendation to the Commission

Pursuant to Fish and Game Code section 2073.5, the Department evaluated the petition on its face and in relation to other relevant information the Department possesses. In completing its petition evaluation, the Department determined that the petition, and other relevant information, provide sufficient scientific information to indicate that the petitioned action to list Morro manzanita as endangered may be warranted. Therefore, the Department recommends the Commission accept the petition for further consideration under CESA.

Acknowledgements

This petition evaluation was prepared by Kristi Lazar in the Department's Habitat Conservation Planning Branch, Native Plant Program.

Literature Cited

CNDDB (California Natural Diversity Database). 2020. California Natural Diversity Database (CNDDB) Management Framework. California Department of Fish and Wildlife, Sacramento, CA, USA.

CNDDB (California Natural Diversity Database). 2024. RareFind 5 [internet]. Government version- dated August 2024. California Department of Fish and Wildlife, Sacramento, CA, USA.

CNDDB (California Natural Diversity Database), and CNPS (California Native Plant Society). 2020. The CNDDB and CNPS cooperative relationship and rare plant status review process. Sacramento, CA, USA. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=175695&inline (Accessed: 2 August 2024).

CNPS (California Native Plant Society). 2024. CNPS inventory of rare and endangered plants of California: *Arctostaphylos morroensis*. Available from: https://rareplants.cnps.org/Plants/Details/27 (Accessed: 2 August 2024).

Cochrane, S. 1996. Chronology of Morro manzanita (*Arctostaphylos morroensis*) activities: Letter and associated documents. Natural Heritage Division, California Department of Fish and Game.

Crawford, Multari & Clark Associates. 2004. Los Osos Habitat Conservation Plan, species accounts, Appendix D. Prepared for the Los Osos Community Services District.

Garbelotto, M., T. Popenuck, B. Hall, W. Schweigkofler, F. Dovana, R. Goldstein de Salazar, D. Schmidt, and L. Sims. 2020. Citizen science uncovers *Phytophthora ramorum* as a threat to several rare or endangered California manzanita species. Plant Disease 104:3173-3182.

Grunwald, N., J. LeBoldus, and R. Hamelin. 2019. Ecology and evolution of the sudden oak death pathogen *Phytophthora ramorum*. Annual Review of Phytopathology 57:301-321.

Jodi McGraw Consulting. 2022. Los Osos Habitat Conservation Plan. Prepared for the County of San Luis Obispo. Available from: https://www.slocounty.ca.gov/departments/planning-building/grid-items/community-engagement/active-planning-projects/los-osos-habitat-conservation-plan-(hcp) (Accessed: 5 August 2024).

Kelly, V., and V. Parker. 1991. Percentage seed set, sprouting habit and ploidy level in *Arctostaphylos* (Ericaceae). Madroño 38(4):227-232.

Kofron, C., and C. Tyler. 2024. A petition to the State of California Fish and Game Commission to list Morro manzanita (*Arctostaphylos morroensis*).

LSA, Associates Inc. 1992. An assessment of the status of the Morro manzanita (*Arctostaphylos morroensis*). Prepared for Central Coast Engineering, San Luis Obispo, CA, USA.

Master, L., D. Faber-Langendoen, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe conservation status assessments: factors for evaluating species and ecosystem risk. NatureServe, Arlington, VA, USA.

McGuire, T., and S. Morey. 1992. Report to the Fish and Game Commission on the status of Morro Bay manzanita (*Arctostaphylos morroensis*). Natural Heritage

Division status report 92-4. California Department of Fish and Game, Sacramento, CA, USA.
McLeod, M. 1991. A petition to the State of California Fish and Game Commission to list Morro Bay manzanita (*Arctostaphylos morroensis*).
Mullany, M. 1990. The distribution and variation of *Arctostaphylos morroensis* (Ericaceae). California Polytechnic State University, San Luis Obispo, CA, USA.
Parker, V., M. Vasey, and J. Keeley. 2009. *Arctostaphylos*. In Flora of North America Editorial Committee, editor. Flora of North America North of Mexico [online]. 25+ vols. New York and Oxford. Available from: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250092374. (Accessed: 5 August 2024).
Parker, V., M. Vasey, and J. Keeley. 2023. *Arctostaphylos*. In Jepson Flora Project, editor. Jepson eFlora, Revision 12. Available from: https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=13951 (Accessed: 2 August 2024).
Peterson, E., E. Hansen, and J. Hulbert. 2014. Source or sink? The role of soil and water borne inoculum in the dispersal of *Phytophthora ramorum* in Oregon tanoak forests. Forest Ecology and Management 322:48-57.
Tyler, C., D. Meade, and D. Odion. 2023. Flowering, fruit set, and seed predation in *Arctostaphylos morroensis*, a rare obligate-seeding shrub. Madroño 70(4):197-209.
Tyler, C., and D. Odion. 1996. Ecological studies of Morro Manzanita (*Arctostaphylos morroensis*). Report prepared for the California Department of Fish and Game, Endangered Plant Program.
Tyler, C., and D. Odion. 2020. Seed banks, seed germination, and implications for conservation of the endangered, fire-dependent shrub, *Arctostaphylos morroensis*. Natural Areas Journal 40(2):155-167.
USFWS (United States Fish and Wildlife Service). 1994. Endangered and threatened wildlife and plants; endangered or threatened status for five plants and the Morro shoulderband snail from western San Luis Obispo County, California. Federal Register 59:64613-64623.
USFWS (United States Fish and Wildlife Service). 1998. Recovery plan for the Morro shoulderband snail and four plants from western San Luis Obispo County, CA. United States Fish and Wildlife Service, Portland, OR, USA.
USFWS (United States Fish and Wildlife Service). 2008. *Arctostaphylos morroensis* (Morro manzanita). 5-year review: summary and evaluation. Ventura Fish and Wildlife Office, Ventura, CA, USA.
USFWS (United States Fish and Wildlife Service). 2013. *Arctostaphylos morroensis* (Morro manzanita). 5-year review: summary and evaluation. Ventura Fish and Wildlife Office, Ventura, CA, USA.
USFWS (United States Fish and Wildlife Service). 2022. Morro manzanita (*Arctostaphylos morroensis*) 5-year review: summary and evaluation. Ventura Fish and Wildlife Office, Ventura, CA, USA.
Wells, P. 1969. The relation between mode of reproduction and extent of speciation in the woody genera of the California chaparral. Evolution 23:264-267.
Wieslander, A., and B. Schreiber. 1939. Notes on the genus *Arctostaphylos*. Madroño 5(1):38-47.

COUNTY OF SAN LUIS OBISPO

February 11, 2025

California Fish and Game Commission
California Natural Resources Building
715 P Street, 16th Floor
Sacramento, CA 95814

Subject: Consideration to List Morro Manzanita Under CESA (Item #13 of the CA Fish and Game Commission Meeting Agenda for February 12-13, 2025)

To California Fish and Game Commission,

The County of San Luis Obispo was not provided notice that the California Fish and Game Commission (Commission) received a petition to list Morro manzanita and intends to hold a meeting to consider listing Morro manzanita. As a key affected party, the County of San Luis Obispo has significant concerns regarding the petition and the lack of information being considered with the petition. On behalf of the County Department of Public Works and Department of Planning and Building (County), this letter urges the Commission to find that the petitioned listing is not warranted, and as such, deny listing of the Morro manzanita under CESA.

Based on the County's preliminary review, the petitioned action to list Morro manzanita (*Arctostaphylos morroensis*) as endangered should be denied because [A] the petitioned listing is not warranted, [B] the petition and evaluation report lacks sufficient information for proper consideration by the Commission, as required by Commission regulations and guidelines, and [C] the petition appears to be partially based on outdated information regarding occurrences, current distribution, and fails to disclose metrics related to current conservation.

Lack of Sufficient Information for Proper Consideration

The petition and evaluation report fails to adequately acknowledge, describe, and account for the mitigation and management actions required for Morro manzanita under the Los Osos Habitat Conservation Plan (LOHCP). Implementation of the LOHCP will provide the circumstances in which Morro manzanita would thrive on contiguous land dedicated for habitat conservation in perpetuity, as opposed to the current circumstances where Morro manzanita exists in fragments throughout the Los Osos area. This lack of key and highly relevant information associated with the pro-active long-term survival and recovery of Morro

manzanita is concerning. Listing of Morro manzanita at this point in time, with a holistic and comprehensive plan already in place and ready for implementation, would inadvertently result in new unnecessary roadblocks that substantially lessen the positive impacts to Morro manzanita in the long run.

It is especially concerning that the petition and evaluation report provides no evidence to rebut the findings made by the U.S. Fish and Wildlife Service (Service) when the Service approved the LOHCP, issued an Incidental Take Permit (ITP), and adopted the accompanying Environmental Assessment on February 15, 2024, which included, but was not limited to, the findings that [A] impacts from taking of Morro manzanita will be minimized and mitigated to the maximum extent practicable and [B] taking of Morro manzanita will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

The petition fails to clearly quantify either the remaining existing distribution of Morro manzanita nor disclose the number of individuals or range of Morro manzanita already protected in perpetuity by State Parks, California Department of Fish and Wildlife, and County of San Luis Obispo. The Petition's Figure 2 shows historical records of Morro manzanita occurrences, many of which clearly no longer exist. The mapping implies that there are populations at risk due to residential development in the developed northern portion of the community. This mapping should be updated.

In addition, the petitioned action would raise significant public safety concerns, including but not limited to the potential to place a hold on fire hazard abatement efforts established under the Community Wildfire Protection Plan, which were developed by CAL FIRE in consultation with the Service and California Department of Fish and Wildlife and incorporated into the LOHCP with required avoidance and minimization measures, including for Morro manzanita which effects are largely temporary and are fully mitigated.

In summary, the petition does not provide sufficient information, in light of the entire record, that would lead a reasonable person to conclude that there is substantial reason for the requested listing to occur. (*Natural Resources Defense Council v. Fish and Game Commission* (1994) 28 Cal.App.4th 1104.)

Lack of Adequate Noticing to Interested or Affected Parties

In addition, receipt of the petition and the item to consider this petition at the meeting on February 12-13, 2025, was not adequately noticed to interested or affected parties. The County of San Luis Obispo has been collaborating with the California Department of Fish and Wildlife and the Service to conserve and restore land to allow Morro manzanita to thrive through the preparation and implementation of the LOHCP. We are concerned that during near continuous consultation with both the Service and California Department of Fish and Wildlife preparing the LOHCP this listing petition was never directly communicated to the County staff working on the LOHCP and coordinating with local California Department of Fish

and Wildlife staff on the mitigation strategy on conservation lands owned by the Department of Fish and Wildlife. Neglecting to consider the holistic benefits of the LOHCP for Morro manzanita and the information the County of San Luis Obispo could contribute to the discussion would be an unfortunate omission.

At minimum, if the Commission intends to consider listing Morro manzanita in light of the lack of sufficient information and presence of information indicating that listing of Morro manzanita is not warranted, the Commission should [A] continue this item, [B] require that the evaluation report include sufficient information that adequately acknowledge, describe, and account for the mitigation and management actions required for Morro manzanita under the LOHCP and the Service's findings, [C] update mapping of extant Morro manzanita and disclose how much of this population is already on protected lands and [D] consider the petition at a future meeting with adequate noticing to all interested or affected parties.

Thank you,

Trevor Keith
Director
Department of Planning and Building
County of San Luis Obispo

John Diodati
Director
Department of Public Works
County of San Luis Obispo

COUNTY OF SAN LUIS OBISPO

April 1, 2025

California Fish and Game Commission
California Natural Resources Building
715 P Street, 16th Floor
Sacramento, CA 95814

Subject: Consideration of Petition to List Morro Manzanita Under CESA (Item #13 of the CA Fish and Game Commission Meeting Agenda for April 16, 2025)

To California Fish and Game Commission,

We strongly urge the Commission to deny the Petition to list Morro manzanita [*Arctostaphylos morroensis*] as an endangered species (Petition) because the Petition fails to provide information required under Section 2072.3 of the California Endangered Species Act (CESA) regarding the impact of existing management efforts and does not provide sufficient information, in light of the entire record, that would lead a reasonable person to conclude there is a substantial possibility the requested listing could occur. (*Natural Resources Defense Council v. Fish and Game Commission* (1994) 28 Cal.App.4th 1104.)[1]

Specifically, the Petition: [1] does not acknowledge, describe, or account for the management actions and mitigation required for Morro manzanita as a covered species under the Los Osos Habitat Conservation Plan (LOHCP); [2] is based on outdated information regarding the location and extent of occurrences and the threat (or benefit) those occurrences face as part of LOHCP implementation; and [3] does not acknowledge or rebut the findings made by the United States Fish and Wildlife Service (FWS) pursuant to Sections 10 and 7 of the Federal Endangered Species Act (ESA) that implementation of the LOHCP would not jeopardize Morro manzanita's recovery.

Rather than being a threat to the survival of Morro manzanita, the LOHCP is the long sought after regulatory mechanism that will permanently conserve, restore, and manage high-quality habitat crucial for the long-term recovery and survival of Morro manzanita. The recent FWS approval of the LOHCP on February 15, 2024 is a milestone to be celebrated and a testament to what can be achieved through persistent cooperation and collaboration among agencies and stakeholders for the benefit of the environment and public.

We recognize that the inadequacy of the Petition may not, at first glance, be apparent since the Petition only provides a cursory discussion of the LOHCP. We also recognize the burden this effectively

[1] The Petition requests that Morro manzanita be listed as endangered, not threatened. A species qualifies as endangered if it "is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes." (Fish and Game Code §2062 (emphasis added).)

places on California Department of Fish and Wildlife (Department) evaluation staff, who might not be as intimately familiar with the LOHCP this early in the process. However, the solution is straightforward (and legally required): deny the Petition because of its failure to provide required information and to meet its burden to demonstrate a substantial possibility of listing.

Key Factor #1: The Petition Ignores the LOHCP and Provides Only Conclusions Regarding Current Management Efforts While Its Suggestions for Future Management Mirror Those in the Approved LOHCP

CESA mandates that "[p]etitions shall include information regarding [. . .] the impact of existing management efforts [. . .] and the availability and sources of information." (Fish and Game Code §2072.3.) Commission regulations similarly provide that "a petition will be rejected by the commission if it fails to include sufficient scientific information under the categories of Section 2072.3." (Cal. Code Regs., tit. 14, § 670.1, subd. (e)(1).)

Here, the Petition asserts that clearing of habitat for residential development as an immediate threat and declares without explanation that the LOHCP only provides limited protection for Morro manzanita. The Petition mentions the LOHCP only five times.[2] Section 8, Impact of Existing Management Actions, consists of two short paragraphs. No discussion or analysis of LOHCP requirements is provided. Below are the five references to the LOHCP from the Petition in full:

1. "The Los Osos HCP and U.S. Endangered Species Act provide only limited protection for Morro manzanita on private land." (Executive Summary, page 4.)
2. "Fragmentation of the remaining, high density, intact stands for residences, permissible under the Los Osos HCP, would be an irreversible loss of Morro manzanita and habitat" (Executive Summary, page 4.)
3. "Conversion of the remaining, high density, intact stands to residences under the Los Osos HCP would be an irreversible loss of Morro manzanita and habitat" (6.3. Clearing of habitat for residential development, page 14.)
4. "The Los Osos HCP and U.S. Endangered Species Act can provide only limited protection for Morro manzanita on private land." (8. Impact of Existing Management Actions, page 17.)
5. "The Los Osos HCP and U.S. Endangered Species Act can provide only limited protection for Morro manzanita on private land." (9. Suggestions for Future Management, page 17.)

In contrast, this is what the LOHCP actually says about Morro manzanita (emphasis added):

1. "The Preserve System is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (central maritime chaparral and native woodlands; Table 4-4), whereas the covered activities are anticipated to impact just 41 acres of habitat. This 8.6:1 ratio of benefits to impacts reflects the far greater proportion of central maritime chaparral on the perimeter of the Plan Area, where the Preserve System will be located, compared to the center of the Plan Area where the covered activities will largely occur." (See LOHCP attached as Exhibit A, Executive Summary, page xxi.)

[2] We assume the Petition is referring to the LOHCP that was approved by the FWS in February 2024. However, the Petition does not include a reference to the LOHCP in Section 10, References and Sources of Information.

2. "The LOHCP incidental take permit will cover the impacts of private development activities permitted by the County through both ministerial and discretionary permit processes, as defined in CEQA Guidelines Sections 15369 and 15357. The general types of private activities that will be permitted include: New Construction: New commercial and residential construction including associated onsite improvements (e.g., driveways, utilities, and storm water control measures) that are part of the development project." (See Exhibit A, Section 2.2.4 Private Development, page 2-13.)
3. "To identify the species to be covered by the LOHCP, 140 species (70 plants and 70 animals) occurring within the region were evaluated according to their range, status, potential impacts, and available information (Section 3.2.1). This analysis resulted in the identification of four covered species: two animals (Morro shoulderband snail and Morro Bay kangaroo rat) and two plants (Morro manzanita and Indian Knob mountainbalm) for which the incidental take permit issued based on the LOHCP will authorize take, at least for some covered activities (Section 3.2.2). These species will also be the subject of the LOHCP conservation program, [which] will avoid, minimize, and mitigate the impacts of the covered activities on the covered species (Chapter 5)." (See Exhibit A, Section 3 Environmental Setting and Biological Resources, page 3-1.)
4. "The covered activities will impact an estimated 40 acres of habitat suitable for Morro manzanita (Tables 4-4 and 4-5, Figure 4-2). [. . .] This represents just over five percent of the species total habitat (798 acres) within the Plan Area; 491 acres (62%) is within existing protected lands, and an additional 98 acres (12%) is anticipated to be protected through implementation of the Plan's conservation program (Table 5-10)." (See Exhibit A, Section 4.3.1.1 Impacts to Habitat, page 4-17.)
5. "The negative impacts of the covered activities on Morro manzanita are anticipated to be greatly outweighed by the positive effects of implementation of the conservation program. The ratio of habitat benefits to impacts for Morro manzanita is more than 8 to 1 (Section 5.8.1, Table 5-10). While the covered activities are anticipated to impact just 41 acres of habitat (Table 4-4), the Preserve System, which will contain 263 acres of Morro manzanita habitat, is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (Chapter 8, Table 8-1)." (See Exhibit A, Section 4.3.1.3 Assessment of Net Impacts, pages 4-18 to 4-19.)
6. "In addition, implementation of the LOHCP will have a strong net positive effect on Morro manzanita by funding long-term, active habitat management in an adaptive management framework, which is essential to ensure long-term persistence and recovery of this narrowly endemic, fire-adapted species. Fire or fire surrogates will be needed to maintain persisting populations of Morro manzanita; however, funds necessary to implement such intensive treatments are often not available. Moreover, the LOHCP provides a mechanism for coordination among landowners and agencies that is necessary to carry out such projects, which can have deleterious impacts on some species, at least in the short term. As a result, implementing the Plan is anticipated to have a large, positive effect for persistence of Morro manzanita including by contributing to recovery (Section 5.8)." (See Exhibit A, Section 4.3.1.3 Assessment of Net Impacts, page 4-19.)
7. "Implementation of the LOHCP Conservation Program is anticipated to have benefits for the covered species that outweigh the effects of the taking caused by the covered activities, by protecting, restoring, and enhancing habitat that is greater long-term conservation value than the habitat impacted through the covered activities (Section 5.8.1). Indeed, the mitigation is anticipated to facilitate species recovery (Section 5.8.2)." (See Exhibit A, Section 5.8 Benefits of the Conservation Program, page 5-36.)

As illustrated above, contrary to the Petition's conclusory statements, the LOHCP does provide protections for Morro manzanita located on private property and its implementation is expected to support, not harm, Morro manzanita's recovery. The Petition makes no attempt to rebut the LOHCP's detailed analysis and conclusions which were the subject of extensive scientific and administrative evaluation. The Petition's failure to do so is fatal and grounds for denial on its face.

The petition to list the Western Burrowing Owl (WBO Petition) recently accepted for consideration by the Commission is illustrative of what level of information should be required when the management of the petitioned species is at least partially implicated by existing Habitat Conservation Plan(s). (See copy of WBO Petition here: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=221396&inline.) The WBO Petition provided over 36 pages of information and analysis describing the purported inadequacy of existing management efforts, including 18 pages describing the Habitat Conservation Plans and the concerns about the effectiveness of those plans for WBO, which as a species of special concern had no coverage under those plans but was the subject of some mitigation. Here, Morro manzanita is a covered species under the LOHCP and the subject of an extensive management and conservation plan tailored to protecting and promoting its recovery, which only heightens the level of information that should be required for the Petition.

While the Petition doesn't elaborate on the LOHCP, it does request management actions that closely resemble those already established under the LOHCP. Below is a table of the Petition's suggested future management actions compared with management actions required under the LOHCP.

Petition's Suggested Future Actions	**LOHCP's Currently Required Actions**
Conserve and protect existing stands with an emphasis on the largest remaining areas	Expand and connect existing protected lands by acquiring private lands via fee title or conservation easement within the Priority Conservation Area (See Exhibit A, Section 5.3.1.2 Priority Conservation Area.)
Encourage discussion with USFWS prior to fuel reduction impacting Morro manzanita	USFWS and California Department of Fish and Wildlife (CDFW) worked closely with CAL FIRE to develop avoidance and minimization measures for the Community Wildlife Protection Plan which is included under the LOHCP (See Exhibit A, Section 2.2.7 Community Wildfire Protection Plan.)
Conduct field surveys to improve data on current distribution and abundance	Baseline surveys and monitoring of habitat and covered species populations required pursuant to Adaptive Management and Monitoring Plan (See Exhibit A, Section 5.3.3.2 LOHCP Preserve System Adaptive Management and Monitoring Plan.)
Develop and implement site-specific management plans within preserves, including success criteria	Development of management and restoration strategies required to achieve LOHCP biological goals, including performance criteria (See Exhibit A, Section 5.3.3.2 LOHCP Preserve

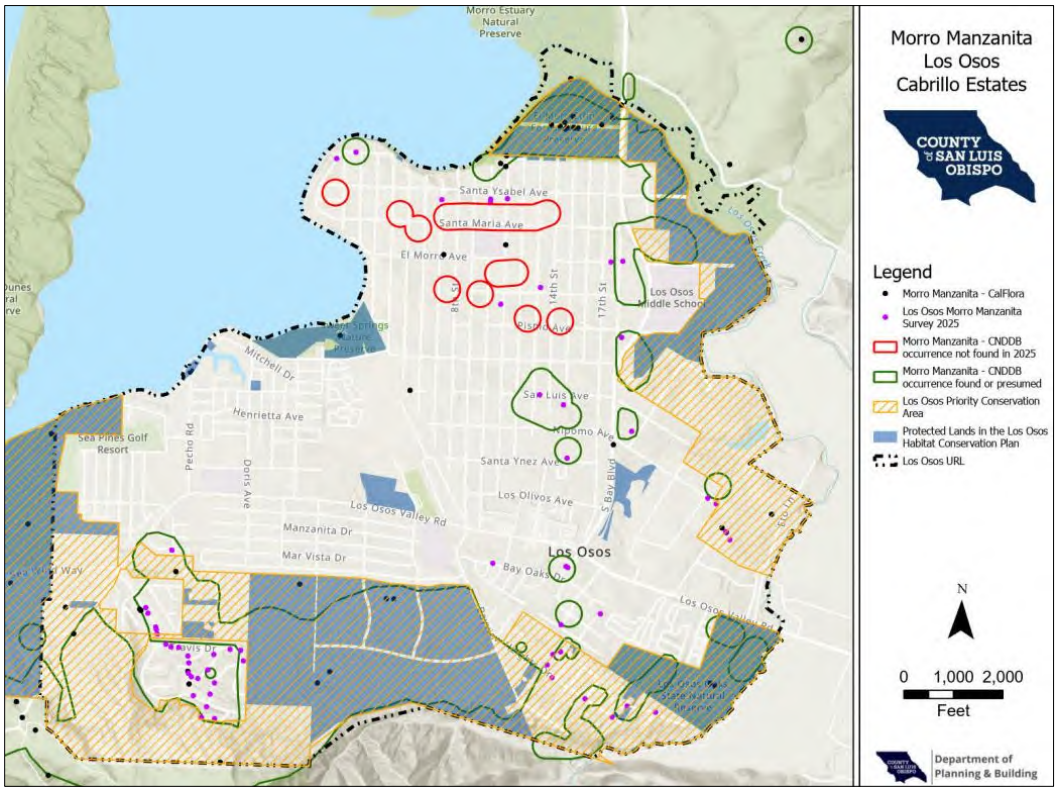
	System Adaptive Management and Monitoring Plan.)
Develop protocols for long-term restoration success, including research on germination requirements	Long-term monitoring of LOHCP effectiveness required, including facilitation of research to improve upon the understanding of covered species biology. (See Exhibit A, Sections 5.4.2.1 Long-Term Monitoring and 5.4.2.3 Facilitate Research.)
Identify potential restoration sites within protected areas and private lands	Expand and connect existing protected lands by acquiring private lands via fee title or conservation easement within the Priority Conservation Area (See Exhibit A, Section 5.3.1.2 Priority Conservation Area.)
Conduct research to describe genetic diversity within existing stands, consider introducing individuals from seed or cuttings from non-adjacent stands	Long-term monitoring of LOHCP effectiveness required, including facilitation of research to improve upon the understanding of covered species biology (See Exhibit A, Sections 5.4.2.1 Long-Term Monitoring and 5.4.2.3 Facilitate Research.)
Remove Eucalyptus and re-establish Morro manzanita where feasible in southwest part of range include sites along Pecho Valley Road	Eucalyptus removal and restoration contemplated during LOHCP jump start period. (See Exhibit A, Sections 6.2.5 Jump Start for the LOHCP.)
Coordinate and share information between agencies, researchers and citizen groups involved with conservation of Morro manzanita	Database will be created for reporting and agency coordination, as well as maintaining a publicly available website that provides information including annual reports and monitoring studies (See Exhibit A, Sections 4 Potential Biological Impacts/Take Assessment, 6.1.1.6 Maintain a Covered Activities Database and 6.1.1.8 Conduct Other Implementation Duties.)
Continue studies of the relationship with fire	Continue research and monitoring regarding the positive and negative effects of vegetation management and other fire management (See Exhibit A, Section 4.1.2.1.2 Promote Incompatible Fire Management.)
Conduct prescribed burns to reduce risk of wildfire and benefit Morro manzanita by stimulating germination and seedlings	Restoration includes steps to manage fire within natural fire regime, including conducting prescribed fire or fire surrogates to promote regeneration (See Exhibit A, Section 5.3.3 Habitat Restoration and Management.)
Conduct modeling to anticipate effects of climate change	Assessment of climate change as potential changed circumstances included under adaptive management (See Exhibit A, Section 6.5.3 Climate Change.)

Collect seeds for conservation seed banking	Covered activities include collection of seeds for storage in a seed bank (See Exhibit A, Section 2.2.8.2 Species Population Enhancement Measures.)
Introduce Morro manzanita into living collections at botanic gardens	Not specifically addressed, but LOHCP would not prohibit such activity

In short, while the Petition fails to provide required information on LOHCP components, it appears to effectively advocate for the same LOHCP components. Either way, the Petition fails to comply with legal requirements and fails to demonstrate a substantial possibility of an endangered listing.

Key Factor #2: The Petition Does Not Accurately Depict the Current Location and Extent of Occurrences or the Threats to the Areas of Highest Habitat Values

The Petition is based on outdated information regarding the location and extent of Morro manzanita occurrences. Figure 2 of the Petition shows geographic distribution of Morro manzanita based on information from the California Natural Diversity Database (CNDDB). However, this information is largely from maps that no longer reflect occurrences that currently exist. To provide a more accurate representation of occurrences, the County Department of Public Works conducted a survey in March 2025 to verify the CNDDB information in the more densely populated areas of Los Osos. The figure below shows CNDDB occurrences found in the survey or presumed (represented in green outline), CNDDB occurrences not found in the survey (represented in red outline), other occurrences found in the survey or according to CalFlora (represented by points), and the Los Osos Priority Conservation Area (PCA) from the LOHCP (represented in orange outline).



Notably, the 2025 survey demonstrated that Morro manzanita is a common landscape species used throughout the community. Morro manzanitas that were found in Baywood (northern portion of Los Osos) were generally isolated, singular specimens that have been incorporated into homeowners' landscaping. They were often heavily pruned, unhealthy in appearance, and unlikely to give rise to future plants.

Example of Morro manzanita as a landscape specimen in Los Osos

Conversely, the PCA identified as part of the LOHCP is the area containing high-quality habitat already under protection or to be placed under protection through LOHCP implementation. As depicted in the figure, there are only scatters of occurrences found or presumed outside of the PCA, whereas most of the occurrences found or presumed are within the PCA. The small number of occurrences affected by development under the LOHCP would have an insignificant impact on the survival of Morro manzanita. In fact, under the LOHCP, the increased protection of high-quality habitat in the PCA will contribute to substantially higher likelihood of Morro manzanita survival in the near and long term, since contiguous lands connected to already protected lands would be placed under conservation as opposed to considering protection of fragmented occurrences.

The compelling near and long term benefits that Morro manzanita is afforded due to LOHCP implementation, especially in light of the current location of occurrences, must be accounted for in considering Morro manzanita for listing if survival of Morro manzanita is the intent. The Petition does not provide adequate information in this regard; and instead, cites outdated information on occurrences without showing the relationship between occurrences and the PCA.

Key Factor #3: The Petition Fails to Acknowledge or Rebut the Extensive Analysis and Findings made by FWS that Implementation of the LOHCP Would Not Jeopardize Morro Manzanita's Recovery

Contrary to the Petition's unsubstantiated assertions, Morro manzanita is now effectively subject to protection under the ESA because of the LOHCP. Absent the LOHCP, the ESA would not normally prohibit the take of listed plant species on private land. However, under Section 7 of the ESA, the FWS was required to ensure that approval of the LOHCP was not likely to jeopardize the continued existence of any federally listed species (including Morro manzanita) or result in the destruction or adverse modification of critical habitat. In other words, because of the LOHCP, Morro manzanita is now afforded significant protections on private land. It should also be noted that the LOHCP includes a "stay ahead" provision that requires conservation and restoration actions to occur prior to allowing for development to occur under the LOHCP, guaranteeing benefit to Morro manzanita.

In accordance with Section 7 of the ESA, on January 17, 2024, the FWS issued its Intra-Service Biological Opinion for the LOHCP (Biological Opinion). (See Biological Opinion attached as Exhibit B.) The Biological Opinion details how the LOHCP "incorporates all of the recovery goals identified for Morro manzanita." (See Exhibit B, page 31.) The Biological Opinion points out that the smaller isolated stands located where most of the development is expected to occur "by definition, do not support the recovery goals for the species." (*Ibid*.) While development under the LOHCP "may adversely affect a small number of Morro manzanita plants", "the number of individuals killed and removed will be low due to the conservation measures", "the conservation program is expected to increase the value and function of Morro manzanita habitat on existing conserved land and newly acquired habitat and by the restoration and management of on-site habitat set asides", and the "improved habitat value and function is expected to increase the number of Morro manzanita plants and facilitate recovery of the species." (See Exhibit B, page 32.) As to the jeopardy factors identified in Section 7 implementing regulations, the Biological Opinion found that the LOHCP would not appreciably reduce reproduction rangewide, would cause a low decrease in the number of individuals, would not reduce distribution rangewide, and would not cause any effects that would preclude recovery. (See Exhibit B, pages 33-34.)

Accordingly, on February 15, 2024 (the same date of final approval of the LOHCP and issuance of the incidental take permit), the FWS issued its Findings and Recommendations (Findings). (See Findings attached as Exhibit C.) Based on the analysis in the Biological Opinion, the FWS found that the LOHCP would not jeopardize the continued existence of the covered species, including Morro manzanita. (See Exhibit C, page 7.)

The Petition does not discuss, let alone try to rebut, the extensive (and required) analysis and findings by the FWS when it approved the LOHCP. In fact, the Petition appears to be based on the demonstrably false assertion that approval of the LOHCP did not assess or account for potential impacts to Morro manzanita on private land. The unaddressed and unrebutted final analysis and findings by a sister wildlife agency is the perfect example of "countervailing information and logic" which "persuasively,

wholly undercut some important component of" the prima facie showing and "diminish[es] the possibility that listing could occur to an 'insubstantial' level." (*Center for Biological Diversity v. Fish & Game Commission* (2008) 166 Cal. App. 4th 597, 612.)

Conclusion

The Commission should deny the Petition because it fails to provide required information on existing management efforts and does not provide sufficient information to demonstrate a substantial possibility of listing Morro manzanita as endangered. The Petition's conclusory statements regarding the LOHCP do not suffice. The failure to provide sufficient information regarding the LOHCP undermines the entire premise of the Petition, including that the same management actions recommended are already contained in the LOHCP, the highest value occurrences will be protected and expanded under the LOHCP, the potential impacts to Morro manzanita have already been extensively vetted, and it has been determined by the FWS that the LOHCP will benefit, not harm, the species' recovery. Denial of the Petition is not only legally required, but it will also allow the important work under the LOHCP to proceed uninterrupted in partnership with CDFW and FWS and other stakeholders.

Thank you for your consideration,

Trevor Keith
Director
Department of Planning and Building
County of San Luis Obispo

John Diodati
Director
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County of San Luis Obispo

CC: Bruce Gibson, District 2 Supervisor of San Luis Obispo County
County Counsel's Office of County of San Luis Obispo

Attachments: Exhibit A – Los Osos Habitat Conservation Plan
Exhibit B – USFWS Biological Opinion
Exhibit C – USFWS Incidental Take Permit Findings

EXHIBIT A

Los Osos
Habitat Conservation Plan

February 2024

Los Osos Habitat Conservation Plan

Prepared for

County of San Luis Obispo

Planning and Building Department

976 Osos Street

San Luis Obispo, CA 93408

Prepared by

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February 2024

Cover Photographs
- Los Osos Landscape: Jodi McGraw
- Morro shoulderband snail: United States Fish and Wildlife Service
- Morro manzanita: Jodi McGraw
- Morr Bay kangaroo rat: Moose Peterson
- Indian Knob mountainbalm: California Department of Fish and Wildlife

Title Page Photograph: Jodi McGraw

Jodi McGraw Consulting. 2022. *Los Osos Habitat Conservation Plan*. Prepared for the County of San Luis Obispo. June 2022.

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List of Acronyms

Acronym	Definition
AMMP	adaptive management and monitoring plan
APN	assessor's parcel number
BLM	Bureau of Land Management
BO	Biological Opinion
CalIPC	California Invasive Pest Plant Council
CAL FIRE	California Department of Forestry and Fire Protection
CASH	California Academy of Sciences Herbaria
CCH	California Consortium of Herbaria
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game)
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CMCA	Crawford, Multari, and Clark Associates
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COI	certificate of inclusion
DPS	Distinct Population Segment
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Federal Endangered Species Act
ESHA	Environmentally Sensitive Habitat Area
FC	Candidate to be Federally Listed
FD	Federally Delisted
FE	Federally Endangered
FGC	State Fish and Game Code
FP	State Fully Protected (CESA) and Fully Protected (CDFW)
FR	Federal Register
FT	Federally Threatened
GIS	Geographic Information System
GPS	Global Positioning System
GSW	Golden State Water Company
HCP	Habitat Conservation Plan
IAMMP	Interim Adaptive Management and Monitoring Plan
IBA	Important Bird Areas
IKM	Indian Knob mountainbalm
IPPC	Intergovernmental Panel on Climate Change
ITP	incidental take permit (federal)

Acronym	Definition
JSA	Jones and Stokes Associates
LOCSD	Los Osos Community Services District
LOHCP	Los Osos Habitat Conservation Plan
MBA	Michael Brandman Associates
MBKR	Morro Bay kangaroo rat
MCAS	Morro Coast Audubon Society
MDER	Morro Dunes Ecological Reserve
MM	Morro manzanita
MOU	Memorandum of Understanding
MSS	Morro shoulderband snail
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OHV	Off-Highway Vehicle Use
OSUH	Oregon State University Herbarium
PAR	Property Analysis Report
PCA	Priority Conservation Area
PRISM	PRISM Climate Group
PT	Proposed for Federally Threatened Listing
S&T	S & T Mutual Water Company
SD	state delisted
SE	state endangered
SOD	Sudden Oak Death
SRA	Sensitive Resource Area
SSC	Species of Special Concern
ST	state threatened
SWAP	Small Wilderness Area Preservation
SWCA	SWCA Environmental Consultants
TP	Threatened Phenomenon
URL	Urban Reserve Line
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USL	Urban Services Line
WL	Watch List
WRCC	Western Regional Climate Center

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Executive Summary

The County of San Luis Obispo is requesting a federal incidental take permit issued pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) to cover take/impacts[1] of four state and/or federally listed species:

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Threatened[2]/None
Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

The take/impacts would result from private development activities as well as public agency and private utility projects conducted during the 25-year permit term within the 3,209-acre Permit Area, where the ITP issued based on the Los Osos Habitat Conservation Plan will authorize take of Morro shoulderband snail (Figure 1-2). The HCP also covers two federally listed plants and the Morro Bay kangaroo rat, a state and federally listed animal. There will be no impacts to occupied Morro Bay kangaroo rat habitat from the permitted activities through implementation of the conservation measures. The Permit Area covers 3,209 acres within the 3,644-acre Los Osos Habitat Conservation Plan Area (Figure 1-1). The Permit Area excludes State Park lands except the 12.0 acres proposed for creation and maintenance of a fuel break as part of the Community Wildfire Protection Plan (Figures 1-1 and 1-2; Sections 1.3 and 2.2.7).

The Los Osos Habitat Conservation Plan Area is centered on the unincorporated community of Los Osos, in central coastal California (Figures 1-1 and 1-2). The Los Osos Habitat Conservation Plan (LOHCP or Plan) Area features the Baywood Fine Sands ecosystem—a unique biological system found only on ancient sand dunes in the Los Osos region, which provides habitat for numerous rare and unique plants and animals, including the four covered species.

Naturally rare due to their limited geographic range and narrow habitat specificity, the covered species have been impacted by habitat loss due to historic development in the region. The central and northern portions of the Plan Area, which are inside the Urban Services Line (USL), feature dense residential and commercial development; the area outside of the USL features sparser residential development, limited agricultural use, and parks and reserves that contain important habitat areas.

Covered Activities

Since 1988, there has been a moratorium on new development throughout much of Los Osos as a result of water quality issues caused by the region's septic systems. However, completion of the Los Osos

[1] "Take" under the federal ESA does not apply to listed plant species. For purposes of the LOHCP and the federal permit, "take" when applied to the covered plant species refers to impacts to the species. The Plan features conservation measures to protect these species, which are included as covered species, so that the USFWS will extend "no surprises" assurances for them.

[2] In 2020, the USFWS proposed to reclassify Morro shoulderband snail from an endangered to a threatened species (USFWS 2020a). The downlisting occurred on February 3, 2022 (USFWS 2022).

wastewater facility in 2016, along with the update to the Los Osos Community Plan, will enable development to resume within the 1,584-acre wastewater facility service area, which features 579 vacant parcels totaling 260 acres. Outside the wastewater treatment area, there are 122 additional vacant private parcels (445 acres), which are designated for single-family residential development. These vacant parcels will likely be developed during the 25-year permit term, impacting an estimated 253.8 acres of habitat: 150.7 acres of residential land and 103.1 acres of commercial land (Table 2-6). Additionally, remodels, additions, and other redevelopment on 5,283 developed parcels, which total 1,476 acres, are estimated to impact 156 acres (Table 2-7).

The take permit issued for this Plan would also cover the impacts of capital improvement projects, facilities operations, and maintenance activities conducted by the County, the Los Osos Community Services District, and two private water purveyors, S&T Mutual and Golden State Water Company. These projects, which include road and trail creation and maintenance, park expansion and creation, and water system upgrades, and facility maintenance activities, are estimated to impact 122.1 acres (Table 2-8).

To conduct these otherwise lawful activities in compliance with ESA, the County is requesting a federal incidental take permit, which would permit the take of Morro shoulderband snail. Pre-project surveys conducted in suitable habitat for Morro Bay kangaroo rat and Indian Knob mountainbalm will be used to ensure projects avoid harm to individuals of these species, such that a take permit is not being requested for these state-listed endangered species under Section 2081 of the California Environmental Species Act (CESA). This HCP includes Morro manzanita and Indian Knob mountainbalm as covered species.

Proponents of covered activities, including private landowners, agencies, and organizations that choose to participate in this voluntary[3] program, will receive take coverage via Certificates of Inclusion (COI)—legal documents that confer the County's federal take coverage to others who agree to the permit terms (Appendix H).

Habitat Impacts

Implementation of the covered activities will impact up to 532 acres of habitat[4] within the 3,209-acre Permit Area, resulting in the loss, degradation, and fragmentation of habitat for the four covered species. Though the precise number, size, and location of the projects to be conducted in this

[3] Participation in the LOHCP is voluntary; landowners who are not conducting activities that cause ground disturbance or otherwise impact the covered species need not participate in this plan. Moreover, proponents of projects causing ground disturbance may have other options for compliance with the local, state, and federal permitting. However, impacts to habitats on Baywood fine sands soils that require a permit from the County will need to be mitigated as outlined in LOHCP Section 5.7, and consistent with the Los Osos Community Plan. The LOHCP was developed to reduce the timeline and costs for permitting, while also contributing to a more cohesive conservation strategy for the covered species. Moreover, the USFWS has indicated that the LOHCP is their preferred permitting mechanism for compliance with the federal Endangered Species Act.

[4] The 532 acres of take/impacts does not include that caused by implementation of the conservation program and the Community Wildfire Protection Plan, both of which will result in additional temporary habitat impacts.

programmatic[5] HCP are unknown, the acres of vegetation and other land cover types that are anticipated to be affected were estimated based on information from available projects (Table 4-1). This analysis estimated that the covered activities will impact 189 acres of coastal sage scrub, 18 acres of central maritime chaparral, and 33 acres of woodlands, including primarily coast live oak woodland (Table 4-3). Much of the remaining impacts (207 acres) will occur within existing developed areas, including the County rights-of-way, which may still support the covered species.

In addition to directly affecting habitat and individuals, the covered activities will also impact the covered species indirectly (Section 4.1.2). Increasing the human population through development is likely to intensify recreational use of parks and reserves, which can degrade protected habitat (Section D.2). The covered activities, in addition to greater human habitation in the region, can also promote the invasion and spread of exotic plants, many of which are adapted to disturbance (Section D.1). Finally, the proximity of greater human population to remaining habitat will further complicate efforts to effectively manage fire in order to promote populations of the fire-dependent covered plants and retain the structure and species composition to which the covered animals are adapted (Section D.3).

The LOHCP permits will also cover fire hazard abatement activities conducted to implement the Los Osos Community Wildfire Protection Plan (Section 2.2.7; SLOCCFSC 2009). Construction of fuel breaks at the wildlife urban interface is anticipated to impact 89.4 acres. Some of the treatments will promote the LOHCP biological goals and objectives by reducing exotic plants and creating early-successional habitat conditions. In order for the take/impacts of the CWPP to be covered under the permit issued for this Plan, the CWPP will be implemented using a suite of avoidance and minimization measures developed as part of the LOHCP to substantially reduce take of Morro shoulderband snail in the form of injury and mortality and reduce the severity of impacts to Morro manzanita (Table 5-4), which will be largely temporary.

Conservation Program

To mitigate the effects of the covered activities on the covered species, the County will be responsible for implementation of the LOHCP conservation program—a comprehensive program designed to avoid, minimize, and mitigate the impacts of the covered activities to a level that is commensurate with the impacts of the taking, as summarized in Table 5-11. This conservation plan is also intended to contribute to recovery of the listed species, by addressing threats to survival to promote long-term persistence.

The LOHCP conservation program includes the following elements:

- **Biological Goals and Objectives:** the desired future conditions of the ecosystem, communities, and covered species (goals), and 23 targets for achieving them (objectives; Table 5-1).
- **Avoidance and Minimization Measures:** the steps that will be taken during implementation of the covered activities to avoid or minimize their effects on covered species and the degradation of upland habitats (Table 5-2); a suite of measures to avoid impacts to other listed species not

[5] Unlike project- or land-specific HCPs, where all of the activities and/or affected areas are known, a programmatic HCP identifies a Permit Area and project eligibility criteria used to identify activities that can be covered by the ITP issued to the Plan's sponsor (in this case, the County). Activities meeting these criteria can be covered provided that project proponents implement the Plan's avoidance, minimization, and mitigation measures and adhere to the associated Plan conditions identified in the certificate of inclusion issued to confer take coverage under the sponsor (i.e., the County's) ITP.

covered by the permits, which primarily occur in the wetland and riparian systems as these areas are not covered by the Plan (Table 5-3); and additional avoidance and minimization measures designed to minimize impacts from the community wildfire protection plan (Table 5-4);

- **Habitat Protection**: the measures that will be taken to secure fee title or conservation easements from willing landowners to safeguard additional habitat, to expand and connect existing protected lands (Section 5.3.2);
- **Habitat Restoration:** the projects to re-establish habitat conditions, including native plant community structure and species composition, where it has been substantially degraded by anthropogenic factors, such as erosion, dense infestations of exotic plants, and fire exclusion (Section 5.3.3);
- **Habitat Management:** the ongoing efforts to maintain or enhance habitat conditions and promote the long-term population viability of the covered species, by addressing factors that negatively impact habitat, including incompatible recreational use, exotic plants, and fire outside of the natural disturbance regime (Section 5.3.3);
- **Monitoring:** the long-term studies to track the status and trends of the covered species populations, and the condition of their habitat (Table 5-6), as well as project-specific monitoring to document the effectiveness of restoration and management relative to the performance criteria that reflect their conservation value for the covered species; and
- **Adaptive Management:** the framework through which the six other elements will be implemented in order to enhance long-term effectiveness of the conservation program at achieving the biological goals and objectives (Section 5.5).

As the permittee, the County will be responsible for implementation of the LOHCP Conservation Program. It envisions contracting with an Implementing Entity— an existing or newly-created non-profit conservation organization (e.g., a land trust or conservancy), that will provide expertise in land conservation and management of threatened and endangered species to assist with implementation of the LOHCP conservation program (Section 6.1). The Implementing Entity will be identified by the County and approved by CDFW and the USFWS prior to issuance of the permit (Table 6-1).

The LOHCP conservation program includes establishment and management of the LOHCP Preserve System—a network of existing protected lands (i.e., parks, open space, reserves already protected extensive development), as well as land protected through Plan implementation, as part of a coordinated strategy designed to achieve the LOHCP biological goals and objectives. Incorporation of existing protected lands eligible for management as part of the LOHCP Preserve System (Table 5-5) will ensure that the habitat of greatest long-term conservation value is restored and enhanced to promote persistence of the covered species (Section 5.3.1).

The LOHCP Preserve System will be assembled during the 25-year permit period, through the acquisition, restoration, and management of native communities that provide habitat for the covered species to build upon the public and private conservation investments in the region over the past three decades. To provide the greatest long-term benefit for the covered species, these activities will primarily occur within the Priority Conservation Area (Section 5.3.1.2). Located on the perimeter of the LOHCP Area (Figure 5-1), this area features large blocks of relatively intact habitat identified as important for long-term viability of the covered species in their respective recovery plans (USFWS 1998a, 1999).

The LOHCP Preserve System will be managed, restored, and monitored as outlined in the LOHCP Preserve System Adaptive Management and Monitoring Plan (AMMP; Section 5.3.3.2). The AMMP will be developed during the first three years of Plan implementation based on initial surveys and monitoring studies that will be used to establish baseline information about habitat conditions and covered species populations and to inform the design of restoration and management strategies and projects (Section 5.3.3.2). The AMMP will be developed based on the framework and information provided in this plan, including: 1) biological goals and objectives (Section 5.1); 2) information about the covered species ecology and conservation needs (Appendix B); 3) scientific information about the three main threats to the covered species—exotic plants, incompatible recreation, and fire exclusion—and approaches to their management (Appendix D); and 4) monitoring protocols for the covered species, communities, and habitat conditions (e.g., exotic plants; Appendix E). The AMMP will build of the *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (IAMMP)—a plan that will guide initial restoration conducted as mitigation in order to jump start the conservation program (McGraw 2020; Appendix M). The AMMP, which will be subject to approval by the USFWS and CDFW, will establish performance criteria that habitat protection, restoration, and management actions must achieve to be credited as mitigation for the take of/impacts to the covered activities on the covered species through this Plan.

Mitigation Requirements

The conservation program elements will be implemented by the Implementing Entity in coordination with the County and others who conduct covered activities under the Plan (project proponents) through measures required to mitigate the take/impacts of their permitted activities on the covered species. To receive take coverage, project proponents who elect to participate in this program will be required to implement the applicable avoidance and minimization measures identified by the County during the application review process (Tables 5-2 to 5-4).

Project proponents will also be required to compensate for their project take/impacts by contributing to the protection, restoration, and long-term management of habitat within the LOHCP Preserve System. The type and level of compensatory mitigation reflects the amount and quality of habitat impacted, to ensure that the impacts to covered species are offset by the mitigation requirements (Table 5-7).

- **On-Site Habitat Protection:** Proponents of residential development projects inside the PCA will dedicate conservation easements to the Implementing Entity, which will protect habitat set-asides on-site at a ratio of 3:1 for the area of habitat impacts. This approach to on-site habitat protection reflects the generally high conservation value of habitat in these parcels.
- **Off-Site Habitat Protection Fee:** Proponents of activities located outside of the PCA will pay a fee that will be used to acquire additional privately held land from willing sellers that will be included in the LOHCP Preserve System. This fee, which was calculated on a per-square foot basis, was calculated to cover the costs of protecting habitat within the PCA (Section 7.2.1).
- **Habitat Restoration, Management, and Plan Administration:** All proponents of project types identified in Table 5-7 will pay a fee to fund restoration of habitat in the LOHCP Preserve System, as compensation for the loss of habitat caused by the covered activities. This fee will also fund ongoing habitat management and monitoring, to ensure that the protected and restored habitat does not degrade in ways that would reduce its value for the covered species. Calculated based on the area disturbed by the covered activity, so that mitigation offsets the project impacts, this Plan Restoration/Management/Administration Fee, will also fund long-

term monitoring of the Preserve System as well as Plan administration, so that the Plan implementation costs are completely funded by project proponents.

The mitigation fees were calculated based on both the anticipated land acquisition costs (Habitat Protection Fee), and the estimated costs to restore, manage, and monitor land within the LOHCP Preserve System, as well as administration of the Plan (Restoration/Management/Administration Fee; Section 7.2). The fees will be used, in part, to establish an endowment to fund ongoing management and monitoring of the LOHCP Preserve System after expiration of the permits. The endowment will ensure the condition of habitat protected and restored within the LOHCP Preserve System is maintained in perpetuity. Calculated on a per-square-foot basis, the initial Habitat Protection Fee is approximately $0.17 while the initial Restoration/Management/Administration Fee is approximately $1.03 (Table 7-1)[6].

The County will work with an Implementing Entity to administer the LOHCP over the 25-year period of the Plan, by permitting a suite of eligible covered activities, and assembling the LOHCP Preserve System by: 1) accepting conservation easements dedicated by landowners developing vacant land inside the PCA (i.e., on-site mitigation); 2) using Habitat Protection Fees collected from other project proponents identified in Table 5-7 to acquire fee title or conservation easements from willing sellers of land inside the PCA; 3) using restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to manage and restore the newly acquired land; and 4) using the restoration, management, and administration fees to manage and restore existing protected lands enrolled into the LOHCP Preserve System, and to monitor the habitat and species populations to document achievement of the performance criteria established in the AMMP.

In this programmatic plan, the land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities. At any time during plan implementation, the benefits of the Preserve System for the covered species, as documented through achievement of the performance criteria specified in the AMMP, will exceed, or at least match, the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities.

To initiate the mitigation component of the conservation program, the County proposes to work with the Implementing Entity to restore habitat within the Morro Dunes Ecological Reserve, which the County and CDFW (the landowner) anticipate enrolling in the LOHCP Preserve System at the outset of Plan implementation as outlined in the Memorandum of Understanding (Appendix J). The *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (McGraw 2020; Appendix M) will guide this initial work, which will 'jump start' the mitigation and help ensure that it stays ahead of the project impacts (Section 6.2.5). Alternatively or additionally, the County will work with the Implementing Entity to protect new land or enroll existing unprotected County land into the LOHCP Preserve System to generate mitigation credits to offset impacts to covered species from covered activities early during implementation (Section 6.2.5).

Habitat Benefits

Mitigation costs in this Plan were estimated based on the LOHCP Preserve System configuration scenario (Section 5.8.1)—a scenario for the final preserve system design, which identifies the acres of land that

[6] The fees will be calculated to the nearest hundredth of a cent (Table 7-8). The fees listed here are rounded to the nearest cent for simplicity.

will be acquired, restored, and managed to mitigate the impacts of the covered activities. As noted above, the LOHCP Preserve System will be assembled over time by the County in coordination with the Implementing Entity, which will work with willing landowners to protect unprotected habitat as well as enroll existing protected lands of high conservation value to the covered species. The precise acreage of new and existing protected land that will ultimately comprise the LOHCP Preserve System is unknown. However, a reasonable scenario for the LOHCP Preserve System was developed in order to estimate the land protection, restoration, management, and monitoring costs, in order to estimate the mitigation fees.

In this scenario, the LOHCP Preserve System would consist of 386 acres and would (Table 5-9):

- **Protect 107.5 acres** of currently unprotected land, of which 10 acres will be restored and then managed (the other 97.5 acres will not require initial restoration and instead will be actively managed);
- **Restore 35 acres** of degraded habitat within existing parks or reserves that are already protected from development (e.g., the Morro Dunes Ecological Reserve) to increase its ability to support the covered species; and
- **Actively manage 243.7 acres** of additional habitat within existing parks and reserves, to meet the unmet management needs and that go above and beyond the existing management obligations of the landowner/land management agency and address factors that threaten long-term persistence of the covered species.

Mitigation crediting ratios were used to relate the value of habitat protection, restoration, and management to the impacts of the covered activities. The ratios are designed to express the relative value of the conservation actions for the long-term recovery of the covered species by assessing the effects of *not* implementing the typical covered activity (Section 5.7.2.3.1; Table 5-8). For example, the ratio of 1.5:1 is used to reflect the 50% higher benefit of restoring habitat that is degraded by dense infestations of exotic plants in an existing protected area (e.g., the Morro Dunes Ecological Reserve), for the conservation of the covered species, relative to *not* implementing a typical covered activity, such as residential development on a 3,000-sf lot within the urban services line.

The ratios are generally greater than 1:1, reflecting the fact that the long-term benefits for the covered species populations of the mitigation actions will exceed the take of/impacts to the covered species resulting from the covered activities. This is because the conservation actions will be largely implemented in the PCA (Figure 5-1), which features larger, more contiguous areas of relatively intact habitat that are of greater long-term conservation value for the covered species, whereas most of the covered activities will occur in areas not deemed essential for recovery of the species such as designated critical habitat or conservation planning units identified in a recovery plan. Instead, the covered activities will largely occur in areas of existing high-density residential and commercial development, that are of lower conservation value. While activities in these areas will impact the covered species and therefore require mitigation in order to meet the issuance criteria for an incidental take permit, the mitigation ratios reflect the greater value of the conservation actions for long-term conservation of the covered species (Section 5.7.2.3.1, Table 5-8).

These mitigation crediting ratios were used to assess the anticipated net benefits of the LOHCP Preserve System for the covered species by comparing the habitat impacts of the covered activities, which are analyzed in Section 4.2 based on the methods outlined in Section 4.1, to the anticipated benefits to habitat in the LOHCP Preserve System, which are described in Section 5.8 based on a similar

methodology. In the scenario used for the final configuration of the LOHCP Preserve System, the 386-acre LOHCP Preserve System will benefit 533.1[7] acres of habitat, thus mitigating the maximum impacts of the covered activities on habitat at a ratio of 1:1 (Table 5-10). The mitigation equivalencies were multiplied by the acres of vegetation and other land cover types anticipated to be within the LOHCP Preserve System to calculate the acre equivalents of each type that would benefit from the LOHCP conservation program (Table 5-10). These were compared to the acreages anticipated to be impacted by the covered activities (Table 4-3). For each, a cross walk between vegetation types and other land cover was used to calculate the area of habitat potentially occupied by Morro shoulderband snail and Morro manzanita (Tables 4-4 and 4-5).

- **Morro Manzanita:** The Preserve System is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (central maritime chaparral and native woodlands; Table 4-4), whereas the covered activities are anticipated to impact just 41 acres of habitat. This 8.6:1 ratio of benefits to impacts reflects the far greater proportion of central maritime chaparral on the perimeter of the Plan Area, where the Preserve System will be located, compared to the center of the Plan Area where the covered activities will largely occur.
- **Indian Knob Mountainbalm:** The Preserve System is anticipated to benefit 156-acre equivalents of central maritime chaparral, while the covered activities will impact just 18 acres of these communities that can provide habitat for this endangered plant. This 8.5:1 ratio of habitat benefits to impacts for central maritime chaparral will greatly facilitate recovery of Indian Knob mountainbalm.
- **Morro Bay Kangaroo rat:** The covered activities are anticipated to impact 189 acres of coastal sage scrub and 18 acres of central maritime chaparral, which can be suitable for Morro Bay kangaroo rat if open habitat conditions are maintained. The Preserve System is anticipated to benefit 475-acre equivalents of these communities thus offsetting habitat impacts for this species at a ratio of more than 2:1.
- **Morro Shoulderband Snail:** The covered activities are anticipated to impact 189 acres of habitat, while the Preserve System will benefit 191-acre equivalents, resulting in a 1:1 ratio of benefits to impacts.

Based solely on habitat acreages, these ratios understate the anticipated net benefits of the Plan for the covered species. First, the habitat that will benefit from the Preserve System is of far greater long-term conservation value than the habitat that will be impacted by the covered activities (Section 4.2). Specifically, of the 207 acres of coastal sage scrub and central maritime chaparral anticipated to be impacted by the covered activities, 166 acres (80%) is anticipated to be inside the Urban Services Line (Table 4-3). Habitat within this already densely-developed portion of Los Osos is not included in designated critical habitat or identified as a conservation planning unit within a recovery plan for the covered species, and has lower long-term conservation value as it is more degraded and fragmented; as a result, it would be far more difficult to actively manage than the larger, more intact habitat within the Priority Conservation Area. As illustrated in Table 5-10, the 386-acre Preserve System is anticipated to result in 475-acre equivalents of habitat benefits from protection, restoration, and/or management of 350 total acres of relatively intact coastal sage scrub and central maritime chaparral communities that

[7] The LOHCP preserve system scenario includes 1.6 acre-credits more than needed to mitigate the 531.5 acres of impacts caused by the covered activities, to address estimation errors in this 25-year, programmatic plan.

occurs in larger, more contiguous habitat patches[8]. In addition, this Plan will result in net benefits for the covered species by funding, in perpetuity, the active habitat management of the upland habitat within the Baywood fine sands ecosystem. The funding is necessary to achieve the goals and objectives and can help promote recovery of the listed species.

Plan Implementation

The Plan will be implemented by the County with the assistance of an Implementing Entity, which is anticipated to primarily assist with implementation of the conservation program (Section 6.1). The USFWS will monitor County compliance with the incidental take permit including by reviewing annual reports (Section 5.6) and annual work plans for the LOHCP Preserve System AMMP. The following paragraphs outline their main roles and responsibilities:

1. **County:** As the sole permittee, the County will be responsible for implementation of the Plan and compliance with the permit terms. Specific roles include: review applications and issuing COIs, conducting implementation monitoring enforcing compliance with the terms of COIs, preparing annual reports, and overseeing work by the Implementing Entity to implement the conservation program.
2. **USFWS:** Pursuant to their regulatory roles under the ESA, the USFWS will primarily be responsible for monitoring Plan implementation and notifying the County if Plan implementation is not proceeding in compliance with the permit. The USFWS will also review and approve land acquisition and conservation easement proposals, review and approve the LOHCP Preserve System AMMP, and review annual reports and work plans documenting plan implementation and monitoring. The USFWS, as well as CDFW, will approve the selection of the Implementing Entity. The USFWS may also, in their discretion, assist the County in securing federal funding to enhance the conservation program (e.g., Section 6 funds).
3. **Implementing Entity:** Under contract with the County, this organization is anticipated to assist with implementation of the conservation program by: assembling, restoring, and managing the Preserve System; conducting all monitoring to evaluate its biological effectiveness including achievement of the success criteria; recommending updates to the AMMP and the Plan to increase its success; and assisting the County with development of the annual reports.

This programmatic Plan will be implemented through an adaptive management framework, which will ensure its long-term effectiveness at achieving the biological goals and objectives (Table 5-1). The Preserve System AMMP, which will be developed early during Plan implementation (Years 1-3) and guide restoration and management of the Preserve System, will be updated as part of annual review cycles based on:

1. **Biological effectiveness monitoring results**, which will document achievement of the performance criteria as well as refine management strategies and techniques to promote long-term effectiveness;
2. **Implementation monitoring results**, which will identify additional or different avoidance and minimization protection measures;

[8] The benefits to habitat exceed the acreages of habitat in the Preserve System, as a result of the mitigation equivalency ratios applied to each of the conservation actions to reflect their value for conservation of the covered species relative to the impacts of the typical covered activity, as described in detail in Section 5.7.2.3.1.

3. **New scientific information,** which will inform effective conservation and management of the covered species and the communities in which they occur; and
4. **Changes in habitat conditions,** relative to baseline conditions, including threats to the covered species, such as invasion and spread of exotic plants or animals, fire, drought, or global climate change, which may necessitate additional or different management treatments (Section 6.5).

The mitigation costs will be tracked to update the financial analysis and mitigation fee schedule (Section 7.4). This adaptive financial management will ensure that the Plan is adequately funded, so that mitigation is assured, and the Plan is implemented as intended, and can respond to changed circumstances including future impacts due to climate change (Section 6.5). In doing so, this coordinated conservation program will contribute to the recovery of the four covered species and help conserve other native plants and animals that comprise the endemic communities of the Baywood fine sands ecosystem.

1 Introduction and Background

1.1 Overview

Located in San Luis Obispo County in central coastal California, the unincorporated community of Los Osos is approximately ten miles northwest of the City of San Luis Obispo and five miles south of the City of Morro Bay (Figure 1-1). The community of Los Osos is situated on an ancient dune complex. The sandy soil, known as the Baywood fine sand, combine with the region's maritime climate to create a mosaic of natural communities including coastal sage scrub, central maritime chaparral, and coast live oak woodland, that support unique and diverse assemblages of plants and animals, including four narrowly endemic species:

- Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*);
- Morro shoulderband snail (*Helminthoglypta walkeriana*);
- Morro Manzanita (*Arctostaphylos morroensis*); and
- Indian Knob mountainbalm (*Eriodictyon altissimum*).

Due to their small geographic range, narrow habitat specificity, and small and declining populations, these four species have been listed as either threatened or endangered under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA; Section 1.4). In order to comply with these laws, landowners and others seeking to conduct projects that would impact these species including their habitats must receive state and federal incidental take permits. These permits cover the take/impacts to the listed species that result from ,otherwise lawful activities.

This habitat conservation plan for the Los Osos area (LOHCP or Plan) is part of an application by the County of San Luis Obispo (County) to obtain an incidental take permit (ITP) from the United States Fish and Wildlife Service (USFWS), which implements the federal Endangered Species Act. The County will avoid take, as defined under CESA, of the state-listed species; therefore, the County is not requesting an incidental take permit issued pursuant Section 2081 of CESA. As the permittee, the County can issue Certificates of Inclusion (COIs) to landowners and other project proponents to confer take coverage for projects that impact one or more of the listed species.

The LOHCP identifies the suite of activities that will be covered by the permit (covered activities; Section 2.2), their anticipated impacts to the listed species covered by the permit (covered species; Chapter 4), and the steps that the County and other plan participants will take to avoid, minimize, and mitigate the impacts of the covered activities on the covered species (the conservation program; Chapter 5).

Participation in the LOHCP is voluntary; landowners who are not conducting activities that cause ground disturbance need not participate in the Plan. Moreover, landowners and other proponents of projects causing ground disturbance have other options for compliance with the local, state, and federal permitting requirements that are addressed through this plan. However, the LOHCP is designed to streamline the permitting process, reducing both the timeline and costs for permitting, while also contributing to a more cohesive conservation strategy for the covered species. Moreover, the USFWS has indicated that the LOHCP and an issued ITP are the recommended permitting mechanism for compliance with the federal Endangered Species Act.

To mitigate the take of animals and impacts to plants from the covered activities, the County has developed a conservation program to: 1) avoid impacts of the projects on the covered species, where possible, and 2) minimize and compensate for the impacts on the covered species, in cases where take/impacts cannot be avoided. The conservation program also includes measures to avoid impacts to other listed species in the Plan area, that are not covered under the ITP. These elements of the LOHCP Conservation Program build upon the history of conservation work in the region, which has protected in state parks and ecological reserves habitat of high conservation value. To leverage these prior public and private investments in conservation in the region, the LOHCP Preserve System will feature a mix of existing protected lands as well as new habitat acquired through the LOHCP, which will be restored, managed, and monitored through a comprehensive strategy designed to maximize effectiveness of the habitat mitigation fees collected through the plan (Chapter 5).

The LOHCP also outlines the specific measures that the County will take to implement the LOHCP. The County envisions contracting with an Implementing Entity—a non-profit conservation organization approved by the USFWS and CDFW— to implement the conservation program (Chapter 6). Chapter 7 outlines the costs and funding approach to implement the elements of the Plan, while Chapter 8 identifies alternatives to the proposed taking and why they were not pursued by the County.

Implementation of this plan will help conserve the covered species and enhance the natural communities that support them as well as other native species, while allowing compatible growth and development consistent with applicable local, state, and federal laws.

1.2 Permit Holder/Permit Duration

The County is requesting to hold the incidental take permit issued pursuant to Section 10(a)(1)(B) of ESA. As the land use jurisdiction for the unincorporated area of Los Osos, the County can be responsible for implementing the Plan and ensuring compliance with the terms of the permit as it implements its general plan and associated land use policies and ordinances. As a landowner and provider of various services, including road and park maintenance, the County will also use the take authorization provided by the incidental take permit issued based on the Plan to cover impacts of its own capital improvement and facilities operations and maintenance projects.

The County will also coordinate plan implementation with other public entities, such as the Los Osos Community Services District (LOCSD), to cover take/impacts caused by covered activities that are outside of County jurisdiction. The County will confer take coverage to other proponents of projects that meet the Plan's eligibility criteria through its land use authority and through issuance of Certificates of Inclusion (Appendix H): legally binding contractual agreements between the County and the Plan participant, as allowed under Title 50 of the Code of Federal Regulations Section 13.25 (e).

The County will monitor the compliance of Plan participants to ensure compliance with the requisite conservation program measures. As the permittee, the County anticipates implementing the conservation program with the assistance of the Implementing Entity; however, the County remains legally responsible for implementing the plan and complying with the incidental take permit, including all actions, and any failure to act, by the Implementing Entity.

The County has requested a 25-year permit term. This duration will allow the County sufficient time to implement the conservation program designed to attain the Plan's biological goals and objectives (Section 5.1). It will also enable implementation of the Los Osos Community Plan, the general plan and

local coastal plan for the Los Osos Region (County of San Luis Obispo 2020b). Prior to expiration of the permit, the County may apply to renew the permit (Section 6.9).

1.3 Plan Area and Permit Boundary

The 3,644-acre plan area for the LOHCP (Plan Area; Figure 1-1) identifies the contiguous area of habitat of the Baywood fine sands ecosystem which was evaluated for covered activities (Section 2), the environmental setting and biological resources (Section 3), potential impacts and take (Section 4) and the Plan's conservation program (Section 5). The Plan Area was delineated to incorporate the upland Baywood fine sands ecosystem that is the focus of the Plan. It was based largely upon the Los Osos Urban Reserve Line—the boundary separating urban and rural land uses in the region—but was modified to primarily include habitat within the Baywood fine sands ecosystem. On the west, the Plan Area extends beyond the Los Osos Urban Reserve Line (URL) in order to incorporate the Baywood fine sands ecosystem located within the Morro Dunes Ecological Reserve and the Morro Dunes Natural Preserve (part of Montaña de Oro State Park) that is east of the Morro Sand Spit. The Plan Area was contracted on the northeast to exclude much of the wetland habitat within Morro Bay State Park. The Plan Area also excludes a small area inside the southern portion of the URL that is outside of the Baywood fine sands ecosystem (Figure 1-2).

The 3,209-acre permit area delineates the area in which the ITP issued by the United States Fish and Wildlife Service for the LOHCP will authorize take of the Morro shoulderband snail (Figure 1-2). The permit area includes all of the land in the Plan Area except the land within State Parks that is located outside of the fuel break for the Community Wildfire Protection Plan (Section 2.2.7). During planning to develop the LOHCP, State Parks did not identify any activities for permit coverage (Section 2.1.3.3) and also declined to have their lands managed as part of the Los Osos Preserve System (Section 5.3.3). However, the narrow strips of land on portions of the perimeter of the Los Osos Oaks State Natural Reserve, Montaña de Oro State Park, and Morro Bay State Park were included in the LOHCP Permit Area so that the ITP can authorize take of Morro shoulderband snails and avoid or minimize impacts to the other covered species that result from vegetation management activities to create and maintain a fuel break as part of the Community Wildfire Protection Plan (Section 2.2.7).

1.4 Species to be Covered by the Habitat Conservation Plan

The LOHCP features four covered species: federally-listed threatened or endangered species. The Morro shoulderband snail is the species for which the incidental take permit is being requested[9]. The covered species were identified through a detailed analysis of the habitat, status, anticipated impacts, and available information for 141 rare species that occur within or near the LOHCP Area (Section 3.2.1).

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Threatened[10]/None

[9] "Take" under the federal ESA does not apply to listed plant species. For purposes of the LOHCP and the federal permit, "take" when applied to the covered plant species refers to impacts to the species. In recognition of the conservation measures in the plan to protect the covered plant species, the USFWS will extend "no surprises" assurances to those species.

[10] In 2020, the USFWS proposed to reclassify Morro shoulderband snail from an endangered to a threatened species (USFWS 2020a). The downlisting occurred on February 3, 2022 (USFWS 2022).

Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

Coverage for Morro Bay kangaroo rat and Indian Knob mountainbalm is requested only for implementation of the LOHCP conservation program; specifically, the permit for these species is requested to cover short-term impacts of management and restoration activities that are intended to promote population growth and restore the habitat of these species. Take/impacts of these species due to development and other covered activities will be avoided through implementation of a series of measures identified in the Plan (Section 5.2). Coverage for Morro Bay Kangaroo rat and Indian Knob mountainbalm is only requested for degradation or loss of unoccupied habitat; take of individuals of these two species will be avoided through the Plan's avoidance measures (Section 5.2).

Eight additional state and/or federally listed species (listed below) that occur within the LOHCP Area are discussed within the Plan but will not be covered by the incidental take permit. These 'additional listed species' did not meet the criteria that were used to identify the Plan's covered species (Section 3.2.3). Most occur within wetland or riparian habitats and will not be affected by the covered activities.

Species Not Covered by the Permit	**Federal Status/State Status**
California red-legged frog (*Rana draytonii*)	Threatened/None
California Black Rail (*Laterallus jamaicensis coturniculus*)	None/Threatened
California seablite (*Suaeda californica*)	Endangered/None
Salt marsh bird's beak (*Chloropyron maritimum* ssp. *maritimum*)	Endangered/Endangered
Marsh sandwort (*Arenaria paludicola*)	Endangered/Endangered
South Central CA Coast Steelhead (*Oncorhynchus mykiss irideus*)	Threatened/None
White-tailed kite (*Elanus leucurus*)	None/Fully Protected
Golden Eagle (*Aquila chrysaetos*)	None[11]/Fully Protected

As part of this plan, project proponents will implement measures to avoid impacting these species (Section 5.2.2). If a project will impact these or other listed species not covered by the LOHCP, the proponent of that project will be required to obtain permits for those species independently, through a separate process. The County will require They will proof of such separate permitting in order to issue a COI that will cover their take/impacts of the LOHCP covered species (Section 6.3.1).

1.5 Regulatory Framework

Though developed primarily to comply with ESA and CESA, the LOHCP was designed to be consistent with other local, state, and federal laws and regulations, in order to streamline permitting and meet the criteria for issuance of the incidental take permit. This section describes consistency of the Plan with the

[11] Though not listed under ESA, golden eagles receive federal protection through the Bald and Golden Eagle Protection Act.

following statutes:

Federal	State
Federal Endangered Species Act	California Endangered Species Act
National Environmental Policy Act	State Fish and Game Code
National Historic Preservation Act	California Environmental Quality Act
	California Coastal Act

1.5.1 Federal Regulations

1.5.1.1 Federal Endangered Species Act

1.5.1.1.1 Overview

Section 9 of the ESA and Federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened animal species, respectively, without special exemption or authorization. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species by annoying them to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity.

Pursuant to Section 11(a) and (b) of the ESA, any person who knowingly violates Section 9 of the ESA or any permit, certificate, or regulation related to Section 9, may be subject to civil penalties of up to $25,000 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to one year.

Individuals and State and local agencies proposing an action that is expected to result in the take of federally listed species are encouraged to apply for an incidental take permit under Section 10(a)(1)(B) of the ESA to be in compliance with the law. Such permits may be issued by the USFWS when take is not the intention of and is incidental to otherwise legal activities. An application for an incidental take permit must be accompanied by a habitat conservation plan, commonly referred to as an HCP. The regulatory standard under Section 10(a)(1)(B) of the ESA is that the effects of authorized incidental take must be minimized and mitigated to the maximum extent practicable. Under Section 10(a)(1)(B) of the ESA, a proposed project also must not appreciably reduce the likelihood of the survival and recovery of the species in the wild, and adequate funding for a plan to minimize and mitigate impacts must be ensured. Section 1.6.1.2 outlines the process of obtaining a Section 10(a)(1)(B) permit.

Section 7 of the ESA requires federal agencies to ensure that their actions, including issuing permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species' critical habitat. "Jeopardize the continued existence of…" pursuant to 50 CFR 402.2, means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers,

or distribution of that species. Issuance of an incidental take permit under Section 10(a)(1)(B) of the ESA by the USFWS is a Federal action subject to Section 7 of the ESA. As a federal agency issuing a discretionary permit, the USFWS is required to consult with itself (i.e., conduct an internal consultation). Delivery of the HCP and a Section 10(a)(1)(B) permit application initiates the Section 7 consultation process within the USFWS.

The requirements of Section 7 and Section 10 substantially overlap. Elements unique to Section 7 include analyses of impacts on designated critical habitat, and analyses of cumulative impacts on listed species. Cumulative effects are effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area, pursuant to Section 7(a)(2) of the ESA. The action area is defined by the influence of direct and indirect impacts of covered activities. The action area may or may not be solely contained within the HCP boundary, though in the case of the LOHCP, the action area is the HCP boundary. These additional analyses are included in this HCP to meet the requirements of Section 7 and to assist the USFWS with its internal consultation.

1.5.1.1.2 The Section 10(a)(1)(B) Process - Habitat Conservation Plan Requirements and Guidelines

The Section 10(a)(1)(B) process for obtaining an ITP has three primary phases: (1) the HCP development phase; (2) the formal permit processing phase; and (3) the post-permit-issuance phase.

During the HCP development phase, the project applicant works with the USFWS to prepare a plan that integrates the proposed project or activity with the protection of listed species. An HCP submitted in support of an ITP application must include the following information:

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested;
- Measures that will be implemented to monitor, minimize, and mitigate impacts; funding that will be made available to undertake such measures; and procedures to deal with unforeseen circumstances;
- Alternative actions considered that would avoid or reduce take; and
- Additional measures the USFWS may require as necessary or appropriate for purposes of the plan.

The HCP development phase concludes, and the permit processing phase begins, when a complete application package is submitted to the appropriate permit-issuing office. A complete application package consists of 1) an HCP, 2) an Implementing Agreement (IA), if applicable, 3) a permit application, and 4) a $100 fee from the applicant, unless exempted under 50 CFR13. The USFWS must also publish a Notice of Availability of the HCP package in the Federal Register to allow for public comment. The USFWS also prepares an Intra-Service Section 7 consultation and a Set of Findings and Recommendations to evaluate the Section 10(a)(1)(B) permit application in the context of permit issuance criteria, which are described below.

The issuance of an ITP is a federal action that triggers USFWS compliance with NEPA. For the LOHCP, the USFWS has prepared an EA (Section 1.5.1.2).

A Section 10(a)(1)(B) incidental take permit is granted upon a determination by the USFWS that all criteria for permit issuance have been met. Statutory criteria for issuance of the permit specify that:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided;
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and
- The applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided; and
- The USFWS has received assurances, as may be required, that the HCP will be implemented.

During the post-issuance phase, the Permittee and any other responsible entities implement the HCP, and the USFWS monitors compliance with the HCP as well as the long-term progress and success of the HCP.

1.5.1.2 National Environmental Policy Act

The purpose of the National Environmental Policy Act (NEPA) is two-fold: to ensure that federal agencies examine the environmental impacts of their actions and assess possible alternatives, and to solicit public input on this analysis through circulation of the appropriate NEPA document, which could be an EAS, an EA or an EIS.

Issuance of an incidental take permit under section 10(a)(1)(B) of the ESA constitutes a federal action requiring compliance with the National Environmental Policy Act (NEPA). In order to ensure NEPA compliance, the USFWS prepared an Environmental Assessment (EA) to address issuance of an incidental take permit associated with the LOHCP.

1.5.1.3 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 et seq.), requires federal agencies to take into account the effects of their actions proposed on properties eligible for inclusion in the National Register of Historic Places. Properties include prehistoric and historic sites, buildings, and structures that are listed on, or meet the criteria for listing on, the National Register of Historic Places.

The issuance of an incidental take permit by the USFWS is an undertaking subject to Section 106 of the NHPA. The NHPA and the potential effects of implementation of the Plan on resources subject to the NHPA are discussed in the EA prepared for the LOHCP.

1.5.2 Regulations of the State of California

1.5.2.1 California Endangered Species Act

The California Endangered Species Act prohibits take of species listed as threatened, endangered or candidate by the California Fish and Game Commission, including birds, mammals, fish, amphibians, reptiles, and plants; invertebrates cannot be designated as threatened or endangered (CESA Section 2080). In CESA, take is defined as any action or attempt to hunt, pursue, catch, capture, or kill a listed species; take does not include loss or degradation of habitat alone or the impacts of the taking.

Like ESA, CESA allows exceptions to the prohibition for take that occurs during otherwise lawful activities. As described in Section 2081 of the California Fish and Game Code, incidental take of state-listed species may be authorized if an applicant submits an approved plan that minimizes and fully mitigates the impacts of take.

Morro shoulderband snail and Morro manzanita are not listed under CESA; however, Morro Bay kangaroo rat and the Indian Knob mountainbalm are state-listed species. The HCP requires pre-project surveys and other measures to avoid take of Morro Bay kangaroo rat and Indian Knob mountainbalm individuals (Section 5.2.1, Section F.1) and thus take as defined under CESA, which is not as inclusive as the definition under ESA; therefore, the County is not requesting a 2081 permit.

Should any restoration and management actions implemented as part of the LOHCP conservation program to promote population growth of Indian Knob mountainbalm be determined to potentially cause take of individuals as defined under the state act, the County will first obtain a separate permit from the state, such as a state recovery permit issued pursuant Section 2081(a) of CESA. The USFWS would also need to reinitiate consultation on the ITP since the analysis based on the Plan would not have included these impacts. An amendment to the Plan might also be needed.

1.5.2.2 Other Regulations in the California Fish and Game Code

The California Fish and Game Code (FGC) contains additional regulations designed to protect native species.

1.5.2.2.1 California Fully Protected Species

Prior to the passage of CESA, the California legislature identified species to be protected under the FGC. These 37 fully protected species are given protection under four separate sections for birds (Section 3511), fish (Section 5515), mammals (Section 4700), and reptiles and amphibian (Section 5050). Fully protected species may not be taken or possessed at any time. Licenses or permits issued for their "take" are limited to collecting for necessary scientific research, including efforts to recover the species.

To comply with Section 4700 of the FGC, this Plan includes measures that must be implemented to avoid impacts to the Morro Bay kangaroo rat, a fully protected species (Section 5.2).

1.5.2.2.2 Bird Nests

Section 3503 of the FGC also makes it unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as permitted by the CDFW. This Plan contains measures to avoid take of bird nests (Section 5.2.3).

1.5.2.2.3 Birds of Prey

Section 3503.5 of the FGC prohibits take, possession, or destruction of birds of prey or their nests or eggs. The CDFW may issue permits authorizing such impacts. The Plan measures are designed to avoid take of birds of prey, including golden eagle and white-tailed kite, which are fully-protected species, as well as other birds of prey that occur in the region, including peregrine falcon (*Falco peregrinus anatum*) and Cooper's hawk (*Accipiter cooperii*).

1.5.2.3 California Environmental Quality Act

The California Environmental Quality Act (CEQA; Public Resources Code §21000 et seq.) requires State and local government agencies to complete an environmental review of most projects that could impact environmental resources. It also requires that the environmental impacts identified be reduced to a less-than-significant level through avoidance, minimization, and mitigation measures unless overriding considerations are identified that make it infeasible to mitigate the impacts or conduct an alternative project.

In adopting the Plan, the County is responsible for conducting the environmental review and ensuring compliance with CEQA. To comply with CEQA, the County acted as the lead agency and prepared an environmental impact report (EIR) and CDFW participated as the responsible agency (County of San Luis Obispo 2020a).

The draft EIR is designed to provide programmatic compliance with CEQA for Plan covered activities. However, each development application must be considered separately for compliance with CEQA. The receipt of an incidental take permit does not in itself ensure compliance with CEQA, as there may be the potential for other significant environmental impacts related to other resources, depending on the size, type, and location of the proposal. If a discretionary project needs to complete an environmental document, as defined under CEQA, appropriate mitigation will need to be determined. The LOHCP may provide appropriate mitigation, but this will be decided on a case-by-case basis.

1.5.2.4 California Coastal Act of 1976

One of the primary objectives of the California Coastal Act is to preserve, protect, and enhance environmentally sensitive habitat areas (ESHA). Section 30107.5 of the Coastal Act defines an "Environmentally Sensitive Area" as:

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

The following sections of the California Coastal Act provide guidance for resource protection:

- Section 30240 prohibits any significant disruption of habitat values, and limits development within ESHA to uses that are dependent on the resources. It also requires development adjacent to ESHA be sited and designed to prevent significant degradation and be compatible with the continuance of the habitat.

- Section 30250(a) directs new residential, commercial, or industrial development to existing developed areas. Where developed areas cannot accommodate new development, it is to be located in other areas where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

The Los Osos Community Plan (LOCP) identified as ESHA the Los Osos Ecosystem (County of San Luis Obispo 2020b). The County designation included habitat of the Baywood fine sand soil ecosystem between the Los Osos Urban Services Line (USL) and the Urban Reserve Line (URL), but excluded the central urbanized area of Los Osos as ESHA (County of San Luis Obispo 2020b). Although the area within the USL may contain Baywood fine sand and may contain individual endangered species, it does not meet the key elements of the definition of ESHA: the area is generally disturbed and degraded (not pristine), remaining habitat is greatly fragmented, and thus the area is not especially valuable for species persistence (County of San Luis Obispo 2020b). In contrast, the area outside of the USL is largely intact, significantly less degraded, and it contains habitat that is especially valuable for long-term persistence.

The LOHCP goals and objectives are consistent with the Coastal Act and the San Luis Obispo County LCP, which implements the Coastal Act for Los Osos. The Plan contains avoidance, minimization, and mitigation measures that will protect the sensitive species and their habitats including ESHA (Section 5.2). Any updates to the LCP will ensure that it is consistent with the LOHCP.

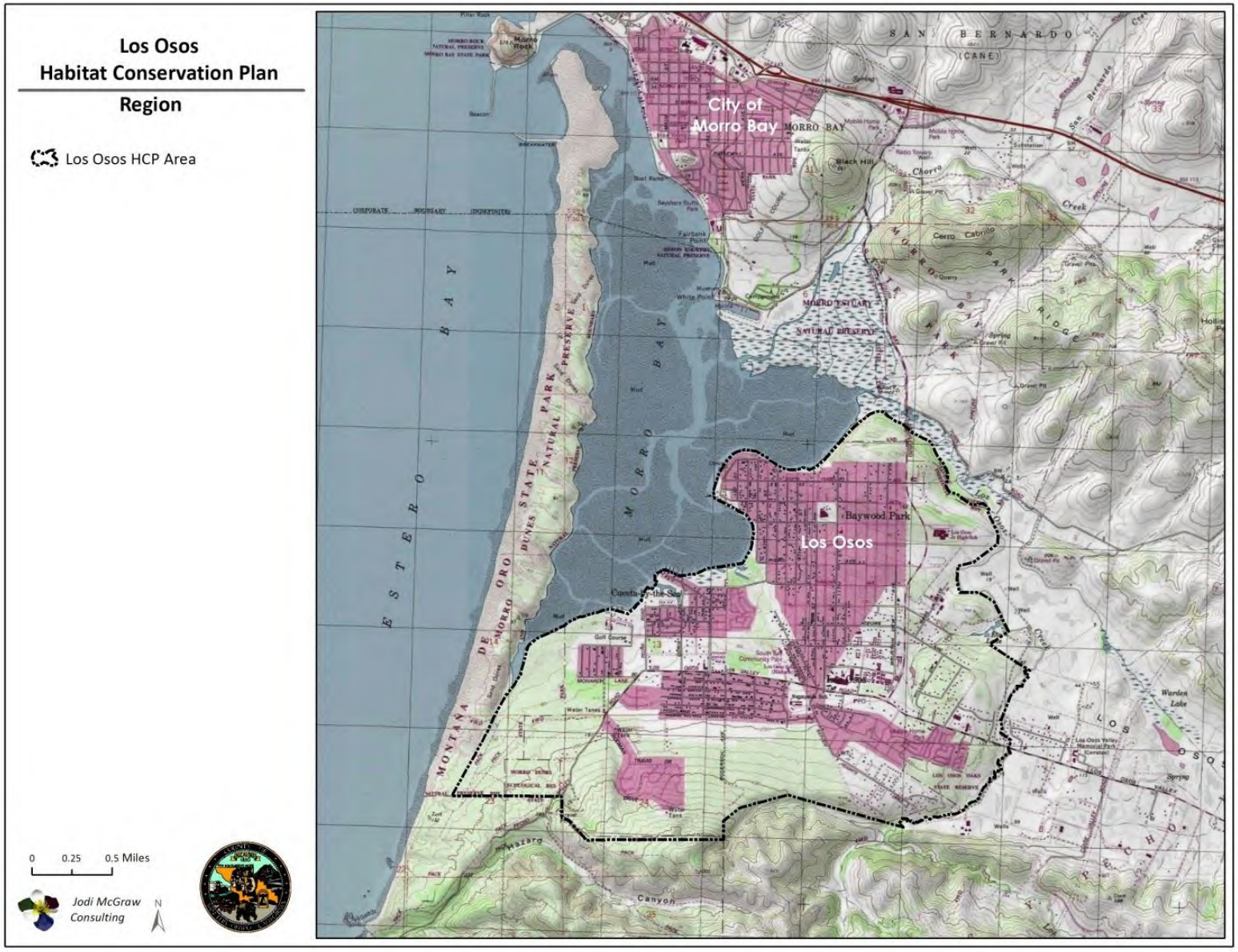

Figure 1-1: Plan Region

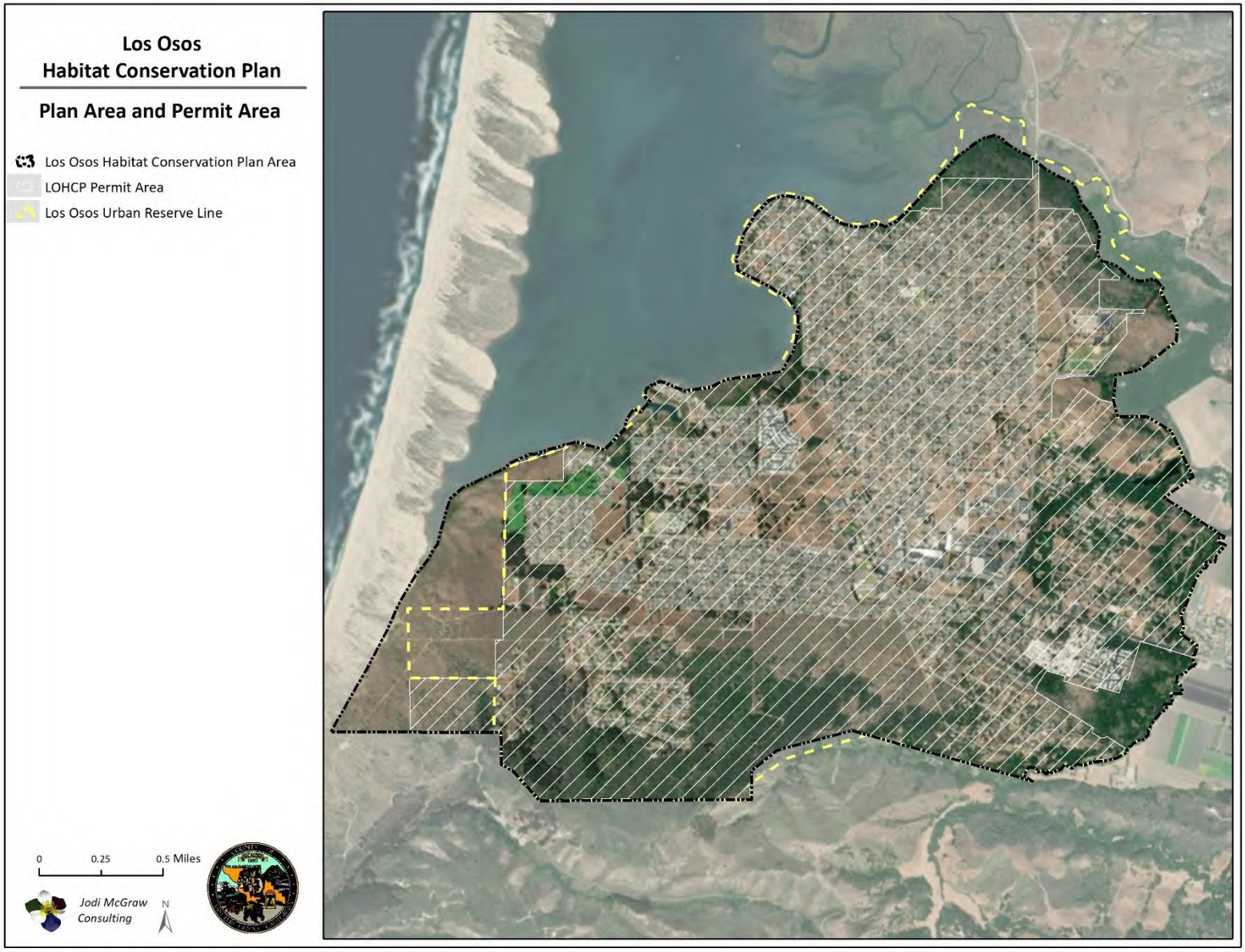

Figure 1-2: Los Osos HCP Plan Area and Permit Area

2 Land Use and Covered Activities

This chapter describes land use in the LOHCP area, including the existing development (Section 2.1.1) as well as current policies under the Estero Area Plan (Section 2.1.2). It then describes the conservation lands, including parks, reserves, and easements, and their current management (Section 2.1.3). This information provides the context for the activities that will be covered under the incidental take permit, which are described in Section 2.2. The impacts of these covered activities on the covered species are described in Chapter 4.

2.1 Land Use and Conservation

The LOHCP features a mix of land uses that include relatively dense residential and commercial development in the center and northern portion of the Plan Area, with generally sparse residential development, limited agricultural use, and conservation lands on the perimeter of the community. The existing and planned land use patterns informed development of the Plan's conservation program, specifically the design of the Preserve System (Section 5.3), and the Plan's covered activities.

2.1.1 Existing Land Use

Los Osos is an unincorporated community of nearly 15,000 people. It has been characterized as a 'bedroom community'' as 75% of those who live there are employed elsewhere (County of San Luis Obispo 2020b).

A large portion of Los Osos was subdivided into small lots in the early part of the twentieth century. The 3,644-acre LOHCP Area features 6,032 assessors' parcels. The following outlines the general parcel status (Table 2-1, Figure 2-1)[12]:

1. **Developed**: 1,525 acres (48.3%) of the Plan Area are held within 5,290 parcels that have been partially or entirely built up for residential and commercial uses and public facilities;
2. **Undeveloped:** 705 acres (22.3%) of the Plan Area are within 701 parcels that are undeveloped or largely undeveloped, in that they feature limited improvements. This category also includes parcels that are in cultivation.
3. **Protected:** 925 acres (29.3%) of the Plan Area are within parks, reserve, or other open space or conservation areas managed, at least in part, for natural resource protection. An additional 23.7 acres within the Plan Area are privately held but protected via open space easements: legal agreements that restrict development, though may not allow active management.

Within the Plan Area, the land use pattern varies, particularly with respect to the Urban Services Line (USL) which demarks the Urban-Rural boundary in the Local Coastal Plan (County of San Luis Obispo 2020b). The area inside of the USL contains more than 95% of the LOHCP Area parcels (5,744), though it represents just 48% (1,509 acres) of the area of land contained within parcels in the Plan Area (Table 2-1). Parcels within the USL are small (average is 0.26 acres; median is 0.14 acres) and the majority (88%) are already developed. Most are residential, though the USL contains all of the land in the LOHCP Area

[12] This analysis is based on 2014 parcel data. Due to the moratorium on development, few changes have occurred since that time; these limited changes are not anticipated to affect the HCP's analysis or implementation.

that is designated for commercial use and contains most of the existing commercial development including the central business district (Figure 2-2).

While the majority of the area within the USL is built up, this area also contains eight vacant parcels that are greater than five acres each and that total 104 acres (Figure 2-1). These parcels generally feature stands of exotic trees (e.g., eucalyptus) or coastal sage scrub habitat that has been degraded by land use including vegetation clearing (e.g., mowing); while such habitat can be restored (Section 3.1.5.1), its location with respect to development reduces its long-term conservation value (Section 5.3.1.2).

In contrast, 50% of the Plan Area located outside of the USL is permanently protected from development, with an additional 388 acres (12.3%) in 45 vacant, unprotected private parcels (Figure 2-1). Of these, 14 parcels greater than 5 acres total 343 acres, much of which is adjacent to existing protected land. Many of these undeveloped parcels support coastal sage scrub, central maritime chaparral, and coast live oak woodlands that are relatively intact and contiguous with similar native communities outside of the Plan Area, particularly to the west, south, and east. The notable exceptions include a few large parcels that are used for row crop agriculture, with the remaining development parcels outside of the USL zoned for residential use.

2.1.2 Land Use Policies, Designations, and Development Patterns

Land use within Los Osos Urban Reserve Line (including the USL) is governed by the County of San Luis Obispo through implementation of the Estero Area Plan, which is a component of the County General Plan and Local Coastal Program. Adopted in 1988, the Estero Area Plan was updated for the community of Cayucos and the rural portions (areas outside of the urban reserve lines) in 2009 (County of San Luis Obispo 2009). During the course of development of the LOHCP, the Los Osos Community Plan was updated to provide consistency with the LOHCP (County of San Luis Obispo 2020a).

A key objective of the Estero Area Plan is to protect agriculture, open space, and sensitive resources, including ground water supplies, in part by focusing future development within the Los Osos, Morro Bay, and Cayucos urban reserve lines (County of San Luis Obispo 2009). The Estero Area Plan identifies numerous sensitive resource areas (SRAs) within the Los Osos URL including: Los Osos Dune Sands Habitat, Morro Bay kangaroo rat habitat, Los Osos Oaks State Reserve, Hazard Canyon and Vicinity, and the pygmy oaks within the 86-acre Los Osos Oaks State Natural Reserve (County of San Luis Obispo 2009). The Sensitive Habitats program in the Estero Area Plan calls for protection and management of sensitive habitat, including: areas that support threatened and endangered species, include a range of vegetation types, are sufficiently large to support ecosystem processes, include buffer areas that separate habitat from incompatible uses, and include continuous wildlife corridors. Strategies for protecting land include encouraging acquisition of fee title or conservation easements by public agencies or conservation organizations and obtaining easements in connection with development projects (County of San Luis Obispo 2009).

Within the Los Osos URL, land use designations typically focus future commercial and residential development largely inside the USL; this infill development approach is designed to aid preservation of a green belt around Los Osos. Table 2-2 and Figure 2-2 illustrate the land use designations and acreage in each under the Estero Area Plan. Of the approximately 3,150 acres located in parcels within the LOHCP Area (the remainder of the Plan Area being in County rights of way), 229 acres (7.3 %) are designated for commercial and multifamily residential uses. These are focused within the center of the Plan Area. A total of 2,318 (73.6%) are designated for single-family residential development. The remaining 19.1% of

the Plan Area is designated for recreation (328 acres), open space (122 acres), and public facilities (66), while 87 acres (3%) were not certified as part of the Estero Area Plan (i.e., are 'white holed').

2.1.2.1 Changes Since the 1988 Plan Was Adopted

Since the Estero Area Plan land use designations were adopted in 1988, development within Los Osos has been limited. In January 1988, the Regional Water Quality Control Board established a discharge moratorium to protect water quality in the aquifer underlying the community and in the Morro Bay Estuary, which was being degraded by the thousands of individual septic systems in the Plan Area. This moratorium prohibited the County from issuing permits for new on-site sewage disposal (septic) systems within a 1,584-acre prohibition area in the center of Los Osos. It halted most new construction or major expansion of existing development until a new wastewater system (sewer) is operational. In 2016, the Los Osos Wastewater Treatment Plant was completed and existing development began to connect to the system

During the more than 30-year period in which the moratorium has been in effect, increasing recognition of the high biodiversity conservation value of intact habitat within the Los Osos area led local, state, and federal agencies and non-profit organizations to collaborate on several habitat protection projects. Working with willing sellers, the conservation agencies and organizations protected 451 acres of land designated for rural, suburban, or single-family residential development, 84 acres that were not designated (i.e., were 'white holed'), and an additional 12 acres designated for commercial or multifamily residential development (Table 2-3). Combined with other lands zoned for parks, recreation, and open space, the conservation lands in the Plan Area total 948 acres (Table 2-4, Figure 2-3).

2.1.2.2 Anticipated Future Development

In 2016, the County completed construction of a wastewater treatment facility that will service 5,147 parcels within a 1,584-acre wastewater service area in the center of Los Osos that contains the highest density of development (Figure 2-2). Most existing parcels are connected to the system. The Los Osos Community Plan, as adopted by the County Board of Supervisors and pending Coastal Commission certification, and associated amendments to the Growth Management Ordinance, would set a 1.3% annual growth rate for new residential development once Phase 1 Basin Plan programs are complete and require a 2:1 water offset for new development until Phase 2 Basin Plan programs are complete and verified to sufficiently increase sustainable basin yield. The Los Osos sewer service area includes 579 vacant, unprotected parcels totaling 260 acres; one of the larger parcels (Tract 1646) has a pre-existing approval to be subdivided. The 882 parcels located outside of the sewer service area will continue to utilize septic systems for on-site sewage treatment and disposal. This area features 122 vacant, unprotected parcels totaling 445 acres that are within one of three land-use categories intended for single-family development. These categories are collectively referred to in this plan as Single-Family Residential.

Future development in Los Osos may be constrained by water issues. As part of the adjudication process, the County and the water purveyors in the region, the LOCSD, Golden State Water, and S&T Mutual Water Company, developed a management plan for the Los Osos groundwater basin to address saltwater intrusion resulting from overdraft and thus develop a sustainable water supply (County et al. 2015). Adopted in October 2015, the basin management plan includes a series of measures to reduce water use and increase the sustainable yield of the basin as part of a coordinated strategy to provide a

sustainable water supply for existing and future users and reverse and halt seawater intrusion. At the time this plan was finalized in 2022, the County estimated that Phase I Basin Plan Programs will be implemented by July 2025 (Section 7.3.2.2).

2.1.3 Existing Protected Lands and Open Space Easements

Within the 3,644-acre LOHCP Area, 948 acres (26%) are protected from development (Table 2-4, Figure 2-3). These lands include 925 acres within a state ecological reserve, state parks, County parks and open space, and other land owned by other government agencies and nonprofit organizations. These lands are managed, at least in part, for natural resource conservation and biodiversity protection; they exclude small parks that are largely built-up, such as the 6.8-acre Los Osos Community Park.

An additional 24 acres within the Plan Area are protected by open space easements granted by landowners to the County pursuant the California Open Space Easement Act of 1974 (Government Code Sections 51070 through 51097; Table 2-4). These conservation measures restrict, in perpetuity, development and other uses including agricultural development, grading, vegetation removal, landscaping, hardscaping (i.e., paving).

Collectively, these public and private lands are referred to as 'protected' in this Plan. They will not be targeted for acquisition to protect habitat in the LOHCP Conservation Program. Selected existing protected parks and ecological reserves that contain intact habitat that is of the greatest long-term conservation value for the rare and endangered species in the Bayview fine sands ecosystem will be subject to restoration and enhanced habitat management to promote recovery of the endangered species (Section 5.3.1).

The LOHCP Area adjoins approximately 12,000 acres of protected land and water located outside of the Plan Area (Figure 2-3):

- **Montaña de Oro State Park:** an 8,396-acre park south and west of the LOHCP Area;
- **Morro Bay State Park**: approximately 2,300 acres of this state park, which is partially within the LOHCP area, is located north of the Plan Area;
- **Morro Bay Wildlife Area:** a 1,307-acre area containing most of the Morro Bay estuary, which is managed by CDFW and is located north of the LOHCP Area; and
- **Los Osos Creek Wetlands:** an approximately 120-acre conservation easement located northeast of the LOHCP Area, which is held by the United States Natural Resource Conservation Service.

Though these adjacent protected lands do not feature the Baywood fine sands ecosystem, effective conservation and management of their other upland and wetland ecosystems can promote effective conservation within the LOCHP Area. Specifically, they can buffer lands that are protected, managed, and restored as part of the LOHCP Conservation Program against the indirect effects of more intensive land uses (e.g., development or agriculture).

The following sections describe the protected lands that are within the LOHCP Area, according to their owner and managing agency, to provide information about land use in the area and as context for the LOHCP Conservation Program. The lands targeted for inclusion in the LOHCP Preserve System, which will be established to mitigate the impacts of the covered activities, are identified in Section 5.3.3.1.

Descriptions of the natural communities noted as occurring within these lands are provided in Section 3.1.5.

2.1.3.1 County of San Luis Obispo

Within the Plan Area, the County owns seven parcels totaling 142 acres that feature parks and open space (Table 2-4, Figure 2-3).

2.1.3.1.1 Division of Parks and Recreation

The County of San Luis Obispo Division of Parks and Recreation (County Parks) manages two properties: the 14-acre Monarch Grove Natural Area, which features a blue gum (*Eucalyptus globulus*) grove, and the 34-acre County-owned portion of the Elfin Forest Natural Preserve, which supports coastal sage scrub, central maritime chaparral, and pygmy coast live oak woodland plant communities.
The mission of County Parks is to ensure personal enrichment of the County's residents and visitors while protecting it's natural, cultural, and historical resources. The Elfin Forest is managed as part of a 93-acre natural area, which includes 59 acres of state-owned land. Currently, Small Wilderness Area Preservation (SWAP), a local non-profit conservation organization that helped protect the land, works with the landowners to manage the Natural Area as part of an "Adopt-A-Park" agreement. Through the 10-year, renewable agreement, that was last extended in 2014, the all-volunteer organization provides docent-led interpretive hikes on the trails, which include a raised boardwalk, and conducts habitat maintenance activities including: native plant revegetation, weed management, erosion control, and trail maintenance activities, such as vegetation trimming, boardwalk repair, and installing deterrents for non-designated trails.

The Monarch Grove Natural Area is managed by County Parks for passive recreational use, including hiking and equestrian use. It mostly serves as an access route to reach the adjacent Montaña de Oro State Park. Management includes trail and fence maintenance, litter removal, and twice-yearly vegetation management for fuel reduction.

The County also owns the 6.8-acre Los Osos Community Park, which is managed by County Parks. This largely developed park features tennis courts, a playground, a skate park, bathrooms, and picnic areas. The approximately 1.6 acres of open space north of the park is slated to be developed as part of a park expansion outlined in the County General Plan (Section 2. 2.5.2). Therefore, this park was not included in the list of conservation lands (Table 2-4).

Of the County-owned lands, only a small portion of the Monarch Grove Natural Area was identified as suitable for inclusion in the LOHCP Preserve System, which will be used to mitigate the impacts of the covered activities on the covered species (Section 5.3.3.1). The LOHCP Implementing Entity will evaluate opportunities to coordinate management of other County lands within the LOHCP Preserve System and other protected lands, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.1.2 Department of Public Works and Transportation

The Department of Public Works and Transportation (County Public Works) manages two open space properties: the 82-acre Broderson Site and the 12-acre Midtown site. These properties feature coastal

sage scrub, central maritime chaparral, and coast live oak woodland plant communities that have been degraded in places due to prior land use. They were partially developed as part of the Los Osos Wastewater Project and feature a leach field (Broderson) and pump station (Midtown).

The temporarily disturbed areas are being actively restored and are permanently protected via conservation easements or deed restrictions, revegetated to address the impacts caused by facilities development as well as the existing habitat degradation, and then actively managed to protect the rare species and natural communities of the LOHCP Area, including the covered species (SWCA 2012). The County currently holds the properties but intends to transfer the 73-acre portion of the Broderson property that is used for mitigation to a land conservation and management agency or organization (County of San Luis Obispo 2012). Because this site is already serving as mitigation for the LOWPP, it will not be considered for incorporation within the LOHCP Preserve System; however, the County and the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with other protected lands to maximize effectiveness of the conservation program (Section 5.3.3.1).

2.1.3.2 California Department of Fish and Wildlife Properties

2.1.3.2.1 Morro Dunes Ecological Reserve

The California Department of Fish and Wildlife (CDFW) owns and manages the 278.7-acre Morro Dunes Ecological Reserve (MDER). Located in the south-central portion of the LOHCP Area, the 230.9-acre Bayview Unit of MDER supports a mosaic of coastal sage scrub, central maritime chaparral, and coast live oak woodland, and features populations of, or habitat for, all four covered species. The remainder of MDER is in a disjunct 47.8-acre parcel located in the southwest portion of the Plan Area (Figure 2-3); it supports coastal sage scrub and central maritime chaparral that provides suitable habitat for the Morro Bay kangaroo rat and populations of Morro shoulderband snail and Morro manzanita.

Ecological reserves are established under California law to protect rare, threatened, or endangered native plants, wildlife, aquatic organisms and specialized terrestrial or aquatic habitat types (Fish and Game Code 1580). They are managed to conserve biodiversity, while providing opportunities for education, research, and compatible recreation, as outlined in the California Code of Regulations Title 14, Chapter 11, Section 630. A management plan was prepared for the MDER in 1982, when it featured only the 47.8-acre Pecho Unit located largely west of Pecho Valley Road (CDFW 1982). Appendix G lists the management recommendations identified in the plan.

2.1.3.2.2 Morro Bay Wildlife Area

The CDFW manages the Morro Bay Wildlife Area, a 1,307-acre estuarine (i.e., largely inundated) area. There is an approximate four acre-portion of this area that is mapped within the LOHCP Area. However, this sliver of land likely reflects mapping imprecision in the spatial data layers used to assess protected lands for the LOHCP, as the wildlife area is, by definition, below the median high tide line and therefore located north of the LOHCP Plan Area.

State wildlife areas are established primarily for wildlife conservation and providing opportunities for compatible recreation, including hunting and wildlife viewing (Fish and Game Code 1525-1530). The

wildlife area is managed pursuant the California Code of Regulations Title 14, Chapter 8, Sections 550, 551, and 553.

2.1.3.3 California Department of Parks and Recreation Properties

The California Department of Parks and Recreation (State Parks) is responsible for 21 parcels (447 acres) of land within the LOHCP Area. This land is managed by the San Luis Obispo Coast District as part of four parks or reserve units (Table 2-4, Figure 2-3). State Parks is governed under Sections 500-514 of the State Public Resources Code. Their natural resource mission is to acquire, protect, restore, maintain, and sustain outstanding and representative examples of California's natural and scenic values for the benefit of present and future generations. Management activities include habitat restoration, prescribed fire management, corrective and ongoing maintenance, and monitoring.

During LOHCP development, State Parks did not identify any activities for permit coverage. State Parks also declined to have its lands evaluated for inclusion in the LOHCP Preserve System (Barker 2015), which will be used to mitigate the impacts of the covered activities on the covered species (Section 5.3.3). As a result, State Park properties were excluded from the LOHCP Permit Area except for in the designated fuel break for the Community Wildfire Protection Plan (Sections 1.3 and 2.2.7). These narrow strips of land on portions of the perimeter of the Los Osos Oaks State Natural Reserve, Montaña de Oro State Park, and Morro Bay State Park were included in the LOHCP Permit Area so that the ITP can authorize take of the covered species that results from vegetation management activities to create and maintain the fuel break, if/when State Parks approvals implementation of such fire hazard abatement activities. The County and the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with other protected lands including State Parks, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.3.1 Morro Bay State Park

The LOHCP Area includes part of Morro Bay State Park—an approximately 2,400-acre park located east of Morro Bay. The southernmost 90 acres of the park located within the northeastern corner of the LOHCP Area primarily support coastal sage scrub and coast live oak woodland, with areas of riparian and wetland vegetation occurring along Los Osos Creek. No existing, authorized trails or facilities occur within the portion of the park within the LOHCP Area.

2.1.3.3.2 Los Osos Oaks State Natural Reserve

Located in the southeastern portion of the LOHCP Area, the 86-acre Los Osos Oaks State Natural Reserve primarily supports a mosaic of coastal sage scrub (24 acres) and coast live oak woodland (60 acres), which features old-growth coast live oaks. The coast live oaks support diverse assemblage of lichens, including splitting yarn lichen (*Sulcaria isidifera*), which is endemic to the area.

2.1.3.3.3 Montaña de Oro State Park

The western portion of the LOHCP Area features five parcels totaling 236 acres that are managed as part of Montaña de Oro State Park: a nearly 8,400-acre park that wraps around the western and southern portions of the Plan Area. Within the LOHCP Area, the park incudes parcels managed as part of the Morro Dunes Nature Preserve. These parcels, which primarily support coastal sage scrub (185 acres) and

central maritime chaparral communities (47 acres),feature five hiking and equestrian trails totaling 3.5 miles that provide beach access from Pecho Valley Road. The park's main facilities including campground and picnic areas are located south of the LOHCP Area.

2.1.3.3.4 Elfin Forest Natural Preserve

Within the LOHCP Area, the State of California owns four parcels totaling 35 acres that are managed as part of the 90-acre Elfin Forest Natural Preserve, which also features County-owned parcels and is managed by SWAP (Section 2.1.3.1.1). This property primarily supports coast live oak woodland (32 acres) but also features a small area of central maritime chaparral communities (2.1 acres).

2.1.3.4 Bureau of Land Management Property

The Bureau of Land Management (BLM) owns and manages one five-acre parcel that supports coastal sage scrub and is contiguous with Morro Bay State Park in the northeast corner of the Plan Area (Figure 2-3). The parcel was designated as an Area of Critical Environmental Concern (ACEC) in the Resource Management Plan for the Bakersfield Office (BLM 2014).

The goal of management in this area is to protect and preserve important cultural resources, natural systems and processes, and habitat for listed species. The objectives are to:

1. Protect significant cultural resources from damage and degradation;
2. Maintain rare and endemic plant communities including coastal dune scrub, central maritime chaparral, and pygmy oak forest; and
3. Ensure no net loss of associated habitat for special-status plants and animals

This designation provides for the following special management:

- excludes rights-of-ways related to utility scale renewable energy projects;
- excludes livestock grazing;
- prohibits campfires and overnight camping;
- prohibits off-highway vehicles, mechanized use, equestrian use, and cross-country travel by pedestrians;
- requires pets to be leashed (maximum eight-foot length) at all times and removal of pet fecal matter by owners or handlers;
- prohibits air-soft and paintball activities, including organized games and casual use of these types of equipment; and
- prohibits the casual collection of plants or their parts without BLM authorization.

The BLM parcel is federal land and, as such, activities thereon cannot be included for take coverage as part of the LOHCP including the conservation program (Section 5.3.3.1). However, the County and the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with the BLM, where appropriate, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.5 Morro Coast Audubon Society

The Morro Coast Audubon Society (MCAS) owns three parcels that comprise the Sweet Springs Nature Preserve (29.4 acres), which is located on Morro Bay in the north-central part of the Plan Area (Figure 2-3). Protected by an easement held by the State Coastal Conservancy, the preserve primarily supports wetlands (28 acres) and riparian areas (0.3 acres) along the estuary as well as upland habitat featuring a mosaic of exotic trees (0.6 acres) and degraded coastal sage scrub (0.1 acres). It features hiking trails and is used for bird watching, nature study, and community outreach efforts. In 2011, MCAS prepared a *Morro Shoulderband Snail Recovery Action Plan for the Sweet Springs Nature Preserve* (SWCA 2011) to guide restoration and management of the Preserve and promote recovery of the Morro shoulderband snail.

The MCAS has two additional conserved parcels totaling 1.15 acres: a 0.92-acre parcel near Cuesta Inlet, which are protected by an easement held by the State Coastal Conservancy, and a 0.23-acre parcel on the northern border of the Planning Area, which is protected from development via deed restrictions. These parcels primarily support disturbed wetlands (0.05 acres) and landscape trees (0.9 acres).

The mission of the MCAS, a volunteer-based organization that is a part of the non-profit network the National Audubon Society, is to promote the appreciation, conservation, and restoration of ecosystems, focusing on the biological diversity of birds, other wildlife, and their habitats, particularly in San Luis Obispo County.

The MCAS lands are being managed by the MCA and were not considered for inclusion in the LOHCP Preserve System. However, the County and the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with the MCAS, where appropriate, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.6 Conservation and Open Space Easements

Within the LOHCP Area, 23.7 acres on 15 parcels are protected through conservation easements voluntarily granted by private landowners to the County. Located primarily in the outer portion of the Plan Area, these easements restrict development in areas ranging in size from less than 0.1 acres to nearly five acres. They occur on vacant parcels as well as undeveloped portions of residential parcels. Collectively, the easements protect a mosaic of riparian communities (7.7 acres) as well as upland communities including central maritime chaparral (6.4 acres), coastal sage scrub (6.3 acres), and coast live oak woodlands (1.1 acres). While most are not actively managed for habitat values, the easements may prohibit activities that can degrade habitat, such as planting exotic and ornamental plants, and vegetation clearing. While not considered for incorporation as part of the LOHCP Preserve System, these easement lands can help buffer and protect habitat in other protected lands and the County and the LOHCP Implementing Entity will evaluate opportunities to coordinate management with private landowners where doing so can promote the goals and objectives of the LOHCP

2.2 Activities Covered by Permit

Covered Activities are actions for which the County is seeking incidental take permit coverage, and for which the LOHCP identifies avoidance, minimization, and mitigation measures. The covered activities include one-time actions occurring in discrete locations, such as capital improvements (e.g., expanding

the library), as well as ongoing actions that occur broadly within the Plan Area, such as mowing road medians.

This section discusses the criteria and methods that were used to identify covered activities and the criteria for covering additional activities, and then outlines the LOHCP covered activities. The final section of this chapter lists activities that will not be covered by the permit requested as part of the LOHCP.

2.2.1 Covered Activity Selection Criteria and Methods

As described in the *Habitat Conservation Planning Handbook* (USFWS and NMFS 2016), covered activities are actions within the Plan Area that: (1) are likely to result in incidental take of Morro shoulderband snails and impacts to the covered species; (2) are reasonably certain to occur over the life of the permit; (3) are controlled by the applicant(s) to some extent, and (4) are otherwise lawful activities, including conducted with landowner permissions and all other required permits and approvals. Based on this guidance, and in consideration of the LOHCP goals, the following criteria were established for covered activities in the LOHCP:

1. **Location:** the activity will occur within the 3,209-acre LOHCP Permit Area (Figure 1-2);
2. **Timing:** the activity will or is likely to occur during the 25-year period of the take permit;
3. **Entity:** the activity is conducted by the County of San Luis Obispo, is subject to the County's jurisdiction as the local land use authority, or will otherwise be conducted under contract with the County;
4. **Impact:** the otherwise-lawful activity has the potential to result in incidental take or impacts to one or more of the covered species by causing ground disturbance, which includes any activity that removes vegetation or compacts or displaces soil not covered by existing impervious surfaces;
5. **Addressed:** the effects of the taking or impacts of the covered activity were evaluated and addressed as part of the plan (Chapter 4); and
6. **Goals:** the activity will not prevent achievement of the biological goals and objectives of the LOHCP (Section 5.1).

To determine activities meeting these criteria, the County worked internally, as well as with landowners, agencies, and organizations, to identify the general types of activities, as well as specific projects, that would occur in the LOHCP Area during the next 25 years and would benefit from take coverage. The County circulated to agencies and organizations a LOHCP fact sheet, which provided potential project proponents including landowners and land management entities with information about the HCP, and an activity worksheet designed to obtain information about anticipated covered activities, including their location, timing, frequency, and size. This information was synthesized to identify the covered activities outlined in this chapter, and to assess their potential impacts to covered species (Chapter 4).

The following sections describe the general activities as well as anticipated specific projects, that will be covered by the permit issued based on the LOHCP. Additional projects not listed here can be covered under the incidental take permit. All projects must meet the following requirements:

1. The project must be a lawful activity meet the plan's eligibility criteria listed above, as determined by the County through review of an application for take coverage (Section 6.3);

2. The project proponent must agree to the terms of the voluntary program, including implementation of the avoidance, minimization, and mitigation measures (Section 5.7); and
3. There must be adequate take coverage remaining under the permit at the time the project application is approved.

2.2.2 Anticipated Project Proponents

The following entities are anticipated to conduct activities that will be covered under the LOHCP incidental take permit.

Private property owners: Owners of private land within the LOHCP Area conducting residential and commercial development projects that are eligible for coverage under the LOHCP permit, and who choose to participate in this voluntary program; their projects will be permitted by the County through the local land use and building application procedures.

County of San Luis Obispo: three separate County departments are anticipated to conduct covered activities:

- Department of Public Works and Transportation (Public Works): This department is responsible for construction and maintenance of infrastructure including roads and drainage systems;
- Library Department: This department operates and manages the Los Osos Public Library.
- Parks Department: This department operates and manages parks, open space, and recreation facilities, develops and maintains trails, and conducts recreation programs.

Los Osos Community Services District: The LOHCP Area includes 3,127 acres under the jurisdiction of this local agency, which provides drainage systems, water, parks, recreation, street lighting, solid waste, and fire emergency and rescue response services, and as well as supplies water within an 826-acre service area.

Golden State Water Company: This private utility company maintains water facilities used to supply water within their approximately 1,569-acre service area in the LOHCP Area.

S & T Mutual Water Company: This private utility company provides water within an approximately 90-acre area near the Sea Pines Golf Course in Los Osos.

California Department of Fish and Wildlife: This state agency manages the 278.7-acre MDER which is within the LOHCP Area, as well as the 1,307-acre Morro Bay Wildlife Area located adjacent to the LOHCP Area.

Though the BLM owns and manages approximately 5 acres of land in the northeastern portion of the LOHCP Area, take resulting from any activities on this property should be covered through a Section 7 consultation with the USFWS, rather than under a Section 10 incidental take permit; therefore, no BLM activities were included as part of the LOHCP.

Though the California Department of Parks and Recreation (State Parks) manages land within the LOHCP area, State Parks did not identify any covered activities to be included in this plan. Additionally, they elected not to have their land considered for enrollment in the LOHCP Preserve System (Barker 2015).

Additional entities may also seek coverage under the LOHCP for projects that meet the covered activity criteria (Section 2.2.1). To receive take coverage, all project proponents must apply to the County Planning and Building Department which will process applications for all LOHCP covered activities (Section 6.3).

2.2.3 General Categories of Covered Activities

Four main categories of covered activity were identified through the outreach conducted by the County to prepare the LOHCP:

1. **Private development:** Commercial and residential development and redevelopment, including remodels or additions, on privately owned legal parcels, including creation and maintenance of defensible space;
2. **Capital Projects:** Public and private infrastructure development projects, such as building or expanding roads, libraries, parks, and water facilities;
3. **Facilities Operations and Maintenance:** Public and private activities to operate and maintain, including repair and replace, existing facilities, such as roads, drainage basins, water systems, and parks;
4. **Fire Hazard Abatement:** Vegetation modification and other related treatments to reduce the amount and contiguity of fuels to reduce the risk of wildfire in designated fuel breaks as part of the Community Wildfire Protection Plan (SLOCCFSC 2009); and
5. **Conservation Program Implementation**: Activities conducted to implement the LOHCP conservation program (Chapter 5), including restoration, management, maintenance, and monitoring of preserves used to mitigate the effects of the other covered activities.

For all covered activities, the project disturbance envelope includes all areas of ground disturbance and vegetation removal. It includes areas of temporary disturbance, such as a corridor in which underground utilities are installed, as well as areas that are permanently covered by impervious surfaces. The disturbance envelope also includes the area impacted through creation and maintenance of defensible space (CAL FIRE 2020). The maximum disturbance envelope applies to remodels and reconstruction, including additions and remodels that disturb additional ground, as well as new construction.

Plan participants must limit the disturbance envelope associated with their projects, including by siting development in areas that minimize the amount of vegetation management required to achieve defensible space, such as along roads or adjacent to existing development, in vegetation and terrain (i.e., slopes) that require less clearance. However, if defensible space requirements would result in more than 30,000 sf of disturbance, including due to the new requirement for 100 feet of defensible space (relative to 30 feet when the plan was written), the County can permit that additional impact area if they find that the project proponent has minimize the impacts of the project. Project proponents must mitigate for the actual total impact area, including by setting aside land or paying the habitat protection fee based on the actual area impacted including any amount in excess of the

maximum disturbance envelopes identified in this plan. Such potential expansion of the disturbance envelop for individual projects will not change the overall impacts of the covered activities in this plan, for which no additional take beyond the 531.5 acres is requested.

The following sections describe each of these types of activities in terms of their anticipated acres of impacts as summarized in Tables 2-5 to 2-9, and illustrated in Figures 2-4 to 2-7.

2.2.4 Private Development

The LOHCP incidental take permit will cover the impacts of private development activities permitted by the County through both ministerial and discretionary permit processes, as defined in CEQA Guidelines Sections 15369 and 15357. The general types of private activities that will be permitted include:

- **New Construction:** New commercial and residential construction including associated onsite improvements (e.g., driveways, utilities, and storm water control measures) that are part of the development project.
- **Remodels and Reconstruction:** Additions or adjustments to existing commercial and residential buildings and associated onsite infrastructure and facilities that add to the ground surface footprint of the existing development.
- **Defensible Space**: Selective vegetation removal in compliance with state law (PRC 4291), which requires property owners to maintain around structures defensible space: an area of reduced flammability materials that will slow the spread of fire and enable firefighters to safely access structures. The defensible space should extend 100 feet or to the property line, whichever is nearer. The first 30 feet should lack flammable vegetation and woodpiles; fuels should be reduced and spaced within the remaining 70 feet (CAL FIRE 2020).

To be eligible for coverage, activities on private property must:

1. Meet the general covered activities criteria (Section 2.2.1);
2. Occur on a legal parcel at the time the LOHCP is adopted and the ITP permit is issued, or on a parcel for which subdivision approval was granted by the County prior to issuance of the ITP and that remains valid (Section 2.1.2.2);
3. Conform with the current Estero Area Plan/Los Osos Community Plan standards; and
4. Meet specific eligibility criteria for private development under the LOHCP, which are described below.

2.2.4.1 Private Project Eligibility Criteria

The additional eligibility criteria for private development are based on three factors:

1. **Development Type:** commercial and multifamily residential development are included in one category, while various types of single-family residential development are included in another;
2. **Parcel size**: the size of the parcel in one of several size categories used for planning purposes**;** and
3. **Planning Zone**: location with respect to the Urban Services Line (Figure 2-1).

For single-family residential development, Table 2-5 outlines the eligibility criteria and identifies the number and total acreage of parcels to which they apply. Table 2-6 identifies the acres of habitat within undeveloped parcels that are estimated to be impacted by all new, residential development, while Table 2-7 estimates the acres of existing developed parcels that can be impacted through redevelopment of all residential parcels. These numbers and acreages were developed based on analyses conducted in 2014. While some changes have occurred since that time, they are limited due to the moratorium on development and will not affect the plan's analysis or implementation.

As noted above, project disturbance envelope includes all areas of ground disturbance and vegetation removal. It includes areas of temporary disturbance, such as a corridor in which underground utilities are installed, as well as areas that are permanently covered by impervious surfaces. The disturbance envelope also includes the area impacted through creation and maintenance of defensible space (CAL FIRE 2020). Depending on the defensible space requirements for the project and the size and configuration of the parcel, the disturbance envelopes for some projects, particularly those occurring on smaller parcels, may encompass the entire parcel.

The maximum disturbance envelopes apply to remodels and reconstruction, including additions and remodels that disturb additional ground, as well as new construction. The entire area featuring non-natural elements, including buildings and other facilities (e.g., septic systems) and infrastructure, hardscapes (e.g., driveways and patios), and non-native plantings including cultivated agriculture as well as ornamental plants or other species not native to the Baywood fine sand.

2.2.4.1.1 Single-Family Residential Development

On the 5,367 parcels totaling 2,362 acres in the Plan Area that are designated Residential Single-Family, Residential Rural, or Residential Suburban in the Estero Area Plan (Table 2-5, Figure 2-2), development can be permitted through the LOHCP. For parcels outside of the USL, development must be contained within maximum disturbance envelopes designed to protect habitat while allowing reasonable use of the land, as outlined in Table 2-5. These eligibility criteria also apply to 10 unprotected privately-owned parcels within the USL that are designated for Recreation and Open Space.

The maximum disturbance envelopes identified in Table 2-5 were determined based on the parcel size and location with respect to the Urban Services Line; these two factors reflect the general conservation value of the habitat within the parcels. Parcels cannot be subdivided unless they have received County approval prior to adoption and permitting of the LOHCP. Only a single parcel (Tract 1646) has received such approval (Section 2.1.2.2). Importantly, a single assessor's parcel may feature more than one legal lot, and in some cases, assessor's parcels do not constitute legal lots for purposes of development. On balance, the number of legal lots approximately equals the number of assessor's parcels.

2.2.4.1.2 Commercial and Multi-Family Residential Development

The LOHCP will also permit development on parcels designated for Commercial Retail, Commercial Service, Office Professional, and Residential Multifamily development. These 621 parcels total just 258 acres (7%) of the LOHCP Area; they are located within the center of the existing developed community (Figures 2-2 and 2-4). Located entirely within the USL, these parcels will not be subject to maximum disturbance envelopes. Instead, by focusing future development inside the existing developed area, the

LOHCP will minimize the negative effects of the permitted projects on the more intact and viable habitat concentrated on the perimeter of the Plan Area, outside of the USL.

2.2.5 Capital Projects

Infrastructure development projects conducted by public entities, private utility companies, and conservation organizations will be covered by the LOHCP. The following are specific capital projects that are slated to be implemented and will be covered. Figure 2-5 illustrates locations of projects for which there are available spatial data; the precise locations of several projects are unknown. As outlined above, other projects that meet the Plan eligibility criteria (Section 2.2.1) can also be covered by the LOHCP permit, following approval of an application to the County (Section 6.3).

2.2.5.1 County of San Luis Obispo Library Department

During the 25-year term of the requested incidental take permit, the San Luis Obispo County Library plans to expand or relocate the main library building (or demolish the existing library and build a larger library) and add paved parking on the 0.3-acre undeveloped south and west sides of the existing building (Table 2-8). Groundskeeping and other maintenance activities will continue on other portions of this parcel (Section 2.2.6.1).

2.2.5.2 County of San Luis Obispo Division of Parks

The Division of Parks operates and manages parks, open space, trails, and recreation facilities and conducts recreation programs. Parks activities anticipated to occur in the LOHCP Area during the permit term were identified based on the Parks and Recreation Element of the County General Plan (County of San Luis Obispo 2006) and the San Luis Obispo County Coastal Access Guide (County of San Luis Obispo 2007). Table 2-8 lists the anticipated capital projects, which are briefly described below.

Facility Creation or Expansion: The Division of Parks anticipates conducting the following projects to create or expand facilities during the permit term (Table 2-8):

- Los Osos Community Park Expansion: The next phase of the County-approved master plan to expand Los Osos Community Park includes addition of tennis courts, a sand volleyball court, and restrooms in an approximately three-acre undeveloped area north of the existing park facilities.
- New Park: The County anticipates building in Los Osos a new, approximately 10-acre park that would feature facilities including play equipment, courts, fields, buildings, paved parking, and other facilities. Though the precise location is unknown, it will likely occur within the USL, and may be located adjacent to existing parks to provide joint-use opportunities.
- New Aquatic Center: The County anticipates building a new aquatic park, which would feature swimming pools and associated facilities. Though the precise location is unknown, it will likely occur within the USL and is estimated to be three acres in size.
- New Boat Ramp: The County anticipates installing a boat ramp in the back bay to provide access the estuary. The facility is estimated to impact 1.5 acres, with the precise location

uncertain. Any impacts to wetland species associated with this project would not be covered by the LOHCP permit (Section 1.4).

Trails and Paths: County Parks plans to build 10 multi-use trails ranging in length between 0.1-1.7 miles and totaling 7.8 miles. Located within the road rights-of-way in Los Osos (Figure 2-5), the trails are within the USL, with the exception of the Coastal Trail and the Los Osos Perimeter Trail. Trail areas were estimated based a 15-foot anticipated width and were rounded to the nearest quarter acre (Table 2-8).

Elfin Forest Natural Preserve Projects: County Parks has an approved plan to expand the existing boardwalk between the loop and 13th Street. The County also anticipates erecting 5,000 lineal feet of symbolic fencing. These projects are designed to increase accessibility and reduce impacts to habitat by focusing visitor travel on well-defined paths.

Coastal Access: County Parks anticipates creating 14 coastal access points in Los Osos, as outlined in the Coastal Access Guide for San Luis Obispo County (County of San Luis Obispo 2007). These access points generally consist of approximately five-foot-wide trails featuring native soils. Their installation may entail minor vegetation clearing and occasionally, installation of fences and signage.

Of these projects planned by County Parks, only half are anticipated to be conducted during the 25-year permit term. Thus, while all constitute covered activities, the County Parks' projects totaling 65.6 acres were estimated to cause just 32.8 acres of disturbance in the take/impacts assessment (Section 4.1.1.2). Additional impacts from County Parks projects can be covered under the LOHCP provided that projects meet the eligibility criteria for the LOHCP, the impacts do not exceed the maximum permitted amount of 532 acres[13], and that the project impacts are mitigated as required in the conservation program (Section 5).

2.2.5.3 County of San Luis Obispo Department of Public Works and Transportation

Within the LOHCP Area, County Public Works is responsible for construction and maintenance of infrastructure including roads and drainage systems designed to limit soil run off onto roads, reduce pollutants that reach the estuary, and promote water infiltration. Drainage systems include ditches, detention basins, bioswales, and underground infiltrators.

Impacts of the Los Osos Wastewater System, including the treatment plant and pipelines that were constructed by Public Works, were addressed through a biological opinion (USFWS 2011a) issued under Section 7 of the federal Endangered Species Act. Impacts to state-listed species were avoided, such that a State 2081(b) permit was not required. The following new capital projects will be covered by the LOHCP permit (Table 2-8).

New Roads and Road Expansion: Public Works anticipates extending two roads located within the USL to adjacent arterials. A 1,015-foot extension of Ramona Avenue will connect South Bay Blvd and Fifteenth Street and cause approximately two acres of disturbance within the 85-foot right-of-

[13] The LOHCP maximum removal of 532 acres does not include impacts due to implementation of the conservation program or the Community Wildfire Protection Plan, which will result in additional temporary impacts to habitat.

way. A 686-foot extension of Doris Avenue between Rosina and South Court will cause an estimated 0.7 acres of disturbance within the 45-foot-wide right-of-way (Table 2-8).

During the term of the permit, County Public Works will also expand existing roads to create new lanes, including turn lanes and bike lanes, install signs, and realign the routes. These activities are anticipated to disturb an estimated 33 acres within the designated road right-of-way: 25 acres to build new roads and widen existing roads, and eight acres to install bicycle lanes.

Drainage Infrastructure Installation and Improvements: During the permit term, Public Works plans to create detention basins in seven sites located within the USL (Figure 2-5). The anticipated footprints of four sites are just under 10,000 square feet each, while one is 1.2 acres and another is 7.2 acres; bringing the total to 11.4 acres (Table 2-8). Installing these features entails removing existing vegetation, grading soil to achieve the desired topography, and excavating soil, in places, to install underground devices (e.g., infiltrators). In addition, Public Works will conduct drainage improvements within the County right-of-way and along road shoulders; these improvements are anticipated to impact seven acres.

2.2.5.4 Los Osos Water Purveyors

Water in Los Osos is largely provided by the Los Osos Community Services District (LOCSD), Golden State Water Company (GSW), and S & T Mutual Water Company (S&T); individual, private wells supply properties in rural areas outside of the service areas of the three purveyors (Figure 2-6). The following sections describe capital improvements that will be conducted by the water purveyors that will be covered by the LOHCP permit; facilities operations and maintenance activities of these entities are described in Section 2.2.6. The future infrastructure projects include projects recommended in the basin management plan (County et. al 2015), such as new and expanded water wells, groundwater blending projects, a community nitrate removal facility, pipeline construction, and water main upgrades. These and similar projects identified in the final plan will be covered by the LOHCP permit.

2.2.5.4.1 Los Osos Community Services District

The LOCSD operates water facilities within their approximately 826-acre service area located primarily within the USL (Figure 2-6). The following are capital projects anticipated to be completed during the LOHCP permit term and that were identified for coverage, based on review of the Los Osos Community Services District 2010 Water Master Plan Capital Improvements Update (Wallace Group 2011) and the Basin Management Plan (County et al. 2015), as well as discussions with the LOCSD staff.

Pipeline Projects: The LOCSD plans to install new pipelines and upgrade existing water pipes (two to 16-inch diameter). These pipelines projects are anticipated to affect an approximately 2.6-acre area within the County right-of-way.

Well Decommissioning and Construction: The LOCSD anticipates the following well projects:

- Disconnecting the decommissioned Ferrell Well from their water distribution system; this will likely include upgrading the existing pipeline in the one-acre site.
- Installing a new well, including appurtenances and possibly nitrate removal equipment, within the 0.5-acre 8th Street and El Moro Yard.

- Constructing a new water tank within the 0.11-acre LOCSD parcel at Highland Drive and Alexander Avenue.
- Installing a new expansion well (approximately 0.42-acres) at the north end of Sage Avenue as part of the Basin Management Plan (County et al. 2015).

Nitrate Removal and Blending Projects: The LOCSD anticipates installing a skid-mounted unit to remove high nitrates in the upper aquifer wells by blending with water from the lower aquifer; this facility will likely be located within a 0.01-acre area within the County right-of-way. As part of the Basin Management Plan, the LOCSD will implement a joint project with Golden State Water Company (GSW) to install a community nitrate removal facility within an estimated 0.023-acre area on a GSW-owned parcel (1,000 square feet).

2.2.5.4.2 Golden State Water Company

The Golden State Water Company (GSW) operates water facilities to supply water within its 1,569-acres service area in the LOHCP Area (Figure 2-6). Capital projects anticipated to occur during the permit term were provided by GSW staff and identified through review of the Basin Management Plan (County et al. 2015).

Pipeline and Blending Projects: To reactivate existing upper aquifer wells, GSW anticipates constructing a pipeline in the County right-of-way to connect their lower aquifer Rosina Well to the upper aquifer Skyline Well, which will occur in an approximate 0.261-acre area. Additionally, to accommodate additional water flow from three expansion wells, the segment of the Los Osos Valley Road water main within an approximately 0.14-acre area near Sea Oaks Drive and Tierra Drive will be upgraded to a 12-inch diameter pipe.

Well Construction: GSW anticipates constructing a new upper aquifer well and a new lower aquifer well, which along with the pipeline to connect them, are estimated to impact an approximately 0.254-acre area; the location of these wells is unknown. Additionally, GSW plans to install a new expansion well south of Los Osos Valley Road in an estimated 0.22-acre area located in the vicinity of the Sunny Oaks Mobile Home Park.

2.2.5.4.3 S & T Mutual Water Company

The S& T Mutual Water Company (S&T) is a corporation that provides water to an approximately 90-acre service area in the Sunset Terrace area around Sea Pines Golf Course in the western portion of the LOHCP Area (Figure 2-6). This private utility company recently installed new water meters for its 199 connections. As described in the Basin Management Plan (County et al. 2015), S&T owns three upper aquifer wells on a parcel that may be developed in the future; if so, S&T will need to construct replacement wells that will occur in an approximately 0.069-acre area (3,000 square feet). Alternatively, S&T could purchase water from either the LOCSD or GSW.

2.2.6 Facilities Operations and Maintenance

The LOHCP will also cover activities conducted by agencies and organizations to operate and maintain existing facilities. This includes the repair or replacement of existing infrastructure such as roads, drainage systems, and water systems, as well as the maintenance of parks and open space.

2.2.6.1 County of San Luis Obispo Library Department

Ongoing operations and maintenance of the Los Osos Library facilities and grounds (e.g., landscaping) within the library parcel and on the perimeter of the adjacent 12-acre parcel also owned by the County may cause impacts that would be covered under the requested permit.

2.2.6.2 County of San Luis Obispo Department of Public Works and Transportation

Road Maintenance: County Public Works maintains 54 miles of roads which are located within the County right-of-way. This 489-acre area is located between assessor's parcels and includes paved and unpaved roads as well as vegetation (Figure 2-5). Existing roads will be maintained by paving and mowing vegetation to maintain visibility and reduce fire risk, which will impact approximately five acres along the road shoulder (Table 2-8).

Drainage Infrastructure Maintenance: County Public Works maintains ten drainage basins inside the USL that total approximately 4.9 acres (Figure 2-5). During the permit term, County Public Works will maintain these as well as the newly installed drainage infrastructure (Section 2. 2.2) by removing established vegetation, grading to remove deposited sediment, and excavation, as needed, to repair underground devices.

2.2.6.3 Los Osos Community Services District (LOCSD)

The LOCSD operates and maintains 24 properties, on which it anticipates conducting the following facilities maintenance activities that will be covered under the LOHCP.

Maintain Drainage Basins: The LOCSD maintains five drainage basins that total approximately four acres (Figure 2-5). During the permit term, the LOCSD will maintain these areas approximately annually, by removing established vegetation, grading deposited sediment, and conducting additional excavation to repair underground devices, as needed.

Vegetation Management: The LOCSD conducts fuel reduction and vegetation removal activities annually or as needed on eight LOCSD parcels totaling approximately 4.9 acres (Figure 2-5). This is in addition to the vegetation management on LOCSD parcels that will be conducted as part of the Community Wildfire Protection Plan (Section 2.2. 7).

Facility Maintenance: The LOCSD operates seven water facility sites totaling approximately two acres, which feature tanks, wells, pump stations, water mains, fire hydrants, water meters, sample stations, and associated infrastructure. Operations and maintenance of these facilities includes: equipment removal and replacement, material storage, grounds keeping, weed abatement, rodent and pest control, painting, inspections, and other related activities.

2.2.6.4 Golden State Water Company

Golden State Water Company (GSW) maintains the water facilities including blending facilities, pump stations, wells, pipeline, and fire hydrants within their service area (Figure 2-6). The following operation and maintenance activities by GSW will be covered by the LOHCP (Table 2-8).

Water Facility Operations and Maintenance: On its ten sites in the LOHCP Area that total approximately five acres, GSW will repair water tanks, booster pumps, filtration units, and buildings, and conduct necessary maintenance of the grounds, including weeding. These activities are anticipated to impact 2.8 acres through the potential mobilization of heavy equipment including cranes, trucks, backhoes, and dump trucks; welding, painting, sandblasting, excavating, grading, and other construction and maintenance activities may also cause impacts.

Water Pipeline and Main Repair, Replacement, and Flush-Outs: As needed, water mains and other pipelines totaling approximately 25 miles will be excavated for repair or replacement and flushed until water within the pipeline runs clear. These pipelines are located primarily in the County right-of-way.

Meter Box Maintenance and Replacement: Approximately twice per year, GSW will clean out its 2,673 water meter boxes. They also replace meter boxes or water meters, as needed. These maintenance activities can affect immediately adjacent habitat.

Fire Hydrant Maintenance: GSW will maintain its 248 fire hydrants and wharf heads, which are generally located in the County right-of-way, by flushing them with water until they run clear; this activity can impact adjacent areas.

2.2.6.5 S&T Mutual Water Company

The S&T Mutual Water Company will likely conduct facilities maintenance activities similar to those conducted by GSW, to maintain their estimated two miles of pipeline and 199 meter boxes. Such activities, which are estimated to affect 0.85 acres, will be covered under the LOHCP permit (Table 2-8).

2.2.7 Community Wildfire Protection Plan

The incidental take permit issued based on the LOHCP will cover take associated with vegetation management and related fire hazard abatement work implemented as part of the Los Osos Community Wildfire Protection Plan (CWPP). The CWPP was developed by the San Luis Obispo County Community Fire Safe Council to identify areas that will receive a range of fuel reduction and fire hazard abatement treatments within and adjacent to the community (SLOCCFSC 2009). Implementation of the CWPP is anticipated to be conducted by CAL FIRE and cooperating entities (e.g., Fire Safe Council, contractors). Prior to implementing the CWPP, CAL FIRE will receive permission from the landowners and a Certificate of Inclusion conferring take coverage under the LOHCP ITP for the CWPP activities (Section 6.1.1.3, Appendix H). Anticipated treatments include removal of downed, dead, or diseased vegetation, the creation of shaded fuel breaks, and mowing of non-native grassland.

These activities are anticipated to occur in a total of 89.4 acres located at the wildland–urban interface (WUI)—the zone where human development meets wildland with vegetative fuels that can present risks to life, property, infrastructure, and habitat (Figure 2-7). Fuel management in these areas will help protect human lives and property as well as adjacent intact habitat from the impacts of wildfire. To cover this activity, the LOHCP Permit Area was delineated to include the area within the designated fuel break even where it occurs on State Park lands (12.0 acres), which were otherwise excluded from the LOHCP Permit Area (Sections 1.3 and 2.1.3.3).

Since completion of the CWPP, the California Department of Fire and Forestry (CAL FIRE) Station 15, under contract with the LOCSD, has been working with the USFWS, CDFW, and local landowners to implement the CWPP in three areas totaling 20.5 acres where no State or federally listed animal species

occur (Figure 2-7). The permit issued pursuant to the LOHCP will provide take authorization under ESA, enabling the activities to be initiated in the remaining 68.9 acres, as well as take of covered species throughout the 89.4-acre treatment area.

CAL FIRE estimates that approximately one-third of the total 89.4-acre treatment area would be retreated annually depending on site-specific conditions, the need for hazard abatement activities, and funding. A maximum distance of 50 feet from structures would be mowed in non-native grassland areas, with the shaded fuel breaks established to complete a total distance of 100 feet from structures. This 100-foot distance is considered the minimum strategically effective distance necessary for hazard abatement. Mowing would likely be done every two to three years, with maintenance of established shaded fuel breaks occurring every three to four years after they are created.

The USFWS and CDFW have worked closely with CAL FIRE to develop avoidance and minimization measures for the CWPP that will enable the fuel modification activities to be covered under this HCP (Section 5.2.4; Table 5-4). The CWPP will avoid take of Morro Bay kangaroo rat and Indian Knob mountainbalm, and is anticipated to have negligible effects on Morro shoulderband snail and Morro manzanita (Section 4.1.1.2) as a result of implementation of avoidance and minimization measures (Section 5.2.4). Accordingly, the CWPP acreages are not included in the total calculation of take/impacts used to identify the compensatory mitigation, as the take/impacts of the CWPP will not be compensated for in the manner used to mitigate the take/impacts of the other covered activities in this plan.

2.2.8 Conservation Program Implementation

The LOHCP conservation program includes measures designed to avoid, minimize, and mitigate the take/impacts of the covered activities on the covered species and impacts to their habitat (Chapter 5). These activities, which are essential to achieving the biological goals and objectives of the LOHCP (Section 5.1) include:

- Avoidance and minimization measures, including surveys (Section 5.2, Section F);
- Habitat restoration and management within the LOHCP Preserve System—the network of protected lands that will be managed and monitored in perpetuity to mitigate the impacts of the covered activities on the covered species (Section 5.3); and
- Monitoring to track the status and trends of the covered species populations (Section 5.4).

The County will implement the LOHCP conservation program through contracts within an Implementing Entity (Section 6.2).

Avoidance and minimization measures for the covered activities will be conducted at project sites throughout the LOHCP Area. They will be implemented by USFWS-approved biologists during the permit term, as well as part of management of the LOHCP Preserve System in perpetuity.

Other aspects of the conservation program will take place primarily within the LOHCP Preserve System, which will include eligible existing protected lands (e.g., the Morro Dunes Ecological Reserve) that will be managed and restored as part of the LOHCP, as well as new preserves established through plan implementation (Section 5.3.1). The detailed management and restoration activities will be identified in the LOHCP Preserve System AMMP, which will be developed and must be approved by the USFWS during the first three years of plan implementation (Section 5.3.3.2).

Though the elements of the conservation program will benefit the covered species by contributing to their recovery, some measures or treatments may cause short-term effects that may result in take of the species. For example, exotic plant removal projects will promote long-term viability of Morro shoulderband snail by restoring the natural community structure and species composition of the habitat; however, they can also have short-term negative impacts on individuals that may occupy infested areas. Similarly, construction of fuel breaks to reduce the risk of wildfire spreading into the, from adjacent developed areas will cause short-term negative effects to covered species in the treatment areas, which will be outweighed by the protection of habitat from fire and fire suppression activities. The consequences of the potential take/impacts caused by the covered activities caused by the conservation program are limited and will be outweighed by their long-term benefits (Chapter 4).

All measures to implement the conservation program that are consistent with the goals and objectives of the plan will be covered. The following outlines anticipated activities.

2.2.8.1 Species Protection Measures

A series of measures will be used to minimize the amount or severity of take of or impacts to the covered species during the course of implementing covered activities (Section 5.2). These include pre-project surveys to evaluate whether a species is present, installation of fences and other barriers to limit project disturbance areas, and capture and relocation of individuals to intact, suitable habitat that is permanently protected and located away from covered activity footprints and adjacent areas that can be indirectly impacted. These measures, which are designed to reduce impacts of the covered activities, may have some limited negative effects themselves; for example, Morro shoulderband snails could be injured or killed inadvertently during efforts to install fences or capture and relocate them out of harm's way (Section 4.2.1.2). Take or impacts caused by these measures will be covered by the Plan incidental take permit.

Prior to engaging in any activity that could result in take in any form, which includes capture of the covered species, qualified personnel must obtain written approval from the USFWS and, if required, CDFW.

2.2.8.2 Species Population Enhancement Measures

Some elements of the conservation program designed to increase or otherwise enhance the viability of the covered species populations in order to promote their recovery may cause short-term negative impacts or take. Activities that will be covered include:

- Collection of seeds or cuttings of the covered plants, for salvage, storage in a seed bank, genetic analysis, direct seeding, and/or propagation for revegetation of the LOHCP Preserves as part of restoration and enhancement projects; and
- Capture and relocation of Morro shoulderband snail individuals in order to establish or enhance populations following successful restoration to address the factors that eliminated or suppressed their populations.

Prior to conducting these activities, qualified personnel must obtain written approval from the USFWS and, if required, CDFW. Notably, an incidental take permit issued under Section 2081(a) of CESA would be obtained prior to any propagation or other activities involving collecting Indian Knob mountainbalm, which is a state-listed plant.

2.2.8.3 Habitat Management and Restoration

The LOHCP Preserve System will be actively managed to maintain and enhance the natural structure and species composition of the communities, and the size and persistence of the covered species populations. Habitat management and restoration will be designed to address anthropogenic factors that are negatively impacting the populations and communities, which include exotic species, fire exclusion, erosion, and incompatible recreation. In some cases, management will utilize treatments that have been proven effective, while in other cases, management will be experimental; that is, the prescriptions will be developed based upon ecological models for the biological systems that are informed by the best available science, and will be conducted in a manner that is designed to limit deleterious effects and allow examination of effectiveness (Section 5.5.2).

Specific habitat restoration and management treatments will be identified in the LOHCP Preserve System AMMP, which will be developed during the first three years of plan implementation (Section 5.3.3.2). While the AMMP is being developed, the *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (McGraw 2020, Appendix M) will guide initial restoration activities within the Morro Dunes Ecological Reserve, which the County proposes to enroll into the LOHCP Preserve System as part of initial work to implement the LOHCP conservation program (Section 6.2.5). The following are techniques that are included in the IAMMP and/or are anticipated to be included in the LOHCP Preserve System AMMP, and that will be covered by the LOHCP permit:

- Management of vegetation using manual, mechanical, and chemical techniques, as well as fire, to promote natural community structure and native species composition or habitat conditions for the covered species;
- Eradication and control or exotic plants using the most appropriate techniques, which may include manual, mechanical, chemical, and biological means;
- Eradication and control of non-native animals including techniques to address non-native snails and other invertebrates, as well as, amphibians and reptiles, birds, and mammals, if any such activities negatively affect the covered species;
- Erosion control in unnaturally denuded areas that would otherwise result in excessive or accelerated soil movement caused by water, wind, and gravity;
- Demolition and removal of structures and other infrastructure;
- Removal of debris and hazardous material, including soil remediation, closure of underground storage tanks, and removal of dumped materials; and
- Active revegetation techniques including the collection of seed and cuttings, off-site plant propagation, seeding, and outplanting of container stock

Additional habitat restoration and management treatments causing similar take or impacts and that are determined in the LOHCP Preserve System AMMP to also advance the biological goals and objectives will also be covered by the permit.

2.2.8.4 General Land Stewardship Management

The LOHCP will also cover general activities required to maintain the LOHCP Preserves. The following activities are covered by this plan.

- **Facilities:** Installation and maintenance of facilities to:
  - Protect the land, including fences and gates;
  - Patrol properties, including roads and trails; and
  - Enable restoration, including water systems (wells, tanks, and pipelines) for temporary irrigation.
- **Recreation:** Provide limited opportunities for passive recreation where doing so is compatible with the LOHCP goals and objectives, by:
  - Installing and maintaining trails and providing opportunities for trail use, including boardwalks that facilitate accessibility while limiting habitat degradation in the sand soil, as well as deterring use of non-designated trail routes;
  - Developing and maintaining limited interpretation facilities, including signage, kiosks, and wildlife observation platforms; and
  - Creating and maintaining parking lots, staging areas, picnic areas, and restrooms.

2.2.8.5 Monitoring

Effective long-term management of the LOHCP Preserve System will require implementation of monitoring studies (Section 5.4), which are generally designed to:

- fill gaps in the scientific understanding of the biology of the covered species, including their distribution and abundance within the Preserve System, and the factors that influence their occurrence and demographic performance;
- track the status and trends in the distribution, abundance, and performance of the covered species populations; and
- evaluate the effects of restoration and management, including responses of the covered species populations to specific restoration projects.

Monitoring activities that can cause take include trapping, handling, and marking individuals, and collecting individuals for *ex situ* (e.g., laboratory) studies or analyses. The adverse effects of such activities that are determined to be essential to long-term effectiveness of the conservation program at attaining the goals and objectives will be covered as part of this plan. Appendix E outlines the draft monitoring protocols, which will be revised, as needed, in the LOHCP Preserve System AMMP, which will be reviewed and approved by the USFWS during the first three years of plan implementation (Section 6.2.3.2).

2.3 Activities Not Covered by Permit

In developing the LOHCP, the County attempted to identify activities that would require take coverage during the 25-year permit term. Some activities identified did not meet the other criteria needed to

qualify for coverage (Section 2.2.1). Specifically, these activities were:

- Not compatible with the LOHCP biological goals and objectives; and/or
- Not sufficiently well-described to enable evaluation of their impacts.

The following activities will not be covered under the LOHCP.

- **Parcel Subdivisions**: Development on parcels that are newly created (i.e., through subdivision) after adoption of the LOHCP will not be covered by the LOHCP permit. Instead, the ITP will only cover development on existing legal lots at the time the LOHCP is adopted by the County and that the ITP permit is issued by the USFWS, or on lots where the County previously granted an approved subdivision that remains valid (Section 2.1.2.2).
- **Agricultural Land Conversion:** Conversion of habitat to agricultural uses will not be covered by the LOHCP permit.
- **Construction Activities that Do Not Cause Soil Disturbance:** Not all land use activities permitted by the County will cause soil disturbance, which is defined as any activity that removes vegetation or compacts or disturbs soil, and thus potential impacts to the covered species. For example, interior remodels or vertical construction in which disturbance is confined to the existing disturbance footprint on a parcel would not require coverage under the LOHCP. If such projects cannot avoid ground disturbance, then they will require a take permit and will be covered under this plan.
- **Projects Impacting Riparian or Wetland Communities, unless a separate permit is provided:** Most of the covered activities described in this section are not anticipated to cause take/impacts to species and habitats in wetland and riparian areas. If any project proposed for coverage occurs within or near, or otherwise is anticipated to adversely affect, wetlands and riparian areas or species, the project proponents must obtain separate permits to cover those impacts, in order to be eligible for coverage of their impacts to the LOHCP covered species through this Plan (Section 6.3.1).

The County will refer proponents of activities not covered by the LOHCP permit to the USFWS and CDFW for permitting and also notify the agencies of such referrals. The County will not issue permits to those projects that cause take or impacts unless proponents provide proof of compliance with CESA and ESA (Section 6.3).

Table 2-1: Parcel Status

	Inside Urban Services Line				Outside Urban Services Line				Total			
	Parcels		Acres		Parcels		Acres		Parcels[2]		Acres[3]	
Status[1]	N	%	Total	%	N	%	Total	%	N	%	Total	%
Developed	5,082	84.3%	1,149	36.4%	208	3.4%	376	11.9%	5,290	87.7%	1,525	48.3%
Undeveloped	656	10.9%	317	10.1%	45	0.7%	388	12.3%	701	11.6%	705	22.3%
Protected	6	0.1%	43	1.4%	32	0.5%	882	28.0%	41	0.7%	925	29.3%
Total	**5,744**	**95.2%**	**1,509**	**47.8%**	**285**	**4.7%**	**1,646**	**52.2%**	**6,032**	**100%**	**3,155**	**100%**

[1] Number and percentage of total parcels and area (acres) that are developed, undeveloped, or permanently protected inside and outside the Los Osos Urban Services Line from the 2009 Estero Area Plan, which is the current community plan. The USL was modified slightly to reflect actual development intensity. The parcel analysis was conducted in 2014; while some numbers have changed, these changes are limited due to the moratorium on development and are not anticipated to affect the plan's impact analysis or implementation.

[2] Number of mapped parcels in assessor's parcel database

[3] Acres based on GIS and County of San Luis Obispo Official Maps of 2016. Approximately 490 acres in Plan Area are located outside assessor's parcels in the County right-of-way.

Table 2-2: Land Use Designations in the Plan Area

	Urban Services Line[1]					
	Inside		Outside		Total	
Status	Acres[2]	%	Acres[2]	%	Acres[2]	%
Commercial and Multifamily Residential						
Commercial Retail	70	4.6%	0	0.0%	70	2.2%
Commercial Services	24	1.6%	0	0.0%	24	0.7%
Office and Professional	25	1.6%	0	0.0%	25	0.8%
Residential Multifamily	111	7.3%	0	0.0%	111	3.5%
Subtotal: Commercial/Multifamily	**229**	**15.1%**	**0**	**0.0%**	**229**	**7.3%**
Single-Family Residential						
Residential Rural	0	0.0%	107	6.5%	107	3.4%
Residential Suburban	62	4.1%	851	52.2%	913	29.0%
Residential Single Family	1,113	73.3%	184	11.3%	1,298	41.2%
Subtotal: Single-Family Residential	**1,175**	**77.4%**	**1,143**	**70.0%**	**2,318**	**73.6%**
Other						
Open Space	13	0.9%	109	6.7%	122	3.9%
Recreation	38	2.5%	290	17.8%	328	10.4%
Public Facilities	40	2.6%	26	1.6%	66	2.1%
White Holed[3]	23	1.5%	64	3.9%	87	2.8%
Subtotal: Other	**114**	**7.5%**	**489**	**30.0%**	**603**	**19.1%**
Grand Total	**1,518**	**100.0%**	**1,632**	**100.0%**	**3,150**	**100.0%**

[1] Acres and percentage of land inside and outside of the Los Osos Urban Services Line within the land use categories within the Los Osos Community Plan. For planning purposes in the LOHCP, the USL was modified slightly to reflect the actual development intensity (Figure 2-2). Acres based on GIS and the County of San Luis Obispo Official Maps of 2016. Remaining acreage results from small gaps in land use category map and land area located in the County right-of-way.

[2] Not all acres are within the Permit Area (Figure 1-2).

[3] No land use category designation

Table 2-3: Land Use Designation of Existing Protected Lands in the Plan Area

Land Use Category	Acres of Protected Land[1]		
	Fee Title	Easements	Total[2]
Commercial and Multifamily Residential			
Commercial Retail	8.4		8.4
Commercial Services	0		0
Office Professional	3.2		3.2
Residential Multifamily	0.2		0.2
Subtotal: Commercial/Multifamily	**11.8**	**0**	**11.8**
Single-Family Residential			
Residential Single Family	173.7	2.5	176.2
Residential Suburban	213.6	21.0	234.7
Residential Rural	39.6	0.0	39.6
Subtotal: Single-Family Residential	**426.9**	**23.6**	**450.5**
Other			
Open Space	114.1	0.1	114.1
Recreation	279.4		279.4
Public Facilities	0.3		0.3
White Holed	84.4		84.4
Agriculture	1.6		1.6
Subtotal: Other	**479.7**	**0.1**	**479.8**
Grand Total	**918.4**	**23.6**	**942.0**

[1] Acres of existing parks (excluding highly built-up parks), reserves, conservation easements, or open space easements in the LOHCP Plan Area according the 1988 Estero Area Plan land use categories. Not all acres are within the Permit Area, which excludes all State Parks lands except 12 acres within the Community Wildfire Protection Plan Area (Figure 1-2).

[2] The total is less than overall protected lands (948.5 ac.; Table 2-4) due to offsets in the land use category map

Table 2-4: Existing Protected Lands [1]

Management Agency	Acres[2]	% of Total
County of San Luis Obispo		
Elfin Forest Natural Preserve (County Parks)	31.8	3.3%
Monarch Grove Natural Area (County Parks)	16.8	1.8%
Broderson Site (County Public Works)	81.5	8.6%
Midtown Site (County Public Works)	12.2	1.3%
Subtotal: County of San Luis Obispo	**142.3**	**15.0%**
California Department of Fish and Wildlife		
Morro Dunes Ecological Reserve	278.7	29.4%
Morro Bay Wildlife Area [3]	4.2	0.4%
Subtotal: Department of Fish and Wildlife	**283.0**	**29.8%**
California Department of Parks and Recreation[4]		
Elfin Forest Natural Preserve (State Parks portion)	34.8	3.7%
Los Osos Oaks State Natural Reserve	85.7	9.0%
Montaña de Oro State Park (a portion of)	236.2	24.9%
Morro Bay State Park (a portion of)	107.4	11.3%
Subtotal: State Parks	**447.0**	**47.1%**
U.S. Bureau of Land Management		
Unnamed (APN: 038-711-016)	4.8	0.5%
Morro Coast Audubon Society		
Sweet Springs Nature Preserve	29.4	3.1%
Other Unnamed Properties	1.2	0.1%
Subtotal: Morro Coast Audubon Society	**30.5**	**3.2%**
Conservation Easements on Private Land	23.7	2.5%
Total	**948.4**	**100.0%**

[1] This table lists existing protected lands in the LOHCP Area. Table 5-5 evaluates their suitability for inclusion in the LOHCP Preserve System managed as mitigation for the covered activities.

[2] Acres within the LOHCP Plan Area

[3] This area likely reflects mapping imprecision and does not occur in the LOHCP Area

[4] Though State Parks are located within the LOHCP Plan Area, they are excluded from the LOHCP Permit Area except for 12 acres within the Community Wildfire Protection Plan Area (Figure 1-2).

Table 2-5: Single-Family Residential Development Eligibility Criteria[1]

Planning Zone	Parcel Size	Number of Parcels[2]	Total Acres[2]	Maximum Disturbance Envelope (sf)
Inside the USL	<20,000 sf	4,799	747	None
	20,000 sf – 1 ac.	185	119	None
	>1 acre	111	299	None
Outside the USL	<=5 acres	230	327	30,000
	> 5 acres	42	870	30,000
All Single Family-Residential Parcels		**5,367**	**2,362**	

[1] Criteria for development on parcels in Single-Family Residential Development Categories based on parcel size and location with respect to the Urban Services Line.

[2] Includes 10 privately held, unprotected parcels totaling 16.5 ac. that were designated for 'Recreation' or 'Open Space' that will be eligible for single-family residential land use.

Table 2-6: Undeveloped Parcel Land Eligible for Private Development[1]

Parcel Locate and Size Category	Single-Family Residential Development					Commercial and Multifamily Development				Total Undeveloped Land	
	Max. Disturbance Envelope[3]	Undeveloped Land		Max. Developed [4]		Undeveloped Land		Max. Developed [4]			
		Parcels	Acres	Assumption	Acres	Parcels	Acres	Assumption	Acres	Parcels	Acres
Inside the USL											
<20,000 sf	None	469	77.8	All Developed	77.8	81	16.1	All Developed	16.1	550	93.9
20,000 sf - 1 ac.	None	30	18	20,000 sf/parcel	13.8	6	4.2	All Developed	4.2	36	22.2
>1 ac.	None	35	95.6	1 ac./parcel	35	18	82.8	All Developed	82.8	53	178.4
Subtotal: Inside the USL		**534**	**191.4**		**126.6**	**105**	**103.1**		**103.1**	**639**	**294.5**
Outside the USL											
<= 5 acres											
<30,000 sf[5]	entire parcel	8	2.8	total parcel	2.8	0	0		0	8	2.8
>30,000 sf but ≤ 5 acres	30,000	24	53.6	30,000 sf/parcel	16.5	0	0		0	24	53.6
Parcels Acquired for Protection[6]	0	4	13.0	Fee Title Acquisition	2.8					4	13.0
Subtotal: Parcels ≤ 5 acres		28.0	43.4		16.5	0	0		0	28.0	43.4
>5 acres	30,000	13	331.2	30,000 sf/parcel	9	0	0		0	13	331.2
Parcels Acquired for Protection[6]	0	2	63.5	Fee Title Acquisition	1.4	0	0		0	2	63.5
Subtotal: Outside the USL		**39**	**311.1**		**24.1**	**0**	**0**		**0**	**39**	**311.1**
Grand Total		**573**	**502.5**		**150.7**	**105**	**103.1**		**103**	**678**	**605.6**

[1] Parcels designated for private development. Single family includes the Residential Rural, Residential Suburban, and Residential Single Family land use categories, as well as 12 privately owned lots designated "Recreation" and "Open Space", which can be developed as the other designations listed here. Analysis conducted in 2014; while some numbers have changed, these changes are limited due to the moratorium on development and are not anticipated to affect the plan's impact analysis or implementation.

[2] Location of the parcel with respect to the Urban Services Line (USL)

[3] Maximum area within the parcel to be disturbed permanently or temporarily during development, in the eligibility criteria for private development under the LOHCP

[4] Maximum acres that will be developed at build out, based on the maximum disturbance envelop and amount of vacant land

[5] Of the 32 total parcels ≤ 5 acres outside the USL, 8 are smaller than 30,000 sf; these parcels are assumed here to be entirely developed.

[6] Six vacant parcels outside of the USL (and inside the PCA) totaling 76.5 acres are assumed to be protected through fee-title acquisition as part of the LOHCP Conservation Strategy (Section 5.7.2.3.2); four of these parcels are anticipated to be less than 5 acres and the other two are anticipated to be greater than five areas. These parcels and associated acreages were subtracted from the calculations of total developed land.

Table 2-7: Redevelopment of Private Land

Land Use Category	Parcels	Acres	Assumption	Acres to Be Impacted[1]
Commercial	518	162	15% of acres to be further impacted	24
Other	7	49	No additional impacts (schools and parks covered elsewhere)	0
Residential Inside the USL	4,558	964	10% of area to be further impacted	96
Residential Outside the USL	207	350	10% of area to be further impacted	35
Residential Subtotal	4,765	1,314	10% of the area to be further impacted	131
Grand Total	**5,290**	**1,525**		**156**

[1] Estimated acres to be impacted by redevelopment of developed, privately held parcels, based on County Planning Department estimates of redevelopment.

Table 2-8: Anticipated Public and Private Utility Covered Activities

Entity	Proposed Project	Estimated Acres
County Parks and Recreation Department	**Parks and Aquatic Center**	
	New Park in Los Osos	10
	Aquatic Center	3
	Los Osos Community Park Expansion	1.6
	Boat Ramp	1.5
	Coastal Access	0.45
	Subtotal: Parks and Facilities	**16.55**
	Creation of New Paths and Trails	
	Elfin Forest Boardwalk 13th St.to loop	0.25
	Elfin Forest Symbolic fencing (5000 ft.)	0.05
	Los Osos to San Luis Obispo Trail (Los Osos URL)	2
	Pismo Ave. to South Bay Blvd. Trail	1.5
	South Bay Blvd to LOVR Trail	3
	Mountain View Dr. Trail	1.5
	Nipomo Street to Buckskin Street Trail	0.75
	2nd/3rd St. to Los Osos Valley Road Trail	2.5
	Pismo Ave. 3rd Street to 18th Street Trail	1.75
	Sweet Springs Preserve Trail	1
	Sea Pines to LOVR through Midtown Site Trail	2
	Highland/Monarch Grove School/Sea Pines/Los Osos Valley Road Trail	2.75
	Highland Drive to Nipomo Ave. via Los Osos Community Park	3.25
	Los Osos Valley Road to Los Osos Community Park to Montaña De Oro	3.5
	Coastal Trail in Los Osos	8.25
	Los Osos Perimeter Trail	15
	Subtotal: Trails	**49.05**
	County Division of Parks: Total Planned Projects	**65.6**
	County Division of Parks: Total Anticipated Projects	**32.8**[1]
County Public Works Department	**Capital Projects**	
	Road Expansion	22
	New Roads	2.7
	Bike Lanes	8
	New Drainage Basins	11.4
	New Bioswales	6.6
	Drainage Improvements	7
	Subtotal: Capital Projects	**57.7**
	Facilities Operations and Maintenance	
	Road Maintenance	5
	Maintain Drainage Basins	4.9
	Subtotal: Facilities Operations and Maintenance	**9.9**
	County Public Works Department Total	**67.6**
County Library	Expansion or relocation of Los Osos Public Library	0.33

Table 2-8: Anticipated Public and Private Utility Covered Activities

Entity	Proposed Project	Estimated Acres
	Los Osos Public Library Grounds Maintenance	0.45
	County Library Department Total	**0.78**
Los Osos Community Services District	**Capital Projects**	
	Pipeline Projects	2.60
	Ferrell Well Loop Upgrade	1
	Upper Aquifer Well at 8th & El Moro Yard	0.50
	New Water Tank at Highland Drive and Alexander	0.11
	South Bay Upper Aquifer Well Nitrate Removal/Blending Project	0.01
	New Expansion Well	0.42
	New Community Nitrate Removal Facility[2]	0.02
	Subtotal: Capital Projects	**4.67**
	Facilities Operations and Maintenance	
	Vegetation Management	4.9
	Maintain Drainage Basins	4
	Facilities Maintenance	2
	Subtotal: Facilities Operations and Maintenance	**13.1**
	Los Osos Community Services District Total	**17.77**
Golden State Water Company	**Capital Projects**	
	Blending Project	0.26
	Well Construction	0.25
	Expansion Well	0.22
	Los Osos Valley Road Main Upgrade	0.14
	Subtotal: Capital Projects	**0.87**
	Facilities Operations and Maintenance	
	Major Plant Site Maintenance	2.8
	Meter Box Maintenance	0.55
	Flush Water Mains	0.07
	Water Main Repair and Replacement	0.05
	Fire Hydrant Maintenance	0.05
	Subtotal: Facilities Operations and Maintenance	**3.52**
	Golden State Water Company Total	**4.39**
S & T Mutual Water Company	Well Construction	0.07
	Water Main and Pipeline Maintenance	0.85
	S & T Mutual Water Company Total	**0.92**
	Anticipated Public and Utility Covered Activities Total	**122.1**

[1] This table does not include the acreage of temporary impacts that will result from the Community Wildfire Protection Plan or implementation of the LOHCP conservation program.

[2] Though County Parks projects could cause up to 65.6 acres of soil disturbance, the County anticipates that only half of the projects will be conducted during the term of the permit.

[3] Joint project of the Los Osos Community Services District and Golden State Water Company under the Basin Plan for the Los Osos Groundwater Basin (County et al. 2015)

Table 2-9: Summary of Anticipated Covered Activity Impacts in the Permit Area[1]

			Acres	
General Category	**Sub-Category**	**Type**	**Total**	**To Be Impacted**
Private Land Development and Improvements	New Development on Vacant Parcels	Single Family	573	150.7
		Multifamily-Commercial	105	103.1
		Subtotal: New Development	**678**	**253.8**
	Improvements to Existing Developed Parcels	Private Redevelopment	1,314	131.4
		Commercial Redevelopment	162	24.3
		Subtotal: Redevelopment	**1,476**	**155.7**
Public and Private Utility Projects	County Division of Parks			32.8
	County Public Works			67.6
	County Library Department			0.8
	Los Osos Community Services District			15.6
	Golden State Water Company			4.4
	S & T Mutual Water Company			0.9
		Subtotal: Public/Utility Projects		**122.1**
		Grand Total		**531.5**

[1] Does not include impacts due to implementation of the conservation program and the Community Wildfire Protection Plan, which will result in additional temporary impacts to habitat.

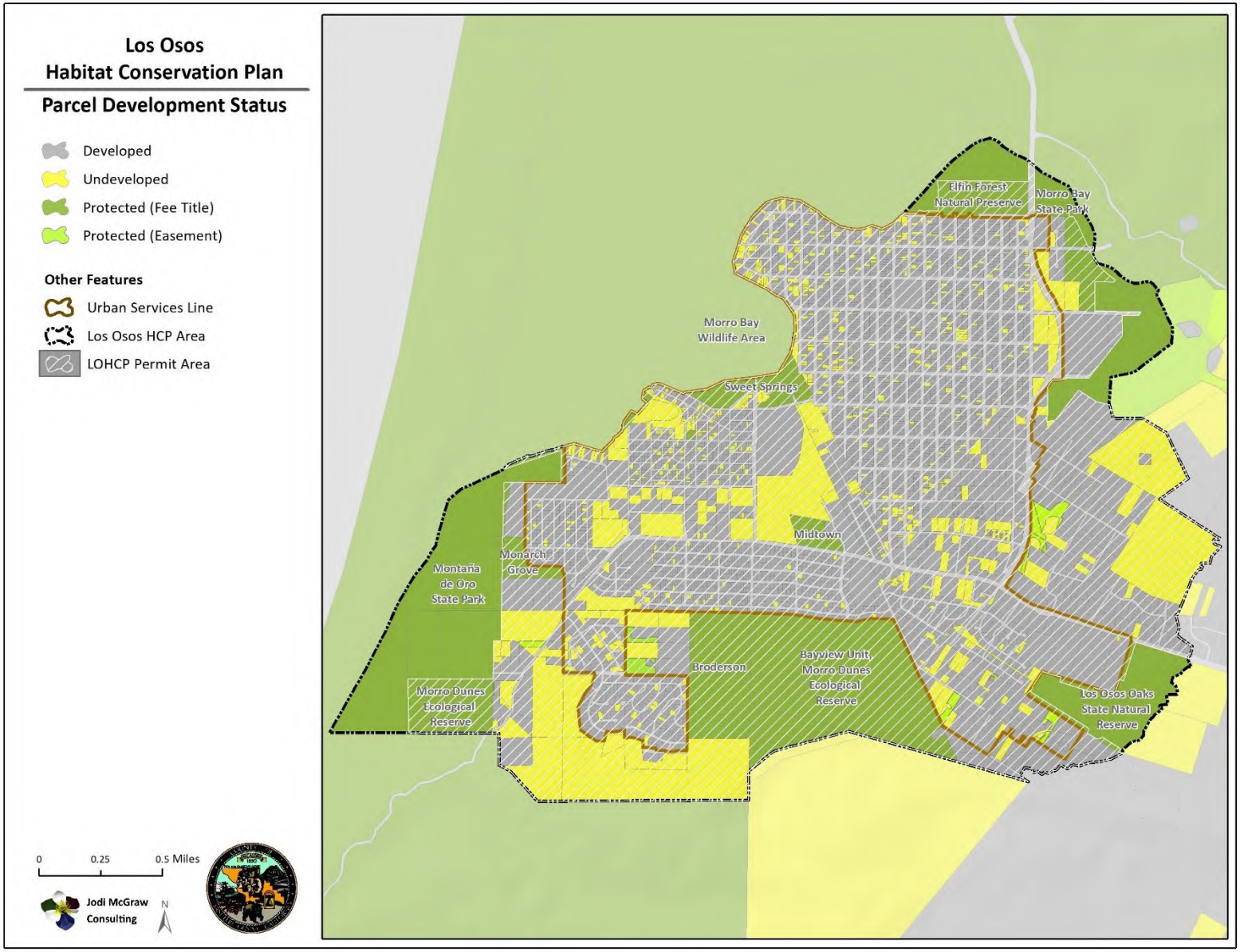

Figure 2-1: Parcel Status

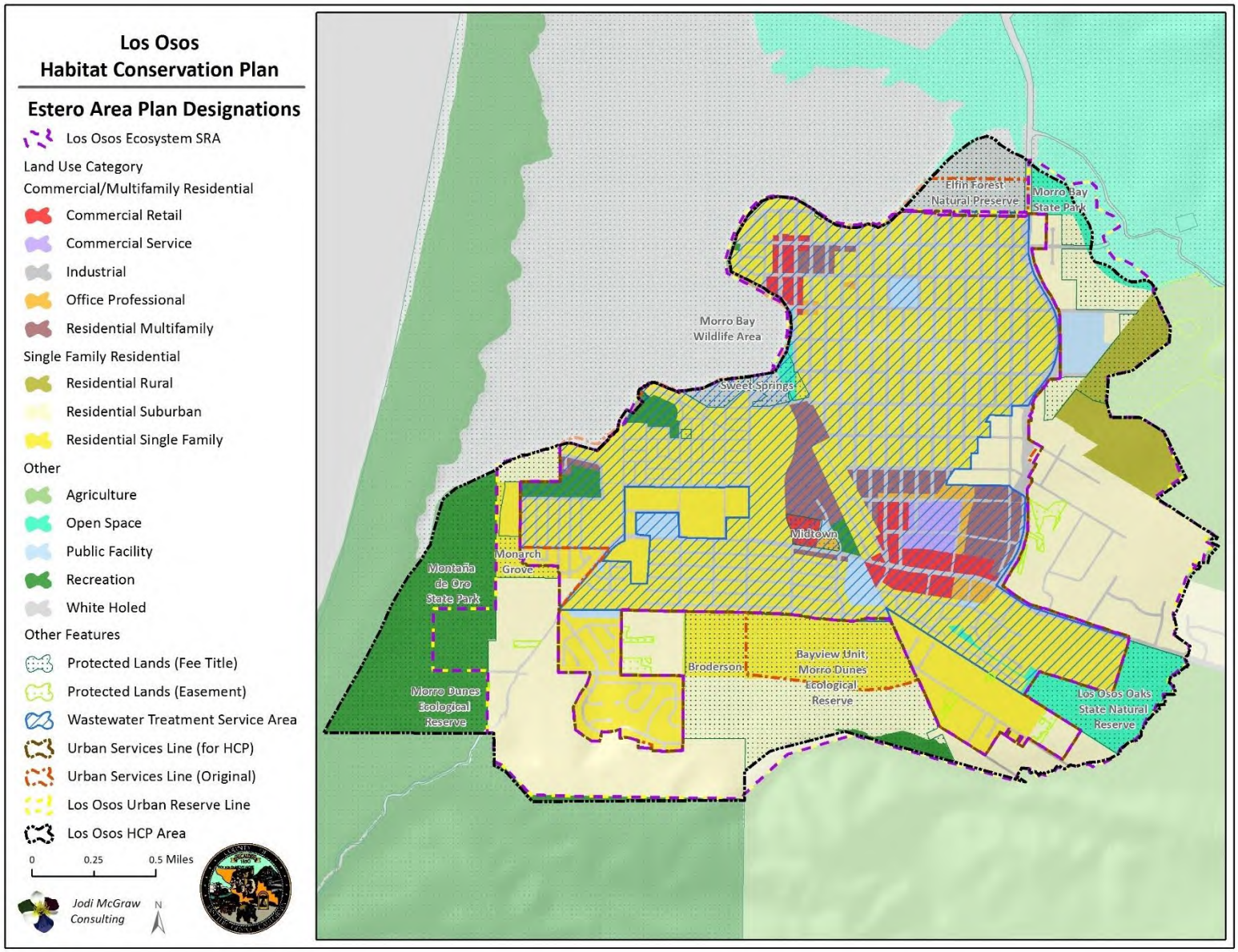

Figure 2-2: Land Use

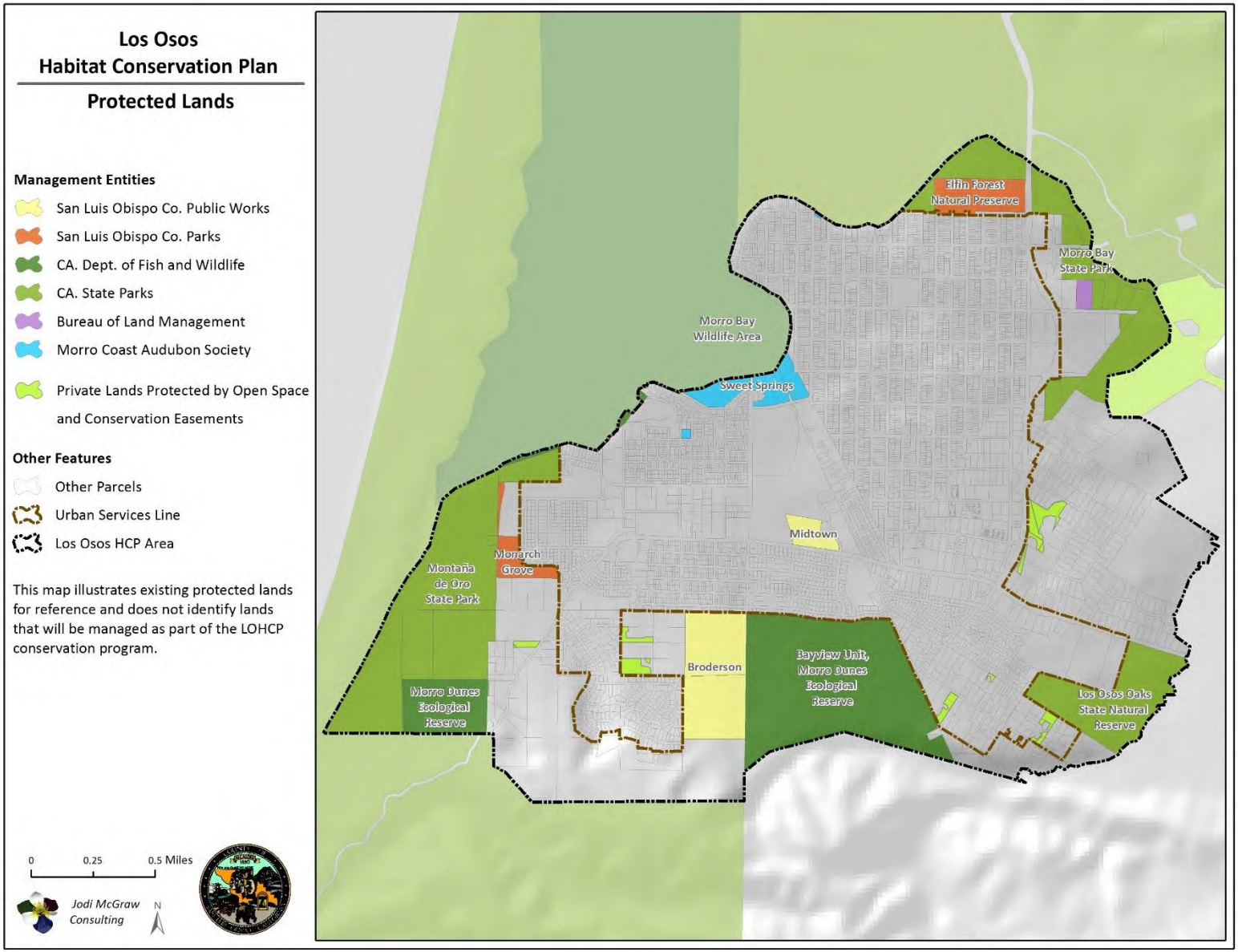

Figure 2-3: Existing Protected Lands in the Plan Area

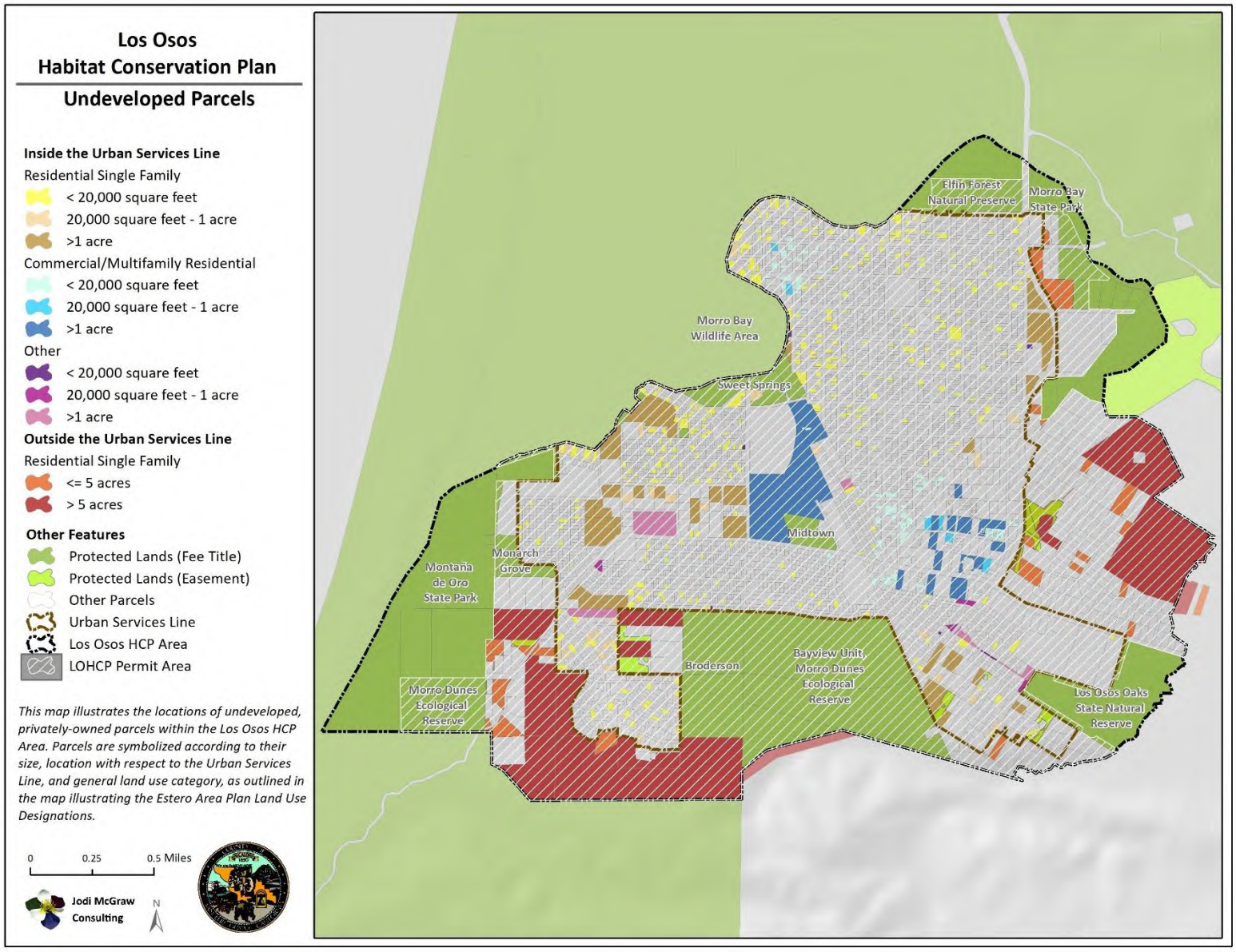

Figure 2-4: Undeveloped Parcels According to their Size and Location with Respect to the Urban Services Line

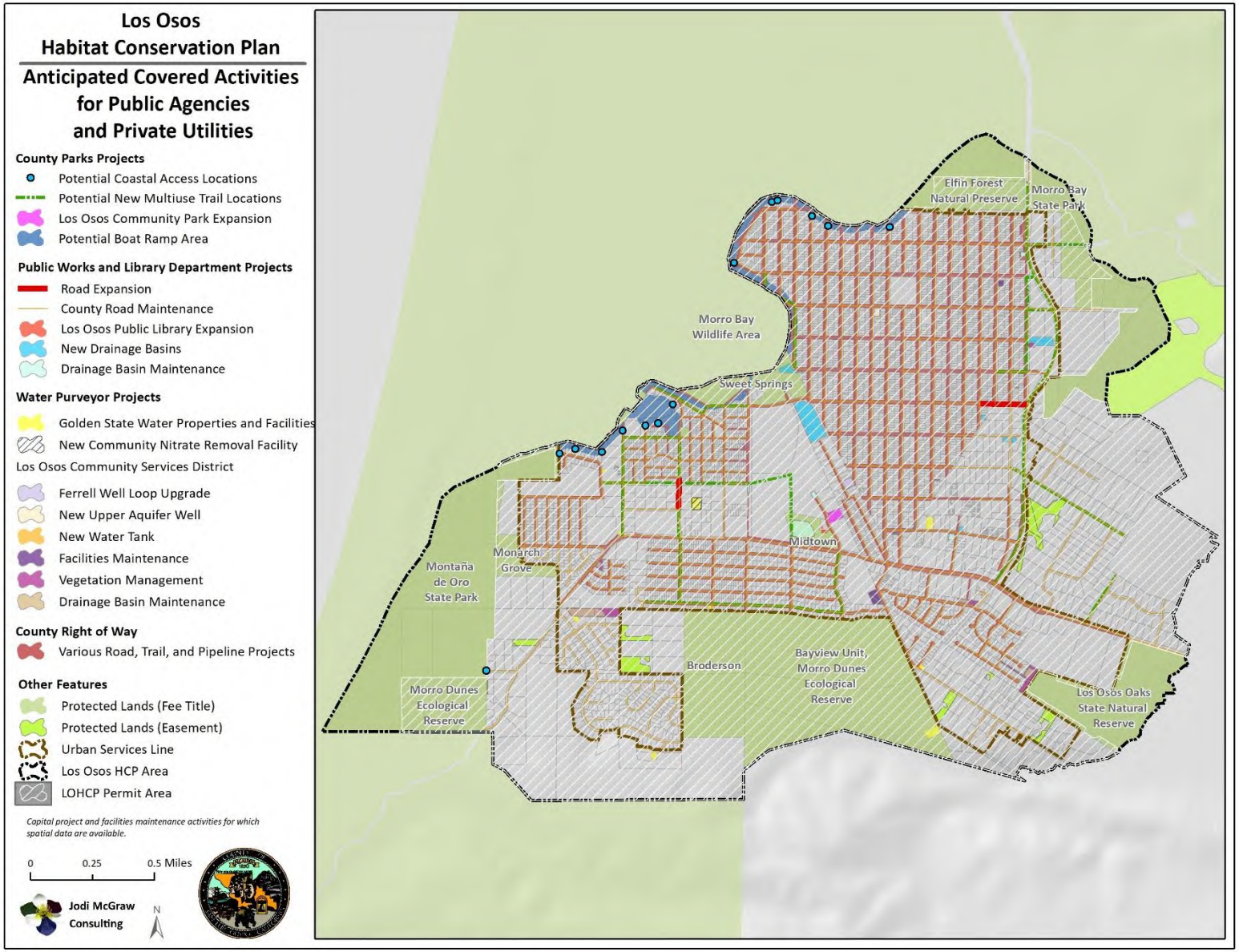

Figure 2-5: Public Agency and Private Utility Projects

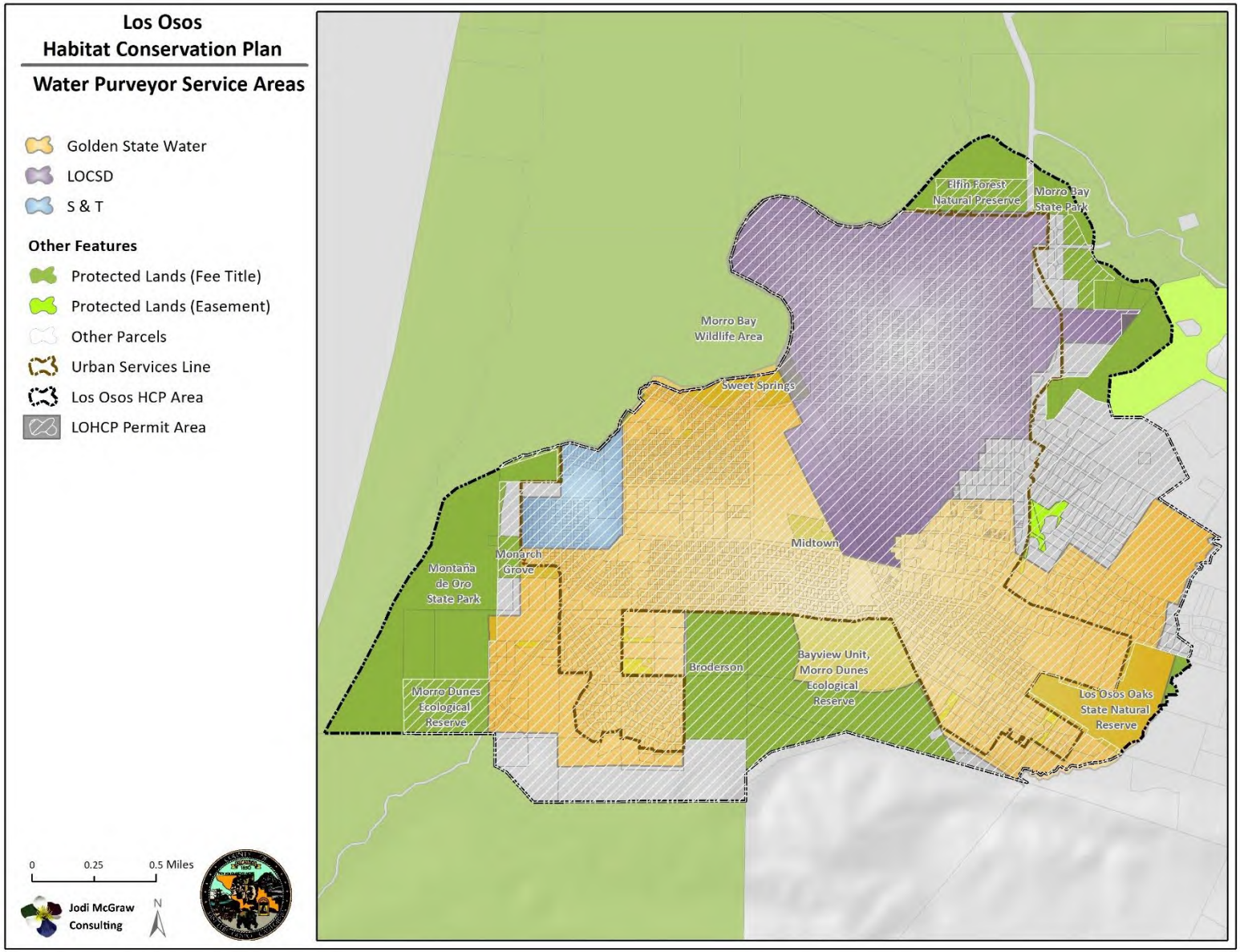

Figure 2-6: Water Purveyor Service Areas

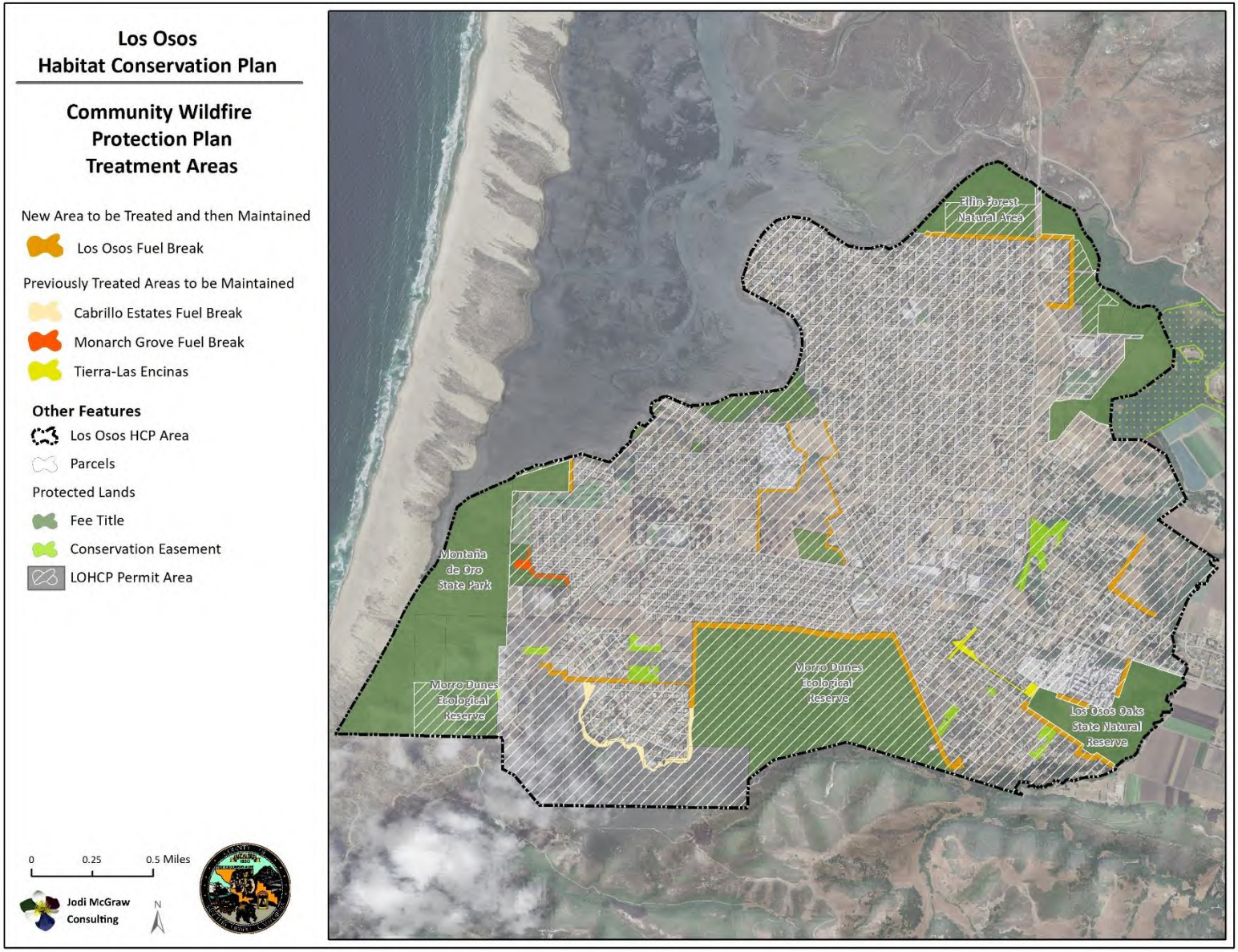

Figure 2-7: Community Wildfire Protection Plan Fire Hazard Abatement Treatment Areas

3 Environmental Setting and Biological Resources

The Los Osos HCP Area features a unique combination of soils and climate that give rise to a suite of endemic communities within the Baywood fine sands ecosystem (Section 3.1). The ecosystem and broader region support numerous rare species, including several narrowly endemic species (Section 3.2.1). These communities and species have the potential to be negatively impacted by the covered activities (Section 2.2). To identify the species to be covered by the LOHCP, 140 species (70 plants and 70 animals) occurring within the region were evaluated according to their range, status, potential impacts, and available information (Section 3.2.1). This analysis resulted in the identification of four covered species: two animals (Morro shoulderband snail and Morro Bay kangaroo rat) and two plants (Morro manzanita and Indian Knob mountainbalm) for which the incidental take permit issued based on the LOHCP will authorize take, at least for some covered activities (Section 3.2.2). These species will also be the subject of the LOHCP conservation program, while will avoid, minimize, and mitigate the impacts of the covered activities on the covered species (Chapter 5).

3.1 Environmental Setting

Centered on the Los Osos community in coastal San Luis Obispo County, the 3,644-acre Los Osos HCP Area (Plan Area) is bounded on the west and north by Morro Bay, on the northeast and east by Los Osos Creek, and on the south by Montaña de Oro State Park (Figure 1-1).

Despite its small size, the Plan Area features a diverse and unique flora and fauna due to two main factors:

- **Biogeography:** Los Osos is located near the center of the California Floristic Province, which has been identified as one of the world's global biodiversity hotspots owing to the richness of its flora (Myers et al. 2000). Located in the center along the Pacific Coast, the area is a mixing zone for species with northern and southern ranges.
- **Unique Soil Conditions:** The Plan Area is located on an ancient dune complex that has given rise to sandy soils of varying degrees of development, and thus fertility. The sandy soils combine with the maritime climate to create a mosaic of conditions that support unique assemblages of plants and animals, include several narrowly endemic species that occur in this region and nowhere else (JSA 1997).

This section describes the Plan Area, with an emphasis on the factors that influence the species and the communities, or habitats, in which they occur. It was developed based on the best available scientific and technical information including:

- Field surveys conducted for the LOHCP and other local projects;
- Prior conservation plans (JSA 1997);
- Environmental review documents (i.e., EIRs/EISs and EAs, previously approved parcel specific HCPs for properties in the LOHCP Area);
- The California Department of Fish and Wildlife's Natural Diversity Database (CNDDB 2016);
- US Fish and Wildlife Service's (USFWS) Critical Habitat Designations and Recovery Plans;
- California Native Plant Society's (CNPS) inventory of rare plants (CNPS 2016); and,

- Information from local biological reports and experts.

3.1.1 Climate

Los Osos features a Mediterranean climate characterized by relatively warm, dry summers and cool, wet winters. Due to its proximity to the coast, Los Osos experiences moderate temperatures; mean high temperatures in July are just 66 ◦F while mean low temperatures in January are 41◦F (PRISM 2011). Dense morning fog is frequent during the summer and helps moderate temperatures and reduce plant desiccation stress. Los Osos receives an average of 18 inches of precipitation, which occurs as rain that falls primarily between November and March. There is a slight precipitation gradient within the LOHCP Area, with the coast receiving an average of 17 inches of rainfall and the higher elevation areas further inland receiving 19 inches (PRISM 2011).

Interannual variability in weather, particularly precipitation, is high and can have important implications for biological systems. Over the 53-year period of record for which daily rainfall was measured at the Morro Bay Fire Station Coop weather station north of the Plan Area (WRCC 2013), mean rainfall was 16.6 inches; the standard deviation of the mean was 7.7, reflecting the high variability. In 21 of the years, precipitation was less than 75% of normal, and there were four periods of two or more years of such low rainfall, which constitute a drought: 1960 - 1961, 1984 - 1985, 1989 - 1990, and 2007 - 2009. Given the low water-holding capacity of the Baywood fine sand soil, drought can have important implications for plant and animal populations and habitat conditions (Section 6.5.6).

3.1.2 Topography and Geology

The LOHCP Area occurs on a broad coastal terrace that is deeply buried by ancient sand dunes. Topography is flat to gently sloping throughout much of the Plan Area, with steep terrain limited to the south where the ancient dunes abut the Irish Hills—a portion of the Coast Range Mountains (Figure 3-1). Elevations within the Plan Area range from just above mean sea level adjacent to the Morro Estuary, to 275 feet above mean sea level at the base of the Irish Hills.

Los Osos is within a seismically active region that includes several active earthquake faults including the Los Osos fault zone, which cuts through the Los Osos Valley area in an east-west fashion. The Plan Area is underlain primarily by Jurassic-age to Cretaceous-age (approximately 120 to 180 million years old) rocks of the Franciscan complex: a mixture of igneous, metamorphic, and sedimentary rocks. This complex is overlain by Cretaceous-age (65 to 140 million years old) and Tertiary-age (2 to 65 million years old) sedimentary rocks, including an unnamed Cretaceous sandstone, and the Lospe, Vaqueros, Rincon, Monterey, and Pismo formations. These formations are, in turn, overlain by a late Pleistocene and Holocene Dune Complex and Lower Pleistocene sediments of the Paso Robles Formation. The upper Paso Robles beds can be distinguished from the dune sands by their higher proportion of clay and silt particles (Chipping 1987).

3.1.3 Soils

The unique geology and climate have combined with other factors including slope, microclimate, and vegetation, to result in the development of seven classified and mapped soil types within the region (USDA 1984, Figure 3-2). The Plan Area itself, however, predominantly features Baywood fine sand soil; with other types occurring on less than 3% of the Plan Area along its perimeter. The relatively coarse

texture of the predominantly sand soils in the Plan Area contrasts with the mix of sandy loam, and clay soils developed on a mix of parent material further inland (Figure 3-2).

Covering 3,550 acres (98%) of the LOHCP Area, the Baywood soil is a deep, somewhat excessively drained fine sand that is derived from the aeolian sand deposits (i.e., dunes; USDA 1984). The surface layer of Baywood soils is slightly acidic, with soils having medium acidic or strongly acidic with increasing depth. Within the Plan Area, Baywood soils primarily occur on slopes between nine and 15 percent (3,225 acres or 89%); 256 acres (7%) in the southwestern portion of the Plan Area are on 15 to 30 percent slopes, and the remaining 69 acres (2%) in the northeast portion of the Plan Area are on slopes of just 2 to 9% (Figure 3-2; USDA 1984).

The Baywood soils vary in their degree of development, which increases with the age of the ancient dunes from which they are derived. Soils on the older and middle-aged dunes farther inland and at higher elevation are more developed than soils closer to the coast (JSA 1997). Soil formation processes have led to a gradient of soil development; these processes include accumulation of organic matter, clay synthesis, clay migration to lower profile position, and iron mineral transformation (JSA 1997). Generally speaking, soil development results in greater organic matter and smaller soil particles (i.e., finer texture). These factors increase soil water-holding capacity and nutrient availability: two properties have important implications for plant growth and thus influence the vegetation and other habitat conditions within the Plan Area (Section 3.1.5).

Located on the perimeter of the LOHCP Area, the other soil types feature characteristics that reflect their occurrence within or near the wetlands and along Los Osos Creek, as well as the different parent material (e.g., sandstone and siltstone) found adjacent to the ancient dunes. When compared with the Baywood fine sand, the other soils have finer texture and are more developed.

- **Santa Lucia shaly clay loam** occurs on 44 acres (1.2%) of the Plan Area on a steep (30-75%) slope in the headwaters of Los Osos Creek;
- **Concepcion fine sandy loam** and **Corralitos loamy sand** occur on 12 acres (0.3%) and two acres (<0.1%), respectively, on the eastern portion of the Plan Area where they support coast live oak woodland;
- **Salinas silty clay loam** occurs on 12 acres (0.3%) along Los Osos Creek in the southeastern portion of the Plan Area;
- **Marimel silty clay loam** occurs on seven acres (0.2%) in the eastern portion of the Plan Area along Los Osos Creek;
- **Dunes** occur on 3.2 acres (0.1%) on the western portion of the Plan Area; and
- **Aquolls saline soils** cover 0.9 acres (<0.1%) of the Plan Area and primarily support wetlands located on the northern portion of the LOHCP Area.

3.1.4 Hydrology

3.1.4.1 Streams, Rivers, Drainages

The LOHCP Area is within the Los Osos Creek Watershed: an approximately 28-square-mile area east and southeast of Morro Bay. Los Osos Creek is one of streams that drain to Morro Bay, the other being the Chorro Creek Watershed to the north (Figure 3-1).

Los Osos Creek is a perennial stream, though it features numerous dry reaches during the summer. It has an unconsolidated streambed substrate composed of sand, gravel, and silt. Los Osos Creek features two named tributaries: Eto Creek and Warden Creek.

The mainstem of Los Osos Creek flows through the Clark Valley, a narrow valley at the base of the Irish Hills. There, the stream's upper reaches have been extensively channeled and diked as part of agricultural activity. After Clark Valley, Los Osos Creek flows along a 2.5-mile portion of the eastern perimeter of the LOHCP Area to its confluence Eto Creek—an approximately one-mile-long tributary that flows from Los Osos Valley Road just east of South Bay Boulevard northeasterly to Eto Lake, a small lake formed at the confluence with Los Osos Creek. From there, the stream flows another 1.5 miles along the perimeter of the LOHCP Area to the confluence with Warden Creek located 0.75 miles upstream of Morro Bay (Figure 3-2).

Located outside of the Plan Area, Warden Creek drains the western portion of Los Osos Valley. The creek flows through an area known as Warden Lake and then northwesterly along the edge of the valley until it joins Los Osos Creek just above the abandoned crossing of Santa Ysabel Avenue. Like Los Osos Creek, Warden Creek's hydrology has been altered as part of agricultural activities in the valley.

Los Osos Creek has an approximately 0.75-mile-long estuary that extends from its confluence with Warden Creek until it enters Morro Bay. The estuary is bordered on the northwest by the delta and tributary system of Chorro Creek, which along with Los Osos Creek provides most of the fresh water that flows to Morro Bay.

3.1.4.2 Lakes and Ponds

The Plan Area includes three mapped ponds: a 0.8-acre pond in the upper headwaters of Eto Creek, a 4.5-acre pond on Eto Creek just upstream of its confluence with Los Osos Creek, and a freshwater pond in the Sweet Springs Preserve (Figure 3-2). No other mapped ponds or lakes occur in the LOHCP Area, though small, unmapped, created ponds may be on some private parcels.

3.1.5 Vegetation

The soils and climate within the LOHCP Area create a unique ecosystem that is found only within Los Osos. As in other areas of Central Coastal California that feature soils derived from ancient dune systems, including Fort Ord to the north (Monterey County) and Burton Mesa to the south (Santa Barbara County), the Baywood fine sand soil in Los Osos combines with the maritime climate to create unique conditions for plants and animals. These unique environmental conditions support a mosaic of native plant communities (vegetation), including one endemic type: Morro manzanita chaparral, a form of central maritime chaparral that is dominated by the endemic Morro manzanita (*Arctostaphylos morroensis*). This and the other communities that occur on Baywood fine sand support three additional endemic species adapted to the ecosystem: Morro shoulderband snail (*Helminthoglypta walkeriana*), Morro kangaroo rat (*Dipodomys heermanni morroensis*), and splitting yarn lichen (*Sulcaria isidifera*). They also support rich assemblages of more widespread plants and animals, including species with northern and southern ranges that overlap in central coastal California.

3.1.5.1 Overview

The LOHCP Area features assemblages of plants adapted to the relatively low-nutrient, well-drained soil Baywood fine sand soil (Section 3.1.3). Within the LOHCP Area, the distributions of plant species and communities reflect several factors including:

- **Soil development**, which is correlated with dune age, with inland areas having more fertile soils derived from older dunes than areas closer to the coast, which feature less-developed soils on younger dunes;
- **Microclimate**, which can result from variation in topography (e.g., cooler north-facing slopes) and also subtle temperature, precipitation, and fog gradients that occur with distance from the coast;
- **Hydrology**, including streams, lakes, and seasonally inundated areas including Morro Bay and Los Osos Creek;
- **Natural disturbances such as fire and erosion,** which remove established vegetation and initiate a process of succession (i.e., changes in plant community composition over time); and
- **Historic land use,** including agriculture, grazing, land clearing, and other human activities such as recreational use, which remove or alter native vegetation.

These and other factors interact in complex ways to create a mosaic of plant assemblages (or communities) within the LOHCP Area, which have been classified and mapped (JSA 1997).

Plant community conditions vary in terms of the cover of exotic plants, which are species that do not naturally occur within the communities; instead, these species were planted, accidentally introduced to the area, or spread from other areas where they were introduced. As outlined below and described in greater detail in Section D.1, several exotic plant species including primarily trees, grasses, and ice plants, have become abundant and have degraded habitat for native plants and animals in the LOHCP Area. The distribution and abundance of many exotic plants has been facilitated by natural disturbance and historic land uses.

Much of the LOHCP Area has been modified by human land use. Vegetation can reestablish after disturbances including agriculture, grazing, and other clearing, through natural succession or regeneration. Many native plants are adapted to natural disturbances and recolonize cleared areas from seed or vegetative materials (e.g., roots, rhizomes, and tubers). For example, cultivated land on the south end of the Plan Area in 1949 returned to coastal sage scrub and Morro manzanita chaparral by 1987. Following dry crop bean cultivation in the 1980s on another site, known as Powell II, dune lupine (*Lupinus chamissonis*), California croton (*Croton californicus*), and other native herbaceous plants became established and created a sparse, coastal sage scrub habitat. Following subsequent bean production on the property in 1997, coastal sage scrub vegetation again re-established within five years. The property has since been permanently protected.

3.1.5.2 Vegetation and Other Land Cover

As a result of the diverse microsite conditions, the 3,644-acre LOHCP Area supports a fine-scale mosaic of plant communities (or vegetation) and other land cover types (Table 3-1, Figure 3-3). An estimated 1,894 acres (52%) supports native and exotic vegetation that can be classified into six main types based

primarily on structure: coastal sage scrub (866 acres or 24%), central maritime chaparral (503 acres or 14%), woodland (367 acres or 10%), grassland (39 acres or 1.1%), wetlands (43 acres or 1.2%), and riparian (77 acres or 2.1%). These general types were further divided into 20 communities that differ in plant species composition due to variability in soil conditions, time since disturbance, microclimate, and other factors (Table 3-1, Figure 3-4, CMCA 2004). The remaining 1,750 acres (48%) of the Plan Area features other land cover, including primarily development, but also agricultural land (Table 3-1).

The following sections describe each general vegetation and land cover type, according to factors influencing its distribution, the dominant species, and important habitat conditions, including prevalence of exotic plants. Distinctions between the subtypes within each general category are also outlined.

3.1.5.2.1 Coastal Sage Scrub

Approximately 866 acres (24%) of the LOHCP Area features coastal sage scrub: a shrubland dominated by short to medium height, soft-woody shrubs. When compared to the shrubs dominating central maritime chaparral, the other shrubland in the LOHCP Area, coastal sage scrub features shrubs that are shorter-statured, less woody, and form a discontinuous canopy.

Coastal sage scrub occurs primarily on relatively flat terraces adjacent to the Pacific Ocean. Within the LOHCP Area, coastal sage scrub dominates the middle-aged dunes; it also occurs as a mosaic with central maritime chaparral and woodlands found on the older dunes.

Coastal sage scrub is dominated by several shrubs including California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), California goldenbush (*Ericameria ericoides*), silver lupine (*Lupinus albifrons*), dune (or sand) almond (*Prunus fasciculata* var. *punctata)*, dune lupine (*Lupinus chamissonis*), deer weed (*Acmispon glaber*), and black sage (*Salvia mellifera*). Herbaceous plants occur between shrubs, with common species including California croton (*Croton californicus*), wedgeleaf horkelia (*Horkelia cuneata*), rush rose (*Crocanthemum scoparium*), and common sandaster (*Corethrogyne filaginifolia*).

In the Los Osos region, many areas of coastal sage scrub have been highly modified by prior land use, including agriculture and grazing. These activities remove shrub cover and facilitate the invasion and spread of exotic plant species such as perennial veldt grass (*Ehrharta calycina*), freeway iceplant (*Carpobrotus edulis*), narrow leaved ice plant (*Conicosia pugioniformis*), wild oats (*Avena* spp.), rip-gut brome (*Bromus diandrus*), and red brome (*Bromus madritensis* ssp. *rubens*).

Within the LOHCP Area, four coastal sage scrub community types have been mapped; they are distinguished by their dominant shrubs and level of invasion by exotic plants (Table 3-1, Figure 3-4, CMAC 2004).

California Sagebrush – Black Sage: An estimated 482 acres, or 13% of the LOHCP Area, supports this community, which features a 2- to 5-foot-tall, continuous or intermittent canopy of California sagebrush and black sage with California buckwheat (*Eriogonum fasciculatum*), deer weed, and white sage (*Salvia apiana*) often present.

California Sagebrush – Black Sage Disturbed: Located on 373 acres in areas that have been relatively recently graded or cleared, including fallowed agricultural fields, this community consists of a relatively low cover of California sagebrush and black sage that are 1 to 4 feet tall. Herbaceous exotic plants are widespread and patchily abundant in these areas.

California Sagebrush – Black Sage Heavily Disturbed: An estimated 11 acres (0.3%) of the LOHCP Area supports small patches of California Sagebrush-Black Sage that have been heavily or more recently disturbed. These areas feature a relatively low abundance of native shrubs and high cover of veldt grass and other exotic plants.

Coyote Brush: Found on just 0.7 acres (<0.1%), this community features a continuous or intermittent shrub canopy dominated by coyote brush that is 3 to 6 feet tall. California sagebrush, California buckwheat, poison oak, and black sage may also be present. It occurs as small patches within disturbed portions of the LOHCP Area.

3.1.5.2.2 Central Maritime Chaparral

Central maritime chaparral occurs on approximately 503 acres (14 %) of the LOHCP Area. It is dominated by sclerophyllous (hard-leaved) shrubs and features scattered trees. Due to the low light and deep leaf litter in the understory, herbaceous plant cover is primarily limited to gaps in the shrub canopy.

Central maritime chaparral occurs in coastal areas of central California that are within reach of the summer fog. Within the LOHCP Area, central maritime chaparral occurs primarily on the older dunes (i.e., farther inland), on the southern hillsides and on the north-facing slopes of the marine terraces just south of Los Osos Creek in the southern portion of the Plan Area (Figure 3-3).

In the LOHCP Area, central maritime chaparral is dominated by Morro manzanita: a species endemic to Los Osos ecosystem. Other common species include chamise (*Adenostoma fasciculatum*) coast live oak, wedge-leaf ceanothus (*Ceanothus cuneatus*), and sticky monkeyflower (*Diplacus aurantiacus*). Canopy gaps support a variety of subshrubs including California goldenbush and deer weed, as well as herbs such as wedgeleaf horkelia, seacliff buckwheat (*Eriogonum parvifolium*), California croton, and golden yarrow (*Eriophyllum confertiflorum*).

Central maritime chaparral forms a mosaic with coastal sage scrub and woodland communities. Though it occurs primarily on the Baywood fine sand, which dominate the Plan Area (Section 3.1.3), central maritime chaparral is also supported by the Santa Lucia shaly clay loam. When compared with the coastal sage scrub, central maritime chaparral occurs on the steeper slopes and predominates the portions of the Plan Area that feature slopes that exceed 30%. This may reflect the dominant shrubs' requirements for more developed soils that occur on the older dunes farther inland. Alternatively, it may result because the gentler slopes (2-9%) have been more recently cleared (Tyler and Odion 1996).

Central maritime chaparral is a fire-adapted community. Though precise aspects of the fire regime are unknown, long fire-free periods (i.e., 100 years) are thought to be necessary for the dominant Morro manzanita to accumulate a sufficient seed bank to regenerate (Odion and Tyler 2002; Section B.2).

Based on their variability in dominant species, four types of central maritime chaparral have been mapped within the LOHCP Area (Table 3-1, Figure 3-4).

Morro Manzanita: Found on 321 acres (9% of the Plan Area), the Morro manzanita community is characterized by dense cover of Morro manzanita, with coast live oak, wedgeleaf ceanothus, sticky monkey flower, and black sage also present in a canopy, which is 4-12 feet tall. It occurs primarily on the older dunes and on steeper slopes in the southern portion of the Plan Area (Figure 3-4).

Morro Manzanita - Wedgeleaf Ceanothus: This community occurs on 113 acres (3.1% of the Plan Area) and features Morro manzanita and wedgeleaf ceanothus as co-dominant species creating a dense shrub canopy that is 3 to 6 feet tall. California sagebrush, black sage, and sticky monkey flower may be present in this community, which appears transitional between coastal sage scrub and Morro Manzanita in the southern portion of the Plan Area.

Morro Manzanita - California Sagebrush: This community consists of Morro manzanita and California sagebrush as co-dominant species creating a sparse canopy that is approximately 3 to 6 feet tall. California buckwheat (*Eriogonum fasciculatum*), deer weed, wedgeleaf ceanothus, sticky monkeyflower, and black sage may also be present. It occurs on 38 acres (1% of the Plan Area) at the transition between middle-aged dunes and older dunes and in areas that have been cleared relatively recently.

Wedgeleaf Ceanothus - California Sagebrush: This community features a dense, 3- to-6-foot-tall canopy of wedgeleaf ceanothus and California sagebrush, with black sage and sticky monkey flower often present. It occurs in one, 31-acre patch in the northern portion of the Plan Area.

3.1.5.2.3 Woodland

Approximately 367 acres (10%) of the Plan Area supports woodlands: upland communities characterized by a largely continuous canopy of trees, with a variable understory featuring primarily shade-tolerant herbs, vines, and shrubs.

Within the LOHCP Area, there are two native woodlands, coast live oak and bishop pine (*Pinus muricata*) woodland, as well as stands of the exotic eucalyptus (*Eucalyptus* spp.). The native woodlands occur primarily on the older dunes on the perimeter of the Plan Area, presumably reflecting their requirement for the higher nutrient availability and water-holding capacity of the more developed soils found there (Figure 3-4). The exotic eucalyptus woodland occurs patchily throughout the Plan Area, reflecting its establishment through deliberate plantings (e.g., as wind rows), from which the species subsequently spread into adjacent areas.

Coast Live Oak: Approximately 291 acres (8%) of the LOHCP Area features an intermittent or continuous canopy dominated by coast live oak, which typically range from 20 to 45 feet in height. The understory can feature Morro manzanita, wedgeleaf ceanothus, coffee berry, poison oak, and herbaceous species dominated by exotic annual grasses.

Within the LOHCP Area, coast live oak woodlands occur as two distinct phases. The area south of Morro Bay and west of Los Osos Creek support stunted, wind-pruned coast live oaks featuring with multiple trunks. These 'pygmy oaks' are well-represented within the Elfin Forest Natural Preserve and the Los Osos Oaks State Reserve. North-facing slopes and canyons, particularly those featuring sandstone or shale-derived soils, support more typical coast live oak woodlands.

Bishop Pine: The LOHCP Area features two stands of bishop pine mapped as occurring on 3.4 acres (0.1% of the Plan Area). This community features a continuous tree canopy of bishop pine 20 to 35 feet in height, and a shrub understory. Located on soils derived from older dunes in the southern portion of the Plan Area, the bishop pine woodland occurs as pockets within Morro manzanita chaparral. Recent examination of the stands indicates that they occupy a much smaller area (~0.5 acres total) and feature just a few living trees (< 10 trees), with several snags (dead standing trees; McGraw 2020). More widespread in the Irish Hills, the isolated stands of bishop pine, which are visible in aerial photographs from 1949, may be restricted by unique soil conditions or lack of fire; like other closed-cone conifers, bishop pine establishes primarily following fire, which releases seeds from their serotinous cones and creates an open canopy and bare-mineral soil conditions that facilitate seedling establishment.

Eucalyptus: The LOHCP Area features numerous, scattered patches of eucalyptus woodland, which total 72 acres (2% of the Plan Area). These non-native woodlands feature a continuous canopy of 20 to 75-foot-tall eucalyptus (*Eucalyptus* spp.), including primarily blue gum (*E. globulus*), with a sparse understory of shrubs and herbs. Eucalyptus create dense canopy and litter (barks and leaves) that often prevent native plant species from growing in the understory. Eucalyptus woodlands in the LOHCP Area provide overwintering habitat for Monarch butterflies (*Danaus plexippus*), a California Special Resource. They are also often used by raptors for nesting and wintering habitat.

3.1.5.2.4 Grassland

Approximately 39 acres (1.1%) of the Plan Area supports grasslands—communities that lack appreciable shrub or tree cover and instead are dominated by herbaceous plants, including primarily grasses but also other graminoids (grass-like plants) such as sedges and rushes, as well as forbs (broad-leaf herbs).

Within the LOHCP Area, grasslands occur primarily in areas where shrublands (coastal sage scrub or central maritime chaparral) and woodlands have been cleared for use in agriculture, grazing, or development. As a result, the grasslands occur primarily as small patches scattered throughout the LOHCP Area (Figure 3-3), and are dominated by exotic species including common velvet grass (*Holcus lanatus*), slender wild oats (*Avena barbata*), common wild oats (*Avena fatua*), rip-gut brome, soft chess (*Bromus hordeaceus*), red brome, Italian ryegrass (*Festuca perennis*), foxtail barley (*Hordeum murinum*), and rat-tail fescue (*Festuca myuros*). Though dominated by exotic plant species, grasslands can provide foraging habitat for raptors. In addition, in the absence of ongoing disturbance (i.e., grazing, cultivation, mowing, etc.), native shrubs and trees can re-establish in these areas, converting them to shrublands and woodlands over time.

Two grassland communities have been mapped within the LOHCP Area, based on their differences in plant species composition (Table 3-1, Figure 3-4, CMCA 2004).

California Annual Grassland*:* Approximately 4 acres (0.1%) of the LOHCP Area supports a mix of native and exotic annual grasses and herbs, including purple needle-grass (*Stipa pulchra*) and wildflowers such as California buttercup (*Ranunculus californicus*), blue-eyed grass (*Sisyrinchium bellum*), blue dicks (*Dichelostemma capitatum*), owl's clover (*Castilleja* spp.), larkspur (*Delphinium* spp.), and annual lupine (*Lupinus* spp.).

Non-Native Grassland: Approximately 35 acres (1%) of the LOHCP Area supports annual grasses and herbs dominated by introduced species and genera such as veldt grass, bromes, wild oats, ryegrass, and Harding grass (*Phalaris aquatica*). Shrubs are absent or occur only very sparsely.

3.1.5.2.5 Wetlands

The LOHCP Area includes 43 acres (1.2%) of vegetation growing in permanently or seasonally saturated soils. This wetland vegetation occurs almost exclusively on the northern perimeter of the Plan Area on Morro Bay and the Los Osos Creek estuary (Figure 3-3). These communities are an important link between the upland ecosystem and the Morro Bay estuary.

Three types of wetlands have been mapped within the LOHCP Plan Area (Table 3-1, Figure 3-4).

Cattail: Approximately 0.2 acres (<0.1%) of the Plan Area supports a continuous, intermittent, or open, 4- to 8-foot-tall community dominated by common cattail (*Typha latifolia*). Associated with permanently or seasonally flooded fresh and brackish water wetlands near the Los Osos Creek estuary, the cattail wetland community contains bulrush (*Schoenoplectus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), mugwort (*Artemisia douglasiana*) and arroyo willow (*Salix lasiolepis*).

Pickleweed: Approximately 1.3 acres (<0.1%) of the LOHCP Area features a continuous or intermittent canopy dominated by 0.5-to-1-foot-tall pickleweed (*Salicornia* spp.). This community occurs in areas permanently or seasonally flooded by saltwater or brackish water along the Los Osos Creek estuary. Associated species include common brass buttons (*Cotula coronopifolia*), marsh jaumea (*Jaumea carnosa*), and saltgrass (*Distichlis spicata*).

Disturbed Wetlands: The LOHCP Area features 41.7 acres (1.1%) of wetlands that have been degraded by human activities. Most occur along Morro Bay near Cuesta-by-the-Sea, where salt and alkali marsh have been impacted by the invasion of exotic species including fig marigold and eucalyptus. A small patch of degraded freshwater wetland occurs south of the intersection of South Bay Boulevard and Los Osos Valley Road (Figure 3-4). This may contain a mixture of riparian and wetland plants including arroyo willow, cattail, rushes, and sedges.

3.1.5.2.6 Riparian

The LOHCP Area includes 77 acres (2.1%) of vegetation associated with waterways, particularly Los Osos and Eto creeks. This riparian vegetation also includes small areas that support arroyo willow along Morro Bay near Cuesta-by-the-Sea.

Riparian vegetation stabilizes stream banks, traps sediment before it reaches the stream, moderates stream temperature, and provides nesting, feeding, and cover habitat for a number of birds, mammals, and other species. Riparian areas also provide corridors that facilitate animal movement through otherwise fragmented landscapes.

Three types of riparian vegetation occur in the LOHCP Area (Table 3-1, Figure 3-4).

Arroyo Willow: Approximately 12 acres (0.3%) of the LOHCP Area features a continuous canopy of arroyo willow, which occurs as a shrub or tree that is 8 to 30 feet in height. Located in seasonally-

flooded areas, including along Los Osos Creek, Eto Creek, and adjacent to Morro Bay near Cuesta-by-the-Sea, this community may also feature California sycamore (*Platanus racemosa*), black cottonwood (*Populus trichocarpa*), and coyote brush, as well as a sparse or abundant herbaceous understory layer that can include common cattail.

Arroyo Willow - Black Cottonwood: Approximately 0.8 acres (<0.1%) of the LOHCP Area features black cottonwood, a large tree (30-75 feet) that is co-dominant with arroyo willow. This community occurs in a single patch located along Los Osos Creek on the northeast corner of the LOHCP Area, within Morro Bay State Park (Figure 3-4). It features California sycamore in the overstory, with coyote brush and herbaceous species in the understory.

Coast Live Oak - Arroyo Willow: Arroyo willow and coast live oak are co-dominant within woodland comprised of 20 to 50-foot-tall trees that occurs on 62 acres (1.7%) of the LOHCP Area. Located along Los Osos and Eto creeks, where it forms a fairly continuous corridor in the eastern portion of the Plan Area, this riparian community may contain wetland plants in the understory and California bay (*Umbellularia californica*) in the stand.

Black Cottonwood: Located on less than two acres in the southeastern portion of the LOHCP Area along Los Osos Creek just downstream of Clark Valley, this community features a nearly continuous canopy of 50- to-100- foot-tall black cottonwood with an understory of shrubs. Arroyo willow is also present.

3.1.5.2.7 Other Land Cover

The following other land cover types cover a total of 234 acres (6.4%) within the LOHCP Area (Table 3-1, Figure 3-4).

Ruderal Disturbed: Approximately 50 acres (1.4%) of the Plan Area supports vegetation that has been significantly disturbed by agriculture, development, land clearing, or other human activities. This vegetation primarily supports exotic plant species that are adapted to colonizing disturbed areas, including wild mustard (*Brassica* spp.), wild radish (*Raphanus sativus*), Russian thistle (*Salsola tragus*), castor bean (*Ricinus communis*), sweet fennel (*Foeniculum vulgare*), Bermuda grass (*Cynodon dactylon*), and red stem filaree (*Erodium cicutarium*). Ruderal vegetation also contains exotic annual grasses common in the grasslands, such as wild oat, red brome, and ripgut brome; however, unlike in the grassland, native species occur at very low diversity and abundance in these areas. The only native plant species that occurs commonly within ruderal habitat is coyote brush.

Landscaped Trees Series: Approximately 131 acres (3.6%) of the Plan Area features dense canopy of native and exotic trees that were planted as for landscaping or as wind blocks. The dominant species include Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), and eucalyptus, which range from 40 to 60 feet in height.

Agriculture: Approximately 49 acres (1.3%) of the Plan Area is used for agricultural crops. Located primarily in areas of flat terrain with fertile soils, agricultural lands have been altered by tillage, irrigation, fertilization, and the use of pesticides and herbicides. Crops vary in terms of their sizes and growing patterns, creating various canopy cover.

Open Water: Covering a total of approximately 4 acres (0.1%) of the LOHCP Area, open water occurs within Eto Lake, Eto Creek, and Los Osos Creek. Eto Lake occurs at the confluence of Los Osos Creek and its tributary, Eto Creek, which is located east of the intersection of Los Osos Valley Road and South Bay Boulevard (Figure 3-1). Los Osos Creek flows from the Irish Hills northerly to Morro Bay, and features a small estuary extending from its confluence with Warden Creek (outside of the LOHCP Area), to where it flows into Morro Bay (Section 3.1.4).

3.2 Covered Species

The LOHCP Area supports diverse assemblages of plant and animal species that are adapted to the unique conditions created by the soil, climate, and vegetation. While some species inhabit a broad geographic area (e.g., the California Coast), others have a more limited geographic range (e.g., central coastal California). Among these species, some exhibit narrow habitat specificity, being found solely within communities on the Baywood sand soils. For these narrow endemic species, which are naturally rare, the loss and degradation of habitat in and around the LOHCP Area has reduced populations, rendering them vulnerable to extinction. In recognition of their peril, these species have been listed as threatened or endangered under the state and federal endangered species acts. The LOHCP is designed to conserve these listed species by protecting, restoring, and managing habitat that can also support the diverse array of native species in the LOHCP Area.

This section describes the analysis conducted to identify the species within the LOHCP Area that should be covered by the take permit issued pursuant to the state and federal endangered species acts and be the focus of the LOHCP conservation program (Chapter 5).

3.2.1 Covered Species Analysis

To determine the species to be covered by the incidental take permit issued based on the LOHCP (covered species), available distribution information for the species and communities (vegetation) within the project area was reviewed, in consideration of the anticipated impacts of the covered activities (Section 2.2).

Four primary criteria were used to evaluate species for coverage:

1. **Range:** The species is known to occur within the coastal San Luis Obispo County based on several sources including:
    - California National Diversity Database (CNDDB 2016): The database of rare species updated July 2016 was queried in GIS to identify plants and animals occurring within the USGS 7.5-minute quad centered on the LOHCP Area, Morro Bay South;
    - California Native Plant Society Rare Plant Inventory (CNPS 2016): The on-line database of rare plant occurrences was queried using the nine-quad search based on the Morro Bay South quadrangle;
    - Existing Literature: Documented occurrences in the literature including reports; and,
    - Expert information: Observations of scientists and other experts in the region, including agency representatives.

2. **Status:** The species is state- or federally- listed as threatened or endangered or is likely to become listed during the 25-year permit term. The following factors were considered to evaluate species' status:
    - Federal Endangered Species Act: listed or proposed for listing;
    - California Endangered Species Act: listed or candidates for listing;
    - Fully Protected Species: listed under California Fish and Game Code;
    - Species of Special Concern on the special animals list (CDFW 2016);
    - California Native Plant Society Rare Plan Inventory: plants that are rare, threatened or endangered in California (Lists 1B and 2); and,
    - CEQA: other species that meet the definition of rare or endangered under CEQA, including those are not listed but known to be very rare or declining.

3. **Impact:** The species will, or is likely to be, negatively affected by the LOHCP covered activities (Section 2.2). This was evaluated based primarily on whether the species is known or likely to inhabit, or utilize for a significant part of their life history (including breeding, foraging, etc.), the following vegetation or land cover types that will be impacted by the covered activities:
    - grassland;
    - coastal sage scrub;
    - central maritime chaparral;
    - woodland; and
    - other upland, including agricultural, ruderal disturbed, and landscape trees.

    Species inhabiting wetlands, riparian, and riverine communities within LOHCP Area, as well as adjacent beach and dune communities outside of the Plan Area, were not considered for coverage though were identified (Section 3.2.3) to facilitate development of appropriate measures to avoid indirect impacts (Section 5.2.2).

4. **Information:** There is sufficient information about the species life history, habitat requirements, and occurrence in the Plan Area to adequately evaluate impacts of the covered activities on the species, and to develop elements of a conservation program to mitigate these activities. Because comprehensive focal species surveys of the Plan Area have not been conducted, distribution information is limited for some species. Such information is necessary to conduct the take/impacts assessment, and to develop elements of the conservation program, including ensuring adequate representation of the populations or suitable habitat within the preserves established to mitigate the project impacts.

Table 3-2 lists the species evaluated and the criteria met by each. Appendix A summarizes key aspects of the distribution and habitat of species known to occur within the Plan Area, or for which suitable habitat is present in the Plan Area.

3.2.2 Covered Species

Take coverage is requested for Morro shoulderband snail. Additionally, impacts to three state and/or federally listed threatened or endangered species are included for which the covered activities, including implementation of the LOHCP conservation program, were deemed to potentially cause impacts. As described above, this is based on the species' listing status and documented current or historical occurrence within the upland habitats of the LOHCP Area where the covered activities will take place (Table 3-2, Appendix A).

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Threatened[14]/None
Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

Morro Bay kangaroo rat and Indian Knob mountainbalm are covered species to minimize or avoid impacts from management and restoration activities during implementation of the conservation program. Coverage for these species is only requested for impacts to suitable but unoccupied habitat, take of individuals is not requested. Take in the form of harm to individuals of these species associated with development and facilities operations and maintenance activities covered by the permit will be avoided.

Conservation, restoration, and management of the mosaic of natural communities as part of the LOHCP conservation program designed to promote recovery of the covered species will benefit many other species including several other sensitive species in the Plan Area (Table 3-2).

The covered species' distributions, life histories, and ecologies, are described in detail in species profiles that synthesize the best available scientific information and identify important gaps in information that will be addressed through implementation of the conservation program (Appendix B). This information, along with the vegetation distribution information (Section 3.1.5) and description of the covered activities (Section 2.2) is the basis for the LOHCP impact analysis (Chapter 4) and conservation strategy (Chapter 5).

The following sections provide a brief summary of the more-detailed species profiles which are provided in Appendix B.

3.2.2.1 Morro Shoulderband Snail

The Morro shoulderband snail (*Helminthoglypta walkeriana* Helminthoglyptidae), is a federally listed threatened terrestrial mollusk endemic to the area immediately north and south of Morro Bay in coastal San Luis Obispo County (Roth and Tupen 2004). When listed by the USFWS in 1994, the taxon, which was also known as the banded dune snail, was comprised of two subspecies, *H. w. walkeriana,* and *H. w. morroensis* (USFWS 1994). These taxa have since been recognized as two separate species: Morro

[14] In 2020, the USFWS proposed to reclassify Morro shoulderband snail from an endangered to a threatened species (USFWS 2020a). The downlisting occurred on February 3, 2022 (USFWS 2022).

shoulderband snail (*H. walkeriana*) and Chorro shoulderband snail (*H. morroensis*; Roth and Tupen 2004).

The current known range of Morro shoulderband snail is estimated to encompass approximately 7,700 acres (Roth and Tupen 2004). Most of the area is centered on Los Osos north of Hazard Canyon, west of Los Osos Creek, and south of Morro Bay; however, it also includes a narrow strip of coastal dunes north of Morro Bay in Morro Strand State Park (Roth and Tupen 2004, USFWS 2006). Within this geographic area, native habitat occupied by the species includes coastal dune scrub along the immediate coast, and coastal sage scrub and open central maritime chaparral communities on stabilized dunes further inland. Within these areas, Morro shoulderband snail is often found in areas featuring dense plant cover comprised of shrubs or mat-forming species (e.g., iceplant) where plant cover including branches is in contact with the ground (USFWS 1998). Individuals are typically patchily dispersed and observed in clumps of coastal sage scrub shrubs or clumps of veldt grass (SWCA 2014).

Though intact habitat includes primarily coastal sage scrub, and open central maritime chaparral, Morro shoulderband snail can also occur, sometimes in high abundance, in areas of degraded habitat, including areas invaded by dense exotic plants, such as veldt grass, fennel (*Foeniculum vulgare*), and iceplant (SWCA 2013). However, the species distribution was negatively associated with exotic eucalyptus (Walgren and Andreano 2012). Morro shoulderband snails also found in association with a variety of anthropogenically disturbed habitat areas, including areas where coastal sage scrub has been converted to non-native grassland due to vegetation clearing and mowing, areas covered by veldt grass and iceplant, landscaping and ornamental plantings, woodpiles, and other habitats within developed areas and rights-of-way (SWCA 2013, 2014, 2015, 2016, and 2017). Indeed, frequent observation of Morro shoulderband snails within a range of habitat conditions found within existing developed parcels areas as well as remaining vacant parcels indicate that the species has the potential to occur throughout the urban services line and Los Osos Wastewater Treatment Plant Area (Figure 2-2), as well as intact habitat on the perimeter of the Plan Area.

Morro shoulderband snail is also often found in litter that accumulates on the soil surface, and under piles of rock, downed wood, or other debris (SWCA 2013). These microsites provide moist, sheltered environments of reduced desiccation stress that are required by the terrestrial mollusk (Roth 1985). The species is occasionally observed in shallow (less than ½ inch) depressions within the soil (Belt 2016). Morro shoulderband snails can be attracted to and found in water puddles, where they can be drowned (SWCA 2013).

Morro shoulderband snails feed on decaying matter and fungal mycelia that grow on decaying matter and plant roots. The species is most active during periods of moist conditions, including during and after rain, as well as when there is heavy fog or morning dew. Feeding, reproduction, and growth occur primarily during the rainy season (i.e., October to April; Roth 1985). During periods of drought, Morro shoulderband snails are typically inactive, and may aestivate (Roth 1985).

Morro shoulderband snail is threated by loss of habitat due to development, and degradation of habitat as a result of exotic plants, recreational activities, and senescence of dune vegetation (USFWS 2001). When originally listed as federally-endangered in 1994, additional threats to Morro shoulderband snail included competition from non-native snails such as the European garden snail (*Helix aspersa*) and parasitism by sarcophagid flies (USFWS 1994); however, the most recent five-year review of the status of the species found no evidence for the effects of the former, and the latter threat was deemed unlikely to threaten the species' persistence (USFWS 2006).

The recommendation from the five-year review was that the species be down listed to 'threatened' (USFWS 2006) and in July 2020, the USFWS officially proposed the species for down listing (USFWS 2020a). The downlisting, which occurred on February 3, 2022 (USFWS 2022), signifies that Morro shoulderband snail is at risk of becoming endangered, rather than risk of becoming extinct.

3.2.2.2 Morro Bay Kangaroo Rat

The Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) is a small, nocturnal, fossorial rodent endemic to the Baywood fine sands ecosystem centered on the community of Los Osos in coastal San Luis Obispo County. Within its range, which was estimated at less than five square miles, habitat for the species includes compacted sandy soils with slopes of less than 15 degrees, supporting a range of vegetation types (Gambs and Holland 1988).

Optimal habitat for Morro Bay kangaroo rat appears to be early-successional stages of coastal sage scrub, which are characterized by scattered subshrubs and shrubs less than three feet tall, interspersed with herbaceous plants and bare ground. Characteristic plant species of Morro Bay kangaroo rat habitat include sandcarpet (*Cardionema ramosissimum*), wedgeleaf ceanothus, western thistle (*Cirsium occidentale*), California croton (*Croton californicus*), seacliff buckwheat, wedgeleaf horkelia, deer weed, and grasses (Roest 1973, Gambs and Holland 1988).

Morro Bay kangaroo rats are solitary, and inhabit burrow systems that they use for nesting, escape, and caching seeds, which constitute their primary food source. Predators likely include snakes, owls, bobcat (*Lynx rufus*), coyote (*Canis latrans*), domestic cat (*Felis catus*) and domestic dog (*Canis lupus*); the domestic animals enter habitat from adjacent residential areas (USFWS 2011b).

Morro Bay kangaroo rat is listed as endangered under the CESA and the ESA; the species is also fully protected under the California Fish and Game Code. Listed as federally endangered in 1970 (USFWS 1970), Morro bay kangaroo rat has not been observed in the wild since 1986 despite several surveys (Section B.4.8). The last observed occurrence was within habitat currently within the Bayview Unit of the Morro Dunes Ecological Reserve (USFWS 2011b). The species may still be present in the Plan Area below detectable levels; alternatively, it may have gone extinct (USFWS 2011b). However, observations of potential signs that may be evidence of the species (e.g., burrow entrance shaped like an upside down "U" with a runway, tail drag mark, surface seed pit cache) from 2008 to 2011 suggest that some isolated colonies may persist in pockets of suitable habitat (USFWS 2011b). The species may persist on several large, privately owned parcels featuring potentially suitable habitat, including two where the species previously occurred, where surveys could not be conducted (USFWS 2011b).

Declines in the population of this species are attributed to habitat loss, degradation, and fragmentation caused primarily by development within the Los Osos and Baywood Park communities; habitat has also been degraded and fragmented by fire exclusion, which converts early-successional coastal sage scrub habitat to later successional communities that lack the preferred food plants and perhaps other important structural components of their habitat. Declines may have also resulted from predation by domestic cats and use of rodenticides (USFWS 1999, USFWS 2011b).

3.2.2.3 Morro Manzanita

Morro manzanita (*Arctostaphylos morroensis*) is a large, evergreen shrub in the heath family (Ericaceae) that is federally listed as a threatened species (USFWS 1994). Though not state listed under CESA, Morro manzanita has a California Rare Plant Rank of 1B.1, which is used for plants that are rare, threatened, or endangered in California and elsewhere (CNPS 2016).

Morro manzanita is endemic to the Los Osos region in coastal San Luis Obispo County where it occurs primarily on Baywood fine sand soils. Based on the likely historic distribution of these soils, Morro manzanita may have covered between 2,000 and 2,700 acres (McGuire and Morey 1992). The current range of Morro manzanita is approximately 890 acres (LSA Associates 1992). Within that area, Morro manzanita covers approximately 350 acres (Tyler and Odion 1996).

Within the LOHCP Area, Morro manzanita primarily occurs within central maritime chaparral communities; it is the dominant species (i.e., in terms of canopy cover) within the Morro manzanita chaparral and co-dominates with wedgeleaf ceanothus and California sagebrush (Section 3.1.5.2.2). Morro manzanita also occurs at low abundance in the coast live oak woodland, in the understory or canopy gaps of coast live oak. Scattered Morro manzanita may also be found in other communities including within the developed areas (Section 3.1.5).

A long-lived shrub (>50-year life span), Morro manzanita is adapted to recurring fire, which is an important component of the disturbance regime within the Baywood fine sands ecosystem. Fire kills adult Morro manzanita, which lack a burl from which to resprout; however, it also promotes seed germination and establishment, and therefore regeneration (Tyler et al. 2000). Effective fire management will likely be essential to the species' long-term persistence. Too-frequent fire may decrease populations by killing adults prior to accumulation of sufficient viable seed to replace them (Odion and Tyler 2002). At the same time, fire exclusion may cause 'senescence risk.' As adult shrubs senesce and die, seed production decreases; at some point, seed availability could be reduced to a level below which seedling establishment following an eventual fire is insufficient to replace the stand (Odion and Tyler 2002).

As a narrowly endemic species, Morro manzanita persistence is also threatened by habitat loss, including land conversion; habitat degradation, including exotic plants and incompatible recreational uses, which can cause erosion, can further impact persistence (USFWS 2008). Morro manzanita may also be impacted by vegetation management, including fire hazard abatement on private lands; the Community Wildfire Protection Plan avoids removing this species; Section 5.2.4. Although individual Morro manzanita are typically trimmed rather than removed in most hazard abatement activities, as noted above, the species does not resprout from a burl when cut, and in the absence of fire, seedling establishment is very limited (Tyler et al. 1998).

3.2.2.4 Indian Knob Mountainbalm

Indian Knob mountainbalm (*Eriodictyon altissimum*) is a shrub in the borage family (Boraginaceae) that is both state and federally listed as an endangered (USFWS 1994); it is also has a California Rare Plant Rank of 1B.1, which signifies that it is rare, threatened, or endangered in California and elsewhere (CNPS 2016).

Indian Knob mountainbalm is known from just seven occurrences in western San Luis Obispo County (CNDDB 2016). Two occurrences are on Indian Knob, a rock outcrop area south of San Luis Obispo and north of Pismo Beach. Two additional occurrences represented by a total of four, disjunct stands are in Hazard Canyon within Montaña del Oro State Park south of the LOHCP Area (USFWS 2013a). Of the three occurrences within the LOHCP Area, one is located in the Broderson site and the other two are within the Bayview Unit the Morro Dunes Ecological Reserve. A census of the three sites within the LOHCP in April 2016 found 22 individual plants (Occurrence 6) and 23 individual plants (Occurrence 4) in the two occurrences within the Bayview Unit; however, no Indian Knob mountainbalm plants were observed in the Broderson Unit (Occurrence 1; USFWS 2016).

Though the populations have not been comprehensively censused throughout the species' range, they are estimated to total fewer than 600 plants, with most of those (~500) occurring within the Indian Knob occurrence approximately 13 miles east of Los Osos (USFWS 2013a).

Indian Knob mountainbalm occurs on sandy soils derived from marine sandstone at Indian Knob, and Pleistocene older and partly cemented aeolian deposits (i.e., the Baywood fine sand soils) in Los Osos. In both areas, the species occurs in a mosaic of chaparral and oak woodland vegetation. Within these communities, the species' distribution is very limited. While the microhabitat characteristics of the endangered shrub have not yet been examined, the stands are thought to be remnants of once larger occurrences that have contracted over time as a result of succession, which creates less favorable conditions for this early successional species that is promoted by fire (USFWS 2013a).

Indian Knob mountainbalm can reproduce vegetatively by establishing clones from rhizomes (Wells 1962). Individuals may survive fire by resprouting from belowground tissues. Fire may be required to stimulate seed germination and create open canopy, bare soil conditions conducive to seedling establishment and survival (USFWS 2013a).

As part of the most recent five-year review, persistence of Indian Knob mountainbalm was deemed threatened by fire exclusion, exotic plants, climate change, and demographic and environmental stochasticity (randomness; USFWS 2013a). Most land supporting Indian Knob mountainbalm, including all stands within the Los Osos region, is now protected; however, development still threatens a portion of one of the Indian Knob occurrences, which is within unprotected, private land (USFWS 2013a).

3.2.3 Additional Listed Species

The LOHCP Area contains populations of eight additional state and/or federally listed threatened, endangered, or fully protected species for which take will be avoided. These species primarily or exclusively utilize habitats where the covered activities will not occur, including wetlands and riparian areas. Impacts to these species can be avoided by the covered activities through implementation of a series of avoidance measures (Section 5.2.2).

These additional listed species will continue to be protected under ESA, CESA, and CEQA under separate permitting processes. If available information indicates that a future project proposed for coverage under the LOHCP has the potential to impact these species, the project must demonstrate compliance with the state and federal regulations for these species in order to receive a Certificate of Inclusion conferring take coverage for Morro shoulderband snail under the LOHCP (Section 6.3.1).

Appendix C provides detailed species accounts that were used to develop the avoidance measures outlined in Section 5.2.2.

Species Not Covered by the Permit	**Federal Status/State Status**
California red-legged frog (*Rana draytonii*)	Threatened/None
California Black Rail (*Laterallus jamaicensis coturniculus*)	None/Threatened
California seablite (*Suaeda californica*)	Endangered/None
Salt marsh bird's beak (*Chloropyron maritimum ssp. maritimum*)	Endangered/Endangered
Marsh sandwort (*Arenaria paludicola*)	Endangered/Endangered
South Central CA Coast Steelhead (*Oncorhynchus mykiss irideus*)	Threatened/None
White-tailed kite (*Elanus leucurus*)	None/Fully Protected
Golden Eagle (*Aquila chrysaetos*)	None[15]/Fully Protected

[15] Though not listed under ESA, golden eagles receive federal protection through the Bald and Golden Eagle Protection Act.

Table 3-1: Vegetation and other Land Cover in the Plan Area

Vegetation/Land Cover	Acres	Percent of Plan Area
COASTAL SAGE SCRUB		
California Sagebrush – Black Sage	481.6	13.2%
California Sagebrush – Black Sage Disturbed	373.0	10.2%
California Sagebrush – Black Sage Heavily Disturbed	10.8	0.3%
Coyote Brush	0.7	<0.1%
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**
CENTRAL MARITIME CHAPARRAL		
Morro Manzanita California Sagebrush	38.0	1.0%
Morro Manzanita	321.2	8.8%
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**
WOODLAND		
Bishop Pine	3.4	0.1%
Coast Live Oak	291.2	8.0%
Eucalyptus	72.0	2.0%
Subtotal: Woodland	**366.6**	**10.1%**
GRASSLAND		
California Annual Grassland	3.5	0.1%
Non-Native Grassland	35.0	1.0%
Subtotal: Grassland	**38.5**	**1.1%**
WETLAND		
Cattail	0.2	<0.1%
Pickleweed	1.3	<0.1%
Disturbed Wetlands	41.7	1.1%
Subtotal: Wetland	**43.1**	**1.2%**
RIPARIAN		
Arroyo Willow Black Cottonwood	0.8	<0.1%
Arroyo Willow	11.6	0.3%
Black Cottonwood	1.8	<0.1%
Coast Live Oak - Arroyo Willow	62.3	1.7%
Subtotal: Riparian	**76.6**	**2.1%**
OTHER LAND COVER		
Agricultural Land	48.5	1.3%
Developed	1,515.8	41.6%
Landscaped Trees	131.4	3.6%
Open Water	4.2	0.1%
Ruderal Disturbed	49.9	1.4%
Subtotal: Other Land Cover	**1,750.0**	**48.0%**
Total	**3,643.8**	**100%**

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
ANIMALS												
Invertebrates												
obscure bumble bee	*Bombus caliginosus*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
vernal pool fairy shrimp	*Branchinecta lynchi*	FT	-	-	Y	Y	N	Y	N	Y	-	
sandy beach tiger beetle	*Cicindela hirticollis gravida*	-	-	-	Y	N	N	Y	N	N	-	
globose dune beetle	*Coelus globosus*	-	-	-	Y	Y	N	Y	N	N	-	
monarch butterfly	*Danaus plexippus*	-	-	-	Y	Y	Y	Y	Y	N	-	Table A-1
Morro shoulderband snail	*Helminthoglypta walkeriana*	FT	-	-	Y	Y	Y	Y	Y	Y	C	Table A-1, App. B
California linderiella	*Linderiella occidentalis*	-	-	-	Y	N	N	Y	N	N	-	
Morro Bay blue butterfly	*Plebejus icarioides moroensis*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
Atascadero June beetle	*Polyphylla nubila*	-	-	-	Y	Y	N	N	N	N	-	
San Luis Obispo pyrg	*Pyrgulopsis taylori*	-	-	-	Y	N	N	Y	N	N	-	
mimic tryonia	*Tryonia imitator*	-	-	-	Y	N	N	Y	N	N	-	Table A-1
Fish												
tidewater goby	*Eucyclogobius newberryi*	FE	-	SSC	Y	Y	N	Y	N	Y	-	Table A-1
steelhead - SCC DPS	*Oncorhynchus mykiss irideus*	FT	-	SSC	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
Amphibians												
foothill yellow-legged frog	*Rana boylii*	-	-	SSC	Y	Y	N	Y	N	N	-	
California red-legged frog	*Rana draytonii*	FT	-	SCC	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
western spadefoot	*Spea hammondii*	-	-	SSC	Y	Y	N	Y	N	N	-	
Coast Range newt	*Taricha torosa*	-	-	SSC	Y	Y	N	Y	N	N	-	
Reptiles												
black/silvery legless lizard	*Anniella pulchra nigra/pulchra*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
western pond turtle	*Emys marmorata*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
coast horned lizard	*Phrynosoma blainvillii*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
Two-striped garter snake	*Thamnophis hammondii*	-	-	SSC	Y	Y	N	Y	N	N	-	

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
				Birds								
Cooper's hawk	*Accipiter cooperii*	-	-	WL	Y	Y	Y	Y	N	N	-	Table A-1
sharp-shinned hawk	*Accipiter striatus*	-	-	WL	Y (w)	N	N	Y	N	N	-	Table A-1
tricolored blackbird	*Agelaius tricolor*	-	SE	SSC	Y	Y	N	Y	N	N	-	
grasshopper sparrow	*Ammodramus savannarum*	-	-	SSC	Y	Y	N	Y	N	N	-	
golden eagle	*Aquila chrysaetos*	-	-	FP, WL	Y	Y	Y	Y	N*	N	AL	Table A-1, App. C
black turnstone	*Arenaria melanocephala*	-	-	-	Y	N	N	Y	N	N	-	
burrowing owl	*Athene cunicularia*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
ferruginous hawk	*Buteo regalis*	-	-	WL	Y	N	N	Y	N	N	-	
western snowy plover	*Charadrius alexandrinus nivosus*	FT	-	SSC	Y	Y	N	Y	N	Y	-	Table A-1
northern harrier	*Circus cyaneus*	-	-	SSC	Y	Y	Y	Y	N	N	-	Table A-1
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT	SE	-	Y	N	N	Y	N	Y	-	
olive sided flycatcher	*Contopus cooperi*	-	-	SSC	Y	N	N	Y	N	N	-	
white-tailed kite	*Elanus leucurus*	-	-	FP	Y	Y	N	Y	N*	N	AL	Table A-1, App. C
southwestern willow flycatcher	*Empidonax traillii* ssp. *extimus*	FE	SE	-	N	Y	N	Y	N	Y	-	
California horned lark	*Eremophila alpestris actia*	-	-	WL	Y	N	N	Y	N	N	-	
merlin	*Falco columbarius*	-	-	WL	Y (w)	Y	Y	Y	Y	N	-	Table A-1
prairie falcon	*Falco mexicanus*	-	-	WL	Y	N	Y	Y	N	N	-	Table A-1
peregrine falcon	*Falco peregrinus anatum*	DE	DE	FP	Y	Y	Y	Y	Y	Y	AL	Table A-1
black oystercatcher	*Haematopus bachmani*	-	-	-	Y	N	N	Y	N	N	-	
loggerhead shrike	*Lanius ludovicianus*	-	-	SSC	Y	Y	Y	Y	N	N	-	Table A-1
California black rail	*Laterallus jamaicensis coturniculus*	-	ST	FP	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
marbled godwit	*Limosa fedoa*	-	-	-	Y (w)	N	N	Y	N	N	-	Table A-1
long billed curlew	*Numenius americanus*	-	-	WL	Y (w)	N	N	Y	N	N	-	Table A-1
whimbrel	*Numenius phaeopus*	-	-	-	Y (w)	N	N	Y	N	N	-	Table A-1

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	-	-	SSC	Y (w)	Y	N	Y	N	N	-	Table A-1
California brown pelican	*Pelecanus occidentalis californicus*	DE	DE	FP	Y	Y	N	Y	N	N	-	Table A-1
purple martin	*Progne subis*	-	-	SSC	Y	Y	N	Y	N	N	-	
California clapper rail	*Rallus longirostris obsoletus*	FE	SE	FP	Y	Y	N	Y	N	Y	-	Table A-1
Allen's hummingbird	*Selasphorus sasin*	-	-	-	Y (b)	N	Y	Y	Y	N	-	Table A-1
yellow warbler	*Setophaga petechia*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
California spotted owl	*Strix occidentalis*	-	CT	SSC	Y	Y	Y	Y	N	N	-	Table A-1
elegant tern	*Thalasseus elegans*	-	-	WL	Y(w)	N	N	Y	N	N	-	Table A-1
California thrasher	*Toxostoma redivivum*	-	-	-	Y	N	Y	Y	Y	N	-	Table A-1
Mammals												
pallid bat	*Antrozous pallidus*	-	-	SSC	Y	Y	Y	N	N	N	-	Table A-1
Townsend's big-eared bat	*Corynorhinus townsendii*	-	CT	SSC	Y	Y	N	N	N	N	-	
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	FE	SE	FP	Y	Y	Y	Y	N*	Y	C[1]	Table A-1, App. B
southern sea otter [4]	*Enhydra lutris nereis*	FT	-	FP	Y	Y	N	Y	N	Y	-	Table A-1
western mastiff bat	*Eumops perotis californicus*	-	-	SSC	Y	Y	N	N	N	N	-	
long-eared myotis	*Myotis evotis*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
fringed myotis	*Myotis thysanodes*	-	-	-	Y	N	N	N	N	N	-	
Long-legged myotis	*Myotis volans*	-	-	-	Y	N	N	Y	N	N	-	
Yuma myotis	*Myotis yumanensis*	-	-	-	Y	Y	N	Y	N	N	-	
San Diego desert woodrat	*Neotoma lepida intermedia*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
big free-tailed bat	*Nyctinomops macrotis*	-	-	SSC	Y	Y	Y	N	Y	N	-	
harbor seal	*Phoca vitulina*	-	-	-	Y	N	N	Y	N	N	-	Table A-1
Mexican free-tailed bat	*Tadarida brasiliensis*	-	-	-	Y	N	Y	N	N	N		Table A-1
American badger	*Taxidea taxus*	-	-	SSC	Y	Y	N	N	N	N	-	Table A-1

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
VASCULAR PLANTS AND LICHENS												
Vascular Plants												
Hoover's bent grass	*Agrostis hooveri*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
Arroyo de la Cruz manzanita	*Arctostaphylos cruzensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Santa Lucia manzanita	*Arctostaphylos luciana*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Morro manzanita	*Arctostaphylos morroensis*	FT	-	1B.1	Y	Y	Y	Y	Y	Y	C	Table A-2, App. B
Santa Margarita manzanita	*Arctostaphylos pilosula*	-	-	1B.2	Y	Y	N	Y	N	N		
Oso manzanita	*Arctostaphylos osoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Pecho manzanita	*Arctostaphylos pechoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
dacite manzanita	*Arctostaphylos tomentosa* ssp. *daciticola*	-	-	1B.1	Y	Y	N	Y	N	N	-	Table A-2
marsh sandwort	*Arenaria paludicola*	FE	SE	1B.1	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
Miles' milk-vetch	*Astragalus didymocarpus* var. *milesianus*	-	-	1B.2	Y	Y	N	N	N	N	-	
Coulter's saltbush	*Atriplex coulteri*	-	-	1B.2	Y	Y	Y	N	N	N	-	Table A-2
round-leaved filaree	*California macrophylla*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo mariposa-lily	*Calochortus obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
La Panza mariposa-lily	*Calochortus simulans*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Cambria morning-glory	*Calystegia subacaulis* ssp. *episcopalis*	-	-	4.2	Y	Y	Y	N	N	N	-	Table A-2
Hardham's evening-primrose	*Camissoniopsis hardhamiae*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
San Luis Obispo sedge	*Carex obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo owl's-clover	*Castilleja densiflora* var. *obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	-	-	1B.1	Y	Y	N	Y	N	N	-	
pappose tarplant	*Centromadia parryi* ssp. *parryi*	-	-	1B.2	Y	Y	N	Y	N	N		
coastal goosefoot	*Chenopodium littoreum*	-	-	1B.2	Y	Y	Y	Y	Y	N		Table A-2

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
dwarf soaproot	*Chlorogalum pomeridianum* var. *minus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
salt marsh bird's-beak	*Chloropyron maritimum* ssp. *maritimum*	FE	SE	1B.2	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
Brewer's spineflower	*Chorizanthe breweri*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Chorro Creek bog thistle	*Cirsium fontinale* var. *obispoense*	FE	SE	1B.2	Y	Y	N	Y	N	Y	-	
compact cobwebby thistle	*Cirsium occidentale* var. *compactum*	-	-	1B.2	Y	Y	Y	Y	N	N	-	Table A-2
Cuesta Ridge thistle	*Cirsium occidentale* var. *lucianum*	-	-	1B.2	Y	Y	N	Y	N	N		
surf thistle	*Cirsium rhothophilum*		ST	1B.2	Y	Y	Y	Y	N	Y	-	Table A-2
leafy tarplant	*Deinandra paniculata*	-	CBR	4.2	Y	Y	N	Y	N	N	-	
Eastwood's larkspur	*Delphinium parryi* ssp. *eastwoodiae*	-	-	1B.2	Y	Y	N	Y	N	N		
beach spectaclepod	*Dithyrea maritima*	-	ST	1B.1	Y	Y	N	Y	N	N	-	
Betty's dudleya	*Dudleya abramsii* ssp. *bettinae*	-	-	1B.2	Y	Y	N	Y	N	N	-	
mouse-gray dudleya	*Dudleya abramsii* ssp. *murina*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Blochman's dudleya	*Dudleya blochmaniae* ssp. *blochmaniae*	-	-	1B.1	Y	Y	N	Y	N	N	-	
yellow-flowered eriastrum	*Eriastrum luteum*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Blochman's leafy daisy	*Erigeron blochmaniae*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
saint's daisy	*Erigeron sanctarum*	-	-	4.2	Y	N	Y	N	Y	N	-	Table A-2
Indian Knob mountainbalm	*Eriodictyon altissimum*	FE	SE	1B.1	Y	Y	Y	Y	N*	Y	C[2]	Table A-2, App. B
Hoover's button-celery	*Eryngium aristulatum* var. *hooveri*	-	-	1B.1	Y	Y	N	Y	N	N	-	
suffrutescent wallflower	*Erysimum suffrutescens*	-	-	4.2	Y	N	Y	Y	Y	N	-	Table A-2
San Benito fritillary	*Fritillaria viridea*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Francisco gumplant	*Grindelia hirsutula* var. *maritima*	-	-	3.2	Y	Y	Y	N	Y	N	-	Table A-2
mesa horkelia	*Horkelia cuneata* var. *puberula*	-	-	1B.1	Y	Y	Y	Y	N	N	-	Table A-2
Kellogg's horkelia	*Horkelia cuneata* var. *sericea*	-	-	1B.1	Y	Y	Y	Y	Y	N	-	Table A-2
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	-	-	1B.1	Y	Y	N	Y	Y	N	-	Table A-2

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
pale-yellow layia	*Layia heterotricha*	-	-	1B.1	Y	Y	N	Y	N	N	-	
Jones' layia	*Layia jonesii*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo County lupine	*Lupinus ludovicianus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Carmel Valley bush-mallow	*Malacothamnus palmeri* var. *involucratus*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Santa Lucia bush-mallow	*Malacothamnus palmeri* var. *palmeri*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Palmer's monardella	*Monardella palmeri*	-	-	1B.2	Y	Y	N	Y	N	N	-	
southern curly-leaved monardella	*Monardella sinuata* ssp. *sinuata*	-	-	1B.2	Y	Y	Y	Y	Y	N	-	
crisp monardella	*Monardella undulata* ssp. *crispa*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
San Luis Obispo monardella	*Monardella undulata* ssp. *undulata*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
woodland woollythreads	*Monolopia gracilens*	-	-	1B.2	Y	Y	N	Y	N	N	-	
shining navarretia	*Navarretia nigelliformis* ssp. *radians*	-	-	1B.2	Y	Y	N	Y	N	N	-	
coast woolly-head	*Nemacaulis denudata* var. *denudata*	-	-	1B.2	Y	Y	Y	Y	N	N		Table A-2
short-lobed broomrape	*Orobanche parishii* ssp. *brachyloba*	-	-	4.2	Y	N	Y	Y	Y	N	-	Table A-2
hooked popcorn-flower	*Plagiobothrys uncinatus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Diablo Canyon blue grass	*Poa diaboli*	-	-	1B.2	Y	Y	N	Y	N	N	-	
sand almond	*Prunus fasciculata* var. *punctata*	-	-	4.3	Y	N	Y	Y	Y	N	-	Table A-2
adobe sanicle	*Sanicula maritima*	-	-	1B.1, SR	Y	Y	N	Y	N	N	-	
chaparral ragwort	*Senecio aphanactis*	-	-	2B.2	Y	Y	N	Y	N	N	-	Table A-2
Cuesta Pass checkerbloom	*Sidalcea hickmanii* ssp. *anomala*	-	-	1B.2, SR	N	Y	N	Y	N	N	-	
most beautiful jewel-flower	*Streptanthus albidus* ssp. *peramoenus*	-	-	1B.2	Y	Y	N	Y	N	N	-	

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
California seablite	*Suaeda californica*	FE	-	1B.1	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
saline clover	*Trifolium hydrophilum*	-	-	1B.2	Y	Y	N	Y	Y	N	-	
caper-fruited tropidocarpum	*Tropidocarpum capparideum*	-	-	1B.1	Y	Y	N	Y	N	N	-	
Lichens												
Spiraled old man's beard	*Bryoria spiralifera*	-	-	1B.1	Y	?	Y	N	Y	N	-	Table A-2
firm cup lichen	*Cladonia firma*	-	-	2B.1	Y	N	Y	N	Y	N	-	Table A-2
Los Osos black and white lichen	*Hypogymnia mollis*	-	-	-	Y	?	Y	N	Y	N	-	Table A-2
long fringed parmotrema	*Parotrema hypolecinum*	-	-	-	Y	?	Y	N	Y	N	-	Table A-2
splitting yarn lichen	*Sulcaria isidiifera*	-	-	1B.1	Y	N	Y	Y	Y	N	-	Table A-2

[1] Status

Federal Endangered Species Act:

FE: Federal Endangered

FT: Federal Threatened

DE: Delisted species

California Endangered Species Act

SE: State Endangered

ST: State Threatened

CT: State candidate for listing

DE: Delisted species

CBR: Considered but Rejected for state listing

Other State Designations:

California Rare Plant Rank Designations:

List 1B: Plants rare, threatened, or endangered in California and elsewhere

List 2B: Plants rare, threatened, or endangered in California, but more common elsewhere

List 3: Plants about which more information is needed — a review list

List 4: Plants of limited distribution or infrequent presence throughout California —a watch list

California Rare Plant Threat Ranks, represented as decimals after status categories (e.g., "List 1B.1"):

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]					LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact Listed	Treatment	Information

0.1: Seriously threatened populations

0.2: Marginally threatened populations

0.3: Populations with limited threats

FP: Fully Protected - may not be taken or possessed at any time without a permit for necessary scientific research or relocation

SR: State Rare-Although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens (California Native Plant Protection Act)

SSC: Species of Special Concern

WL: Watch List - previously SSCs but no longer merit SSC status

[2] Criteria: Detailed description of criteria is provided in the text.

Range: Y= occurs within; Y(w)= wintering, and Y(b)= breeding within the LOHCP Area; N=outside of range

Habitat: Y = Species occurs within the upland habitat found in the LOHCP Area; N=species does not occur in LOHCP Area upland habitats

Impacts: Y=potential for impacts from covered activities and N= impacts unlikely; * Indicates that impacts can be avoided through measures outlined in the Conservation Strategy of the LOHCP.

Listed: Y= species is listed federal and/or state as endangered or threatened, N=species is not listed under CESA and ESA

[3] LOHCP Treatment:

AL= Additional listed species for which impacts can be avoided.

C= Species recommended for coverage in the LOHCP.

C^1= Take coverage only requested for habitat impacts (not impacts to individuals) for management and restoration as part of the LOHCP Conservation Strategy.

C^2= Take coverage only requested for management and restoration as part of the LOHCP Conservation Strategy.

LOHCP Information: Section of document where additional species information is provided.

[4] The southern sea otter is designated as a Special Species of Concern by the Marine Mammal Commission

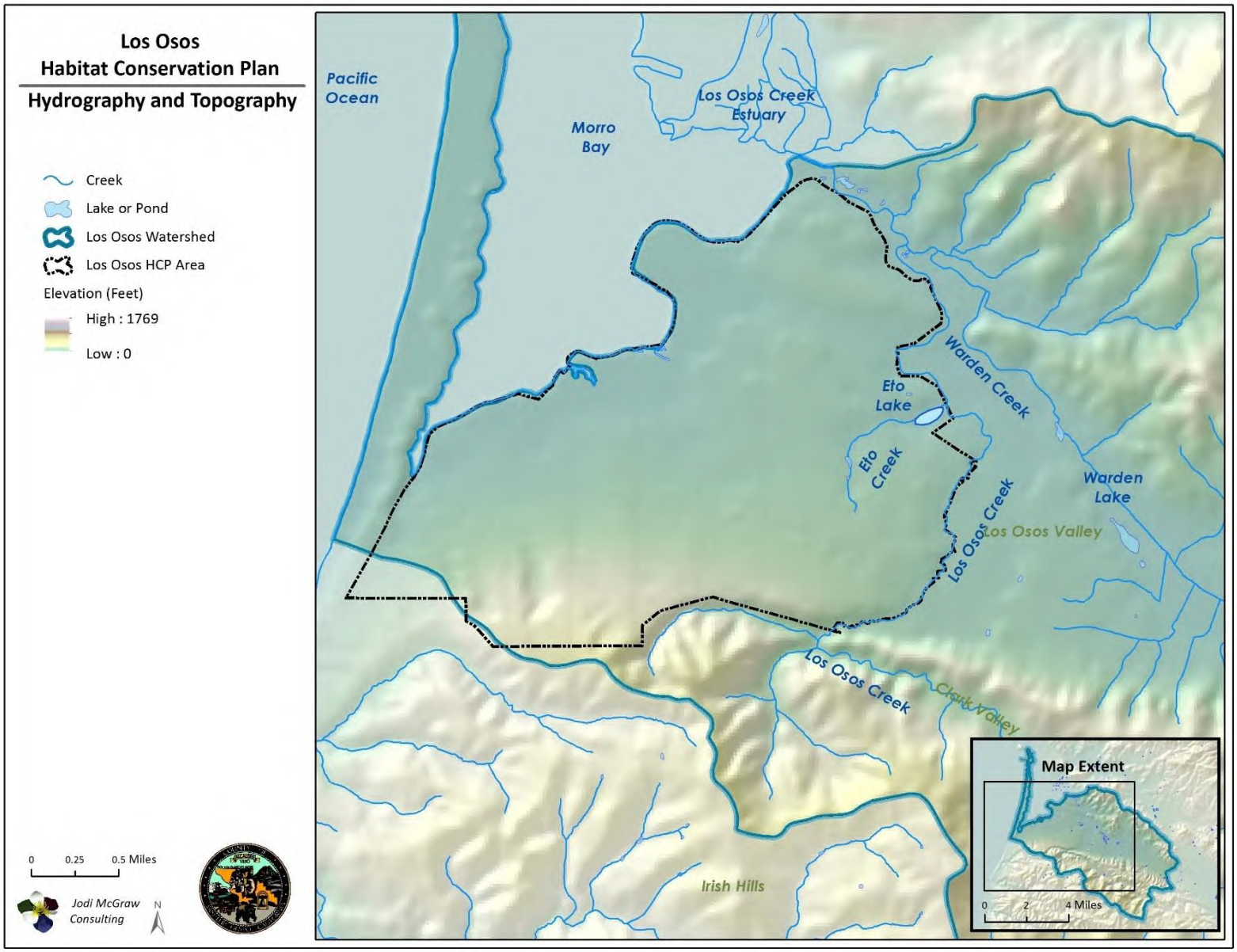

Figure 3-1: Hydrography and Topography

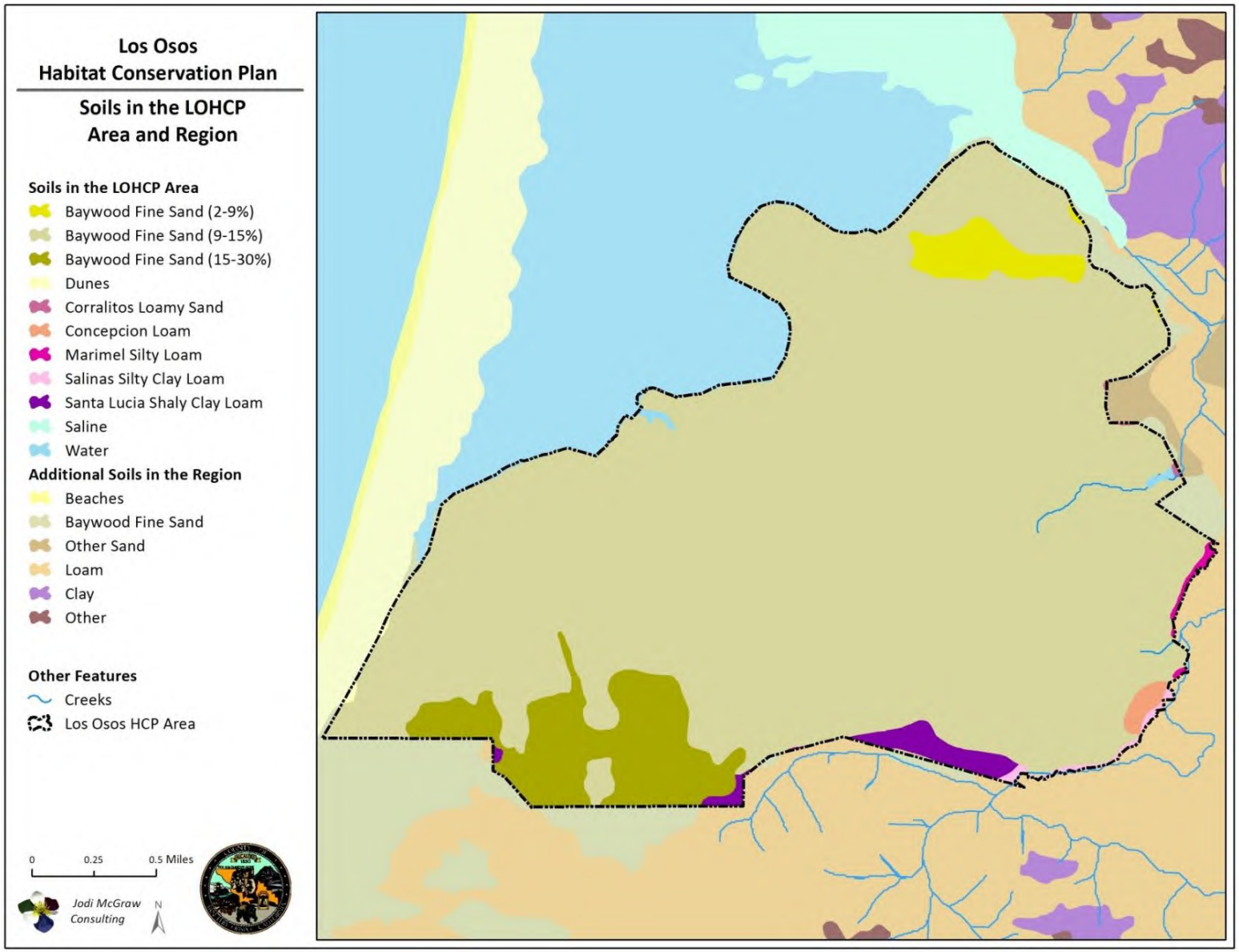

Figure 3-2: Soils

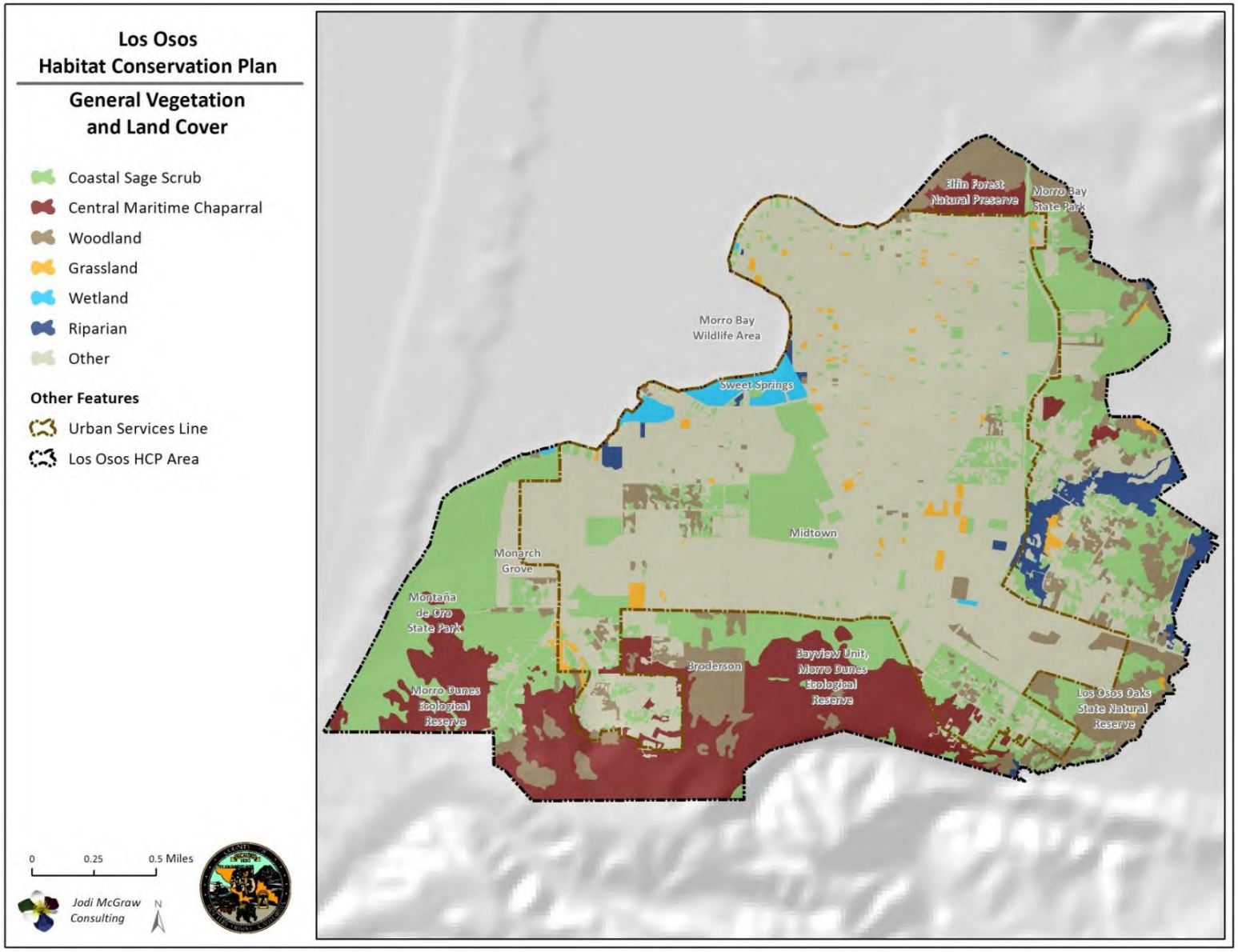

Figure 3-3: General Vegetation and Land Cover

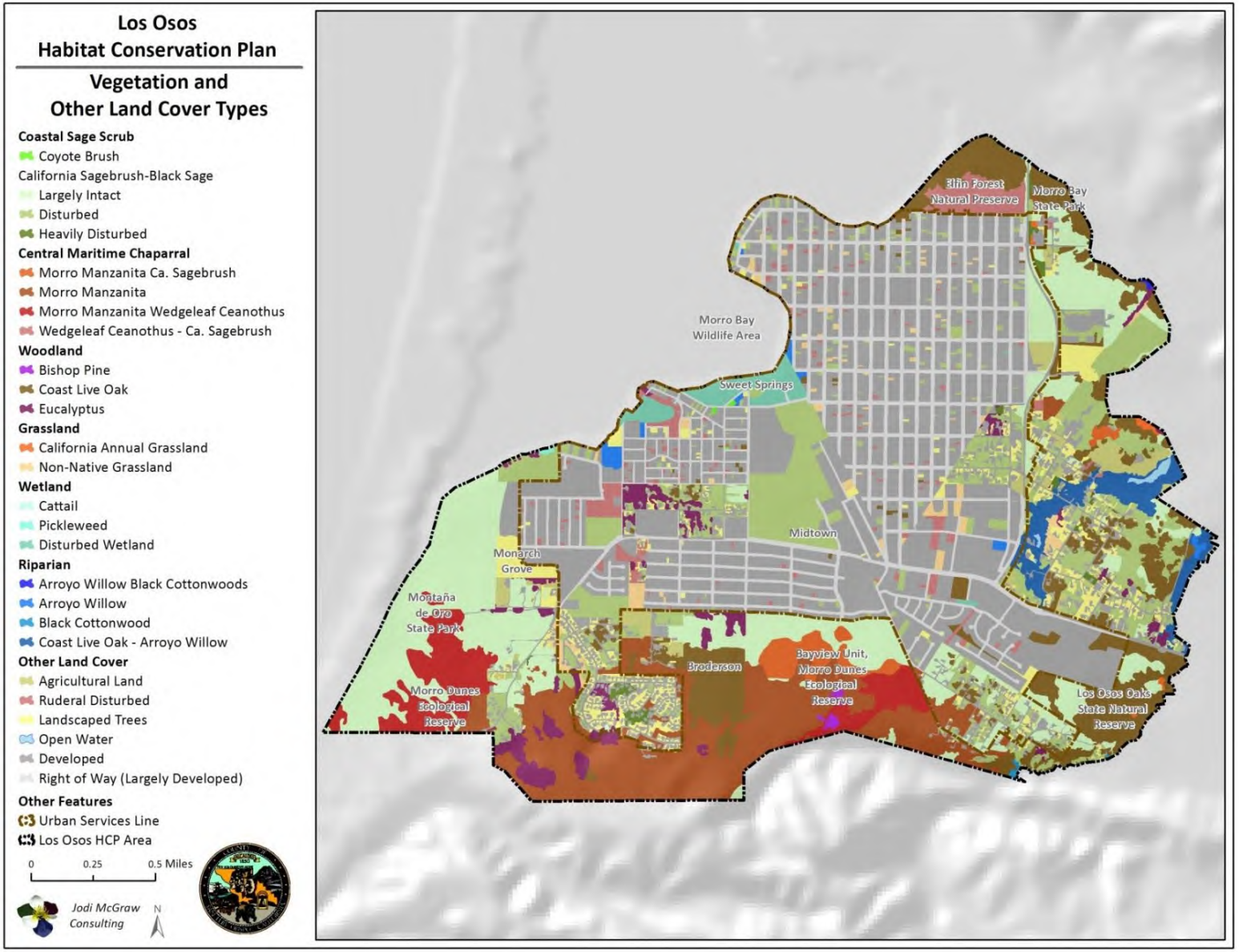

Figure 3-4: Specific Vegetation and Other Land Cover Types

4 Potential Biological Impacts/Take Assessment

The activities that will be covered by the LOHCP have the potential to negatively impact the covered species and their habitats. This chapter assesses the take/impacts both qualitatively, based on the various ways or mechanisms in which they affect species, and quantitatively, based on their direct effects on potentially occupied habitat. This assessment of impacts and take was based on the anticipated covered activities (Section 2.2), and available information about the habitats (Section 3.1.5) and occurrences (Section 3.2.2, Appendix B). It informed development of the conservation program (Chapter 5) and the financial analyses used to determine how it will be funded (Chapter 7).

After first describing both the general effects of the covered activities and the approach used to quantify the habitat impacts, this section evaluates the anticipated effects of the covered activities on each of the covered species. It ends with an assessment of the cumulative effects of the covered activities, which considers their effects in light of past, present, and reasonably foreseeable future actions.

During plan implementation, a database will be created and used to track each project covered by the LOHCP permit and document their actual take/impacts on the covered species and the impacts to their habitats (Section 5.4.1.1). This database will be used to prepare the annual reports (Section 5.6) and enable the County, the Implementing Entity, and the USFWS to evaluate whether the benefits of the conservation program are keeping pace with, or exceeding, the impacts of the covered activities, as part of the Plan's 'stay-ahead provision' (Section 6.2.4).

4.1 General Effects and their Mechanisms

The covered activities will impact the covered species through a variety of mechanisms, which can generally be categorized as:

- **direct effects:** impacts that occur where and when the covered activity occurs; and
- **indirect effects:** impacts that occur at a different place, and/or at a later time, than the covered activity, but are still reasonably certain to occur as a result of the activity.

4.1.1 Direct Effects

The covered activities will directly affect the covered species, potentially causing take of Morro shoulderband snails or impacts to covered animals and plants, by causing:

- **direct mortality** or injury that leads to mortality to individuals (excludes Morro Bay kangaroo rat and Indian Knob mountainbalm, for which no take/impacts in the form of injury or mortality will be permitted);
- **permanent loss of habitat suitable for, or occupied by, covered species**, resulting from areas of open soil (including vegetated areas) with impermeable surfaces (e.g., pavement or buildings); and/or
- **temporary loss of habitat suitable for, or occupied by, covered species**, such as by disturbing soil and removing vegetation in an area that will otherwise be restored. For example, temporary habitat loss will result from soil and vegetation disturbance to install a below-ground pipeline, after which habitat recovers naturally or as part of an active revegetation effort.

4.1.1.1 General Consequences of Direct Effects

Habitat loss and mortality can decrease the long-term viability of the covered species, by reducing the size of their populations. Loss of habitat is the leading threat to endangered species persistence (Wilcove et al. 1998), and can be especially problematical for narrowly endemic species such as the covered species, given their natural rarity (Skinner and Pavlik 1994). Habitat loss was identified as a leading threat to the covered species when they were originally listed (USFWS 1994); accordingly, protecting remaining habitat was identified as essential to their recovery (USFWS 1998a and 1999).

As part of more recent evaluations of the species' status, which has been documented in their five-year reviews (USFWS 2006, 2008, 2011b, 2013, and 2020a), habitat loss has been characterized as having lower threat, relative to when the species were listed, due to successful efforts during the past twenty years to protect large tracts of high-quality habitat in the LOHCP Area (Section 2.1.2.1). Nonetheless, given their extremely small geographic ranges and narrow habitat specificity, habitat loss remains a significant factor contributing to the declines; as a result, loss of additional habitat has potential to impact their long-term viability, in the absence of efforts to offset its effects.

Even if habitat loss and direct mortality do not directly lead to the loss of populations, known as a local extinction or extirpation, they can cause a genetic bottleneck—the process through which genetic diversity is lost when populations go through a large decline (Primack 2002). These losses of genetic diversity can influence individual fitness, population growth, and thus species persistence.

4.1.1.2 Methods used to Estimate Direct Effects

Direct effects on the covered species were quantified by estimating the acres of habitat that will be affected by the covered activities. Direct effects were quantified in terms of habitat, rather than the number of individuals, for a variety of reasons including:

- this regional conservation plan is focused on protecting and improving the quality of habitat within which the covered species can persist;
- there is no systematic information about the distribution and abundance of the covered species, which would be needed to estimate impacts to individuals; and
- this programmatic plan covers a suite of activities over 25 years, and finite project footprints are not yet known for many of the activities, such that surveys of cannot be used in advance to evaluate their effects.

The direct effects on habitat were estimated for the anticipated private development, facilities maintenance, and capital improvement projects that will be covered by the LOHCP permit (Section 2.2). The direct effects on habitat caused by the activities covered to implement the conservation program, including avoidance and minimization measures, habitat management, restoration, and monitoring, are generally anticipated to be temporary and are discussed in Section 4.2.

Because only the conservation program activities are anticipated to affect Morro Bay kangaroo rat and Indian knob mountainbalm, both of which occur within extremely limited distribution in the Plan Area, impacts to these species were also qualitatively described.

To estimate impacts to potentially occupied habitat for Morro shoulderband snail and Morro manzanita, available information about the species' ecology (Appendix B) was used to characterize the vegetation and land cover types as habitat if it is more likely than not to be occupied by the species. This analysis was designed to approximate the acres of suitable habitat that will be affected by the covered activities. This cross walk was also used to calculate the acres of potentially occupied habitat that will be benefited by conservation and management of the Los Osos Preserve System (Section 5.8.1).

Importantly, additional occurrences of the covered species may occur outside of the areas mapped as suitable; conversely, some of the mapped area may not be occupied. Additional habitat may become suitable in the future, as a result of succession, alterations in land use, and/or restoration. Moreover, new information about covered species distribution and ecology may indicate that additional areas are suitable. For these and perhaps other reasons, this landscape-scale analysis of potentially occupied habitat is not designed to be used to determine the appropriate measures that must be implemented to avoid and minimize impacts the covered species. Instead, Section 5.2.1 describes how project-specific site evaluations will be used to identify the avoidance and minimization measures that must be implemented, which are outlined in Section 5.2 and Tables 5-2 through 5-4.

The direct effects of the covered activities were quantified using a spatial analysis of the LOHCP Plan Area, based on a series of assumptions about the size, location, and in some cases, frequency of the anticipated private development, facilities maintenance, and capital improvement projects. Table 4-1 lists the assumptions for each of these anticipated covered activities identified in Section 2.2. The following outlines the approach used to quantify the impacts of the covered activities on vegetation and land cover types, and thus the covered species' habitat.

Step 1: Estimate the size of the disturbance envelope. The disturbance envelope (or project footprint) is the entire area that will be disturbed during the course of implementing the covered activity. For construction projects, this includes the area that will be covered by the structures or other improvements, including hard surfaces, as well as the adjacent area that will be disturbed but later restored. For purposes of this analysis, the disturbance envelopes include areas of existing impervious surfaces and areas of existing fire hazard abatement, as they could not be estimated based on available information; such areas will be excluded from the take or impact calculations conducted during implementation of the plan (Section 5.7.2). Therefore, the disturbance envelopes used in this analysis likely overestimate the actual habitat impacts and thus take or impacts to the covered species. This overestimate may be large for projects occurring in or near existing developed areas, such as developed parcels or the County right-of-way.

The disturbance envelopes correspond to the sizes outlined in Section 2.2, and Tables 2-6 through 2-8. Tables 2-6 and 2-7 outline the assumptions for the private development and redevelopment, respectively. These estimates were based on the patterns of existing development within Los Osos.

For capital projects (Table 2-8), the disturbance envelopes were largely estimated by the project proponents; where size estimates were not provided, the envelopes were estimated based on the dimensions of typical projects, and assumptions about the adjacent area that would be disturbed. As noted, although County Parks has numerous projects planned, only half of these projects are likely to be implemented during the course of the 25-year permit term; therefore, the estimated total disturbance envelope of County Parks Projects (65.6 acres) was cut in half (32.8 acres) for purposes of conducting this take or impact assessment.

Step 2: Determine the vegetation or other land cover types that are likely to be impacted. The vegetation or other land cover types that will be impacted by each covered activity were quantified using geographic information system (GIS) featuring the best available vegetation map for the region (Section 3.1.5, CMCA 2004). Impacts were assessed using one of two main methods, depending on whether the location of the covered activity was known.

a. **Projects with Known Locations:** For activities with a known location, such as mapped project footprint (e.g., drainage basin) or specific parcels that will be entirely impacted (e.g., the Los Osos Community library parcel), the vegetation and other land cover mapped that occur within the anticipated project area were characterized as being impacted in this analysis. Similarly, the impacts of projects known to occur within the County right-of-way, such as road and major pipeline projects, were allocated to this largely developed portion of the Plan Area.

b. **Projects with Unspecified Locations:** For activities without known locations, the impacts to vegetation and other land cover types were extrapolated based on their proportional occurrence within the broader geographic area in which the activity is anticipated to occur. For example, development of a 5-acre facility on a 10-acre parcel featuring 2 acres of coastal sage scrub and 8 acres of central maritime chaparral is presumed to result in the loss of 1 acre of coastal sage scrub and 4 acres of central maritime chaparral.

   When conducting such extrapolations to estimate vegetation and other land cover impacts, available information was used to attribute the habitat impacts to the most accurate area possible, given the available information (Table 4-1). Extrapolations were conducted for a variety of different geographic areas, including:

   i. **Parcels:** For activities anticipated to impact a given parcel, the acres of impact were allocated proportionally to the vegetation and other land cover types mapped within the parcel;

   ii. **Service Areas:** For activities anticipated to occur within the service area of a specific water purveyor (e.g., Golden State Water), the impacts were allocated proportionally to the vegetation and other land cover types within the service area; and

   iii. **Inside the Urban Services Line:** For projects anticipated to occur within the largely developed portion of the LOHCP Area, such as development of a new County park, impacts were allocated proportionally to the vegetation and land cover types occurring within the Urban Services Line (USL).

When extrapolating impacts, vegetation and other land cover types were excluded from the proportional allocation if they were assumed unlikely to be impacted by the activity. Most notably, impacts to wetland and riparian vegetation, as well as open water, were excluded from most development projects, as impacts to these habitats will not be covered by the LOHCP; therefore, it is assumed in this analysis that such covered activities will be sited in other habitats.

Where actual mapped project footprints contained riparian and wetland vegetation, or open water habitat, these habitat impacts were tabulated so that the total anticipated disturbance envelope would equal to the total vegetation and other land cover type impacts (Tables 4-2 and 4-3). However, take of other listed species that occur in these habitats is not covered by the permit issued by the LOHCP; therefore, proponents of projects in these areas must either avoid

such habitats, or demonstrate that they have complied with state and federal regulations for these non-covered listed species before they can receive take coverage under the LOHCP take permit (Section 6.3.1).

Step 3: Characterize the Activity Location with Respect to the Urban Services Line. The urban services line largely circumscribes the area of greater existing development density within the LOHCP Area (Section 2.1.1). Habitat within this area is generally considered to have lower long-term conservation value for the covered species. In order to assess the relative impacts of habitat loss on the covered species, the impacts of covered activities were assessed based on their location with respect to the USL.

As with the assessment of impacts to vegetation and other land cover, this assessment was conducted using GIS following one of two approaches:

- **Specified Project Location**: In many cases, the location of covered activity was known and thus could be attributed as occurring inside or outside of the USL; and
- **Extrapolate by Area:** Where the precise location of the activity was unknown, its impacts were allocated to habitats inside or outside of the USL based on assumptions about where it might occur. For example, if a Golden State Water capital improvement project lacked a specific location, its impacts were allocated as 65% inside and 35% outside the USL (35%), as these are the percentages of the utility's service area located inside and outside of the USL.

Step 4: Estimate the Permanent and Temporary Impacts. The impacts of each covered activity were broken down into the percentages of permanent and temporary impacts, based on available information about the nature of the activity and its impacts on habitat. As defined above, permanent impacts remove habitat; therefore, the percentage of the disturbance envelope to be covered with impervious surfaces or other non-habitat land cover (e.g., mulch) was characterized as permanently impacted.

Temporary impacts occur when vegetation and perhaps soil are disturbed but not permanently covered, such that habitat within the affected area is revegetated and otherwise restored to the conditions pre-project or to an improved condition. Temporary impacts commonly result during project construction, when habitat is impacted to install infrastructure or access the building site and is later restored. The area of temporary impacts for each project was estimated as a percentage of the total disturbance envelope based on available information about the project including its construction methods and dimensions.

Importantly, areas that will be chronically disturbed by covered activities were characterized as permanently impacted for purposes of this take/impacts assessment, as these areas are unlikely to be restored or otherwise contribute to the viability of the covered species populations. For example, drainage basin maintenance, which requires annual removal of accreted soil and established vegetation, was characterized as having 100% permanent impacts even though the area could be revegetated between treatments. Areas of fuel modification to create and maintain defensible space, as required by state and local fire departments (i.e., under Public Resources Code 4291; CAL FIRE 2020) is similarly regarded as permanently impacted since ongoing vegetation removal is needed to maintain the fuel reduction standards. This ongoing

vegetation removal will significantly impair the ability of the area to support the covered species, such that it will be regarded as permanently impacted.

Step 5: Estimate Impacts to Morro Shoulderband Snail and Morro Manzanita Habitat. To assess impacts to Morro manzanita and Morro shoulderband snail habitat, the vegetation and land cover types were categorized as follows:

1. **Habitat:** For Morro manzanita, this designation was applied to vegetation types that are suitable and has a high potential to be occupied;
2. **Primary Habitat:** for Morro shoulderband snail, this designation refers to native vegetation types where the species is preferentially found;
3. **Secondary Habitat**: for Morro shoulderband snail, these areas are either native vegetation types in which the species is found at lower frequency and/or abundance, or anthropogenic land cover types (e.g., Ruderal Disturbed) where the species may occur at higher frequency and/or density than in native vegetation types as described in Sections 3.2.2.1 and B.1.6.
4. **Non-habitat:** vegetation or land cover types that are generally not suitable and unlikely to be occupied.

Table 4-4 identifies the vegetation and land cover types within each habitat category for each species, while Table 4-5 illustrates the permanent and temporary impacts to their habitats, which are illustrated in Figure 4-1 (Morro shoulderband snail) and Figure 4-2 (Morro manzanita).

Due to their extreme rarity within the Plan Area, the impacts of the covered activities on Indian Knob mountainbalm and Morro Bay kangaroo rat were evaluated based on the likely impacts to individuals, rather than habitat. To quantify the habitat benefits that will result from implementation of the conservation program, Morro Bay kangaroo rat was assumed to benefit from protection, restoration, and management of coastal sage scrub and central maritime chaparral communities, as the species can occur in the latter when they are managed for open conditions (Section 3.2.2.2). Habitat benefits for Indian Knob mountainbalm were assessed based on protection, restoration, and management of central maritime chaparral communities.

Implementation of avoidance and minimization measures developed for the fire hazard abatement measures as part of the Community Wildfire Protection Plan (Section 5.2.4, Table 5-4) will avoid impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm. These measures will also reduce take of Morro shoulderband snail in the form of injury or mortality and reduce the severity of impacts to Morro manzanita caused by trimming of individual shrubs. As a result, the CWPP will result in only short-term negative impacts to the covered species and their habitat, which are anticipated to benefit from the vegetation modifications including invasive plant removal in the long term.

Given the limited scope of the CWPP and the requisite avoidance and minimization measures that will be implemented to protect the covered species during fire hazard abatement (Table 5-4), implementation of the CWPP is expected to have a negligible effect on the covered species. Habitat impacts are anticipated to be temporary: they do not convert the land to hardscape or other impermeable surface. Instead, the treated areas will support native plants and intact soils that can support the covered species. Additionally, certain aspects of the CWPP fire hazard abatement treatments have the potential to improve habitat conditions for covered species in the long term, by removing invasive plant species and creating early-successional conditions required by Morro Bay

kangaroo rat. Accordingly, this covered activity was not subject to the quantitative analysis of direct effects that is outlined above, and that was used to tabulate habitat impacts in this chapter. Nonetheless, the take and impacts of CWPP treatments on the covered species are assessed qualitatively in Sections 4.2 and 4.3.

4.1.2 Indirect Effects

The covered activities can also indirectly, negatively affect the covered species, by degrading adjacent habitat, fragmenting habitat, and increasing human activity in the area.

4.1.2.1 Habitat Degradation

Through a variety of mechanisms, the covered activities can lead to the degradation of habitat in adjacent areas, including existing protected lands as well as habitat that will be protected through implementation of the LOHCP conservation program (Section 5.3). Generally speaking, habitat degradation is the reduction in the quality of the habitat due to anthropogenic factors, including those outlined below, which can reduce or eliminate the ability of the covered species to inhabit these areas. Resulting population reductions can reduce their long-term viability, as smaller populations are more susceptible to demographic and environmental stochasticity—chance events in population demography and environmental conditions, respectively, which can reduce populations and result in extirpations (localized extinctions), to which small populations are more vulnerable (Gilpin and Soulé 1986, Land 1993, Matthies et al. 2004). Habitat degradation causes population bottlenecks that can reduce genetic diversity, which can reduce individual fitness and thus population growth (Keller et al. 1994, Young et al. 1996). Small populations can ultimately suffer from inbreeding depression—the reduced fitness (performance) of a population as a result of breeding of related individuals (Hedrick and Kalinowski 2000, Keller and Waller 2002).

The following sections describe specific mechanisms by which the covered activities could indirectly degrade habitat for the covered species. These and other factors will be the focus of habitat restoration and management conducted within the LOHCP Preserve System to mitigate the impacts of the covered activities (Section 5.3).

4.1.2.1.1 Promote the Invasion or Spread of Exotic Species

Some covered activities can indirectly degrade habitat for the covered species by promoting the invasion and spread of exotic plants and animals, which threaten the persistence of many endangered species (Wilcove et al. 1998), including the covered species (USFWS 1994, 1998, 1999, 2006, 2008, 2011b, 2013, and 2020a). When abundant, exotic plants reduce the ability of habitat to support populations of native species both directly, through competition (Carlsen et al. 2000), and indirectly, by altering habitat conditions so that they are no longer suitable (D'Antonio and Vitousek 1992, Levine et al. 2003). Exotic animals may similarly affect the covered species. For example, the brown snail (*Helix aspersa*) is hypothesized to compete with the Morro shoulderband snail (USFWS 1994), while domestic cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) may date predate upon native mammals including the Morro Bay kangaroo rat (USFWS 2011b).

Human activities can promote the invasion and spread of exotic species through a variety of mechanisms. For plants, these include:

1. Planting exotic plant species into landscapes, from which they spread into adjacent habitat;
2. Removing vegetation or disturbing soil, which can promote establishment and growth of disturbance-adapted exotic plants;
3. Vectoring seed of exotic plants into intact habitat areas on their clothes, pets, stock (e.g., horses), or equipment.

The occurrence of exotic animals in habitat areas can similarly be promoted by the covered activities. Development can increase the density of dogs and cats and their proximity to habitat areas. Non-native snails can similarly spread from nearby gardens and landscapes where they are introduced, and their populations are promoted by watering and other horticultural activities.

4.1.2.1.2 Promote Incompatible Fire Management

Some of the covered activities can indirectly negatively impact the covered species by further altering the fire regime of the Baywood fine sand communities. Fire is a natural component of the disturbance regime in the ecosystem, and the covered species exhibit many adaptations to fire and the conditions it creates. Fire promotes Morro manzanita seed germination and creates conditions appropriate for seedling establishment (Tyler et al. 2000). Fire similarly is thought to promote establishment of Indian Knob mountainbalm from seed as well as vegetatively (Wells 1962, USFWS 1998a). Fire is thought to have played an important role in maintaining early successional conditions characterized by a low density of subshrubs and perennial herbs (e.g., *Croton californicus, Horkelia cuneata,* and *Acmispon glaber*), which is the preferred habitat of Morro Bay kangaroo rat (USFWS 1999). Fire may similarly create and maintain habitat for Morro shoulderband snail, which occurs in coastal sage scrub but is not typically observed in later-successional central maritime chaparral; however, the species is itself vulnerable to mortality due to fire (Roth 1985, Walgren 2003a).

Within the LOHCP Area, fires are suppressed in order to protect lives and property. Removing fire from the ecosystem may threaten persistence of the fire-adapted covered species. For Morro manzanita and Indian Knob mountainbalm, an excessively long fire return interval (time between fire) can lead to senescence of the adult population without regeneration of a cohort (group) of seedlings of sufficient density to replace them (Tyler et al. 2000). Likewise, a long fire-free period may result in canopy closure in coastal sage scrub and ultimately succession to central maritime chaparral or coast live oak woodland, thus degrading habitat for Morro Bay kangaroo rat and Morro shoulderband snail (USFWS 1998a, 1999).

Although unlikely to alter the current policy of fire suppression, implementation of the covered activities may exacerbate fire exclusion by further impeding the use of fire as a management tool (e.g., prescribed fire) in protected lands, where it can be used to promote the natural community structure and species composition of the Baywood fine sand communities and the populations of the covered species. Increased density of human development in proximity to parks and ecological reserves could increase the concern about the threat to public health and safety posed by fire management.

The covered activities may also indirectly impact the covered species by facilitating human-caused fires. The covered activities will increase the population density and the proximity of development to protected lands, both of which will increase the probability of a wildfire occurring in the protected habitat areas. Such wildfires can cause mortality of the covered species and could lead to the extirpation of Morro Bay kangaroo rat and Indian Knob mountainbalm which occur at extremely low density. Fires

could similarly eliminate occurrences of Morro shoulderband snail (Walgren 2003a). Due to the fragmented nature of the remaining habitat, recolonization of habitat following fire may be inhibited.

In addition to killing individuals and potentially extirpating occurrences or populations, fire may negatively impact the covered species populations by causing soil erosion, which can preclude native plant re-establishment, and by promoting the invasion and spread of exotic plant species. Many exotic plants are adapted to establishing within the low-litter, open-canopy conditions created by fire (Hobbs and Huenneke 1992, Haidinger and Keeley 1993).

The risk of wildfire in the region, which results from high-density development occurring immediately adjacent to fire-prone vegetation, has promoted vegetation management projects designed to reduce the risk of wildfire, such as the CWPP (Section 2.2.7). Such vegetation management projects, which are often conducted by fire safe councils and fire prevention agencies, can include establishment of shaded fuel breaks at the wildland-urban interface, which are designed to reduce the risk of wildfire and slow its rate of spread. Efforts to conduct vegetation management may be intensified as a result of implementation of the covered activities, due to the increased development and thus risk of lives and property. Such vegetation management projects have the potential to negatively impact the covered species directly, by killing Morro manzanita and Morro shoulderband snail, which can be trampled during vegetation removal, and also by removing suitable habitat, including downed woody debris used by Morro shoulderband snail. Vegetation management projects can also impact the covered species indirectly, by promoting the invasion and spread of exotic plants, which are often promoted by disturbance and thrive in the open-canopy conditions of shaded fuel breaks.

Vegetation management projects also have the potential to promote populations of the covered species, by simulating the beneficial effects of fire in this fire-adapted system; for example, vegetation management can possible be used to re-create early successional conditions in coastal sage scrub that are required by Morro Bay Kangaroo rat. Likewise, vegetation management projects can also potentially promote regeneration of Morro manzanita populations facing 'senescence risk' (Odion and Tyler 2002), where prescribed fire is not feasible. Research and monitoring will be needed to fully evaluate the positive and negative, short-term and long-term, effects of vegetation management and other fire management in the LOHCP Area.

4.1.2.1.3 Promote Incompatible Recreation Activities

Some of the covered activities can indirectly negatively impact the covered species by increasing the frequency of recreation within remaining habitat areas. New development will increase the human population overall, as well as increase the proximity of development adjacent to parks, reserves, and other open spaces. The covered activities include creation of new trails within Los Osos, some of which will connect developed areas to parks and reserves on the perimeter of the Plan Area (Table 2-8, Figure 2-5). As a result, these areas will likely receive more frequent use, including both allowed use of trails for passive recreation, as well as unauthorized uses.

Like all disturbances, recreation impacts plant communities and species in various ways, which depend on the type, areal extent, and frequency of the use; these factors can interact with conditions of the habitat in which they occur, including the topography (e.g., slope), soil conditions, and vegetation, to determine the ultimate effects of the use (Section D.2.1). Generally speaking, recreational use will have greater impacts if it occurs on steep slopes with loose, sand soil, or other erosive soil, where vegetation removal renders slopes vulnerable to erosion, which further degrades habitat through soil loss. Negative

impacts of recreation can be reduced by siting trails appropriately and implementing measures to facilitate compliance with the trail use provisions, including installing signage and symbolic fences, and conducting trail patrols.

4.1.2.1.4 Increase Pollution including Nitrogen Deposition

The covered activities have the potential to indirectly impact the covered species by increasing pollution. Greater human development and associated activities including automobile use in the region can increase concentrations of nitrogen in the atmosphere, the deposition from which can fertilize the otherwise low-nutrient Baywood fine sand soil. This could promote the invasion and spread of exotic plants, particularly annual grasses, and can be promoted by increased nitrogen (Weiss 1999, Brooks 2003, James et al. 2011). These and other exotic plants can complete with the covered plant species, degrade habitat conditions for the covered animal species, and create fine fuels that can increase the risk of wildfire, which can further degrade habitat (Section 4.1.2.1.2).

4.1.2.2 Habitat Fragmentation

The covered activities can indirectly, negatively impact the covered species by fragmenting their habitat. Private development and capital public and private utility projects including roads and trails can fragment habitat for less mobile species, including Morro shoulderband snail and plants that are lack long-range seed dispersal mechanisms, such as wind or dispersal by wide-ranging animals (e.g., medium and large mammals or birds).

Like habitat loss, habitat degradation can fragment remaining covered species habitat. For example, fire suppression that converts coastal sage scrub and central maritime chaparral communities to coast live oak woodland also fragments remaining habitat for the covered species, which preferentially occur in the shrublands.

Fragmentation can effectively isolate groups of individuals, thus creating multiple smaller populations where from one large population (Primack 2002, Fahrig 2003). By eliminating or greatly reducing the likelihood of immigration into newly separated habitat patches, fragmentation reduces population size and therefore the likelihood of population persistence amidst demographic and environmental stochasticity (Gilpin and Soulé 1996, Hanski 1998). Fragmentation also limits opportunities for a "rescue effect", whereby immigration from an adjacent patch can boost population growth (Brown and Kodrick-Brown 1997, Hanski et al. 1995). In doing so, fragmentation can decrease genetic diversity by reducing population size and causing genetic bottlenecks. Small, fragmented populations can ultimately suffer from inbreeding depression, which can further imperil the covered species populations. This scenario is likely for Indian knob mountainbalm, given its exceptionally population small size.

To mitigate these potential effects, the LOHCP conservation program includes habitat protection, restoration, and management measures, including efforts to maintain habitat connectivity and protect large contiguous blocks of habitat that can promote long-term viability of the covered species (Chapter 5).

4.2 Anticipated Take of Covered Animals

The following sections integrate the qualitative assessment of indirect effects and quantitative and qualitative assessments of direct effects to characterize the anticipated take of the covered animal species. The assessment of net impacts compares the anticipated negative effects of the covered activities, to the positive benefits anticipated from implementation of the LOHCP conservation program, based on the LOHCP Preserve System configuration scenario (Section 5.8.1).

4.2.1 Morro Shoulderband Snail

The covered activities will impact Morro shoulderband snail individuals and habitat at both directly and indirectly, causing take as defined under ESA. The effects of these impacts will be offset by the protection, restoration, and management of habitat in the LOHCP Preserve System (Section 5.3) and are not anticipated to affect the long-term persistence of the species within the LOHCP Area or throughout its range.

4.2.1.1 Impacts to Habitat

The covered activities (other than the conservation program and CWPP) are anticipated to impact approximately 189 acres of primary habitat for Morro shoulderband snail (Table 4-5) which is defined as including all types of coastal sage scrub and open communities within maritime chaparral in the Plan area (Table 4-4, Figure 4-1). This represents 20 percent of the species primary habitat (935 acres) within the Plan Area; 48 percent (445 acres) is within existing protected lands, and an additional 37 acres (4 percent) is anticipated to be protected through habitat protection efforts conducted as part of the LOHCP conservation program (Section 4.2.1.3).

The covered activities are anticipated to impact an additional 289 acres (15%) of the 1,898 acres of secondary habitat Morro shoulderband snail (Table 4-5). This secondary habitat largely consists of existing developed areas and County rights-of-way, where prior surveys have detected the species (Table 4-4, Figure 4-1). Ongoing monitoring for Morro shoulderband snail as part of the conservation program for the Los Osos Wastewater Treatment Project has revealed that Morro shoulderband snail frequently inhabit, and are often found at high abundance, in such ruderal and disturbed areas (SWCA 2013, 2014, 2015, 2016, and 2017), hence their inclusion in the analysis of take and habitat impacts.

The estimated area of primary and secondary habitat to be impacted by the covered activities is likely greater than the actual acres supporting Morro shoulderband snail that will be impacted, as the species is unlikely to occupy the entire area of mapped as primary and secondary habitat. Moreover, many projects can avoid or reduce the direct impacts to habitat or individuals, by implementing the required protection measures, including by siting the project disturbance envelope away from occupied habitat (Section 5.2).

Of the total 478 acres of habitat for Morro shoulderband snail anticipated to be impacted, 429 acres (90%) is located inside the urban services line (Table 4-5, Figure 4-1)—the portion of the Plan Area that is already densely developed (Section 2.1.1), and where the Estero Area Plan will focus remaining development (Section 2.1.2.2). When compared with habitat outside of the USL, habitat within the USL is generally more degraded, in that it features higher cover by exotic plants and lower native plant cover due to vegetation management (e.g., frequently mowing), intense recreational use, and other historic

and current land uses. Habitat within the USL also occurs primarily on small parcels, which are highly fragmented by roads and other development. While surveys document the occurrence of Morro shoulderband snail in fragmented and degraded habitat, such areas provide lower long-term conservation value for the species. Due to the small size and degraded nature of the habitat patches, in the USL, the Morro shoulderband snail population there is likely smaller and more vulnerable to extirpation due to environmental or demographic stochasticity (than habitat of the same size outside of the USL). If Morro shoulderband snail becomes extirpated from habitat patches in this area, the probability of recolonization is lower due to habitat fragmentation, which will constrain dispersal of this species.

An estimated 30 acres of habitat and 20 acres of secondary habitat for Morro shoulderband snail habitat located outside of the USL will be impacted by the covered activities (Table 4-5, Figure 4-1). This will primarily be due to low-density residential development and redevelopment on primarily larger parcels, though some public and private utility projects will also impact small areas of habitat in this area.

The LOHCP caps the disturbance envelopes for private development outside of the USL (30,000 square feet; Table 2-6), and requires on-site habitat set-asides for new development on parcels in the within the Priority Conservation Area (Section 5.7.2.1.1), which includes much of the area outside of the USL. These Plan requirements are collectively designed to promote persistence of Morro shoulderband snail on even developed parcels in order to support populations in protected habitat and habitat connectivity and landscape permeability in this area.

Of the total 478 acres of suitable and potentially suitable habitat for Morro shoulderband snail impacted by the covered activities, 59 acres (12%) is anticipated to be temporarily impacted (Table 4-5). This represents the area adjacent to, or in the access path of, the improvement area, which will be degraded as a result of construction. These habitat areas will be restored to the pre-project or better habitat condition as part of the measures to minimize impacts to the covered species (Section 5.2).

Fuel hazard abatement treatments implemented as part of the CWPP are anticipated to impact 45.6 acres of Morro shoulderband snail primary habitat, as well as 15.7 acres of secondary habitat for this species in addition to the acreages identified in Table 4-5. These treatments, as well as other fuel breaks created on lands within the Preserve System to protect habitat from wildfire, can include removal of dead plants, thinning and selective removal of shrubs and trees, as well as mowing of non-native grasslands. They are anticipated to have temporary impacts on Morro shoulderband snail habitat, by removing plants used by the species for cover and food. By targeting invasive plants, such as eucalyptus, veldt grass, and exotic annual grasses, fuel hazard abatement projects have the potential to promote growth of native plant species and enhance habitat conditions in the long-term[16]. Nonetheless, these treatments have the potential to negatively impact Morro shoulderband snail habitat in the short term, and cause take in the form of capture, to move individuals within the treatment areas out of harm's way (Section 5.2.4, Table 5-4).

[16] The *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (McGraw 2020; Appendix M) outlines a prescription for the fuel break within the Bayview Unit of the Morro Dunes Ecological Reserve, that is designed to maximize beneficial effects of fuel reduction for the covered species.

4.2.1.2 Impacts to Individuals

The covered activities will impact Morro shoulderband snails occurring within their disturbance envelopes, where vegetation removal and soil disturbance can cause individuals to be trampled, crushed, buried, or otherwise injured or killed. These impacts will be reduced through implementation of the LOHCP avoidance and minimization measures, which for certain projects including the CWPP will include pre-project surveys to capture and relocate the species out of harm's way (Sections 5.2.1, 5.2.4, and F.2; Table 5-4).

Habitat modifications caused by the covered activities, whether permanent or temporary, can also increase Morro shoulderband snail vulnerability to exposure, including predation and desiccation. Similarly, vegetation removal can also reduce food availability by removing plant biomass. As a result, habitat impacts have the potential to impact individuals of this species.

The number Morro shoulderband snail individuals subject to take by the covered activities is impossible to predict for this programmatic plan and will likely vary for each covered activity depending on the nature of activity and the condition of the habitat that it affects. Notably, even non-native dominated habitat, including ruderal disturbed vegetation, and landscaping along County rights-of-way, can support relatively high concentrations of this species, as were observed during construction monitoring for the Los Osos Wastewater Plant (SWCA 2013, 2014, 2015, 2016, and 2017).

Impacts to individual Morro shoulderband snails may also result from implementation of the LOHCP conservation program. Pre-construction surveys and construction monitoring to capture and move individuals out of harm's way will greatly reduce take in the form of injury or mortality. Although such handling has some potential to cause take of Morro shoulderband snail in the form of injury or mortality, the incidence of this is low if the handling is done correctly (J. Vanderwier, pers. comm. 2017). Monitoring studies to track the status and trends of populations can similarly result in negative impacts to individuals handled and relocated during monitoring.

Morro shoulderband snail can also be impacted by habitat restoration and management activities, including erosion stabilization and revegetation, exotic plant control projects, and fire hazard abatement activities. Notably, Morro shoulderband snails may be impacted by the use of herbicides to control exotic plants as part of work to implement the LOHCP conservation strategy; specifically, to restore and manage habitat that has been degraded by veldt grass, exotic annual grasses, and iceplants. Morro shoulderband snails could be exposed to herbicides by ingestion and absorption while living in, or migrating through, a recently treated area. Direct herbicide spray or drift from spray could contaminate soil; leaves, stems, and branches of shrubs and other live plants; leaves, mold, and fungi in plant litter; and potential shelter sites for Morro shoulderband snails, including downed wood, rocks, or debris piles.

The potential effects of herbicide exposure for Morro shoulderband snail are unknown as most standard toxicology analyses do not test effects of pesticides on snails (USFWS 2018). A study found that the herbicide glyphosate caused genotoxicity to *Bulinus truncates*, an air-breathing, freshwater snail (Bakry et al. 2015). Aquatic snails exposed to glyphosate exhibited abnormalities in development and reproduction (Tate et al. 1997). However, atrazine was concluded to have no effects on four species of freshwater snails (Gustafson et al. 2015).

Exotic plant control and other restoration and management projects, which will be designed to improve habitat conditions and promote long-term population viability, will be implemented following methods to avoid or minimize impacts to Morro shoulderband snail (Section 5.2). For example, pre-project surveys and project monitoring will be used to capture and move out of harm's way any individuals observed. Treatments will be conducted in small-scale areas, where feasible, to avoid impacting large numbers of individuals; in addition, refugia will be maintained in or near treatment areas to facilitate recolonization of the affected habitat area.

Despite these measures, some impacts to individual snails may occur as a result of even well-designed and carefully implemented habitat management and restoration treatments. For example, in the Los Osos Wastewater Plant construction projects, Morro shoulderband snails were drowned after being attracted to puddles created in tarps used to cover equipment in a construction area (SWCA 2013). Implementation of the conservation program through an adaptive management framework, in which new information, including monitoring results, is used to enhance effectiveness of the program elements, will reduce the likelihood of such inadvertent take and related impacts.

Finally, Morro shoulderband snail individuals may be killed, injured, or otherwise harmed during implementation of the biological effectiveness monitoring protocols (Section E.2) and also pre-project surveys conducted to minimize impacts of the covered activities by moving individuals from harm's way (Section F.2). Long-term monitoring to examine the effectiveness of the conservation program at achieving the Plan biological goals and objectives (Section 5.1) will entail surveys for Morro shoulderband snail, to evaluate their distribution and abundance within the LOHCP Preserve System (Sections 5.4.2.1 and E.2). Surveys and counts for Morro shoulderband snail might also be used to evaluate the effectiveness of specific habitat restoration projects as part of project-specific monitoring (Section 5.4.2.2). Covered activities on selected parcels will also need to be preceeded by pre-project surveys in which biologists search for Morro shoulderband snails and then move them to suitable habitat that will not be impacted by the project (Section F.2) While these monitoring protocols and pre-project surveys will be conducted by highly-qualified, USFWS-approved biologists following procedures designed to avoid harming individuals, individuals will likely be taken in the form of harming and harassing, and a small number will even be inadvertently injured or killed.

4.2.1.3 Assessment of Net Impacts

The negative effects of the covered activities on Morro shoulderband snail populations will be offset by the beneficial effects that will result from efforts to protect, restore, and manage habitat within the LOHCP Preserve System—the network of protected lands that will be managed and monitored in perpetuity to promote populations of, and habitat conditions for, the covered species (Section 5.3).

In the scenario used for this analysis (Section 5.7.2.3.2), the LOHCP Preserve System will benefit 231 acres of habitat suitable for Morro shoulderband snail (Section 5.8.1; Table 5-10). Specifically, it is anticipated to protect and manage, in perpetuity, 49 acres of habitat suitable for Morro shoulderband snail that is currently unprotected and thus subject to development and other land uses that could degrade it. An estimated six acres of this newly protected habitat will be restored, to re-create habitat conditions where they have been severely degraded by erosion and dense exotic plant infestations (Section 5.7.2.3.2, Table 5-10).

The 386-acre Preserve System will also restore 26 acres of habitat suitable for Morro shoulderband snail and provide additional management for another 193 acres of suitable habitat within existing protected

lands; these parks and reserves feature some of the largest areas of remaining habitat, where additional restoration and management can promote species population sizes and viability. When these existing protected land acreages are multiplied by the mitigation equivalency or crediting ratios that relate the conservation value of acquiring, restoring, and managing new habitat to the value of not implementing the typical covered activity (Section 5.7.2.3.1), a total of 301-acre equivalents of Morro shoulderband snail habitat will benefit from the LOHCP Preserve System (Table 5-10). This reflects the greater quality and long-term viability of the habitat in the Preserve System compared to that which will be impacted by the covered activities. Therefore, protecting, restoring, and managing an equivalent of 139 acres of habitat in the LOHCP Preserve System will more than compensate, for the anticipated loss of 189 acres of habitat for the species due to the covered activities (Table 4-5). For these and other reasons outlined in Section 5.8, implementing the Plan is anticipated to have a large, positive effect for persistence of Morro shoulderband snail including by contributing to recovery.

4.2.2 Morro Bay Kangaroo rat

4.2.2.1 Impacts to Habitat

Covered activities permitted under the LOHCP are not anticipated to permanently impact habitat occupied by Morro Bay kangaroo rat. Suitable habitat for this species is primarily located outside of the USL. In areas of suitable habitat for the species, private development and public and private utility projects will only be permitted under the LOHCP pending a negative visual assessment, or as needed, a negative presence/absence survey (species not found; Sections 5.2.1 and F.1). Moreover, as part of the compensatory mitigation component of the LOHCP conservation program, the Implementing Entity will work with willing landowners to protect remaining private land featuring suitable habitat for Morro Bay kangaroo rat as part of the LOHCP Preserve System (Section 5.3); as a result, fewer covered activities (e.g., private residential development projects) are likely to be conducted than were included in the covered activities and thus take/impacts assessment (Table 2-8).

Suitable habitat for Morro Bay kangaroo rat may be temporarily impacted by fire hazard abatement treatments as part of the CWPP (Section 2.2.7), as well as other fuel breaks created on lands within the Preserve System to protect them from wildfire. Specifically, the creation of the Los Osos fuel break will require thinning plants on the perimeter of the County's Broderson Property and adjacent the Bayview Unit of the Morro Dunes Ecological Reserve, which is owned by the state and managed by CDFW (Figure 2-7). These treatments have the potential to enhance habitat for the endangered species, by removing invasive plants and dead or senescent vegetation, which can create more open habitat conditions preferred by this species.

Habitat suitable for Morro Bay kangaroo rat may be temporarily impacted by habitat management and restoration activities implemented within the LOHCP Preserve System as part of the Plan's conservation program (Section 5.3). Activities that will take place on existing protected lands, as well as new lands protected as part of the LOHCP, will include restoration of eroded areas such as old roads and trails, exotic plant control, and fire management including vegetation management to simulate the beneficial effects of fire (Section 5.3.3). These and other treatments designed to enhance habitat for Morro Bay kangaroo rat in the long term, may have short-term, negative impacts on habitat. These temporary effects can include soil disturbance and removal of native plants, which can temporarily reduce food availability for this herbivorous small mammal.

4.2.2.2 Impacts to Individuals

The covered activities will avoid take of Morro Bay kangaroo rat individuals, which will not be hunted, harmed, harassed, or captured, other than as part of surveys conducted to evaluate presence (Sections 5.2.1 and F.1) and to conduct long-term monitoring (Sections 5.4 and E.5). Prior to implementation of activities within potentially occupied habitat for the species, pre-project visual assessments and then surveys, if warranted, will be conducted to evaluate whether the species is present (Section 5.2.1). If the species is detected, all work will stop immediately, and the project proponents will contact CDFW and the USFWS to discuss project permitting. Take of individuals, in the form of hunting, pursuing, or killing, of this species will not be permitted under this plan (Section 1.4).

4.2.2.3 Assessment of Net Impacts

The short-term, negative effects of the covered activities on Morro Bay kangaroo rat habitat due to implementation of the covered activities will be offset by the long-term benefits that will result from protection, restoration, and management of suitable habitat for this species within the LOHCP Preserve System. Under the LOHCP Preserve Configuration scenario developed for this assessment (Section 5.7.2.3.2), the Preserve System will benefit 240 acres of coastal sage scrub, the preferred habitat for this species, and 110 acres of central maritime chaparral communities, which Morro Bay kangaroo rat can utilize when in an early-successional state. These habitat benefits will be accomplished through the following (Table 5-10):

- protecting and managing an estimated 33 acres of coastal sage scrub and 42 acres of central maritime chaparral communities that are currently unprotected;
- restoring 26 acres of coastal sage scrub and 9 acres of central maritime chaparral in existing protected lands, including through vegetation management projects to promote early successional habitat conditions; and
- actively managing an additional 226 acres of coastal sage scrub and 67 acres of central maritime chaparral communities within parks and reserves where habitat conditions can be improved through enhanced management to meet unmet needs (Section 5.3.3.1).

The covered activities are anticipated to impact just 189 acres of coastal sage scrub, and 18 acres of central maritime chaparral (Table 4-3). Therefore, the 475-acre equivalents of benefits to these communities that are anticipated to occur through implementation of the conservation program will offset the effects of the covered activities at a more than 2:1 ratio (Section 5.8.1 ; Table 5-10). This ratio reflects the anticipated net benefits of the Plan for Morro Bay Kangaroo rat, as the habitat benefited by the conservation program has much higher viability than that which will be impacted by the covered activities. Specifically, of the 207 acres of coastal sage scrub and central maritime chaparral anticipated to be impacted by the covered activities, 166 acres (80%) is anticipated to be inside the Urban Services Line (Table 4-3). Habitat within this already densely developed portion of Los Osos has very little long-term conservation value for Morro Bay kangaroo rat, as the species is highly-sensitive to the effects of habitat fragmentation, including predation by domestic cats and dogs. In contrast, the 475-acre equivalents of habitat benefits resulting from protection, restoration, and/or management of 350 total acres of coastal sage scrub and central maritime chaparral communities in the 386-acre Preserve System (Table 5-10), will all occur in larger, contiguous habitat areas largely outside of the USL, including the Morro Dunes Ecological Reserve where the species was last observed. Restoration and

active management of this and other high-quality habitat areas are necessary to recover Morro Bay kangaroo rat (USFWS 1999, Section 5.8).

4.3 Anticipated Impacts on Covered Plants

The following sections integrate the qualitative assessment of indirect effects and quantitative and qualitative assessments of direct effects to characterize the anticipated impacts of the covered plant species.

4.3.1 Morro Manzanita

4.3.1.1 Impacts to Habitat

The covered activities will impact an estimated 40 acres of habitat suitable for Morro manzanita (Tables 4-4 and 4-5, Figure 4-2). This is the area of central maritime chaparral, as well as coast live oak woodland—the mapped vegetation types that can support the species—that are anticipated to be impacted by the covered activities, excluding the conservation program and CWPP (Tables 4-3 and 4-4). This represents just over five percent of the species total habitat (798 acres) within the Plan Area; 491 acres (62%) is within existing protected lands, and an additional 98 acres (12%) is anticipated to be protected through implementation of the Plan's conservation program (Table 5-10).

Implementation of the CWPP is anticipated to impact an additional 29.0 acres of Morro manzanita habitat, 19.1 acres of which are anticipated to be modified under the Plan for the first time; the remaining 9.8 acres have been previously modified and will just be treated to maintain the desired conditions (Section 2.2.7). In these areas, fuel reduction treatments may actually benefit Morro manzanita by stimulating seed germination and creating open canopy, bare mineral soil conditions that can promote seedling establishment. Conversely, these treatments may degrade habitat for Morro manzanita if they promote the invasion and spread of exotic plants, though these indirect negative effects can be prevented through follow-up invasive plant removal.

The estimated area of suitable habitat that will be impacted by the covered activities is greater than the actual acres covered by the Morro manzanita, as the species does not occupy the entire area of suitable habitat; most notably, the species likely occurs at only limited abundance within the 22.5 acres of coast live oak woodland that are anticipated to be impacted (Table 4-3). Coast live oak woodland was included as 'habitat' (Table 4-4) for purposes of this analysis, as the Morro manzanita occurs at low frequency and abundance in this community (Section 3.1.5.2.3). Moreover, some projects occurring on parcels supporting the Morro manzanita habitat can be sited so the project disturbance envelope avoids suitable habitat.

The impacts to suitable habitat for Morro manzanita are anticipated to occur nearly evenly inside (20.6 acres) and outside (19.5 acres) of the USL (Table 4-5, Figure 4-2). This results from inclusion of coast live oak woodland as Morro manzanita habitat; 67% of total impacts the central maritime chaparral communities, where the species occurs at greatest frequency and abundance, will occur outside the USL (Table 4-3). There, the impacts primary impacts will result from single-family residential development. Shrubs within the building footprint will be removed, as might some Morro manzanita individuals within the 100-foot area around structures in which woody vegetation must be well-spaced in order to maintain defensible space for fire safety (Section 2.2.4).

Of the 41 acres of habitat to be impacted, 5 acres (12%) is anticipated to be temporarily impacted. This represents the area adjacent to, or in the access path of, the improvement area, which will be degraded as a result of construction but will be restored to the pre-project or better habitat condition in order to minimize effects on the covered species (Section 5.2).

4.3.1.2 Impacts to Individuals

The covered activities will impact Morro manzanita individuals that occur within the disturbance envelopes of projects that are sited in areas where the species cannot be avoided. Established individuals will be killed as will viable dormant seed in the areas permanently covered by development, other impervious surfaces, and landscaping elements that are not conductive to the species (e.g., turf grass, weed matting etc.). Implementation of the CWPP minimization measure, which precludes removal of Morro manzanita and requires that canopy thinning and limbing be minimized (Table 5-4), will limit impacts to individuals associated the fire hazard abatement treatments within the CWPP (Section 5.2.4); however, some mortality may result from this covered activity. Overall, the number of individuals is impossible to predict for this programmatic plan and will likely vary for each covered activity depending on the nature of activity and the condition of the habitat that it affects.

Individual Morro manzanita may also be impacted during implementation of the conservation program. Individuals could experience die back (loss of biomass) or mortality due to use of herbicides to control invasive plants. The potential for this will be reduced through implementation of elements of an integrated pest management approach to exotic plant control, in which: 1) non-chemical treatments are used in areas supporting Morro manzanita, wherever possible, and 2) chemical treatments deemed necessary to achieve the management objectives are conducted using techniques that will prevent chemical contact with Morro manzanita, such as cut stump treatment or wicking, and foliar spray only away from Morro manzanita and when winds are calm.

Adult Morro manzanita shrubs are also anticipated to be killed by fire or fire surrogates—treatments that simulate the beneficial effects of fire, including mechanical vegetation removal. These treatments will be used to maintain the mosaic of natural communities of the Baywood fine sands ecosystem and promote regeneration of Morro manzanita and Indian Knob mountainbalm, among other fire-dependent species (Section D.3). These direct, negative, short-term impacts to the individuals are anticipated to promote long-term persistence of the populations by facilitating regeneration through germination of seeds of this obligate seeding plant from the soil seed bank (Section B.2.3). Fire and fire surrogates have the potential to facilitate the invasion and spread of exotic plants that are adapted to such disturbance and the conditions it creates (Section D.3.1.2). Accordingly, fire and fire surrogate treatments will be monitored to evaluate the establishment of exotic plants, and remedial treatments employed to limit exotic plant competition with Morro manzanita seedlings and other native plants. Other habitat management and restoration treatments, including revegetation of denuded areas, and control of exotic plants such as eucalyptus, will similarly enhance habitat for this covered species (McGraw 2020; Appendix M).

4.3.1.3 Assessment of Net Impacts

The negative impacts of the covered activities on Morro manzanita are anticipated to be greatly outweighed by the positive effects of implementation of the conservation program. The ratio of habitat

benefits to impacts for Morro manzanita is more than 8 to 1 (Section 5.8.1, Table 5-10). While the covered activities are anticipated to impact just 41 acres of habitat (Table 4-4), the Preserve System, which will contain 263 acres of Morro manzanita habitat, is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (Chapter 8, Table 8-1). These benefits are anticipated to be accrued by the following aspects of the LOHCP conservation strategy (Table 5-10):

- Protecting 51.7 acres of habitat, of which approximately 5 acres will be restored and managed, and the remainder will be actively managed to address threats;
- Restoring 22.3 acres of habitat for this species within existing protected lands, including by conducting fire management to promote regeneration of the populations, as needed; and
- Actively managing an additional 189 acres of suitable habitat, to address factors that can degrade it including exotic plants.

The skewed ratio for Morro manzanita habitat benefits to impacts reflects the far greater proportion of central maritime chaparral habitat and to a lesser extent, coast live oak woodland, located in the Priority Conservation Area, where the Preserve System will be assembled, compared to the anticipated disturbance envelopes of the covered activities, which are largely within the USL (Table 5-10). The ratio of habitat benefits to impacts for central maritime chaparral is 8.5 to 1; for every acre of these communities that will be impacted, 8.5-acre equivalents will be benefited in the LOHCP Preserve System (Chapter 8, Table 8-1).

In addition, implementation of the LOHCP will have a strong net positive effect on Morro manzanita by funding long-term, active habitat management in an adaptive management framework, which is essential to ensure long-term persistence and recovery of this narrowly endemic, fire-adapted species. Fire or fire surrogates will be needed to maintain persisting populations of Morro manzanita; however, funds necessary to implement such intensive treatments are often not available. Moreover, the LOHCP provides a mechanism for coordination among landowners and agencies that is necessary to carry out such projects, which can have deleterious impacts on some species, at least in the short term. As a result, implementing the Plan is anticipated to have a large, positive effect for persistence of Morro manzanita including by contributing to recovery (Section 5.8).

4.3.2 Indian Knob Mountainbalm

4.3.2.1 Impacts to Habitat

The covered activities will impact an estimated 18 acres of habitat that is suitable for Indian Knob mountainbalm. This is the area of central maritime chaparral communities that is anticipated to be impacted by the covered activities other than the conservation program and CWPP (Table 4-3). Fire hazard abatement projects conducted to implement the CWPP are anticipated to impact an additional 20.9 acres of central maritime chaparral habitat which may be suitable for Indian Knob mountainbalm. The vegetation removal projects are anticipated to largely improve habitat conditions for this early-successional species, by mimicking the beneficial effects of a fire and creating more open canopy, bare mineral soil conditions which may promote plant establishment. However, the fuel reduction treatments may degrade habitat for Indian Knob mountainbalm if they promote the invasion and spread of exotic plants, though these indirect negative effects can be prevented through follow-up exotic plant control treatments.

4.3.2.2 Impacts to Individuals

The covered activities will not directly impact Indian Knob mountainbalm individuals, which will be avoided in this Plan. A 2016 survey in Los Osos found Indian Knob mountainbalm individuals occur in only two patches within the Plan Area, in the southeastern corner of the Bayview Unit of the Morro Dunes Ecological Reserve, which is owned by the state and managed by CDFW (Section 2.1.3.2.1); the species was not observed in the historic occurrence mapped within the County's Broderson Property (USFWS 2016).

The only covered activities anticipated to occur on the Morro Dunes Ecological Reserve are construction of the Los Osos fuel break as part of the CWPP (Figure 2-7), establishment of other fuel breaks needed to protect the Preserve lands from wildfire, and implementation of habitat restoration and management as part of conservation strategy for the Plan. To prevent impacts to individual Indian Knob mountain balm, which would constitute take under CESA and is not covered in this Plan or the ITP (Section 1.4), pre-project surveys for Indian Knob mountainbalm will be conducted prior to implementation of the CWPP, the conservation program, and any other projects within suitable habitat for the species (Section 5.2). If the species is present, the project proponent must take steps to avoid direct effects to individual plants as the County is not requesting a state incidental take permit for this species and therefore will avoid all direct impacts to individuals (Section 1.4).

To prevent die back (loss of biomass) or mortality due to use of herbicides to control invasive plants, herbicides will be applied using techniques that will prevent their contact with Indian Knob mountainbalm, such as cut stump treatment or wicking; foliar spray will only be permitted when winds are calm and will not be allowed within 50 feet of Indian Knob mountainbalm individuals.

If take of Indian Knob mountainbalm individuals cannot be avoided during implementation of the LOHCP conservation program, the County will contact the USFWS and CDFW to discuss project permitting requirements. Should the agencies determine that implementation of the conservation program may cause mortality to Indian Knob mountainbalm individuals, the County will first obtain a separate permit from the state, such as a state scientific, educational, or management permit issued pursuant Section 2081(a) of CESA. Such permits can be issued to cover restoration treatments designed to increase the size and thus viability of the population within the Plan Area and that would involve take of individuals, including the collection of seeds or cuttings to propagate plants that will be outplanted into suitable habitat. A state scientific, educational, or management permit would also be needed to cover any take of individuals resulting from the use of fire or fire surrogates to stimulate reproduction and create open habitat conditions that may promote regeneration. Such direct, negative, short-term impacts to individual Indian Knob mountainbalm plants, which are anticipated to be outweighed by the long-term benefits of the treatments and increase the population size and promote its viability, would need to be permitted through a separate state permits. Implementation of activities that result in take of individual Indian Knob mountainbalm (as defined under CESA) would also require reinitiating consultation with the USFWS for the LOHCP and ITP and may require a major amendment to the Plan (Section 6.7.3).

4.3.2.3 Assessment of Net Impacts

Like Morro manzanita, Indian Knob mountainbalm will benefit in the long-term from the protection of the central maritime chaparral habitat, which provides suitable habitat. The LOHCP Preserve System is anticipated to protect an additional 42.2 acres supporting central maritime chaparral communities.

When combined with the restoration of 8.5 acres and the management of 58.9 acres of central maritime chaparral within existing protected lands, the conservation program will benefit 155.5-acre equivalents of this endemic community which provides habitat that is potentially suitable for Indian Knob mountainbalm (Table 5-10). The covered activities will impact an estimated 18 acres of habitat, of which six acres are expected to be inside the densely developed Urban Services Line are (Table 4-3) where the active habitat management required to recover this species will be more difficult.

In addition to the anticipated more than 8-to-1 ratio of habitat benefits to impacts for central maritime chaparral, the LOHCP will promote recovery of Indian Knob mountainbalm by implementing management required to promote population growth, including fire management, that could increase the species distribution and abundance and thus promote long-term persistence. As a result, implementing the Plan is anticipated to have a positive effect for persistence of Indian Knob mountainbalm including by contributing to recovery (Section 5.8).

4.4 Effects on Critical Habitat

Under the federal Endangered Species Act, critical habitat is defined as "the specific areas within the geographic area occupied by a species on which are found those physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and specific areas outside the geographic area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species."

The LOHCP features critical habitat that has been designated for Morro shoulderband snail and Morro Bay kangaroo rat. In addition, the Plan Area features a 1.5-acre strip of area designated as critical habitat for the Western snowy plover (*Charadrius alexandrinus nivosus*). This area is at the toe of the inland slope of the Morro Sand Spit on the extreme western boundary of the Plan Area within the Morro Dunes Natural Preserve in Montaña de Oro State Park. This area located outside of the LOHCP Permit Area (Section 1.3, Figure 1-2) and consequently will not be affected by the Plan's covered activities; therefore, it is not discussed further.

4.4.1 Morro Shoulderband Snail

Critical habitat was designated for Morro shoulderband snail on February 7, 2001 (USFWS 2001). Located entirely south of the City of Morro Bay, the area designated consists of land contained within three disjunct units that total 2,576 acres[17] (Figure 4-3; USFWS 2001):

- **Unit 1-Morro Spit and West Pecho:** This 1,831-acre unit includes the Morro Bay sand spit and foredune south toward Hazard Canyon in Montaña de Oro State Park, as well as the coterminous area west of Pecho Valley Road. The protection and recovery of this unit is essential to maintain the genetic diversity of the Morro shoulderband snail.
- **Unit 2-South Los Osos:** This 330-acre unit features critical habitat south of the residential area along Highlands Drive and north of the lower slopes of the Irish Hills. At the time of

[17] This is the acreage in a geographic information system shapefile produced by the USFWS, which was used in the spatial analysis for this Plan. The acreage differs slightly from the 2,556 acres listed in the critical habitat designation (USFWS 2001).

designation, this area contained what was considered to be a core population that could be expanded, and threats to the species reduced, with appropriate management.

- **Unit 3-Northeast Los Osos:** This 414-acre unit includes undeveloped areas between Los Osos Creek on the east and development on the west. The protection and recovery of this unit is essential to maintain the genetic diversity within the species and conserve the full range of ecological settings within which it occurs.

Of the total 2,575 acres of Morro shoulderband snail designated critical habitat:

- 2,192 acres (85%) is within existing protected lands, including Montaña de Oro State Park and Morro Dunes Ecological Reserve (Unit 1), the Broderson Parcel and the Bayview Unit of the Morro Dunes Ecological Reserve (Unit 2), and Morro Bay State Park and the Elfin Forest Natural Preserve (Unit 3; Figure 4-3); and
- 1,594 acres (62%) is located outside of the Plan Area.

Of the 981 acres (38%) inside the LOHCP Area, 695 acres (71%) is within existing protected lands. Of the 286 acres (29%) of designated critical habitat that is within the LOHCP Area and is not protected, approximately 87% is within the 412 already developed parcels; the remaining 13% lies within just 60 undeveloped parcels that feature land that is all or partially designated as critical habitat for Morro shoulderband snail. While private parcels of relatively high conservation value will be targeted for protection as part of the LOHCP conservation program (sections 5.3.2 and 6.2.2), the LOHCP will also cover private development and other public and private infrastructure projects in these areas. Based on the maximum disturbance envelope and parcel size distribution, development of vacant parcels could remove up to 37.5 acres of additional designated critical habitat for Morro shoulderband snail. Residential redevelopment projects, which are assumed to affect 10% of the residentially developed parcels, could impact another 14.2 acres. Finally, small public and private utility projects (e.g., road or pipeline work along South Bay Boulevard), as well as perhaps construction of the Los Osos Perimeter trail, and as some facilities maintenance projects have the potential to impact an estimated 2 acres of MSS critical habitat. In total, the covered activities are estimated to impact up to 53.7 acres of MSS critical habitat within the LOHCP Area.

Importantly, some of the land within the unprotected parcels lacks the physical and biological features that are essential to conservation of the species. These primary constituent elements are "sand or sandy soils needed for reproduction, a land slope not greater than ten percent to facilitate movement of individuals, and the presence of native coastal sage scrub vegetation, which was defined as typically but not exclusively represented by "California goldenbush, buckwheat, *Eriastrum,* chamisso lupine and *Dudleya*; and in more inland locations by California sagebrush, coyote brush and black sage" (USFWS 2001).

Implementation of the LOHCP conservation program will enhance critical habitat for Morro shoulderband snail in all three units, by contributing to the restoration and management of the existing protected lands with the exception of the Broderson property, which the County is managing as part of a separate habitat management plan (SWCA 2012). In doing so, the LOHCP will help achieve the objectives for designating the three units (USFWS 2001). The LOHCP conservation program may also protect additional designated critical habitat, through fee title acquisition or through on-site habitat set-asides dedicated as part of partial residential development of the remaining private parcels described above.

4.4.2 Morro Bay Kangaroo Rat

Critical habitat was designated for Morro Bay kangaroo rat in April 1977 (USFWS 1977). The single 689-acre unit includes the southern portion of the Morro Bay sand spit and adjacent habitat west of Pecho Valley Road (Figure 4-3); specifically, the southern half of section 14 and portions of Sections 23 and 24 that are west of Pecho Valley Road in T30S R10E of the Mount Diablo Base and Meridian.

The critical habitat is largely contained within the Morro Dunes Ecological Reserve and the northern portion of Montaña de Oro State Park, much of which is designated as part of the Morro Dunes Natural Preserve (Figure 4-3). Of the 672 acres contained within parcels (the remainder is outside of the parcel GIS database), 629 acres (94%) of the critical habitat area is already protected. An estimated 43 acres is within adjacent private land located west of Pecho Valley Road. Of this, 27 acres is contained in a total of eight vacant parcels, one of which is greater than five acres. Zoned for single-family residential land use, development of these parcels as part of the LOHCP could result in a loss of 3.9 acres of critical habitat. An estimated 1.6 acres of additional impacts to critical habitat for Morro Bay kangaroo rat could result from redevelopment on the 18 already-developed parcels, which total 16 acres, based on the estimate of 10% of the area to be further impacted by redevelopment (Table 2-1). Finally, construction of the Los Osos Perimeter Trail (Table 2-8) could impact a small area (i.e., 1.2 acres assuming the trail is one mile long and ten feet wide) though the alignment of this trail has not been determined. In total, the covered activities are estimated to impact 6.7 acres of critical habitat for Morro Bay kangaroo rat.

Implementation of the LOHCP conservation program will enhance critical habitat for Morro Bay kangaroo rat by contributing to the restoration and management of the Morro Dunes Ecological Reserve, which is proposed for inclusion in the LOHCP Preserve System (Table 5-5). The LOHCP conservation program may also protect additional designated critical habitat, through fee title acquisition or through on-site habitat set-asides dedicated as part of partial residential development of the remaining private parcels described above.

4.5 Cumulative Impacts

4.5.1 Analysis

The cumulative impacts are the incremental effects of the LOHCP taken together with the impacts of past, present, and reasonably foreseeable future actions, as required under NEPA (40 CFR 1508.7). In contrast with the analysis of cumulative impacts under Section 7 of the ESA, NEPA analysis of cumulative impacts accounts for incremental impacts of the action on the environment when added to other past, present, and reasonably-foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. The geographic area for analysis may be defined by the manifestation of direct or indirect impacts as a result of covered activities.

Under ESA Section 7 regulations, cumulative impacts are limited to the effects of future state or private actions that are reasonably certain to occur within the action area (50 CFR 402.02); the cumulative effects of federal projects, including projects that require federal permits or are federally funded, will be considered in future Section 7 consultations. In addition, the EIR/EA for the LOHCP presents a thorough analysis of the cumulative effects of all projects, federal and non-federal, when combined with the effects of the Plan. The internal consultation by the USFWS for the LOHCP will also address the Plan's cumulative effects.

4.5.2 Current Projects Not Covered by the LOHCP

The cumulative impacts of the LOHCP include the effects of prior projects causing take of Morro shoulderband snail permitted under individual low-effect HCPs. Eighteen HCPs affecting a total of 42.3 acres have been permitted by the USFWS and are in various stages of implementation in the Plan Area. In addition, California State Parks prepared an HCP in support of an incidental take permit for 0.41 acres of impacts to Morro shoulderband snail within Morro Bay State Park outside of the LOHCP Area (California State Parks 2008).

These projects are similar to the activities covered in this Plan, and therefore will likely have similar direct and indirect, permanent and temporary effects on Morro shoulderband snail (Section 4.2.1). The impacts of these projects will be mitigated through implementation of their respective conservation programs, which include habitat protection, restoration, and contributions to an in-lieu fee program which will fund projects to promote recovery of this species. Given their moderate size, and the occurrence of some in existing developed parcels that feature degraded habitat (e.g., Tenera 2010), the impacts of these projects, when considered with those of the LOHCP covered activities, are not anticipated to negatively influence recovery of Morro shoulderband snail or the other covered species.

Three prior HCPs are within designated critical habitat for Morro shoulderband snail, where they will impact up to 4.65 acres within the three units of critical habitat, with one project occurring in each unit.

Overall, the loss of 4.65-acres of critical habitat through the low-effect HCPs, when combined with the anticipated impacts of the LOHCP covered activities of approximately 53.7 acres of critical habitat, is not anticipated to degrade the overall function of the critical habitat for Morro Shoulderband snail, as 85% of critical habitat is protected within existing protected lands (Section 4.4.1) and the LOHCP will restore and manage critical habitat within the Morro Dunes Ecological Reserve, and help protect additional critical habitat in the Priority Conservation Area as part of the LOHCP Preserve System (Section 5.3).

4.5.3 Future Activities Not Covered by the LOHCP

Cumulative impacts also include the effects of future activities not covered by the Plan. The County does not anticipate any additional projects that will impact the covered species in the Plan Area, other than the covered activities (Section 2.2) and those activities that are specifically not covered by the Plan (Section 2.3). As part of work to develop this regional plan, the County contacted local and state agencies and private organizations that manage land within the Plan Area, to ascertain whether they anticipate conducting activities, including ongoing maintenance and operations and capital projects, that would impact the covered species. The activities identified by these entities were all included in the covered activities (Section 2.2). Take or impacts caused by activities on Bureau of Land Management Lands cannot be covered by an incidental take permit issued pursuant Section 10 of ESA and must instead be covered through the Section 7 consultation with the USFWS. The USFWS does not expect any take to occur on the 5-acre BLM parcel, which was also excluded from the potential LOHCP Preserve System (Section 5.3.3.1.2).

Soil-disturbing activities not covered by the LOHCP, including agricultural activities and activities for which the County does not issue permits, such as landscaping, have the potential to further impact the covered species directly and indirectly, causing both permanent and temporary impacts. Such projects

are anticipated to primarily impact Morro shoulderband snail, by causing direct mortality to individuals as well as temporary and permanent loss of habitat, as this species inhabits existing developed parcels and other degraded habitat areas. These activities will generally impact a small number of isolated individuals of Morro manzanita, which remain within existing developed areas. Non-covered activities may also affect suitable habitat for these and other covered species.

The magnitude of these effects is unknown though in general, they are anticipated to affect a small amount of habitat, most of which is highly degraded and lacks long-term conservation value due to its poor landscape context (i.e., fragmented nature and location within existing developed areas). The cumulative impacts of these activities, when considered along with the LOHCP covered activities and the impacts of other projects permitted through low-effect HCPs, are not anticipated to influence recovery of the covered species. Instead, implementation of the LOHCP conservation program as outlined in the next section of the Plan, is anticipated to have a net benefit for the covered species.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
County Parks and Recreation Department		
New Park in Los Osos	County Parks plans to build an approximately 10-acre park in a yet to be determined location likely within the Urban Services Line (USL).	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land within the USL. Because the project was anticipated to affect only undeveloped, upland vegetation types; impacts to developed areas and the County right-of-way (right-of-way), as well as wetland and riparian vegetation types and water were excluded. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Aquatic Center	County Parks plans to build 3.5-acre aquatic center in an undetermined location likely within the USL	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land within the USL. Because the project was anticipated to affect only undeveloped, upland vegetation types; impacts to developed areas and the right-of-way, as well as wetland and riparian vegetation types and water were excluded. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Los Osos Community Park Expansion	Count Parks plans to expand the Los Osos Community Park, which is estimated to impact the remaining undeveloped 1.6 acres on the parcel.	Impacts were allocated to the vegetation and other land cover types mapped within the project footprint. Habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Boat Ramp	County Parks plans to build a boat ramp, which is estimated to impact 1.5 acres of habitat near the Morro Bay shoreline.	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land located within 150 feet of the shoreline inside the USL. Impacts from this activity excluded developed areas and the right-of-way, as well as open water, where this project is unlikely to occur. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as this area will be restored.
Coastal Access	County Parks plans to build 14 coastal access routes (i.e., trails to the coast), which would require some vegetation clearing and sign installation. Each route was estimated to be 200 feet long and 7-feet wide creating a cumulative 0.45-acre footprint.	Impacts of 13 routes located inside the USL were distributed proportionally to the vegetation and other land cover types mapped within 150 feet of the shoreline between Montaña de Oro State Park and Elfin Forest Natural Preserve. Impacts for the other route, which is in the vicinity of Costa Azul Drive outside the USL, were assigned to the vegetation mapped within the anticipated access area. This activity was not anticipated to affect developed areas, rights-of-way or open water. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Within the project footprints, the habitat impacts from these activities are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
New Paths and Trails	County Parks plans to create sixteen new trails in the LOHCP Area. Of these, two are anticipated to be entirely within intact open space, five are expected to occur near existing streets, and nine are likely to be near existing streets but affect adjacent open space. To estimate the total area affected, each trail's approximate length was multiplied by 15 feet and rounded to the nearest quarter acre, resulting in a total 49.05-acre project footprint.	Impacts were assessed separately for trails occurring near existing streets and trails occurring within open space. Impacts within the 19.3-acre total footprint of trails anticipated to be constructed within open space were distributed proportionally to vegetation and other land cover types mapped outside the USL, excluding the following types in which trails are not likely to be built: wetland and riparian vegetation, open water, and developed areas and rights of way. The 29.75-acre total footprint of trails near existing streets was estimated to be comprised of 25% developed areas and 25% right-of-way. The remaining 50% of the impacts were distributed proportionally to the vegetation and other land cover types mapped within the USL, excluding wetland and riparian vegetation and open water which presumably will be avoided. Within the project footprints, the habitat impacts from trail construction are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.
County Public Works Department		
Road Expansion	County Public Works plans to expand existing roads, to install turn lanes, and widen and realign roads in a 22-acre footprint of the existing right-of-way.	Impacts of road expansion were allocated to the right-of-way. Within the project footprints, the habitat impacts from road expansion are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
New Roads	County Public works plans to extend Ramona and Doris avenues by 1,013 feet and 686 feet, respectively. They estimate Ramona Avenue would impact an 85-foot-wide area, and Doris Avenue would affect a 45-foot-wide area, resulting in a total 2.7-acre footprint for new roads.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the project footprint. The habitat impacts from road construction are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Bike Lanes	Public Works plans to install bike lanes in an 8-acre portion of the existing right-of-way.	Impacts of bike land construction were allocated to the right-of-way. Within the project footprints, the habitat impacts are assumed to be 60% permanent, as this is the portion of the outer roadway that will be converted or chronically disturbed, and 40% temporary as this area will be restored.
New Drainage Basins	Public Works plans to create 7 new drainage basins totaling 11.4 acres.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the anticipated project footprints, which were mapped by County Public Works. Any impacts to riparian and wetland vegetation located within these areas will not be covered by the LOHCP. The habitat impacts from drainage basin construction are anticipated to be 90% permanent, as this portion will be chronically disturbed through basin maintenance activities, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Bioswales	Public Works plans to install new bioswales in the existing right-of-way that would impact approximately 6.6 acres.	Impacts of this activity were allocated to the right-of-way. As the bioswales can be revegetated, their construction was assumed to result in just 20% permanent impacts and 80% temporary impacts to the affected habitat.
Drainage Improvements	Public Works plans to implement drainage improvements throughout the right-of-way, which are estimated to affect a 7-acre area.	Impacts of drainage improvements were allocated to the right-of-way. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost or chronically disturbed through ongoing maintenance, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Road Maintenance	Public Works anticipates conducting annual road maintenance, including resurfacing roadways and vegetation management along roadsides, which would impact 5 acres.	Impacts of road maintenance were allocated to the right-of-way, where habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
Maintain Drainage Basins	Public Works will annually maintain 10 sediment basins that total 4.9 acres, through removal of soil and vegetation management to maintain capacity.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the footprints of the drainage basins. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Habitat impacts associated with maintenance of drainage basins were assumed to be 100% permanent, as the affected area will be disturbed annually (rather than affected then restored).
County Library Department		
Expansion of Los Osos Public Library	The County Library Department plans to expand the Los Osos Public Library, which is estimated to affect the 0.57-acre undeveloped area around the existing facility.	Impacts to vegetation were based on the acres of each type mapped within the project footprint. The habitat impacts from library expansion are anticipated to be 90% permanent, as this portion will be lost or chronically disturbed through maintenance activities, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Los Osos Public Library Grounds Maintenance	The County conducts monthly vegetation management and associated activities to maintain approximately 0.4 acres of the grounds around the existing library.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the library parcel that are outside of the library expansion project footprint. Habitat impacts associated with grounds maintenance were assumed to be 100% permanent, as the affected area will be disturbed chronically.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Los Osos Community Services District (LOCSD)		
Pipeline Projects	The LOCSD plans to build and maintain pipelines within the right-of-way. Installation and maintenance of the 2 to 16-inch-wide pipes were estimated to impact a 3.5-foot-wide area; based on their cumulative length, the projects are estimated to impact 2.6-acres.	Impacts from pipeline projects were allocated to the right-of-way, where this activity will be located. Within the project footprint, 40% of the habitat will be permanently impacted by an estimated 16-inch diameter pipe; the 60% temporary impacts reflect the adjacent area disturbed during construction that will be restored.
Ferrell Well Loop Upgrade	The LOCSD plans to disconnect a decommissioned well from the distribution system, which will impact a 1-acre area within the project parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within the parcel boundary. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Upper Aquifer Well at 8th & El Moro Yard	The LOCSD plans to drill a new upper aquifer well and install appurtenances, such as a skid-mounted nitrate removal equipment with a brine tank. The LOCSD estimates the project will impact the entire 0.5-acre parcel where it will occur.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Water Tank at Highland Drive and Alexander	The LOCSD plans to install a new water tank that would impact the entire 0.11-acre target parcel.	Impacts were allocated to the vegetation and other land cover type mapped within the project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
South Bay Upper Aquifer Well Nitrate Removal/Blending Project	The LOCSD plans to construct a 0.01-acre brine storage tank on a skid mounted unit within the right-of-way.	Impacts of the new facility were allocated to the right-of-way, where the habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
New Expansion Well	The LOCSD will install an expansion well on the north end of Sage Avenue as part of the Basin Management Plan. The project footprint was assumed to include a 0.023-acre area for the well and an additional 0.4-acre area for the pipeline (5,000 lineal feet x 3.5-foot-wide area of impact).	Impacts were allocated to the vegetation and other land cover types mapped within the intended project area. The habitat impacts are anticipated to be 33% permanent impacts (well footprint and 12" pipeline) and 67% temporary (disturbed area adjacent to the well and pipeline).
New Community Nitrate Removal Facility	The LOCSD and Golden State Water (GSW) intend to install a facility to remove nitrates from upper aquifer water supplies in a location identified in the Basin Plan for the Los Osos Groundwater Basin (2015).	The project was assumed to impact a 0.023-acre area. Within this area, impacts were distributed proportionally to the vegetation and other land cover types mapped within the anticipated project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Vegetation Management	The LOCSD plans vegetation maintenance including fuel reduction and tree trimming on 8 parcels totaling 4.9 acres.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the parcels where the LOCSD conducts vegetation management, excluding the area that will be affected by sediment basins, facilities maintenance, or capital projects, for which impacts were estimated separately. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Due to the chronic disturbance they cause, vegetation management impacts were characterized as permanent.
Maintain Drainage Basins	The LOCSD plans to annually remove soil and vegetation to maintain the capacity of its 5 drainage basins which total 4 acres.	Impacts were allocated to the vegetation and other land cover types mapped within the basin footprints, three of which were supplied by County Public Works; the other two were digitized based on recent aerial images. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Due to the chronic disturbance required to maintain them, sediment basin impacts to habitat were identified as permanent.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Facilities Maintenance	The LOCSD plans to conduct facilities maintenance including repairing storage tanks, booster pumps, generators, and other types of equipment and buildings on 7 of parcels totaling 2 acres.	Impacts were distributed proportionally to vegetation and other land cover types mapped within parcels in which the LOCSD maintains facilities. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Due to the chronic disturbance they cause, facilities maintenance impacts were characterized as permanent.
CAL FIRE/Los Osos Community Services District		
Los Osos Community Wildfire Protection Plan	CalFire plans to conduct fuel hazard abatement projects in an 89.4-acre area at the wildlife-urban interface.	Impacts were assessed using the shapefile for the proposed project area (Figure 2-7). The area was assumed to be temporarily impacted. It was not included in the overall calculation of acres of habitat to be impacted, which was used to calculate the compensatory mitigation need, because the CWPP projects are assumed to have negligible impacts after implementation of project-specific avoidance and minimization measures (Table 5-4).
Golden State Water Company (GSW)		
Blending Project	As described in the Basin Plan for the Los Osos Groundwater Basin (2015), GSW plans to install pipelines to connect its lower aquifer Rosina and upper aquifer Skyline wells to the community nitrate removal facility. The total 3,254-foot-long pipelines are estimated to affect a 3.5-foot-wide area, and thus impact 0.261 acres.	Impacts of the pipelines were allocated to the right-of-way, where they are expected to be installed. Of the project footprint, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Well Construction	The Basin Plan for the Los Osos Groundwater Basin (2015) states that GSW plans to construct a new upper aquifer and a new lower aquifer well within its service area, which would also require installation of a pipeline to connect the well to the water system	The well footprints were estimated to be 1,000 square feet (0.023 acres) each. The pipeline footprints were estimated to be 0.104 acres each based on the dimensions provided for the pipeline of the new aquifer well (1,300 lineal feet x 3.5-foot-wide area of impact). Impacts within the cumulative 0.254-acre footprint were distributed proportionally to vegetation and other land cover types mapped within the GSW service area, excluding wetland and riparian vegetation and open water which presumably will be avoided. The vegetation impacts were distributed according to the percentages of the GSW service area located inside the USL (65%) and outside the USL (35%). Within the project footprint, habitat impacts were assumed to result in 41% permanent impacts from the well and pipe footprints; the remaining 59% will be restored and assumed to be temporary.
New Expansion Well	As described in the Basin Plan for the Los Osos Groundwater Basin (2015), GSW plans to install an expansion well located in the vicinity of Sunny Oaks Mobile Home Park south of Los Osos Valley Road. The project footprint was assumed to include a 0.023-acre area for the well and an additional 0.2-acre area for the pipeline (2,400 lineal feet x 3.5-foot-wide area of impact).	Impacts within the cumulative 0.22-acre footprint were distributed proportionally to vegetation and other land cover types mapped within the GSW service area, excluding wetland and riparian vegetation and open water which presumably will be avoided. The vegetation impacts were allocated to within the USL, where the well is anticipated to be located. Within the project footprint, habitat impacts were assumed to be 36% permanent due to the well and pipe footprints; the remaining 64% will be restored and was assumed to be temporary.
Los Osos Valley Road Main Upgrade	To accommodate increased flows from new wells and well expansion, GSW plans to replace a 1,757-foot-long segment of the Los Osos Valley Road water main between Sea Oaks Drive and Tierra Drive with a larger, 12-inch diameter pipe.	Impacts of the water main were allocated to the right-of-way, where it is located. The project footprint is estimated to be 0.14 acres (1,757 lineal feet x 3.5-foot-wide area of impact). Of this, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Major Plant Site Maintenance	Golden State Water anticipates 2.8 acres of impacts within their 10 facilities, which total 4.6 acres, will be further impacted through major plant site maintenance, including repairing water tanks, booster pumps, and filtration units, as well as building maintenance.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the GSW's seven parcels and three additional facilities. Impacts to riparian and wetland vegetation and open water within the project footprints will not be covered by the HCP. Of the 4.6 acres impacted, 65% are anticipated to occur within the USL (3 acres) and 35% (1.6 acres) outside the USL. The habitat impacts were estimated to be 90% permanent due to major site and facility repair, and 10% temporary due to disturbance of adjacent habitat which will be restored.
Meter Box Maintenance	Golden State Water plans to maintain 2,673 meter boxes approximately twice per year by cleaning them out, maintaining the surrounding area, and replacing the meters and boxes as needed. This activity is estimated to impact 9 square feet per meter box or 0.552 acres total.	Because meter boxes are located on private development near the right-of-way, 40% of impacts were allocated to developed areas and another 40% of impacts were allocated to the right-of-way. To estimate the impacts to adjacent habitat, the remaining 20% of impacts were distributed to upland vegetation types to reflect potential impacts to adjacent habitat. The vegetation impacts were distributed according to the percentages of the GSW service area located inside the USL (65%) and outside the USL (35%). The impacts of this activity were characterized as permanent, as ongoing maintenance of meter boxes will result in chronic disturbance of the habitat.
Flush Water Mains	On an ongoing basis, GSW plans to flush pipelines, hydrants, and wharf heads. These activities are estimated to impact a total of 3,000 square feet (0.07 ac.), with each event affecting 100 square feet.	Impacts from flushing water mains were allocated to the right-of-way where water mains occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
Water Main Repair and Replacement	Based on its historic records, GSW anticipates 2,000 square feet (0.046 ac.) of vegetation will be impacted by the maintenance of water mains within their service area.	Impacts from repairing and replacing water mains were allocated to the right-of-way where water mains occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain the pipelines.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Fire Hydrant Maintenance	Golden State Water indicated they would maintain 248 fire hydrants approximately once per year, through cleaning, painting, and testing. Occurring approximately once per year, this activity will impact approximately 9 square feet per fire hydrant for a total of 2,232 square feet (0.051 ac.).	Impacts from maintaining fire hydrants were allocated to the right-of-way where they primarily occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
S & T Mutual Water Company (S&T)		
Well Construction	The Basin Plan for the Los Osos Groundwater Basin (2015) indicates that S&T may construct three wells to replace their existing upper aquifer wells.	Each well footprint was estimated to be 1,000 square feet, for a total of 3,000 square feet (0.069 acres). Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land located inside the USL, exclusive of wetland and riparian vegetation and open water which presumably will be avoided. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Water Main and Pipeline Maintenance	S&T will likely maintain pipelines within their service area, which could impact 0.85 acres (approximately 10,560 feet of pipeline x 3.5-foot-wide area of impact). To estimate the lineal feet of pipeline, the number of S&T meter boxes (199), was multiplied by the ratio of meter boxes to pipeline in the GSW service area (2,673 meter boxes and 25 miles of pipeline) and rounded up to the nearest mile.	Impacts from pipeline projects were allocated to the right-of-way, where the pipelines occur. Of this area, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
New Development on Privately-Owned Vacant Parcels: Inside the Urban Services Line		
Single-Family Residential parcels <20,000 sf	The County anticipates that 469 vacant parcels that are less than 20,000 square feet in size will be completely developed, thus impacting their total 77.8 acres inside the USL.	Impacts to vegetation and other land cover types were based on the acres of each type mapped within the parcels. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Habitat impacts from development of these small parcels were characterized as permanent, as the entire parcel will be impacted by development and/or ongoing land use activities which will chronically impact habitat.
Single-Family Residential parcels between 20,000 sf and 1 acre	The County anticipates that 30 vacant parcels between 20,000 square feet and one acre will be developed inside the USL. The total 13.8 acres of impacts were based on an assumption that 20,000 sf would be impacted per parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development that will be restored.
Single-Family Residential parcels greater than 1 acre	The County anticipates that 35 vacant parcels greater than one acre will be developed inside the USL. The total 35 acres of impacts were based on an assumption that one acre would be impacted per parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development that will be restored.
Multifamily-Commercial	The County anticipates that 105 vacant parcels designed for commercial, industrial, multifamily, and professional land use, will be completely developed, impacting their total 103 acres inside the USL.	Impacts to vegetation and other land cover types were based on the acres of each type mapped within the parcels. Potential impacts to riparian and wetland vegetation and open water will not be covered by the LOHCP. Habitat impacts from the development of these parcels were characterized as permanent, as the entire parcel will be impacted by development and/or ongoing land use activities which will chronically impact habitat.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
New Development on Privately-Owned Vacant Parcels: Outside the Urban Services Line		
Single-Family Residential parcels less than or equal to 5 acres	The County anticipates that 32 vacant parcels less than or equal to 5 acres will be developed outside the USL. The total 14.7 acres of impacts were based on the assumption that development within each will impact the maximum per-parcel disturbance envelope of 20,000 sf.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development will be restored.
Single-Family Residential parcels greater than 5 acres	The County anticipates that 13 vacant parcels greater than 5 acres will be developed outside the USL. The total 9 acres of impacts were based on the assumption that development within each will impact maximum per-parcel disturbance footprint of 30,000 sf.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development will be restored.
Improvements to Developed, Privately-Owned Parcels		
Commercial Redevelopment	The County anticipates that 15% of the area within the existing developed commercial parcels located in the USL will be further impacted by expansion and redevelopment activities (e.g., remodeling, renovation, and reconstruction), thus impacting a total of 24.3 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area[1]

Activity	Description	Take/Impacts Assessment Methods
Residential Redevelopment within the USL	The County anticipates that 10% of the area within developed single-family parcels located inside the USL will be further impacted by expansion and redevelopment, thus impacting a total of 96.4 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.
Residential Redevelopment outside the USL	The County anticipates that 10% of the area within developed single-family parcels outside the USL will be further impacted by expansion and redevelopment, thus impacting a total of 35 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.

[1] This analysis excludes the LOHCP conservation program, the take/impacts of which are qualitatively evaluated in the text.

Table 4-2: General Activities and their Habitat Impacts in Acres[1]

	Inside the Urban Services Line				Outside the Urban Services Line				Entire LOHCP Area[5]			
General Activity Type	**Upland Habitats[2]**	**Wet Areas[3]**	**Developed Areas[4]**	**Total**	**Upland Habitats**	**Wet Areas**	**Developed Areas**	**Total**	**Upland Habitats**	**Wet Areas**	**Developed Areas**	**Total**
New Private Single-Family Residential	109.6	2.0	15.0	126.6	23.1	<0.1	1.0	24.1	132.7	2.0	16.0	150.7
New Commercial and Multifamily	87.6	1.3	14.3	103.2	0.0	0.0	0.0	0.0	87.6	1.3	14.3	103.2
Redevelop/Remodel/Rebuild	20.2	<0.1	100.5	120.0	27.2	<0.1	7.8	35.0	47.5	<0.1	108.2	155.7
Public and Private Utility Projects	40.7	2.6	67.6	110.9	10.9	<0.1	0.4	11.4	51.6	2.6	68.0	122.2
Total	**258.2**	**5.8**	**197.3**	**460.6**	**61.2**	**0.0**	**9.2**	**70.5**	**319.4**	**5.8**	**206.5**	**531.8**

[1] Acres of upland vegetation, riparian and wetland vegetation, and developed areas and right-of-ways, to be impacted by the covered activities, showing the location with respect to the Los Osos Urban Services Line in the 2009 Estero Area Plan

[2] Upland habitats include all vegetation and land cover *except* wet areas and developed areas, each of which are defined below.

[3] Wet areas include riparian and wetland communities, as well as open water. Impacts to species in these habitats will not be covered by the LOHCP ITP.

[4] Developed areas include existing developed lands lacking vegetation, and County right-of-ways.

[5] Impacts will be limited to the 3,209-acre permit area.

Table 4-3: Impacts by Vegetation and Land Cover Type, Location, and Duration[1]

	Total in LOHCP Area		Existing Protected		To be Impacted by Covered Activities[2]					
Vegetation/Land Cover	Acres	Percent	Acres	Percent Protected	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	Percent of LOHCP Area
COASTAL SAGE SCRUB										
California Sagebrush – Black Sage										
Largely Intact	481.6	13.2%	327.5	68.0%	18.7	14.7	27.3	6.1	33.4	6.9%
Disturbed	373.0	10.2%	54.9	14.7%	138.7	13.4	143.1	9.0	152.1	40.8%
Heavily Disturbed	10.8	0.3%	0.1	0.9%	1.6	0.8	2.1	0.3	2.4	22.2%
Coyote Brush[3]	0.7	<0.1%	0	0	0.7	0.0	0.7	<0.1	0.7	100.0%
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**	**382.4**	**44.2%**	**159.7**	**28.9**	**173.2**	**15.4**	**188.6**	**21.8%**
CENTRAL MARITIME CHAPARRAL										
Morro Manzanita California Sagebrush	38.0	1.0%	34.4	90.5%	<0.1	0.6	0.5	0.1	0.6	1.6%
Morro Manzanita	321.2	8.8%	135.1	42.0%	6.1	10.1	13.6	2.7	16.2	5.0%
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%	111.3	98.1%	0.1	1.2	1.1	0.2	1.3	1.1%
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%	28.4	92.9%	<0.1	0.2	0.2	<0.1	0.2	0.7%
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**	**309.2**	**61.4%**	**6.2**	**12.1**	**15.4**	**2.9**	**18.3**	**3.6%**
WOODLAND										
Bishop Pine[4]	3.4	0.1%	3.4	100.0%	0.0	<0.1	<0.1	<0.1	<0.1	0.6%
Coast Live Oak	291.2	8.0%	178.3	61.2%	14.4	7.4	19.7	2.1	21.8	7.5%
Eucalyptus	72.0	2.0%	10.7	14.8%	7.1	3.6	8.8	1.8	10.7	14.9%
Subtotal: Woodland	**366.6**	**10.1%**	**192.4**	**52.5%**	**21.5**	**11.0**	**28.5**	**3.9**	**32.5**	8.9%
GRASSLAND										
California Annual Grassland	3.5	0.1%	1.2	34.4%	0.1	0.1	0.1	<0.1	0.2	4.4%
Non-Native Grassland	35.0	1.0%	1.0	2.9%	20.7	0.4	20.5	0.7	21.1	60.4%
Subtotal: Grassland	**38.5**	**1.1%**	**2.2**	**5.8%**	**20.8**	**0.5**	**20.6**	**0.7**	**21.3**	**55.3%**
WETLAND[5]										
Cattail	0.2	<0.1%	0.1	47.3%	<0.1	0	<0.1	<0.1	<0.1	<0.1%

Table 4-3: Impacts by Vegetation and Land Cover Type, Location, and Duration[1]

	Total in LOHCP Area		Existing Protected		To be Impacted by Covered Activities[2]					
Vegetation/Land Cover	Acres	Percent	Acres	Percent Protected	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	Percent of LOHCP Area
Pickleweed	1.3	<0.1%	1.2	90.5%	<0.1	0	<0.1	<0.1	<0.1	1.5%
Disturbed Wetlands	41.7	1.1%	29.5	70.8%	2.6	0	2.5	0.1	2.9	6.8%
Subtotal: Wetland	**43.1**	**1.2%**	**30.7**	**71.3%**	**2.6**	**0.0**	**2.5**	**0.1**	**2.9**	**6.7%**
RIPARIAN										
Arroyo Willow Black Cottonwood	0.8	<0.1%	0.8	100%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Arroyo Willow	11.6	0.3%	0.4	3.6%	3.1	0	3.1	<0.1	3.1	26.7%
Black Cottonwood	1.8	<0.1%	0	0%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Coast Live Oak - Arroyo Willow	62.3	1.7%	7.7	12.3%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Subtotal: Riparian	**76.6**	**2.1%**	**9.0**	**11.7%**	**3.1**	**0**	**3.1**	**<0.1**	**3.1**	**4.1%**
OTHER LAND COVER										
Agricultural Land	48.5	1.3%	0.1	0.1%	2.8	3.0	4.8	1.0	5.8	12.0%
Developed	1,515.8	41.6%	4.5	0.6%	197.4	9.2	169.0	37.6	206.5	13.6%
Landscaped Trees	131.4	3.6%	16.8	12.8%	16.3	5.3	19.2	2.4	21.6	16.4%
Open Water	4.2	0.1%	0.6	15.0%	0.0	0	0.0	0.0	0.0	0.0%
Ruderal Disturbed	49.9	1.4%	0.5	1.1%	30.9	0.6	30.1	1.4	31.5	63.0%
Subtotal: Other Land Cover	**1,750.0**	**48.0%**	**22.5**	**1.3%**	**247.4**	**18.0**	**223.1**	**42.3**	**265.4**	15.2%
Total	**3,643.8**	**100%**	**948.4**	**26.0%**	**461.3**	**70.5**	**466.3**	**65.4**	**532.0**	**14.6%**

[1] Areas of each mapped vegetation and other land cover type to be impacted temporarily and permanently by the covered activities. The amount of each type within existing protected lands is provided for reference. Does not include take due to implementation of the conservation program and the Community Wildfire Protection Plan, which will result in temporary impacts to habitat.

[2] Impacts will be limited to the 3,209-acre permit area.

[3] Impacts to coyote brush were overestimated as a result of this community primarily occurring in single family residential parcels, which as presumed to be completely impacted, as well as the community being included in the extrapolation used to estimate community-level impacts of activities without specified project footprints.

[4] Impacts to bishop pine community, which is only within existing protected lands, are overestimated as a result of the process of estimating impacts of activities without specified project footprints using extrapolation.

[5] Impacts to species in wetland and riparian communities will not be covered by the LOHCP ITP.

Table 4-4: Morro shoulderband snail and Morro manzanita Habitat Types in the Plan Area

Vegetation/Land Cover	Acres	Percent of Plan Area	Morro Shoulderband Snail[1]	Morro Manzanita
COASTAL SAGE SCRUB				
California Sagebrush – Black Sage				
Largely Intact	481.6	13.2%	Primary Habitat	
Disturbed	373.0	10.2%	Primary Habitat	
Heavily Disturbed	10.8	0.3%	Primary Habitat	
Coyote Brush	0.7	<0.1%	Primary Habitat	
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**		
CENTRAL MARITIME CHAPARRAL				
Morro Manzanita California Sagebrush	38.0	1.0%	Primary Habitat	Habitat
Morro Manzanita	321.2	8.8%		Habitat
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%	Secondary Habitat	Habitat
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%	Primary Habitat	Habitat
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**		
WOODLAND				
Bishop Pine	3.4	0.1%		Habitat
Coast Live Oak	291.2	8.0%		Habitat
Eucalyptus	72.0	2.0%		
Subtotal: Woodland	**366.6**	**10.1%**		
GRASSLAND				
California Annual Grassland	3.5	0.1%	Secondary Habitat	
Non-Native Grassland	35.0	1.0%	Secondary Habitat	
Subtotal: Grassland	**38.5**	**1.1%**		
WETLAND[3]				
Cattail	0.2	<0.1%		
Pickleweed	1.3	<0.1%		
Disturbed Wetlands	41.7	1.1%		
Subtotal: Wetland	**43.1**	**1.2%**		
RIPARIAN				
Arroyo Willow Black Cottonwood	0.8	<0.1%		
Arroyo Willow	11.6	0.3%		
Black Cottonwood	1.8	<0.1%		
Coast Live Oak - Arroyo Willow	62.3	1.7%		
Subtotal: Riparian	**76.6**	**2.1%**		
OTHER LAND COVER				
Agricultural Land	48.5	1.3%	Secondary Habitat	
Developed	1,515.8	41.6%	Secondary Habitat	
Landscaped Trees	131.4	3.6%	Secondary Habitat	
Open Water	4.2	0.1%		
Ruderal Disturbed	49.9	1.4%	Secondary Habitat	
Subtotal: Other Land Cover	**1,750.0**	**48.0%**		
Total	**3,643.8**	**100%**		

[1] MSS Primary Habitat: native vegetation where the species is more likely to occur than not; and

MSS Secondary Habitat: native vegetation where the species occurs at lower frequency and/or abundance than in primary habitat, as well as anthropogenically altered that often support MSS.

Table 4-5: Areas of Morro shoulderband snail and Morro manzanita habitat to be temporarily and permanently impacted by the covered activities[1]

Habitat[2]	Total Acres[3]	Existing Protected		To be Impacted (Acres)[4]					Percent to be impacted[3]
		Acres[3]	%[3]	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	
Morro Manzanita Habitat	797.9	490.9	61.5%	20.6	19.5	35.0	5.1	40.1	5.0%
Morro Shoulderband Snail									
Primary Habitat	934.6	445.2	47.6%	159.7	29.6	173.9	15.4	189.3	20.3%
Secondary Habitat	1,897.5	135.4	7.1%	269.1	19.6	245.5	43.2	288.7	15.2%
Total Morro shoulderband Snail	**2,832.1**	**580.7**	**20.5%**	**428.8**	**49.2**	**419.4**	**58.6**	**478.0**	**16.9%**

[1] Areas of Morro shoulderband snail and Morro manzanita habitat to be temporarily and permanently impacted by the covered activities. This quantitative analysis excludes the impacts of the CWPP and the conservation program, which will have additional impacts to temporary habitat as discussed in the text.

[2] Habitat impacts were determined based on the acres of impacts to vegetation and other land cover types (Table 4-3) using the cross walk presented in Table 4-4.

[3] These acres and percentages are for the total LOHCP Area.

[4] Impacts will be limited to the 3,209-acre permit area.

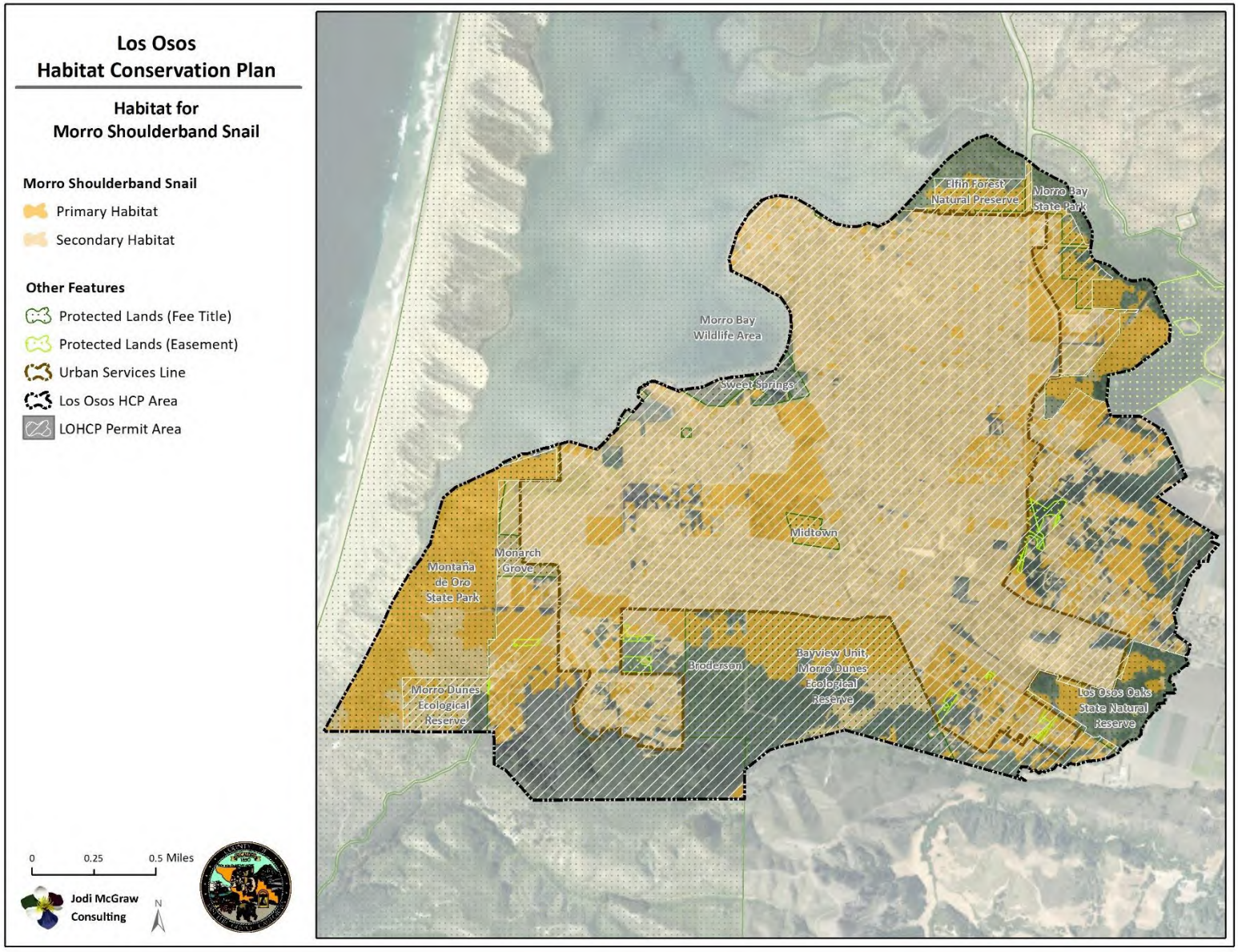

Figure 4-1: Morro Shoulderband Snail Habitat

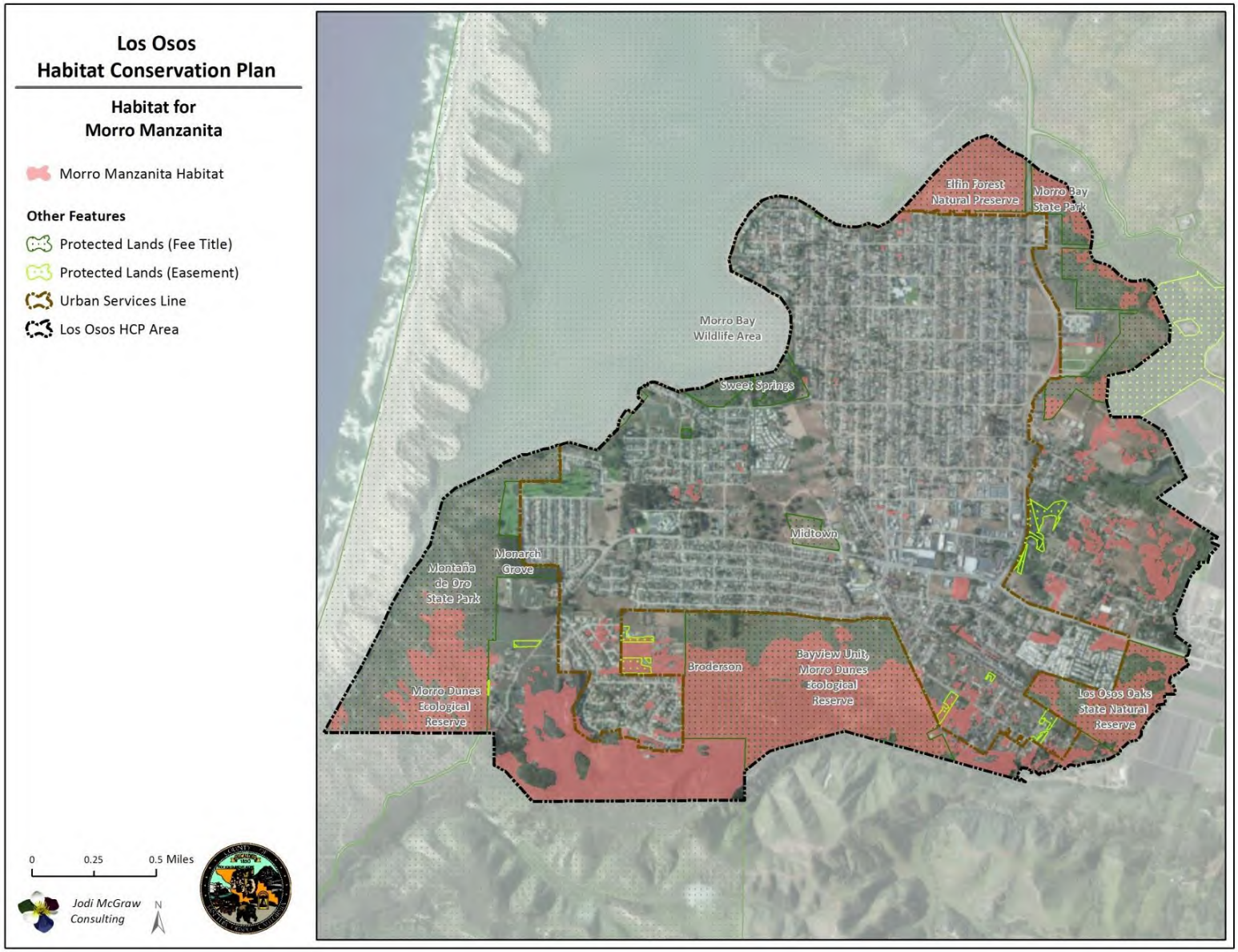

Figure 4-2: Morro Manzanita Habitat

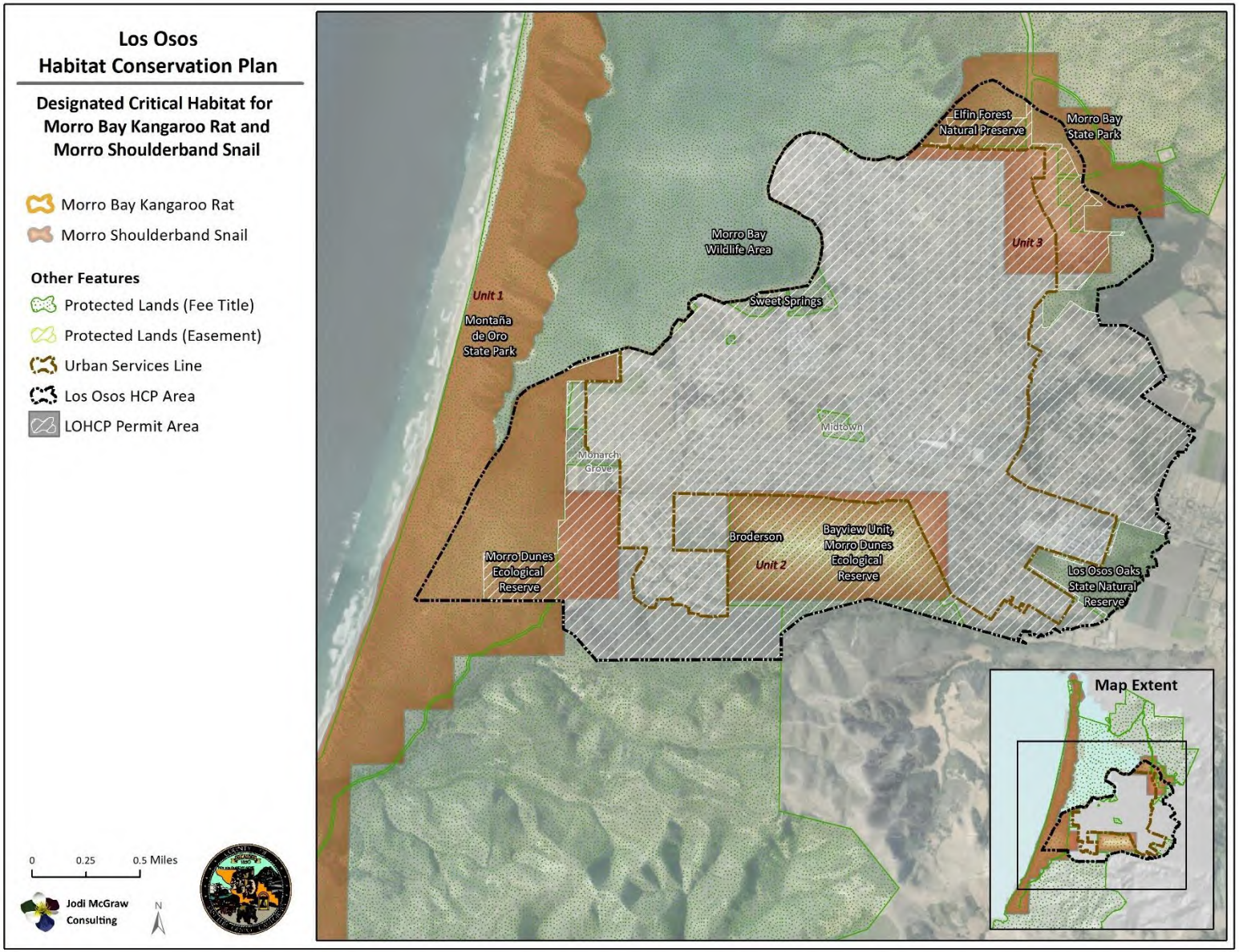

Figure 4-3: Designated Critical Habitat

5 Conservation Program

This chapter describes the LOHCP conservation program, which is designed to avoid, minimize, and mitigate the impacts of covered activities on the covered species such that the benefits of the mitigation will be, in aggregate, commensurate with the take /impacts of the covered activities on the covered species. The program features seven primary elements:

1. **Biological Goals and Objectives:** goals identify the desired outcome or future condition of the covered species, communities, and ecosystem in which they occur (collectively, "biological systems"), and the objectives identify specific targets for attaining the goals through implementation of the conservation program (Section 5.1);
2. **Avoidance and Minimization:** measures that will be taken during implementation of the covered activities, in order to avoid or minimize their effects on covered species and the degradation of habitat, as well as measures to avoid take of other listed species not covered by the permit (Section 5.2);
3. **Habitat Protection**: efforts to safeguard habitat by preventing its development or other uses that would result in its degradation, in order to expand and connect existing protected habitat that is managed at least in part for the covered species (Section 5.3.2);
4. **Habitat Restoration:** projects to re-create habitat conditions suitable for the covered species, and re-establish native plant community structure and species composition, where it has been substantially degraded by anthropogenic factors, such as erosion or dense infestations of exotic plants, and fire exclusion (Section 5.3.3);
5. **Habitat Management:** ongoing efforts to maintain or enhance habitat conditions and promote the long-term population viability of the covered species, by addressing factors that negatively impact habitat, including (but not limited to) incompatible recreational use and invasion by exotic plant species (Section 5.3.3);
6. **Monitoring:** studies to tract the status and trends of the covered species populations and the condition of their respective habitats, as well as the effects of restoration and management projects (Section 5.4); and
7. **Adaptive Management:** the framework through which the six other elements will be implemented in order to enhance long-term effectiveness of the conservation program at achieving the biological goals and objectives (Section 5.5).

These conservation program elements are intended to fulfill the habitat conservation plan requirements for issuance of a take permit; specifically, plans must identify goals and objectives, and steps that will be taken to avoid and minimize (protection measures) impacts of the covered species, as well as compensate for them (habitat protection, restoration, and management). Habitat conservation plans must also include monitoring to evaluate plan effectiveness toward achieving the goals and objectives, as well as adaptive management framework to enhance effectiveness over time (USFWS and NMFS 2016).

This section describes the elements of the conservation program. Appendix D provides details of the approaches that will be used to manage three primary factors that impact the covered species within protected habitat: exotic plants, incompatible recreation, and fire, including wildfires and fire exclusion. Appendix E provides initial monitoring protocols for the communities, the covered species, and their

habitats. Appendix F provides details for pre-project surveys to avoid take of Morro Bay kangaroo rat and minimize take in the form of injury or mortality for Morro shoulderband snail. These elements of the Plan will be combined with results of surveys and other information obtained early during implementation, to develop the LOHCP Preserve System Adaptive Management and Monitoring Plan (AMMP), which will detail how habitat restoration, management, and monitoring will be implemented based on the framework developed in this plan (Section 5.3.3.2).

The conservation program will be implemented by the County with the assistance of an Implementing Entity (Section 6.2). The conservation program will be funded through fees paid by plan participants (Chapter 7).

5.1 Biological Goals and Objectives

The biological goals identify the desired outcome, condition, or state of the biological systems. The objectives identify targets for attaining the goals related directly to the three primary elements of the conservation strategy: habitat protection, restoration, and management (Table 5-1). Goals and objectives reflect the ecological hierarchy: ecosystems, communities, and covered species. Although the primary purpose of the conservation program is to mitigate the impacts of the covered activities on covered species, goals were also developed for ecosystems and communities in order to:

1. create a unified, coordinated strategy for habitat-based management for the covered species, which co-occur within the various plant communities and their successional stages within the Baywood fine sands ecosystem; and
2. avoid negative impacts associated with single-species management, including cost inefficiencies, competing objectives, and unintended negative consequences for sensitive species and communities, as well as other natural resources in the Plan Area.

The LOHCP biological goals and objectives, which are listed in Table 5-1, are centered on promoting long-term persistence of the species, communities, and broader ecosystem. As such, the objectives emphasize the important role of maintaining connectivity and promoting natural processes, such as natural disturbance regimes, and other ecosystem functions. Recognizing the critical role of natural disturbances in creating and maintaining the habitat conditions to which the covered species are adapted, the objectives emphasize the importance of restoring and managing existing protected habitat as well as protecting and managing habitat in currently unprotected land.

The objectives also reflect the importance of maintaining and enhancing connectivity of habitat within the Plan Area, in order to promote long-term viability of the species populations, including by enabling movements in response to climate change.

For each biological objective, Table 5-1 identifies the following:

1. **Conservation measures:** the general habitat protection, restoration, and management measures that will be implemented to achieve the objective;
2. **Implementation monitoring**: the approach that will be used to track implementation of measures to achieve the objective (e.g., tracking the acres of habitat managed to control exotic plants); and

3. **Effectiveness monitoring**: the studies that will be used to evaluate the effectiveness of the conservation program at achieving the objective (e.g., monitoring the distribution and abundance of the Morro shoulderband snail population).

As part of efforts to develop and implement the LOHCP Preserve System AMMP, the goals and objectives will be updated to provide quantitative targets that will enable success to be measured (Section 5.3.3.2). Likewise, the monitoring protocols (Appendix E) will be revised to feature quantitative thresholds based on results of the initial baseline surveys.

5.2 Avoidance and Minimization Measures

During implementation of Plan covered activities, Plan participants will be required to implement a series of measures to avoid and/or minimize take of the covered animal species and impacts to the covered plant species (Section 5.2.1), avoid take of other listed species in the Plan Area that are not covered by the LOHCP permit (Section 5.2.2), avoid impacts to active bird nests (i.e., with eggs, nestlings), migratory birds, including birds of prey (Section 5.2.3), and avoid and minimize impacts to covered species and nesting birds during implementation of the CWPP (Section 5.2.4). The County will work with the Implementing Entity, which will assist the County with implementation of the conservation program, to facilitate successful implementation of the AMMs, evaluate their effectiveness, and recommend adjustments to ensure species protection as part of the adaptive management framework (Section 6.2.1).

5.2.1 Avoidance and Minimization Measures for Covered Species

Section 10 (a)(2)(B) of the Endangered Species Act stipulates that the impacts of covered activities must be minimized and mitigated to the maximum extent practicable. Table 5-2 lists the measures that will be implemented as part of the LOHCP to avoid or minimize take of/impacts to the covered species during implementation of the covered activities. These measures are designed to reduce the take of/impacts to individuals and the degradation of remaining habitat to the maximum extent practicable, in compliance with federal and state endangered species laws. The measures are outlined in accordance with the LOHCP conservation hierarchy, where attaining goals and objectives for ecosystems and communities will promote conservation of the covered species, as well as other species within the Baywood fine sands ecosystem of Los Osos (Table 5-2).

5.2.2 Avoidance Measures for Other Listed Species Not Covered by the LOHCP

The Plan Area and the area immediately adjacent supports habitat for eight state and/or federally listed species that will not be covered by the LOHCP permit (Section 3.2.3, Appendix C). Six of these species primarily inhabit riverine, riparian, and wetland communities, rather than the upland communities within the Baywood fine sands ecosystem, which are the focus of this HCP. Constraints to development within these aquatic systems are such that take coverage for these species is not necessary to implement the covered activities of the LOHCP. However, certain activities occurring in proximity to these habitat areas may have potential to cause take of these species; proponents of these projects will be required to implement measures to avoid such impacts in order to participate in the LOHCP.

To ensure that activities proposed for coverage under the LOHCP avoid wetland and riparian listed species, proponents of projects in parcels bordering the estuary, lake, stream or another water body, as

well as parcels featuring mapped wetland and/or riparian habitat, will be required to implement pre-project habitat assessments. Figure 5-4 illustrates the map of parcels that will be subject to a prep-project habitat assessment for wetland and riparian species; the map will be updated, as needed, as part of the adaptive management process.

The purpose of the assessment will be to evaluate whether the project has the potential to result in take of state or federally listed species not covered by the LOHCP permit. Assessments will be conducted by qualified biologists approved by the USFWS and CDFW. Where the County determines that potentially suitable habitat is known or likely to occur on the project site, focal species surveys will be required to ensure that no take of/impacts to non-covered wetland and riparian species occurs. Those that cannot avoid impacts will be required to obtain a separate take permit or otherwise demonstrate compliance with ESA and CESA, or they will be deemed ineligible for coverage under the LOHCP (Section 6.3.1).

The other two species, white-tailed kite and golden eagle, occur at low density and frequency but forage broadly within the LOHCP Area; they may infrequently nest in discrete locations in the Plan Area. These birds of prey are California Fully Protected Species therefore CDFW cannot issue permits for take of individuals; golden eagle is also protected by the Bald and Golden Eagle Protection Act.

Table 5-3 lists measures that will be implemented to avoid impacts to the other state or federally listed species and take of the California Fully Protected Species. They include ecosystem and community-level avoidance measures, which will protect aquatic, wetland, and riparian habitats more broadly, as well as species-specific avoidance measures.

5.2.3 Other Protection Measures

The Plan Area features populations of nesting birds and additional birds of prey. In compliance with Section 3503 of the California Fish and Game Code (Section 1.5.2.2), project proponents will implement measures to avoid and minimize impacts to bird nests and birds of prey. Specifically,

- Projects that remove vegetation and other nesting habitat will be conducted outside of the nesting season (September 1 - January 31), whenever feasible; and
- If it is not feasible, then they will use pre-project surveys for nesting birds to identify measures that will be implemented to avoid impacts to nests of birds of prey and any other nesting birds.

The seasonal prohibition period will be adjusted, as needed, to reflect changes in the breeding bird season due to climate change or other factors. These and other measures will be identified based upon the specific project.

5.2.4 Avoidance and Minimization Measures for the Community Wildfire Protection Plan

A series of separate avoidance and minimization measures will be implemented to limit take of/impacts to the covered species and nesting birds during implementation of the fire hazard abatement treatments as part of the Community Wildfire Protection Plan (Table 5-4). These measures were developed by the USFWS and CDFW, which have worked closely with CAL FIRE since 2010 to develop and implement avoidance and minimization measures for listed species within the CWPP area (Section 2.2.7; Figure 2-7). They will be included as requirements in the Certificate of Inclusion that confers incidental take coverage to entities implementing the CWPP (Section 6.2.1). The measures for the four

covered species are designed to reduce take in the form of injury or mortality for Morro shoulderband snail, reduce the severity of impacts to Morro manzanita, and avoid take of/impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm. Take of Morro shoulderband snail would be predominantly in the form of capture; trimming of Morro manzanita would be limited to the minimum required to achieve the fuel reduction objectives, with no removal of individual plants allowed. Based on the use of these measures as part of the LOHCP (Table 5-4) and the limited scope of abatement activities, implementation of the CWPP is expected to have a negligible effect on the covered species.

5.3 Compensatory Mitigation: The LOHCP Preserve System

In addition to avoiding and/or minimizing the impacts of the covered activities, the LOHCP conservation program will mitigate their negative effects on the covered species to a level that is commensurate with the impacts of the covered activities by:

- **Protecting** additional habitat from activities that would type-convert or degrade it;
- **Restoring** degraded habitat so that it can support larger and thus more viable populations of the covered species; and
- **Managing** protected habitat to ensure it remains suitable and can support persisting populations.

Habitat and covered species will be monitored in order to evaluate and enhance the long-term effectiveness of these compensatory mitigation components of the LOHCP conservation program. These activities will be conducted within the Los Osos Habitat Conservation Plan Preserve System—a network of protected lands managed as part of the LOHCP to maximize their long-term benefits for the covered species, as the communities and ecosystem they inhabit.

This section describes the approach used to design the LOHCP Preserve System, and then describes how the habitat it protects will be managed and restored to promote the biological goals and objectives. Section 5.7.2.3 describes how the Preserve System will be assembled over time, to mitigate the impacts of the LOHCP covered activities.

5.3.1 Preserve System Design

5.3.1.1 Background and Approach

The LOHCP encompasses much of the range of each covered species (Section 3.2.2, Appendix B). As a result, the LOHCP covered activities and conservation program have great potential to influence their persistence and recovery. In consideration of this, elements of the LOHCP were developed based in part on USFWS recovery plans for the Morro Bay kangaroo rat (USFWS 1999) and Morro shoulderband snail, Morro manzanita, and Indian Knob mountainbalm (USFWS 1998a), as well as updated recommendations provided in the species most recent status reviews and species reports (USFWS 2006. 2008, 2011b, 2013a).

Developed by the USFWS with input from outside biologists with additional expertise in these species, the recovery plans identify general strategies and specific measures to promote long-term viability of the listed species; the plans are designed to achieve the goal of either down listing (i.e., reclassify endangered species as threatened) or, where possible, delisting (removing the list of threatened and

endangered species). Recovery plan measures include habitat protection and management, as well as research to fill key data gaps to inform effective conservation measures. These plans feature additional components such as captive breeding program for Morro bay kangaroo rat; though outside of the scope of a habitat conservation plan, such efforts could be conducted by agencies and organizations in coordination with implementation of the LOHCP conservation program.

Since the plans were developed, agencies and organizations have implemented several measures of the recovery plans, including protecting habitat of high conservation value that is now within the Morro Dunes Ecological Reserve (CDFW) and Morro Bay and Montaña de Oro state parks. Elements of the LOHCP conservation program were designed to build upon these prior efforts to contribute to the recovery of the covered species and avoid jeopardizing their persistence in the wild. Most notably, to achieve the biological goals and objectives, the LOHCP Preserve System will include selected existing protected lands (Section 5.3.3.1), as well as the acquisition of new lands as mitigation for covered activities (Section 5.3.2). Enhancing management of existing protected lands will increase the long-term viability of the covered species by creating and maintaining the largest, most contiguous area of high-quality habitat possible, given the constraints in the landscape. The following sections provide the rationale as well as details for this approach to assembling LOHCP Preserve System.

5.3.1.2 Priority Conservation Area

A key consideration in developing the habitat protection, restoration, and management measures is where they should take place; specifically, identifying the land should be included in the LOHCP Preserve System to maximize the benefits for the covered species. Therefore, the LOHCP planning process evaluated habitat within the Plan Area for protection, restoration, and management. Properties that will ultimately be included in the LOHCP Preserve System will be determined during implementation of the plan by the County with the assistance of the Implementing Entity, which will work with willing landowners to acquire additional lands (Section 6.2.2) and enroll existing protected lands in the Preserve System based on approval from the USFWS (Section 6.2.3).

The LOHCP Preserves will primarily occur within the 1,510-acre Priority Conservation Area—the general area identified as most important for habitat protection, restoration, and management (Figure 5-1). The Priority Conservation Area was identified based on a critical review and analysis of the recovery plan conservation measures, including the recovery Conservation Planning Areas (USFWS 1998a), existing habitat conditions, and the principles reserve design (Soulé and Simberloff 1986, Soulé and Terbough 1999), including those to promote resiliency to climate change (Hannah et al. 2002, Morelli et al. 2016).

Located on the perimeter of Plan Area (Figure 5-1), the Priority Conservation Area:

1. features relatively large blocks of nearly contiguous and largely intact habitat on Baywood fine sands ecosystem;
2. supports the diverse mosaic of the natural communities and upland habitats that support the covered species; and
3. contains significant habitat adjacent to open space lands located outside of the Plan Area, that feature largely intact habitat including the estuary, wetlands, riparian areas, and dunes, as well as other upland communities, which are either protected or occur in large parcels featuring low-intensity land use.

As a result of this landscape context, habitat within the Priority Conservation Area is considered to provide the greatest conservation value, both in terms of current conditions and long-term viability; specifically, land within this area will be more conducive to effective, long-term management, which is essential to the persistence of the covered species (Section 5.7.2). Therefore, land within the portion of the Priority Conservation Area that is within the Permit Area (Figure 5-1) will be prioritized for additional habitat protection, restoration, and management, as part of the LOHCP Preserve System.

Conservation and management of habitat outside of the Priority Conservation Area can also promote achievement of the LOHCP biological goals and objectives. As part of implementation of the LOHCP, the Implementing Entity will evaluate additional land protection, restoration, and management opportunities that arise, and compare their relative conservation benefits to alternative actions, including future, unknown protection projects (Section 6.2.2). The cost-benefit analyses will critically evaluate the long-term contributions to achieving the goals and objectives, including long-term viability of the habitat and restoration and management needs and thus costs.

5.3.2 Habitat Protection

Protecting and connecting relatively large areas of comparatively intact habitat is essential to obtain the LOHCP biological goals and objectives (Table 5-1) and compensate for the permanent loss of habitat resulting from implementation of the covered activities (Section 4.2.1.1). Habitat for the covered species is naturally rare, and largely confined to the Baywood fine sand soils in the Plan Area (Section 3.2.2, Appendix B). Residential and commercial development has reduced the amount of habitat supporting the covered species and has contributed to their population declines. Habitat loss has also fragmented and led to the degradation of remaining habitat, including by promoting the invasion and spread of exotic species, and leading to fire exclusion. Protecting significant areas of remaining habitat will be essential to maintaining viable populations of the covered species.

As part of implementation of the LOHCP, unprotected habitat (i.e., privately-owned habitat not protected by conservation easements) will be protected and managed and monitored in perpetuity as part of the LOHCP Preserve System. Habitat protection will occur through one of two main mechanisms:

- **Acquisition of Fee Title or Conservation Easements**: Habitat mitigation fees and supplemental funding (e.g., grants) where available, will be used to acquire from willing sellers fee title or conservation easements. These conservation easements will protect habitat from activities that could result in its loss or degradation, such as new development, grading, and other land uses (e.g., agriculture); the easements will also allow the Implementing Entity periodic access to the property to conduct habitat management, monitoring, and in some cases, habitat restoration (Section 6.2.2.2).
- **Dedication of Conservation Easements**: If a private landowner developing vacant land inside the Priority Conservation Area chooses to participate in the LOHCP, they will be required to dedicate conservation easements approved by the USFWS and granted to the Implementing Entity at a ratio of 3:1 for the amount of habitat disturbed (Sections 2.2.4.1.1 and 5.7.2.1.1), as well as pay the Restoration/Management/Administration Fee (Section 5.7.2)[18].

[18] Proponents of new development projects on vacant parcels inside the PCA that are too small to set aside the required set aside based on the maximum disturbance envelop can either reduce the size of their project to a size that accommodates the requisite habitat set-aside or mitigate habitat loss through payment of the Habitat Protection Fee rather than on-site habitat set asides (Section 5.7.2.1.2).

Lands acquired in fee title will also be protected by a conservation easement approved by the USFWS and granted to the Implementing Entity . All conservation easements will provide the Implementing Entity and USFWS the right to access the conserved habitat to implement necessary habitat management and restoration (Section 5.3.3), and monitoring (Section 5.4). Additional information about the easements is provided in Section 6.2.2.

The newly protected lands incorporated within the LOHCP Preserve System will be located primarily within the Priority Conservation Area (Figure 5-1). They will specifically be chosen to achieve the following objectives:

1. protect habitat that supports, is suitable for, or can be restored to render it suitable for, one or more of the covered species;
2. protect relatively large areas of habitat, including by buffering and expanding existing protected habitat areas, in order to safeguard large areas that feature reduced perimeter-to-area ratios that are therefore more resistant to edge effects and can be effectively managed using techniques designed to promote diversity and long-term population persistence, including prescribed fire of fire surrogates;
3. maintain and restore critical landscape linkages between significant habitat areas, including protected lands and other large areas of relatively intact habitat. Connecting habitat that might otherwise become isolated will facilitate gene flow (exchange of genetic material) between individuals in otherwise isolated habitat, and recolonization of sites where populations are extirpated; and
4. protect habitat that can confer resiliency to climate change, including climate change refugia (Morelli et al. 2016) and linkages that can promote species migration in response to a changing climate (Keeley et al. 2018).

In addition, land protected as part of the LOHCP Preserve System must meet the following criteria:

- Contribute to meeting the biological goals and objectives of the LOHCP (Section 5.1);
- Permanently protect the biological functions and values that contribute to the LOHCP;
- Be managed in perpetuity according to the LOHCP Preserve System AMMP (Section 5.3.3.2);
- Be monitored according to the requirements and guidelines in Section 5.4; and
- Have no hazardous materials or property encumbrances that conflict with LOHCP goals and objectives.

The specific habitat areas to be protected as part of the LOHCP Preserve System will be identified during implementation of the LOHCP. For purposes of estimating mitigation needs and thus the fees, the LOHCP Preserve System was assumed to include 107.5 acres of newly protected habitat, with a minimum of 55.25 acres acquired in fee title and protected with a conservation easement (Section 5.7.2.3.2). Table 5-10 lists the total acres of habitat type that could be protected in newly protected lands, which are based on the proportions of each vegetation type within unprotected land within the Priority Conservation Area. The total acres of habitat, as well as the number of acres of each vegetation type, that are ultimately included in the LOHCP Preserve System will depend on the specific parcels acquired from willing sellers, and land dedications from participants in this voluntary plan. Most of the

habitat in the Priority Conservation Area (where land acquisition will primarily occur) is either coastal sage scrub or central maritime chaparral communities which are most suitable for one or more of covered species and thus will ensure that the first objective of habitat protection listed above is achieved.

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act. While the LOHCP requires that proponents in the Priority Conservation Area set aside habitat at a 3:1 ratio, the State Coastal Commission may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set-asides would protect additional habitat not included in the analysis of the conservation benefits of the LOHCP Conservation Program (Section 5.8.1).

5.3.3 Habitat Restoration and Management

Lands protected within the LOHCP Preserve System will be restored, where needed, and then managed in perpetuity. Restoration and management of habitat within the LOHCP Preserve System will be critical to attaining the biological goals of the plan, and to the recovery of the covered species. Much of the remaining habitat in the Plan Area has been degraded to some extent by a variety of factors which reduce populations of the covered species, thus threatening their long-term persistence. Described in detail in Appendix D, the three main factors that degrade habitat are:

1. **Exotic Plants:** plants that are not native to the region outcompete native plants, modify habitat for native animals, and have the potential to promote fire outside of the natural disturbance regime, which can further impact the covered species (Section D.1);
2. **Incompatible recreation activities:** intensive recreation (e.g., off-highway vehicle use), unmanaged use, and trespass removes vegetation, can cause erosion, and promote the invasion and spread of exotic plants (Section D.2); and
3. **Incompatible fire management:** vegetation clearing and other hazard abatement (e.g., mowing) removes habitat and can injure individuals, while the suppression of the natural fire regime alters the structure and species composition of the plant communities, degrades habitat for the covered animals, and can inhibit population regeneration of the covered plants (Section D.3).

The LOHCP Preserve System will be managed to restore priority degraded habitat areas and prevent further deterioration of its condition as a result of the above and other factors, including global climate change, by maintaining areas of contiguous habitat and microsite conditions that can confer resiliency to a future hotter and potentially drier climate. Mean annual temperature in San Luis Obispo County is projected to increase by 2.1 to 3.9 °F by 2045 and 4.1 and 7.6 °F by 2085 (Koopman et al. 2010), though coastal areas such as Los Osos may experience less dramatic changes. The effects of these and other changes on individual species or communities can be difficult to predict as they will be influenced by a host of cascading indirect effects mediated by complex species interactions. Promoting persistence of the covered species may entail additional measures to address the effects of climate change (Section 6.5.3).

While the terms “restoration” and “management” have a variety of definitions, the following are operational definitions for the Plan:

1. **Restoration:** specific projects designed to re-create native plant community structure and species composition and/or ecosystem functions where they have been lost or severely impacted by anthropogenic (human-related) factors (e.g., invasion by exotic plant species, vegetation removal). Restoration activities typically occur in discrete areas and over a discrete period of time to achieve specified performance criteria, after which habitat is subject to ongoing management.
2. **Management:** treatments designed to address current or future threats to habitat, in order to enhance and then sustain conditions. Management treatments occur over larger areas (than restoration) and are often recurring or even ongoing, in the case of habitat maintenance activities, to prevent negative impacts to habitat, or to continue to improve generally degraded conditions.

Examples of restoration activities include establishing native plant community structure and species composition where it has been degraded by erosion, dense infestations of invasive plants, and incompatible recreational use including large or gullied trails. Restoration can also include steps to manage fire within the natural fire regime, including conducting a prescribed fire in an area of senescent central maritime chaparral where fire has been excluded (i.e., through fire suppression).

Management activities include steps to detect and rectify anthropogenic stressors that degrade habitat including: ongoing control of exotic plants, installing and maintaining fences or conducting patrols to enforce trail use regulations, and other activities to enhance and maintain natural community structure and species composition.

When compared with management, restoration generally has greater relative benefits for the covered species, which are assumed to not be able to utilize many severely degraded habitat areas (e.g., erosion gullies that lack vegetation); in contrast, covered species may occur within areas that require management, albeit at reduced population levels, depending on the habitat condition. Restoration activities are also generally more costly than management, on a per-acre basis, as they require more intensive planning (e.g., engineered solutions for erosion) and often more extensive effort to implement (e.g., extensive exotic plant removal, or active revegetation of large, denuded areas).

These distinctions were used as the basis for assigning these compensatory mitigation activities 'mitigation equivalencies' or 'mitigation crediting ratios', which express the relative benefits for the covered species of restoring or managing habitat within existing protected land, to *not* implementing a typical covered activity (Section 5.7.2.3.1). These mitigation crediting ratios were used to evaluate the net-effects and costs of a LOHCP Preserve System configuration scenario that was developed to illustrate how the conservation strategy can mitigate the impacts of the covered activities (Sections 5.7.2.3.2 and 5.8.1). The ratios will also be used by the County and the Implementing Entity to track the status of the Plan's stay-ahead provision, which requires that compensatory mitigation measures keep pace with, or exceed, the impacts caused by the covered species (Section 6.2.4)

Specific habitat restoration and management activities will be identified in the LOHCP Preserve System AMMP, which will be developed during the first three years of Plan implementation (Sections 5.3.3.2 and 6.2.3.2). Lands that are enrolled in the LOHCP Preserve System, including existing protected lands and newly protected lands, will be evaluated based on the condition of the natural communities, in terms of plant community structure and species composition, and the anthropogenic factors degrading them. These existing conditions will be used to delineate restoration and management areas based on the criteria above. That is, areas where native plant species composition and structure, and/or

ecosystem functions have been lost of severely impacted by anthropogenic factors will be assigned to restoration units. Once the restoration treatments have been implemented and the area has achieved the performance criteria, mitigation will be credited. The restored area will become a habitat management unit and will be subject to ongoing management and monitoring as part of the larger preserve system. The remaining area outside of restoration units, which is either relatively intact or features only limited degradation not meeting the criteria for restoration, will be included within the preserve's management units; in these areas, efforts will be taken to enhance and maintain habitat as well as monitor its conditions over time. The LOHCP Preserve System AMMP will identify a schedule for the release of mitigation credits based upon the timing of the enhancement management tasks in each preserve, with mitigation credits released over time as additional management tasks are phased in (Section 5.3.3.2). As a result, the entire area within each preserve will be within either a restoration or management unit as part of this plan, as the entirety of the preserves will be restored and/or managed as well as monitored.

The AMMP will then identify the specific restoration, management, and monitoring activities that are proposed for each preserve. The following criteria will be used to select and prioritize projects across the preserves:

1. **Number of Plan Goals and Objectives Advanced:** Projects that can advance multiple biological goals and objectives of the Plan (Section 5.1, Table 5-1) will be prioritized over those that advance fewer goals. For example, projects that can restore habitat for multiple covered species, and connect existing protected habitat areas, will be prioritized over projects that might benefit just a single covered species.
2. **Likelihood of Success**: Projects with a high likelihood of being successful, in terms of advancing one or more Plan goals and objectives, will be prioritized over those that are experimental or otherwise have lower probability of success;
3. **Cost Effectiveness**: To maximize effective use funds at achieving the Plan's biological goals and objectives, projects that are lower cost relative to the benefits achieved will be prioritized over projects that are higher cost, all else being equal (i.e., if they advance similar numbers of goals and objectives); and
4. **Sustainability:** Restoration and management projects that can have sustained benefits for the covered species, communities, and ecosystem will be prioritized over those that will require ongoing treatments, all else being equal.

Restoration projects will be required to meet specified performance criteria before the acres of habitat benefited can be credited as mitigation and be used to offset the impacts of covered activities. The performance criteria will be developed in the LOHCP Preserve System AMMP and, as appropriate, in project-specific work plans that are developed to implement the AMMP by detailing individual restoration projects. The performance criteria will reflect the specific functions or values that the project or strategy is designed to address and provide quantitative methods for objectively evaluating its benefits for the covered species, communities, and/or ecosystem, in order to clearly link the proposed work to the biological goals and objectives of the LOHCP (Section 5.1, Table 5-1).

The effectiveness of enhanced management will be assessed through ongoing monitoring as part of the AMMP (Appendix E), which will be designed to ensure that the LOHCP is achieving its biological goals and objectives (Section 5.1). While specific activities management units, such as larger-scale management projects, can be monitored to assess their effectiveness and inform adjustments as part of

the adaptive management framework of the AMMP (Section 5.5.2), specific performance criteria will not be established for areas subject to enhanced management.

5.3.3.1 Incorporation of Existing Protected Lands in the LOHCP Preserve System

5.3.3.1.1 Conservation Benefits

Existing protected lands contain much of the largest and most important habitat areas for the covered species within the Priority Conservation Area (Figure 5-1, Section 2.1.3). Restoration and management of these lands are essential to the long-term persistence of the covered species. Presently, management of habitat in County Parks, State Parks, State Ecological Reserves, Bureau of Land Management lands, and privately held conservation lands in the Plan Area is constrained by the limiting funding of the respective land management entities. In many cases, the properties were relatively recently acquired, and habitat conditions still reflect the legacies of prior land uses, including cultivation and off-highway vehicle use. As a result, areas of habitat within these lands are degraded, and in need of active management and in some cases, restoration.

Increases in the human population in Los Osos, which will result, in part, from additional development permitted as a result of the LOHCP, may indirectly impact habitat in existing protected lands, and thus the populations of the covered species (Section 4.1.2). For example, increasing the human population will likely increase the frequency of recreational use, which can trample vegetation and cause erosion (Section D.2). Degradation of habitat within these parks and reserves will impede efforts to restore and manage habitat that is protected during implementation of the Plan. Also, uncontrolled exotic plant populations and incompatible recreational uses on existing protected lands can result in the degradation of habitat on adjacent or nearby habitat protected through the LOHCP. Conversely, efforts to control veldt grass or deter incompatible recreational uses on a property protected through the LOHCP would be more effective if similar efforts were undertaken on adjacent protected lands.

Recognizing that enhanced and coordinated management of protected habitat within the Priority Conservation Area will promote long-term persistence of the covered species, the LOHCP Preserve System will include existing protected lands, which will be managed and restored along with new land protected through implementation of the Plan, as part of a coordinated, strategy outlined below. In addition, the County and the Implementing Entity will work with managers of other conservation lands that are not part of the LOHCP Preserve System (e.g., State Parks and BLM), as resources allow, to coordinate management in order to achieve common goals and objectives for management, including control of exotic plants.

To ensure that management of existing protected lands promotes attainment of the LOHCP goals and objectives, agencies and organizations seeking to enroll their lands into the LOHCP Preserve System must guarantee the following:

1. **Maintenance of effort:** the agency or organization will continue existing restoration and management efforts on the property, such that efforts funded through the LOHCP have added benefit for the covered species and do not simply replace existing efforts; and
2. **Long-term habitat protection:** the agency or organization must demonstrate that the property, or at least the portion that will be managed as part of the LOHCP Preserve System, is

permanently protected from development or other activities that would result in loss or degradation of the habitat.

To ensure these conditions are met, participating agencies and organizations shall enter into an agreement with the County to provide these assurances; these agreements will be subject to the review and concurrence of the USFWS. Such a cooperative management arrangement, which must be in place before habitat management and/or restoration of the site can be credited toward mitigation in the LOHCP, will also establish other important aspects of how the lands will be managed, including access by LOHCP Preserve System personnel (Section 6.2.3). The cooperative management agreement will also identify the legal authorities that govern management of the sites, and otherwise demonstrate how the habitat management and restoration conducted within the properties will have lasting benefits, and not be undone as a result of development or incompatible land uses.

5.3.3.1.2 Existing Protected Lands to be Enrolled

As part of the LOHCP planning process, County staff met with representatives of respective agencies to discuss the opportunity for have their lands within the Plan Area managed as part of the LOHCP Preserve System. The County also worked with conservation landowners to evaluate whether any policies or legal agreements, including deed restricts or terms within grant agreements, might preclude them from having their lands subject to restoration and enhanced management (i.e., management above and beyond what the agency is already required to implement) as mitigation.

Representatives of California Department of Parks and Recreation (State Parks) San Luis Obispo District declined to have their lands be considered for restoration and management as mitigation for the LOHCP (Barker 2015). The County similarly determined that it could not manage or restore the County-owned portion of the Elfin Forest Natural Area, since it was purchased, in part, with a grant from the State Coastal Conservancy which precludes future use of the property for mitigation. The portion of the County's Monarch Grove Natural Area that features a dense stand of mature blue gum (*Eucalyptus globulus*), is also unsuitable for mitigation, as it lacks suitable habitat for the covered species and is unlikely restored as the trees provide nesting habitat for raptors and support overwintering monarch butterflies (*Danaus plexippus*). The BLM lands were eliminated from consideration for inclusion within the LOHCP Preserve System because take cannot be authorized on federal lands under a Section 10(a)(1)(B) permit.

Staff from CDFW determined that the proposed management and restoration of the Morro Dunes Ecological Reserve is consistent with the CDFW mitigation policy (CDFW 2012; Appendix G). Therefore, of the nearly 800 acres of existing protected land within the Priority Conservation Area (Table 5-5, Figure 5-1), 281.1 acres were found to be suitable for management and restoration as part of the LOHCP (Table 5-5). Of the 281.1 suitable acres, an estimated 35.4 acres (12.6%) will require restoration to address severely degraded habitat conditions (Table 5-5). This area was determined based on an estimate of the percent of each property that features highly degraded habitat, including dense veldt grass infestation and denuded areas (e.g., trails or old roads), which were observed in recent aerial imagery and through limited site reconnaissance. The remaining 245.7 acres (87.4%) are eligible for enhanced management.

The precise areas to be restored and managed as part of the LOHCP will be identified in the LOHCP Preserve System Adaptive Management and Monitoring Plan, which will be developed early during implementation of the LOHCP (Sections 5.3.3.2 and 6.2.3.2). This management plan will identify and

prioritize areas for restoration and enhanced management based upon a comprehensive assessment of the lands to be enrolled, and application of the criteria listed in Section 5.3.3. It will build upon the *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System,* which identifies initial, high-priority restoration projects for the Morro Dunes Ecological Reserve (McGraw 2020; Appendix M).

As noted above, in order for activities to count as mitigation in the LOHCP, they must be above and beyond that which the landowner is already obligated to do. For the MDER, Appendix G documents how the enhanced management and restoration will be above and beyond the existing responsibility of CDFW (R. Stafford, pers. comm. 2016), which are taken to be the management recommendations identified in the land management plan for the ecological reserve (CDFW 1982). Appendix G also outlines how management of the ecological reserve is consistent with CDFW's *Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands* (CDFW 2012).

There is currently no management plan identifying existing management obligations for the County's Monarch Grove Natural Area. Prior to the potential enrollment of this property into the LOHCP Preserve System, the existing obligations for management will be identified and used to determine the enhanced management and restoration activities proposed in the LOHCP Preserve System Adaptive Management and Monitoring Plan.

Though the remaining 497.7 acres of habitat within existing protected lands inside the Priority Conservation Area are not eligible for enrollment in the LOHCP Preserve System, these BLM, State Parks, and County lands contain habitat that is important for recovery of the covered species. Effective management of these lands can help promote the biological goals and objectives of the LOHCP, by limiting the potential of stressors degrading habitat on adjacent lands, such as exotic plants and incompatible recreational use, from impacting the LOHCP Preserves. Accordingly, the County and the Implementing Entity will work with managers of other existing protected lands within the Priority Conservation Area to coordinate management in order to maximize effectiveness and achieve shared conservation goals for the region. Such coordinated management can also enhance the cost-effectiveness of efforts on the LOHCP Preserve System. For example, coordinating exotic plant management across properties can help prevent reinvasion of a preserve from an adjacent property and reduce the per-acre costs of management through economies of scale.

5.3.3.2 LOHCP Preserve System Adaptive Management and Monitoring Plan

Restoration and management of land within the LOHCP Preserve System, as well as monitoring (Section 5.4.2), will be implemented following an Adaptive Management and Monitoring Plan (AMMP) that identifies the coordinated strategies that will be implemented in perpetuity to achieve the greatest long-term conservation benefits for the covered species. To ensure that it is based upon the most current information about habitat conditions, species ecology, threats, and management, the LOHCP Preserve System AMMP will be developed by the Implementing Entity during the first three years of plan implementation. The AMMP will be subject to written approval of the USFWS as representatives of agencies whose lands will be managed as part of the LOHCP Preserve System, including CDFW (Section 6.2.3.2).

The LOHCP Preserve System AMMP will be developed based on information contained in the LOHCP, which provides the framework for its development based upon an up to date and detailed assessment

of habitat conditions. Specifically, the LOHCP Preserve System AMMP will be designed to promote achievement of the LOHCP biological goals and objectives (Section 5.1, Table 5-1), integrate the LOHCP's avoidance and minimization measures (Section 5.2), and prioritize restoration and management actions (Section 5.3.3) that will have the greatest lasting benefits for the covered species. The management plan will reflect other elements of the conservation program outlined in this Plan, including the appendices which contain the following information designed to inform the LOHCP Preserve System AMMP:

- Detailed descriptions of the covered species, with an emphasis on aspects of their ecology that can inform habitat management (Appendix B);
- a critical assessment of three main factors that degrade habitat— exotic species, unmanaged recreation, and altered fire regimes— and approaches to addressing them through restoration and management projects (Appendix D); and
- draft monitoring protocols for the covered species, natural communities, and general habitat conditions (Appendix E).

During the first three years of Plan implementation, the framework and initial information presented in the LOHCP will be integrated with new information obtained through the following:

- baseline surveys and monitoring of the habitats and covered species populations; and
- the latest scientific information including results of habitat management and restoration projects.

Collectively, this current information will be used to develop robust management and restoration strategies to achieve the biological goals and objectives of this plan (Section 5.1, Table 5-1). The site-specific surveys will also be used to identify the initial projects or tasks within the preserve system lands, which will be prioritized based on their long-term conservation value for the covered species, communities, and ecosystem. For example, exotic plant management strategies will reflect the distribution, abundance, and impacts of the exotic plants found in or near the preserves. These elements will be adapted over time, based on the results of monitoring that will be used to evaluate effectiveness of management and restoration, as well as to identify changed conditions (e.g., new invasive species).

The following are the specific objectives of Preserve System AMMP, which will:

1. **Evaluate current conditions of habitat**, including the structure and species composition of the vegetation and occurrences of the covered species;
2. **Examine existing and future threats** to habitat and the covered species, which include a variety of factors that can degrade habitat or reduce populations (Appendix B), such as exotic species, altered disturbance regimes, and current and historic land uses (Appendix D), as well as climate change;
3. **Identify goals and objectives**, which tier off the Plan biological goals and objectives (Section 5.1), reflect the desired future condition of habitat, and provide specific measures to evaluate success of management;
4. **Describe general treatments** that can be used to restore habitat degraded by erosion, exotic plants, incompatible recreation, wildfire, and fire exclusion (Appendix D) and abate threats presented by these and other anthropogenic factors that can degrade habitat;
5. **Prioritize restoration and management,** based on the criteria outlined in Section 5.3.3 and the results of the baseline surveys and monitoring, and identify a timeline or system of phasing

projects (e.g., short, medium, and long-term projects) to maximize long-term effectiveness of the regional strategy;

6. **Identify performance criteria for restoration projects** to be implemented on existing protected lands**,** which will specify the conditions that the projects are designed to achieve, in terms of quantitative measures of habitat condition that relate to the covered species, and/or direct measures of the covered species populations (e.g., occupancy or indices of abundance), and the timeframes in which the criteria will be achieved in order for the projects to be used as mitigation in the plan;
7. **Identify the Schedule for Management Actions:** identify a schedule for management actions and how mitigation credits will be released as management projects are conducted as part of enhanced management of existing protected lands. Newly protected lands will also be managed per a schedule outlined in the AMMP, but mitigation credits for these preserves will be generated at the time they are protected, rather than over time as restoration and management are implemented.
8. **Describe the final monitoring protocols** that will be used to evaluate status toward the goals and objectives and track trends in the covered species and their habitats (Appendix E), as well as evaluate the effectiveness of specific restoration and large-scale management projects; and
9. **Describe the adaptive management process** that will be used to make changes in restoration, management, and monitoring over time, to achieve the goals and objectives of the Plan.

By developing the LOHCP Preserve System AMMP at the outset of LOHCP implementation based on the framework and background information in this plan, combined with the information gained through current, site-specific surveys and assessments and a critical review of the latest scientific literature and management and restoration practices, the management plan will be able to most accurately identify the priority projects for properties incorporated in the LOHCP Preserve System. Once developed, the Preserve System AMMP will be updated at approximately five-year intervals, or as needed to ensure that it remains current and relevant and reflects the latest information as part of the adaptive management framework; specifically, to reflect monitoring results, scientific information, changed circumstances, and new measures to achieve the Plan's goals and objectives (Section 5.5).

The Preserve System AMMP will also be updated as new preserves are enrolled in the Preserve System following acquisition of fee title and/or easement (Sections 5.3.2 and 6.2.2). Specifically, as each property is added to the preserve system, it will be surveyed and evaluated to inform restoration and management. The LOHCP Preserve System AMMP will then be updated to include a property-specific management element (e.g., chapter) that identifies the restoration and management units, as well as priorities restoration and management activities for the new preserve. These preserve-specific priorities will be integrated into an updated prioritization for the entire LOHCP Preserve System, so that resources available for restoration and management are directed where they can maximally effective toward achieving the biological goals and objectives of the LOHCP.

5.3.3.3 Interim Adaptive Management and Monitoring Plan

The *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (McGraw 2020, Appendix M) was developed to guide initial restoration activities within the Morro Dunes Ecological Reserve, which the County proposes to enroll into the LOHCP Preserve System as part of initial work to implement the LOHCP conservation program (Section 6.2.5). The

Interim AMMP (or IAMMP) describes the existing conditions within the MDER, establishes the existing management effort by CDFW (the land manager), identifies priority restoration work to re-create natural community structure and species composition in communities in order to promote populations of the covered species, and describes how the work will be monitored to evaluate achievement of performance criteria so that the restoration can be credited as mitigation under the Plan (Appendix M). The IAMMP will be superseded by the AMMP, which will be developed while the IAMMP is being implemented.

5.4 Monitoring

Monitoring is an essential element of the LOHCP conservation program and is integral to implementation of the LOHCP in an adaptive management framework (Section 5.5). Monitoring for the LOHCP will include two main components:

1. **Implementation Monitoring:** steps taken to document implementation of the Plan and compliance with the terms of the incidental take permit; and
2. **Biological Effectiveness Monitoring**: methods to track the status and trends in the covered species populations and their habitats, examine the effectiveness of restoration and management projects, and evaluate progress toward attaining the LOHCP biological goals and objectives.

Table 5-6 identifies the monitoring methods that will be used to track implementation and effectiveness of the LOHCP toward achieving the Plan's biological goals and objectives (Table 5-1). Appendix E provides draft protocols for the biological effectiveness monitoring studies. These monitoring protocols will be finalized within the Preserve System AMMP (Section 5.3.3.2), which will identify changes designed to improve their effectiveness. During implementation of the Plan, monitoring results will be documented in the annual reports provided to the USFWS (Section 5.6).

5.4.1 Implementation Monitoring

The County will track implementation of the Plan, and compliance with the terms of the incidental take permit. The County will conduct monitoring of individual projects, to ensure that their impacts do not exceed the predetermined envelopes specified in their Certificate of Inclusion. If additional impacts are determined to have occurred, or if projects are conducted without a Certification of Inclusion, the County will contact the USFWS and County Code Enforcement and proceed with addressing the violations as outlined in Section 6.3.3.

The County will also conduct implementation monitoring to ensure that take/impacts due to the covered activities does not exceed the limits of the permit, and that the Plan is being implemented in compliance with the stay-ahead provision, which ensures that the habitat protection, restoration, and management activities keep pace with, or outpace, habitat and species impacts that result from covered activities (Section 6.2.4).

5.4.1.1 Covered Activities Implementation Monitoring

To track implementation of the covered activities, the County will create and maintain a database that documents their impacts as well as the success of the required mitigation elements. The spatial database will identify the type and location of each covered activity as well as the following:

1. **Impacts**: the area (i.e., square feet) of habitat temporarily impacted, the area of habitat permanently impacted, as well as the take of/impacts to individuals, if any is observed;
2. **Protection measures:** implementation of the measures established to avoid and minimize impacts to the covered species and avoid impacts to other listed species in the Plan Area (Section 5.2); and
3. **Mitigation**: payment of habitat mitigation fees, and dedication of conservation easements, where applicable, by the Plan participants (Section 5.7.2).

The database will be used to evaluate implementation of the Plan to ensure the covered activities are mitigated to a level that is commensurate with the impacts of the covered activities.

5.4.1.2 LOHCP Preserve System Implementation Monitoring

To track implementation of the compensatory mitigation, the County will work with the Implementing Entity to create and maintain a database that documents LOHCP Preserve System activities, including habitat protection, restoration, and management funded by the mitigation fees to collectively compensate for impacts of the covered activities (Section 5.7.2). The spatial database will track the following:

1. **Habitat Protection:** the area of new habitat permanently protected through acquisition of fee title, and the area protected through conservation easements;
2. **Habitat Restoration:** the degraded habitat area that was successfully restored to promote the ability of the habitat to sustain the covered species; and
3. **Habitat Management:** the type and area of habitat management treatments used address factors that degrade habitat for the covered species.

The database will track application of these activities to each of the vegetation and other land cover types mapped in the area and used for the take/impacts assessment (Table 4-3); this will enable the comparison of the net effects of Plan implementation on the covered species and their habitats and to determine whether the plan is being properly implemented in accordance with the terms of the Plan and permit. In order for the acres of habitat restored or managed to be counted as mitigation under the Plan, the treated area will need to meet the performance criteria identified in the AMMP (or IAMMP), which will be evaluated through the LOHCP effectiveness monitoring program, as described below.

The database will also track costs associated with these activities, to facilitate ongoing work to improve the cost-effectiveness of the conservation program, as well as facilitate updates to the mitigation program fee schedule (Section 7.4).

5.4.2 Effectiveness Monitoring

Monitoring will be conducted to evaluate the effectiveness of the conservation program, including:

1. **Long-Term Monitoring:** studies to evaluate the status and trends in the covered species populations and the conditions of their habitats, and thus progress toward the biological goals and objectives; and
2. **Project-Specific Monitoring:** studies to examine the effectiveness of specific restoration and management projects, to ensure that they achieve the performance criteria established to

gauge their effectiveness at promoting the biological goals and objectives of LOHCP Preserve System Management, and substantiate the mitigation to compensate for the impacts of the covered activities on the covered species.

The following sections describe the objectives and approaches to these two general types of monitoring. Appendix E provides draft monitoring protocols for the covered species and habitat conditions within the LOHCP Preserve System. Additional details will be developed in the LOHCP Preserve System AMMP that will be developed during the first two years of plan implementation (Sections 5.3.3.2 and 6.2.3.2).

5.4.2.1 Long-Term Monitoring

A suite of complementary studies will also be conducted to track the status of the covered species populations and evaluate the conditions of their habitat that could influence viability of their populations. Table 5-6 summarizes the monitoring protocols, while Table 5-1 identifies how they will track progress toward the goal and objectives. Initial monitoring protocols for the studies in Table 5-6 are outlined in Appendix E; these will be revised as part of efforts to develop the LOHCP Preserve System AMMP.

Long-term monitoring studies will be conducted in perpetuity as mitigation for the covered activities. During the permit period, the frequency of monitoring, or number of years between study implementation, varies depending on the life history and ecology of the biological system being examined, to maximize cost effectiveness of the overall monitoring effort. Specifically, annual monitoring will be conducted to evaluate the general conditions of the habitat to detect changes or threats that merit remedial actions. Annual monitoring will also be used to track populations of Morro shoulderband snail; this relatively short-lived species can exhibit greater population fluctuations than longer-lived species (e.g., Morro manzanita). More frequent monitoring is needed to identify natural fluctuations in the populations and understand factors that influence them (e.g., climate), and distinguish these from population declines that can threaten long-term persistence.

Morro manzanita and the other covered species will be monitored on a five-year interval. This interval will also be used to map exotic plants and the plant communities, as well as quantitatively assess plant community structure and species composition to evaluate habitat conditions (Table 5-6). While these factors can vary annually due to weather, the goal of the monitoring is to detect long-term changes due to management, or lack thereof.

After the permit has expired, and no additional take/impacts of the covered species will be permitted under the LOHCP, the habitat and covered species populations will continue to be monitored as part of in perpetuity implementation of habitat management, which will be designed to ensure that the biological goals and objectives related to their long-term persistence are attained. However, the frequency of monitoring for the covered species will decrease (Table 5-6) to reduce overall costs of the conservation program while still providing information needed to monitor success toward the biological goals and objectives in perpetuity.

5.4.2.2 Project-Specific Monitoring

As part of the adaptive framework that will be used to manage the LOHCP Preserve System, monitoring will also be conducted to examine the effects of individual restoration and large-scale management

projects. The purpose of project-specific monitoring is to evaluate achievement of the performance criteria needed to credit restoration as mitigation for the covered activities, and enhance long-term effectiveness of restoration and management by 'learning by doing' (Walters and Holling 1990). Wherever possible, restoration and large-scale management projects will be conducted using an experimental design, which enables quantitative examination of their effects. Such experimental methods include establishing controls or reference populations, and replicating treatments, wherever feasible. Smaller-scale management projects can also be monitored, as resources allow; however, restoration projects and management projects with the potential to have large effects will be the focus of project-specific monitoring.

Project-specific monitoring will be conducted for all restoration actions that are designed to offset the impacts of the covered activities. The monitoring methods will vary depending on the nature of the project, but in all cases will be designed to evaluate whether the restoration project has achieved the performance criteria: specific objectives of the action that reflect its effectiveness and enhancing habitat or promoting population growth and persistence directly (Section 5.3.3.2). Project-specific monitoring will also be used to identify the need for follow-up treatments as well as remedial actions to ensure the project meets the performance criteria.

Project-specific monitoring will be especially important for projects that can have uncertain or potentially deleterious effects on the covered species. To leverage expertise and other resources, the Implementing Entity will partner with research institutes such as California Polytechnic State University San Luis Obispo to design and implement effective monitoring studies.

Within a given study, the monitoring duration and interval will depend on the project and the monitoring objectives. Generally speaking, project-specific monitoring will be conducted three to five times during a five to ten-year period; longer monitoring periods may be required depending on the nature of the habitat or species response(s) being evaluated. For example, treatments to control the exotic perennial veldt grass could be evaluated in years 1, 3, and 5. Monitoring for a prescribed burn or fire surrogate designed to promote Morro manzanita regeneration could occur in years 1, 5, and 10. These and other details of project-specific monitoring protocols will be developed based upon the specific aspects of the project and the goals for monitoring.

5.4.2.3 Facilitate Research

As part of the LOHCP, the County will work with the Implementing Entity to facilitate research by scientists at universities, agencies, and organizations by maintaining a list of priority studies, conducting outreach to research institutions to engage their participation in research in the LOHCP Preserve System, and as feasible, seeking outside funds to support research (Section 6.1.1.8). The goal of the research, which will not constitute mitigation in the conservation program, will be to improve upon the understanding of the biology of the covered species in order to develop and implement effective conservation strategies to facilitate their persistence. Examples of such research identified in the recovery plan for the species include (USFWS 1998a, 1999):

- Examination of the species' habitat requirements;
- New exotic plant control methods that maximally benefit the covered species;
- Techniques to maintain a mosaic of vegetation appropriate for all listed and sensitive species; and

- Evaluate recolonization abilities of species.

The research studies will complement work by the Implementing Entity to increase understanding of the ecology and conservation needs of the covered species and the natural communities in which they occur through long-term and project-specific monitoring implemented as in the LOHCP Preserve System as described above and in Appendix E. New information developed through research as well as monitoring will be integrated into the adaptive management process used to promote effectiveness of the LOHCP.

5.5 Adaptive Management

The LOHCP conservation program will be implemented through an adaptive framework, in which the elements of the program are adjusted, over time, in order to enhance their long-term effectiveness at achieving the program goals (Figure 5-5). The adaptive management framework incorporates the four elements recommended by the USFWS for adaptive management in HCPs (65 FR 35252):

1. Identify uncertainties and the questions that must be addressed to resolve the uncertainties;
2. Develop alternative strategies and determine which experimental strategies to implement;
3. Integrate a monitoring program that is able to detect the necessary information for strategy evaluation; and
4. Incorporate feedback loops that link implementation and monitoring to a decision-making process.

The adaptive management process will be used to implement all elements of the conservation program, including the avoidance and minimization measures as well as habitat protection, restoration, management, and monitoring.

5.5.1 Adaptive Management of the Overall Conservation Program

The LOHCP conservation program will be managed adaptively as part of the annual cycle in which monitoring results (Section 5.4) are used to assess progress toward achieving the biological goals and objectives (Section 5.1). New scientific information and changed conditions or circumstances (Section 6.5) will also be evaluated to identify modifications to the conservation program components, including avoidance and minimization measures (Section 5.2) habitat protection strategies (Section 5.3) and habitat management and restoration techniques (Section 5.4). The annual report (Section 5.6) will identify proposed adjustments to enhance effectiveness of the program, which will be based on one or more the following:

- **Biological effectiveness monitoring results**, which can refine management strategies and techniques;
- **Implementation monitoring results**, which can identify additional or different protection measures;
- **New scientific information,** which can inform effective conservation and management of the covered species and the communities in which they occur; and

- **Changes in habitat conditions,** including threats to the covered species, such as invasion and spread of exotic plants or animals, fire, drought, or global climate change, which may necessitate additional or different management treatments (Section 6.5).

The County will work with the Implementing Entity to identify proposed adjustments to the LOHCP conservation program in the annual reports, which will be provided to the agencies by March 31 during the year following that which is covered by the report. The County will work with the Implementing Entity to convene a meeting of agency representatives to review the annual report and discuss proposed changes.

5.5.2 Adaptive Management in Management of the LOHCP Preserve System

The LOHCP Preserve System will be managed following adaptive management techniques, which address the uncertainty inherent in habitat restoration and management, enable managers to adapt to changed conditions within the LOHCP Preserve System, and will increase understanding of the covered species and communities over time, in ways that will promote long-term effectiveness of management.

As part of this adaptive approach, management and restoration projects will be conducted as experiments that can be used to evaluate their effects on the covered species and communities, and their effectiveness (Figure 5-5, Walters and Holling 1990, Nyberg 1998, Lee 1999, Elzinga et al. 2001). Should the projects succeed, monitoring will be used to document their long-term success. Should a project fail, the results will be used to refine the model for the system that will increase the likelihood of future restoration project success. Notwithstanding the objective of learning from unsuccessful projects, restoration projects will still be required to meet specified performance criteria, which will be identified in the LOHCP Preserve System AMMP and that reflect their conservation value for the covered species, in order to be credited as mitigation in the Plan (Section 5.3.3).

Adaptive management will also be needed to confront the changes in conditions during the course of management of the LOHCP Preserve System in perpetuity. Changes in community composition (e.g., the invasion of an exotic plant) and species populations (e.g., a decline in Morro shoulderband snail populations due to disease outbreak), among others, will require changes in management strategies and priorities. In addition, management techniques that might have been effective in one place or time may not be effective in another, requiring continued vigilance to achieve the conservation goals of the LOHCP.

Adaptive management will therefore by utilized at several levels during management of the LOHCP Preserve System to facilitate attainment of the biological goals and objectives. To fund the remedial management to address adaptive management, as well as changed circumstances, 10 percent was added to the estimated restoration, management, and monitoring costs (Section 7.2.3); this reflects remedial management costs budgeted in another recent regional HCP (County of Santa Clara et al. 2012).

5.6 Reporting

In order to document implementation of the Plan and its progress toward the goals and objectives, the County will work with the Implementing Entity to prepare and submit to the USFWS an annual report. The reports will be submitted by March 31 of the year immediately following the reporting year, to

allow time for results of annual monitoring studies, as well as all other requisite record keeping, to be prepared and synthesized.

The annual report will document the results of the implementation and biological effectiveness monitoring conducted during the calendar year, as well as provide the status of the overall conservation program to date. The following is an outline of specific elements that will be integrated into the annual report.

1. **Implementation Monitoring Report:** This component of the annual report will describe the effectiveness of efforts to implement the plan and quantify its impacts on the covered species. It will include the following:
    - **Plan Impacts to Covered Species:** The number of applications and approvals for take authorization, the area (i.e., square feet) of habitat temporarily impacted and the area of habitat permanently impacted, as well as the take/impacts of individual covered species, including that resulting from any pre-project surveys;
    - **Protection measures:** the results of compliance monitoring to ensure implementation of the measures to avoid and minimize impacts to the covered species and avoid impacts to other listed species in the Plan Area (Section 5.2); and
    - **Mitigation:** work to implement the conservation strategy, including mitigation fees collected, and acres of habitat permanently protected, restored, and managed.
2. **Biological Effectiveness Monitoring Report:** This component of the report will document the results of monitoring studies to evaluate condition of the habitat and covered species populations, and effectiveness of the plan at achieving its biological goals and objectives. Report components will depend on the studies conducted in the plan year, but will generally include:
    - Results of long-term monitoring studies for the communities, habitats, and covered species populations; and
    - Results of specific monitoring studies conducted for habitat management and restoration projects to examine the effects and effectiveness.
3. **Financial Report:** This report will document the financial status of the Plan, including mitigation fees collected, mitigation costs (funds expended to implement the conservation program), and the balances of the trust accounts that contain funds for management during the permit term, and the endowments that will be used to fund administration and management post-permit (Section 7.3.1). The report will also assess financial viability of the plan, which will address the sufficiency of the mitigation fees to implement the conservation program to the level needed to ensure that the mitigation is commensurate with the impacts of the covered activities.
4. **Changes to the Plan:** This component of the report will document any minor or administrative amendments to the Plan approved for the preceding year in accordance with the procedures described in Section 6.7. It will also outline any recommended changes identified as part of the adaptive management process (Section 5.5).

The annual report will contain as appendices the reports from studies to monitor specific projects, the covered species, and their habitats (Section 5.4.2; Appendix E).

The County and the Implementing Entity will convene a meeting with the USFWS to review the annual report during the second quarter of the year (April-June) to discuss changes to plan implementation and proposed plan amendments (Section 6.7). A separate meeting will be conducted in the fall to discuss preliminary monitoring results and their implications for the Plan in the coming year; the decision points from that meeting will be reflected in the annual report.

5.7 Mitigation Requirements and Implementation

The elements of the LOHCP conservation program will be implemented by the County in coordination with the Implementing Entity and the project proponents to mitigate the impacts of their permitted activities on the covered species and their habitats.

The mitigation in this plan includes two main components:

1. **Avoidance and Minimization measures,** to prevent or reduce the number or severity of take of/impacts to the covered species resulting from the covered activities, including by restoring temporarily disturbed habitat on-site; and
2. **Compensatory Mitigation,** to offset the unavoidable take/impacts of the covered species resulting from the covered activities by permanently protecting and managing habitat, as well as restoring degraded habitat.

Tables 5-2 through 5-4 outline the measures designed to avoid and minimize impacts. Table 5-7 identifies the compensatory mitigation requirements. These elements were developed so that collectively:

1. the LOHCP mitigates the impacts of the covered activities to level that is commensurate with the effects of the taking; and
2. there is rough proportionality between the take/impacts of the covered activities and the mitigation requirements.

The following sections describe the mitigation requirements; additional information about the actions themselves is provided in the preceding sections of this chapter.

5.7.1 Avoidance and Minimization

Participants in LOHCP will be required to avoid and/or minimize take of/impacts to the covered species (Table 5-2) and avoid impacts to other listed species not covered by the incidental take permit (Table 5-3). A separate suite of avoidance and minimization measures will be implemented for activities conducted to implement the CWPP (Table 5-4) to ensure these projects have negligible impacts on covered species (sections 2.2.7 and 5.2.4).

As part of the application review and permitting process, the County will identify the specific protection measures that must be conducted for each project permitted under the LOHCP. These measures will be identified within the Certificate of Inclusion issued for projects covered by the LOHCP (Appendix H).

Certain avoidance and minimization measures may entail costs (e.g., for pre-project surveys), which will be the responsibility of the project proponents. The mitigation fees provided to compensate for the

project impacts do not fund implementation of the avoidance and minimization measures; instead, the mitigation fees will fund the compensatory mitigation under the LOHCP (Chapter 7).

5.7.2 Compensation

Participants in the LOHCP will be required to compensate for the impacts of their permitted projects on the covered species by implementing mitigation to protect, restore, and manage habitat that contributes to the long-term viability of their populations. The level of compensatory mitigation will be commensurate with the impacts of the project activity and will be based on the amount of disturbance caused by the project. For purposes of this plan, disturbance is defined as any activity that removes vegetation or disturbs soil, including by displacing it or covering it. The disturbance envelope, for purposes of mitigation calculations, includes the entire area that is disturbed as a result of the project and that is not covered by existing impervious surfaces including existing buildings or other structures, and hardscapes such as concrete, asphalt, or other land cover that is impervious. Areas that are landscaped, denuded, or feature pervious surfaces, as well as natural or semi-natural habitat, are all included within the disturbance envelope.

The disturbance envelope includes the area surrounding buildings or other structures where fire hazard abatement and vegetation modification are required to create and maintain defensible space (Section 2.2.4), as well as the area of new improvements themselves, including buildings, hardscapes, and landscaping.

The disturbance envelope for purposes of compensatory mitigation includes the area of habitat that is temporarily impacted as a result of construction activities including access and staging, and is restored following completion of the project, as well as the area of permanent habitat impacts. This inclusive disturbance envelope ensures compensation for all take/impacts, including that which occurs in areas of temporary disturbance, as well as from permanent loss of habitat.

Compensatory mitigation is not required for the impacts of activities to restore, manage, and monitor the Preserve System, as outlined in the Preserve System AMMP (Section 5.3.3.2), as to do so would require compensation for the compensatory mitigation itself. Compensatory mitigation will also not be required for implementation of the CWPP activities, which are limited in scope and will have negligible and largely temporary impacts that will be adequately mitigated through implementation of the avoidance and minimization measures (Table 5-4; Section 5.2.4).

5.7.2.1 Habitat Protection Requirement

Safeguarding additional unprotected habitat from development or other factors that degrade habitat for the covered species is an essential component of the LOHCP conservation program (Section 5.3.2). In order to mitigate the covered activities, project proponents will be required to protect habitat on-site or off-site, with the specific requirement depending on the type of project (Table 5-7). To summarize, private residential landowners developing vacant parcels located within the Priority Conservation Area will be required to set aside habitat on site at a ratio of 3:1 for the impacts caused by the development projects (Section 5.7.2.1.1). Other project proponents will pay a Habitat Protection Fee which will be used to protect land through acquisition of fee title or conservation easements from willing sellers largely inside the Priority Conservation Area (Section 5.7.2.1.2). All project proponents will be required

to pay a habitat restoration, management, and administration fee, which will fund management of the LOHCP Preserve System, as well as administration of the Plan (Section 5.7.2.2).

5.7.2.1.1 On-Site Habitat Protection

Participants in the LOHCP conducting new residential development on vacant land within the Priority Conservation Area (Figure 5-1) will protect habitat on site at a ratio of 3:1 for the disturbance caused by the activity. For example, landowners seeking to develop a new single-family home and associated improvements that disturb 30,000 square feet will be required to set aside 90,000 square feet of habitat within the parcel. Proponents of new development projects on vacant parcels inside the PCA that are too small to set aside the required set aside based on the maximum disturbance envelop can either reduce the size of their project to a size that accommodates the requisite habitat set-aside or mitigate habitat loss through payment of the Habitat Protection Fee rather than on-site habitat set-asides (Section 5.7.2.1.2).

The undeveloped parcels located within the Priority Conservation Area generally feature habitat of greater general conservation value for the covered species than other parcels in the Plan Area (Section 5.3.1.2). This accounts for the higher ratio for habitat protection (3:1) when compared to that required for other projects (1:1), which will pay the habitat mitigation fee (Section 5.7.2.1.2). Protecting habitat within parcels in the Priority Conservation Area will help promote several of the biological objectives, most notably by promoting connectivity of habitat in the region (Table 5-1).

The location of the habitat set-aside will be determined by the Implementing Entity in coordination with the County and the USFWS, which will work with the landowner to identify a set-aside area that provides high conservation value and is conducive to long-term protection, management, and monitoring. The habitat will be permanently protected via a conservation easement dedicated to the Implementing Entity (Section 6.2.2). To ensure that the protected habitat facilitates the biological goals and objectives of the LOHCP (Section 5.1, Table 5-1), the easement will provide for permanent management and monitoring of the conserved area. (Section 6.2.2.2).

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act. While the LOHCP requires that proponents in the PCA set aside habitat at a 3:1 ratio, the State Coastal Commission may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set-asides would protect additional habitat not included in this analysis of the conservation benefits of the LOHCP Conservation Program.

Proponents of these projects must also pay a separate habitat restoration, management, and administration fee. This fee will be used to manage the LOHCP Preserve System in perpetuity, including that which they dedicate on site, as well as to administer the plan (Sections 5.7.2.2 and 7.2.5.2).

5.7.2.1.2 Habitat Protection Fee

Proponents of the other covered activities identified in Table 5-7 will pay a Habitat Protection Fee that will contribute to protection of additional privately held, unprotected land that will be included in the LOHCP Preserve System (Section 5.3.2). Proponents of these covered activities will be required to

mitigate their project impacts on a per-square foot basis: for every square foot of ground disturbance, project proponents will pay a fee that was calculated to cover the costs to acquire through fee or conservation easement (i.e., protect) in perpetuity suitable habitat as outlined in the sections describing the Preserve System Configuration (Section 5.7.3.2) and Funding (Section 7.3). As outlined above, ground disturbance includes any activity that removes vegetation or disturbs soil in an area not covered by existing impervious surfaces.

The Habitat Protection Fee was calculated based on vacant land costs in the area (Section 7.2.1). The fee will be re-evaluated after three years, and then every five years thereafter, with adjustments made, as needed, to ensure the fee is sufficient to fund habitat protection (Section 7.4).

Though on-site habitat protection is preferable in many cases, it was determined to be infeasible and/or ineffective at contributing to the biological goals and objectives of the LOHCP for the following types of projects designated to pay the Habitat Protection Fee (Table 5-7).

Private Development of Vacant Parcels outside of the PCA: Habitat within vacant parcels located outside the PCA has limited ability to promote population viability of the covered species. Much of it is on small, often isolated parcels and is therefore fragmented; a lot of this habitat has been degraded by more intensive land uses in this area, including frequent mowing or incompatible recreational uses. Habitat outside the PCA would be difficult to restore and manage due to its proximity to dense development, which increases the impacts of incompatible recreation use and inhibits effective fire management.

Redevelopment on Developed Parcels: Habitat on parcels that have already been developed either for commercial or residential uses, with all else being equal, is less valuable for conservation of the covered species, as it is fragmented by existing development, and degraded by the associated land use activities. The value of on-site set-asides established for redevelopment activities would be further limited by their small size; most redevelopment projects will affect 500 to 5,000 square feet which would lead to set-asides of just 1,500 to 15,000 square feet. Such small areas are extremely cost-ineffective to monitor and manage.

Public and Private Utility Projects: Many public and private utility projects will occur outside the PCA where habitat is fragmented and degraded, and has lower long-term viability as outlined above. Many will occur in the County right-of-way or on small parcels with existing facilities, where habitat protection is not feasible. As with redevelopment projects, many of the public and private utility projects are small, such that the value of resulting set-asides would be low relative to their costs to manage and monitor.

Proponents of these projects must also pay a separate fee is also paid to manage and restore habitat, as well as fund administration of the plan (Section 5.7.2.2).

5.7.2.2 Habitat Management and Restoration Requirement

All proponents of projects outlined in Table 5-7 must pay a Restoration/Management/Administration Fee, which will be used to restore, manage, and monitor habitat in the LOHCP Preserve System as outlined in the LOHCP Preserve System AMMP (Section 5.3.3.2); this fee will also fund administration of the Plan.

Restoration of habitat is necessary to compensate for the loss of habitat caused by the covered activities (Section 4.2). This off-site restoration designed to offset the impacts of the covered activities, is in addition to restoration of temporarily disturbed habitat on-site, which is required to minimize project impacts (Table 5-2). Ongoing management is required to ensure that the habitat restoration achieved is sustained, and that habitat protected from development in LOHCP Preserves is enhanced in terms of its functions for the covered species (Section 5.3.3). Long-term monitoring of the Preserve System is essential to ensuring long-term effectiveness of the restoration and management treatments (Section 5.4).

These critical components of the conservation program will be funded through a Restoration/Management/Administration Fee, which will also fund administration of the Plan, so that its costs are born by the Plan participants (Section 7.3). Like the Habitat Protection Fee, the Restoration/Management/Administration Fee is based on the area disturbed by the covered activity; this ensures the mitigation is proportional to the project impacts.

The initial fee was determined based on the anticipated costs of conducting the necessary habitat restoration, management, and monitoring activities within the LOHCP Preserve System, as well as administering the plan (Section 7.2). The cost analysis included establishment of endowments to fund ongoing management and monitoring of the LOHCP Preserve System (Section 7.3). These endowments will ensure the condition of habitat protected and restored within the LOHCP Preserve System is maintained in perpetuity.

Like the Habitat Protection Fee, the Restoration/Management/Administration Fee will be re-evaluated after three years, and then every five years thereafter or as needed; adjustments to the fee will be made, as needed, to ensure it funds the actual costs of restoration, management, monitoring, and administration (Section 7.4).

5.7.2.3 Preserve System Assembly and Management

In this programmatic, 25-year plan, the LOHCP Preserve System will be assembled over time as the Implementing Entity accepts conservation easements dedicated by landowners developing vacant land inside the Priority Conservation Area; uses Habitat Protection Fees collected from other project proponents identified in Table 5-7 to acquire fee title or easement from willing sellers of land inside the Priority Conservation Area; and uses restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to restore, manage, and monitor the newly acquired land, as well as existing protected lands enrolled into the LOHCP Preserve System. These land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities, such that at any time during plan implementation, the benefits of the Preserve System for the covered species exceed or at least match the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities.

The County will work with the Implementing Entity to use the fees and habitat dedications to establish and manage the LOHCP Preserve System—the network of protected habitat, which will include existing protected lands as well as habitat protected through implementation of the Plan, which will be restored, managed, and monitored in a coordinated manner to achieve the biological goals and objectives of the

LOHCP. The LOHCP covered activities are estimated to result in 532 acres[19] of ground disturbance within the Baywood fine sands ecosystem (Section 2.2; Table 2-9). This will primarily result from private residential and commercial development (409.5 acres), including that of vacant parcels (253.8 acres) and redevelopment of partially developed parcels (155.7 acres). The remaining area (122.1 acres) is anticipated to be impacted by capital improvements and maintenance activities associated with public and private utility projects (Table 2-9).

To mitigate the impacts of these projects at a ratio of 1:1, the LOHCP Preserve System must benefit at least 532 acres of habitat suitable for the covered species. Analyses conducted to develop the Plan identified more than 300 acres of privately owned, unprotected land within the Priority Conservation Area, which is illustrated in Figure 5-1. These lands are highly suitable for long-term conservation and that could be protected (i.e., through acquisition of fee title and dedication of a conservation easement) and managed to mitigate the impacts of the covered activities. In addition, the Priority Conservation Area features 298.2 acres of habitat within existing protected lands that were identified as suitable for management as managed as part of the LOHCP; of these, an estimated 35.4 acres merit restoration to address highly degraded conditions (Section 5.3.3.1; Table 5-5).

During the permit period (Years 0-25 of Plan Implementation), the Implementing Entity will work with willing landowners to conduct habitat protection, restoration, and management projects to compensate for the impacts of the covered activities. Because the required mitigation is provided when plan participants receive their local building or other land-use permits, which is anticipated to occur throughout the 25-year permit term, the LOHCP Preserve System will be assembled over time. Plan participants mitigation fees will be used to fund elements of the conservation program, pay for Plan administration, and establish a non-wasting endowment that will fund management and administration in the post-permit term (Chapter 7). The Implementing Entity will also receive the land dedications (i.e., conservation easements) offered on vacant parcels developed for residential use inside the Priority Conservation Area (Section 5.7.2.1.1).

To maximize the long-term conservation benefits of the mitigation fees, the Implementing Entity will conduct further analyses to strategize conservation within the LOHCP Area, to identify the highest-priority habitat protection, restoration, and management projects; that is, those that are deemed most beneficial to long-term achievement of the biological goals and objectives. Developed based on the analysis presented in this Plan, the Implementing Entity's strategies will be continually updated, to reflect changing conditions that create new opportunities and constraints.

As mitigation funds accrue, they will be used to implement the priority conservation actions, which will include protecting and managing unprotected habitat, as well as conducting habitat restoration and additional management on existing protected lands that are enrolled in the LOHCP Preserve System (Section 5.3.1). The Implementing Entity will create and maintain a database that will be used track implementation of the various activities on a per-square-foot basis, according to the type of vegetation or other land cover type affected. This database will be used to track benefits to the covered species, based on the crosswalk between the vegetation and land cover types and their habitats (Table 4-4).

[19] Does not include take due to implementation of the conservation program and the Community Wildfire Protection Plan, which will result in additional temporary impacts to habitat.

5.7.2.3.1 Mitigation Crediting Ratios

Mitigation equivalencies will be used to track the mitigation value of different types of actions in this conservation program. These mitigation equivalencies are expressed as ratios that relate the conservation value of habitat protection, restoration, and additional management, to the impacts of the covered activities. Table 5-8 discusses the ratios and summarizes the rationale used to assign them based on the relative value of the actions for the long-term recovery of the covered species. They were developed by asking the question: *What is the relative value of protecting new habitat, restoring existing protected habitat, or providing enhanced management of existing protected habitat, for the long-term viability of the covered species, relative to* not *implementing a typical covered activity?*

Restoration and Management of Existing Protected Lands

The ratios for restoration (1.5:1) and management (1.25:1) of existing protected lands are both greater than 1:1, reflecting:

1. the imperative nature of active habitat management within the Baywood fine sands ecosystem in order to maintain and enhance the habitat conditions for the covered species, and the high importance of appropriate habitat conditions for achieving the biological goals and objectives for the covered species (Section 5.3.3); and
2. The greater conservation value of land within existing protected lands relative to much of the land that will be impacted by the covered activities.

Active Management and restoration of eligible existing protected lands, including the Morro Dunes Ecological Reserve (MDER; Table 5-5), will be essential to the long-term persistence of the covered species. This and other protected lands feature large areas of unfragmented habitat that have the greatest potential to support large and persisting populations. Although protected from development, habitat within the MDER has been degraded by a variety of factors that impair its ability to support the covered species populations including historic land uses, such are off-highway vehicle use, erosion resulting from old roads and trails, invasive plant species, and fire exclusion, much of which occurred prior to the acquisition of the property by CDFW. Funding and staff capacity within the Department of Fish and Wildlife are insufficient to conduct the restoration and habitat management tasks that are necessary to enhance and maintain the habitat but that are beyond that which is identified in the land management plan for the property (CDFW 1982). Conducting enhanced management and restoration within the MDER to address these and other factors that degrade habitat and otherwise impact the covered species within the MDER and any other existing protected lands that are ultimately enrolled in the LOHCP Preserve System can increase the distribution, abundance, size, and persistence of populations.

In doing so, such conservation actions will have greater long-term benefit for the covered species than *not* implementing a typical activity covered by the LOHCP. This is because the majority of covered activities will impact habitat that lacks the physical and biological features and landscape context to provide long-term conservation value for the covered species. Specifically, of the 532 acres of habitat that will be impacted by the covered activities in this plan, 461 acres (87%) are projected to be inside the USL—the area slated for urban (rather than rural) development in Los Osos, which features 95% of the parcels yet just 48% of the land in the LOHCP Area. This area inside the USL already features small parcels (median = 0.14 acres), the majority (885) of which area already developed; remaining

undeveloped land is scattered throughout the USL, rather than in contiguous areas, and has been degraded by prior land use including vegetation clearing. Indeed, of the 461 acres to be impacted within the USL, an estimated 197 acres (43%) will occur in parcels and in the right of way, which were mapped as developed (Figure 3-4); degraded habitat within these lands is anticipated to be impacted through public and private utility projects, infill, and redevelopment projects (Table 4-2, Figures 2-4 and 2-5). Such projects will similarly impact an estimated 9.2 acres of degraded habitat outside of the USL. Of the 532 acres of impacts from the covered activities, only 61.2 acres (12%) will affect intact habitat outside of the USL which, generally speaking, is of higher conservation value. Therefore, compensating for the loss of habitat (largely) inside the USL, much of which is already developed and fragmented and therefore has lower long-term conservation value, by restoring and enhancing the condition of habitat within existing protected lands, specifically the MDER, will have a net benefit for the long-term persistence of the covered species.

The value of restoration, relative to not implementing a covered activity, is greater (1.5:1) than for enhanced management (1.25:1), because restoration will recreate the appropriate habitat structure and/or functions for the covered species. In most cases, restoration will enable covered species to expand their distribution into restored areas. By increasing the area occupied by the species, restoration can promote population growth and resilience to the impacts of future perturbations in the landscape. While management activities are not anticipated to increase areal extent of occupied habitat, they are expected to increase the size of populations by increasing abundance and/or demographic performance in areas treated to improve habitat conditions by addressing anthropogenic factors that degrade it.

Areas that are subject to restoration and management within existing protected lands will be managed (i.e., following restoration) and monitored in perpetuity, to address future anthropogenic factors that might otherwise degrade their ability to support the covered species. This long-term management and monitoring of high-value conservation lands protected for the covered species will be essential to their recovery and vastly outweigh the negative impacts of the LOHCP covered activities. As a result, both management and restoration then management have ratios that exceed the 1:1, reflecting their net benefits for promoting population growth and persistence of the covered species relative to the average impacts of the LOHCP covered activities, which will primarily occur in habitat that has low long-term conservation value.

Protection and Management of New Habitat

The ratios used to credit protection of new habitat as mitigation for the covered activities will reflect the long-term conservation value of the habitat for the covered species, and its ability to facilitate achievement of the Plan's biological goals and objectives (Section 5.1, Table 5-1). Habitat protected through acquisition of fee title or conservation easement, which will primarily occur in the Priority Conservation Area (Section 5.3.2), will be assigned to one of four tiers, based on their size, development status, habitat condition, and landscape context, including potential to promote habitat connectivity. Table 5-8 identifies the general attributes of parcels that will be used to assign unprotected parcels into one of four tiers, the protection of which would be credited at ratios ranging from 0.5:1 to 2:1.

As with the mitigation crediting ratios for restoration and management of existing protected lands, the ratios for new habitat protection reflect the long-term value for species recovery of permanently protecting and then managing, in perpetuity, the currently unprotected habitat. The ratios reflect the net benefit of protecting and managing the habitat in perpetuity, relative to implementing a typical covered activity in the LOHCP.

As illustrated in Table 5-8, permanent protection of habitat in large (>10 acre) undeveloped parcels or moderately sized (3-10 acres) undeveloped parcels that are adjacent to protected lands, and that feature habitat that is intact and of high value to one or more of the covered species, will be credited at a ratio of 2:1. This high ratio reflects the far greater conservation value of the habitat in such parcels of Very High Conservation Value, relative to the generally low conservation value of most of the habitat that will be impacted by the covered activities. As described above, these activities will largely occur in small parcels and rights of way within the USL and many will affect either developed habitat or habitat that is degraded owing to prior land-use activities including vegetation clearing. Owing to its highly-fragmented nature, including extensive network of streets, habitat in this area has low long-term conservation value, such that funding protection of parcels in the Priority Conservation Area that are large and/or adjacent to existing protected lands will far outweigh the impacts of the covered activities on the covered species.

Protection of moderately sized parcels (3-10 acres) that feature habitat that can help connect existing protected land and Tier 1 parcels will be credited at a ratio of 1.5:1. Like the Very High Conservation Value parcels, protection of these High Conservation Value parcels will yield a net benefit for recovery of the covered species relative to implementation of the covered activities. Protection of smaller parcels (<3 acres) that have moderate conservation value due to their landscape context, including adjacency to existing protected lands, and intact habitat conditions, will be credited at a ratio of 1:1. Protecting and managing these parcels is anticipated to benefit the covered species at a level that is commensurate with the impacts of the covered activities. Protection of such small (<3 acre) parcels that lack adjacency to other protected lands, could still contribute to species recovery; however, they would not yield a net benefit such that twice as much habitat would have to be protected to mitigate the impacts of the covered activities on a per-acre basis (Table 5-8).

During implementation of the LOHCP Conservation Program, the Implementing Entity will work with the County and USFWS to protect habitat that is of the greatest long-term conservation value and that can maximally promote achievement of the LOHCP biological goals and objectives (Section 5.1, Table 5-1). The mitigation crediting ratios applied to new habitat protection projects will be determined during specific acquisition projects, based upon on-the-ground assessments of habitat conditions, evaluations of current landscape context, and other factors that influence conservation value, based on the criteria and value for recovery outlined in Table 5-8.

Collaborative Mitigation Projects

During the course of mitigation of the LOHCP over the anticipated 25-year permit period, the County may identify opportunities to implement collaborative projects in coordination with other entities seeking to conduct mitigation or other voluntary conservation actions. Such collaborative projects could leverage the funds available by the individual entities to conduct larger projects of greater conservation value than either entity could afford. For example, the entities could collaborate to implement a large or otherwise costly habitat protection project and/or restoration project, the costs of which exceed the funding and perhaps also the mitigation needs of the individual entities.

Collaborative projects could be designed in a variety of ways including:

- simple cost-sharing agreements, in which the parties split the costs of a single project (e.g., property acquisition);

- sequential projects that build upon each other, such as when one party protects habitat and the other restores and/or manages it.

When implementing collaborative mitigation projects in the LOHCP, the mitigation credits generated under the LOHCP will be based on the acres of habitat protected, restored, and/or subject to enhanced management using the LOHCP mitigation crediting ratios as outlined above. The acres credited to the County (as opposed to its collaborators) would be determined through the design of the collaborative agreement. To ensure that the mitigation is commensurate with the impacts of the project impacts in the LOHCP, the County will coordinate with the USFWS to ensure that the unit conservation benefits (mitigation credits) for the LOHCP covered species are not used to mitigate impacts of multiple projects.

Notwithstanding the need to avoid such 'double dipping', collaborative mitigation projects implemented under the LOHCP can be used to generate mitigation that could offset impacts to species and habitats *not* covered by the LOHCP. For example, the County could partner with another entity to purchase and then enroll into the LOHCP Preserve System a priority property for the LOHCP covered species that also features wetland habitat supporting rare aquatic species. Under this scenario, the County could receive the mitigation credits for habitat protection, restoration, and management of the acres of habitat supporting Baywood fine sands habitat to support the covered species, while the partner entity could receive mitigation credits for separate area of the property that supports wetlands and aquatic species, which are not covered in the LOHCP.

As part of work to develop collaborative mitigation projects or other cost-sharing agreements, the County will coordinate with the USFWS to ensure that the project is consistent with the terms of the LOHCP and ITP.

5.7.2.3.2 Preserve System Configuration Scenario

The mitigation crediting ratios in Table 5-8 were used along with the total estimated (and thus maximum permitted) habitat impacts (532 acres; Table 2-9), to develop a scenario for the configuration of the LOHCP Preserve System. The scenario was used to develop three components of the Plan.

1. **Financial Analysis:** Estimate the costs to implement the LOHCP Preserve System (Section 7.2), and therefore determination of the mitigation fees (Section 7.3).
2. **Impact Analysis:** Assess the net effects of Plan implementation on the covered species, their habitats, and the environment by comparing the anticipated impacts of the covered activities (Section 4) to the anticipated benefits of the conservation program (Section 5.8, Table 5-10), including in compliance with state and federal laws (i.e., CEQA and NEPA; Section 1.5).
3. **Alternatives to Take/impacts:** Develop and analyze the net effects of the alternatives to the take/impacts of the Plan (Chapter 8).

The following outlines the configuration of the LOHCP Preserve System in the realistic, albeit hypothetical, scenario for the ultimate LOHCP Preserve System design (Table 5-9). The County will work with the Implementing Entity to assemble the LOHCP Preserve System over time, by incorporating a mix of newly protected habitat and restoring and managing existing protected land to benefit the covered species in the greatest extent practicable (sections 5.3 and 6.2).

Management and Restoration of Existing Protected Lands (278.7 acres generating 357.1- acre mitigation credits): Of the 298.2 acres of habitat contained in three existing protected lands that

would be eligible for additional management and monitoring as part of the LOHCP (Table 5-5), this scenario assumes that the 278.7-acre Morro Dunes Ecological Reserve (MDER) will be enrolled in the LOHCP Preserve System. This enrollment will occur at the outset of LOHCP implementation, prior to take authorization. The County and Implementing Entity will coordinate its management activities with managers of the other protected lands inside the Priority Conservation Area; however, mitigation fees will not be used to provide additional management of these lands.

Of the MDER's 278.7 acres expected to be enrolled in the LOHCP Preserve System, 35.0 acres (12.5%) was projected in this preserve system scenario to be restored to address highly degraded habitat conditions, prior to ongoing active management (Tables 5-5 and 5-10). This acreage was identified based on an assessment and preserve management plan developed for the 230-acre Bayview Unit of the Morro Dunes Ecological Reserve (McGraw 2005), and conversations with the MDER's land manager regarding current habitat conditions and management units in that unit as well as the 48-acre Pecho Unit of the MDER (R. Stafford, pers. comm. 2016).[20] The remaining 243.7 acres of the MDER are in good, but not excellent, condition such that they will require only enhanced management above and beyond what CDFW has committed to implement to achieve the biological goals and objectives of the LOHCP (Table 5-9).

Based on the mitigation crediting ratios, the restoration of 35.0 acres within the MDER will yield 52.5 acres of mitigation credits, based on the 1.5:1 crediting ratio for restoration; meanwhile, the 1.25:1 crediting ratio for management will generate 304.6-acre-mitigation credits for management of the remaining 243.7 acres within the MDER.

Dedication of Easements (31 acres generating 31-acre mitigation credits): This preserve system scenario assumes that the Implementing Entity will be granted conservation easements for a total of 31 acres of habitat, as mitigation for impacts of private development on vacant parcels located within the Priority Conservation Area. This estimate assumes that project proponents required to set aside habitat will develop their parcels to the maximum allowed levels (Table 2-6). Proponents of residential development projects in vacant land in the Priority Conservation Area will be required to set aside habitat on site at a ratio of 3:1—for every square foot of habitat impacted, three square feet will be required to be protected through a conservation easement dedicated to the Implementing Entity, which will permanently protect, manage, and monitor the habitat (Section 5.7.2.1.1). Although the conservation value of habitat in these set-asides may vary, these habitat set-asides will all be credited at a ratio of 1:1, in which one square-foot-mitigation credit is generated to offset impacts of all covered activities for every square foot set aside (Table 5-8).

Fee title acquisition (76.5 acres generating 176 mitigation credits): In this preserve system configuration scenario, the Implementing Entity will acquire from willing sellers 76.5 acres of land, which will then be managed as part of the LOHCP Preserve System. Most (63.5 acres or 83%) would be in the Tier 1 (very high conservation value) parcels, with a smaller area (10 acres or 13%) protected in Tier 2 (high conservation value) parcels and just 3 acres (4%) protected in parcels of moderate conservation value; no Tier 4 (low conservation value) parcels are anticipated to be protected in this scenario (Table 5-9). In this scenario, the new habitat would be protected through

[20] The IAMMP, which was developed subsequent to this analysis, identified 27.74 acres of habitat in the MDER that merits restoration (McGraw 2020; Appendix M). The AMMP may identify additional acres that should be restored and will ultimately be used to determine the amount of the MDER that is in restoration and management units.

acquisition of fee title or conservation easements on parcels within the Priority Conservation Area and then actively managed as part of the LOHCP Preserve System (Section 5.3.1.2).

Under this scenario, the LOHCP Preserve System will include 107.5 acres of currently unprotected land, of which 10% (11 acres) will be restored and then managed, and the rest will be managed. The LOHCP Preserve System will contain 35 acres of degraded habitat in existing protected lands (i.e., the MDER) that will be restored, and an additional 243.7 acres of existing protected land that will be actively managed. In total, this hypothetical configuration for the LOHCP Preserve System will include 386.2 acres of habitat which will be protected, restored, and managed to generate 533.1-acre equivalents of benefits (Table 5-10); this mitigation will offset the 532 acres of habitat impacts at an overall ratio of 1:1. Permanent habitat loss is typically mitigated at a ratio greater than 1:1, with 3:1 ratios being common. However, the 1:1 ratio used in this Plan is appropriate since the habitat anticipated to be impacted by the covered activities is, generally speaking, of much lower long-term value for species recovery than the habitat that will be protected and managed inside the Priority Conservation Area (PCA; Section 5.3.1.2). As a result, the mitigation from the Plan will be commensurate with the impacts of the covered activities, as required under ESA.

As noted at the outset of this section, this Preserve System design described above and summarized in Table 5-9, is a realistic, albeit hypothetical, scenario for the ultimate LOHCP Preserve System. The scenario was developed to illustrate the anticipated benefits of the conservation strategy, estimate its costs, and thus determine the mitigation fees (sections 7.2 and 7.3); it was also used in the analysis of alternatives to the taking (Section 8). In this 25-year, programmatic plan, the actual Preserve System will be assembled over time as the Implementing Entity accepts conservation easements dedicated by landowners developing vacant land inside the Priority Conservation Area; uses Habitat Protection Fees collected from other project proponents identified in Table 5-7 to acquire fee title or easement from willing sellers of land inside the Priority Conservation Area; and uses restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to manage and restore the newly acquired land, as well as manage and restore existing protected lands enrolled into the LOHCP Preserve System. These land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities to ensure that the mitigation stays ahead of the impacts (Section 6.2.4), such that at any time during plan implementation, the benefits of the Preserve System for the covered species exceed or at least match the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities.

The plan establishes mitigation equivalencies to relate the conservation value for species recovery, of restoration and management of existing protected lands to protection and management of unprotected habitat, enabling these two important elements of the overall conservation strategy to be implemented as appropriate, to achieve the biological goals and objectives (Section 5.1, Table 5-1). However, in order to ensure that new habitat is protected in this programmatic plan, the LOHCP Preserve System will include a minimum of 55.25 acres of habitat acquired from willing sellers if the anticipated 531.5 acres of impacts are permitted. Though the scenario used here assumes the Implementing Entity will acquire fee title or conservation easements for a mix of Tier 1, Tier 2, and Tier 3 parcels totaling 76.5 acres (Table 5-9), the minimum habitat protection requirement could be fulfilled through acquisition of just 55.25 acres of Tier 1 parcels, due to their higher mitigation credit ratio (Table 5-8). Thus, this minimum habitat protection target of 55.25 acres is designed to connect and buffer existing protected lands and safeguard important habitat in the Priority Conservation Area. The 55.25 acres to be acquired by the Implementing Entity in addition to the 31 acres of land that is anticipated to be dedicated voluntarily by those project proponents developing vacant parcels inside of the PCA. As a result, if the covered

activities are implemented in their entirety, a minimum of 86.25 acres of new habitat will be protected through implementation of the LOHCP conservation Strategy.

5.8 Benefits of the Conservation Program

Implementation of the LOHCP Conservation Program is anticipated to have benefits for the covered species that outweigh the effects of the taking caused by the covered activities, by protecting, restoring, and enhancing habitat that is greater long-term conservation value than the habitat impacted through the covered activities (Section 5.8.1). Indeed, the mitigation is anticipated to facilitate species recovery (Section 5.8.2).

5.8.1 Habitat Benefits

In order to compare the habitat benefits to the impacts (Section 4.2), the acres of vegetation and other land cover types to be benefited by the LOHCP Preserve System were extrapolated using proportions (Table 5-10). Acreages within existing protected lands were estimated based on the proportions of the vegetation and other land cover types contained within the parks and reserves identified as eligible for inclusion (Table 5-5). For the newly protected lands, the acreages were calculated using the proportions of the vegetation and other land cover types within vacant, unprotected parcels in the Priority Conservation Area; these are the parcels on which habitat set-asides will be established (if developed), and that the Implementing Entity will target for fee title acquisition and management using the mitigation fees (Section 7.2.1).

The specific vegetation types and other land cover types in the respective areas were summarized according to the general type (Table 5-10) and also used to calculate the area of habitat for Morro shoulderband snail and Morro manzanita, based on the crosswalk between the specific vegetation and other land cover types and the habitats, which was used to assess the impacts of the covered activities (Table 4-4).

The Preserve System will primarily benefit coastal sage scrub, which is estimated to comprise 240.4 acres or 60% of the land, and central maritime chaparral, which is estimated to occur on 109.6 acres or 30% of the preserve system (Table 5-10). In comparison, these two community types, which constitute the primary habitat for the four covered species and will comprise 90% of the land in the preserve system, are estimated to comprise just 25.4% of the habitat to be impacted by the covered activities (Table 4-3).

The analysis of alternatives of the take/impacts provides the comprehensive list of ratios for impacts to benefits (Chapter 8, Table 8-1). This analysis reveals that the benefits of the conservation program will more than offset the impacts of the covered activities. Specifically, for every acre of coastal sage scrub impacted (189 acres; Table 4-3) 1.7-acre equivalents will be benefited in the LOHCP Preserve System scenario, which will benefit 320-acre equivalents (Table 5-10). The ratio for central maritime chaparral communities is even greater (8.5 to 1); the 18 acres of this community that are anticipated by be impacted by the covered activities will be more than offset by the 156-acre equivalent benefits (Table 5-10).

Likewise, the ratio of habitat benefits to impacts for Morro manzanita is more than 8:1; the Preserve System is anticipated to benefit 176 acre-equivalents of Morro manzanita habitat (Table 5-10), whereas the covered activities are anticipated to impact just 41 acres of habitat (Table 4-4). This reflects the far

greater proportion of central maritime chaparral habitat in the Preserve System under the scenario used in this analysis, compared to the anticipated footprints of the covered activities.

The Preserve System will benefit 301-acre equivalents of habitat for Morro shoulderband snail. This value is lower than the total acres impacted (478 acres), which includes developed areas and County rights-of-way. These highly degraded habitat areas were included in the take/impacts assessment, as the species can be found in them; however, they provide low long-term conservation value for the species. The greater long-term viability of the habitat in the Preserve System, compared to that which will be impacted, elevates the ratio of conservation benefits to impacts anticipated (Section 4.2.1.3).

As a result, the mitigation provided through the LOHCP Conservation Program is expected to more than offsets the anticipated impacts of the covered activities, thus exceeding the incidental take permit issuance criterion, that the mitigation be commensurate with the impacts.

The scenario reflects levels of habitat protection, restoration, and management that can achieve the biological goals and objectives (Section 5.1), and that could be feasible based on anticipated landowner interest in participating in the LOHCP. The actual Preserve System configuration, which will almost certainly differ from this scenario, will depend on the willing sellers of private land, land prices, and the precise area of existing protected lands enrolled in land management and restoration, among other factors. These changes will influence costs and thus mitigation fees. To ensure adequate funding for the plan, the actual mitigation components and their costs will be tracked (Section 5.4.1.2) and used to update the financial analysis used to develop the mitigation fee schedule (Section 7.4). Ultimately, the mitigation crediting ratios used in the plan will enable the County to work with the Implementing Entity to implement a suite of conservation actions (habitat protection, restoration, and management) that will have benefits that are commensurate with the impacts of the covered activities and promote species recovery.

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the Los Osos Community Plan and therefore the California Coastal Act (sections 1.5.2.4 and 2.1.2.2). While the LOHCP requires that proponents in the PCA set aside habitat at a 3:1 ratio, the Los Osos Community Plan may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set-asides would benefit additional habitat not included in this analysis.

5.8.2 Contributions to Species Recovery

In addition to compensating for the impacts of the covered activities on the covered species, the preserve system scenario will contribute to their recovery by protecting and restoring priority habitat, as well as restoring and managing existing protected lands of the greatest long-term conservation value for the covered species. The Priority Conservation Area, where the LOHCP Preserve System will be assembled and managed, incorporates much of the habitat that has been identified as important for protection in the recovery plans for the covered species (USFWS 1998a and 1999; Figure 5-1). It also features much of designated critical habitat for Morro shoulderband snail and Morro Bay kangaroo rat (Figure 4-3).

In addition to protecting high-priority habitat, the LOHCP Preserve System will also manage habitat to address exotic plants, non-native animals, fire exclusion, threat of catastrophic wildfire, and recreation;

these activities will help ensure that the habitat that is protected from development supports more viable populations. Also, by minimizing impacts of development of remaining vacant lands that are not protected within the Priority Conservation Area, the LOHCP will help promote landscape connectivity between protected habitat areas, which can be essential to maintaining genetic diversity and promoting long-term species persistence. These benefits will be achieved through implementation of the Plan's minimization measures (Table 5-2 through 5-4), including:

- Siting new development and other projects in already developed or degraded habitat areas (Measure C1), away from habitat occupied by the covered species (measures MSS-1, MBKR-1, IKM-1, and MM-1), wherever possible;
- Restoring areas of temporary disturbance (Measure C2); and
- Minimizing the impacts of vegetation management projects conducted for fire safety (i.e., defensible space; Measure C4).

The LOHCP will also contribute to species recovery and advance specific objectives of the USFWS recovery plans, by using surveys and long-term monitoring to increase understanding of the habitat factors influencing the distribution and abundance of the covered species, evaluating their management needs, and assessing the effectiveness of restoration and management strategies. Specifically, the studies and monitoring will be designed to fill data gaps identified in the recovery plans, including regarding the role of fire in promoting plant establishment and maintaining habitat for the covered animals (Section 5.4 and Appendix E).

The LOHCP AMMP, which will synthesize existing information, guide initial management and monitoring, and be adapted over time to incorporate new scientific information obtained through implementation of the plan, will inform and help prioritize restoration and management, as well as ongoing habitat protection, to further recovery of the covered species.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Ecosystem Goal: Promote persistence of the Baywood fine sands ecosystem and the natural processes that sustain it.			
Objective E1: Protect large, contiguous areas of land within the Baywood fine sands ecosystem, which can support large and therefore more viable populations of the covered species, feature greater native biodiversity, and enable effective management.	Protect or expand large habitat areas, as well as smaller areas that can expand and buffer existing protected lands, with an emphasis on land within the Priority Conservation Area that supports or can support one or more of the covered species.	Annual tracking of habitat protection projects will be used to document expansions to protected habitat.	Plant community sampling will be used to characterize native species cover and richness in lands protected through the LOHCP.
Objective E2: Maintain and enhance connectivity of habitat within and adjacent to the Baywood fine sands ecosystem, to promote dispersal and other ecological processes including gene flow, which are necessary to maintain viable populations of the covered species.	Protect land that can connect or maintain corridors between habitat within and adjacent to the LOHCP Area, with an emphasis on land that connects protected lands within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document steps to connect protected habitat.	Plant community mapping will be used to evaluate status of habitat between protected habitat areas.
Objective E3: Maintain and enhance the natural mosaic of Baywood fine sands communities and their varying successional stages, to provide a range of habitat conditions for the covered species and the broader assemblages of native plants and animals in the ecosystem.	Use fire and fire surrogates—vegetation management treatments that mimic fire's beneficial effects—to create and maintain a mosaic of native plant communities of various successional stages and thus habitat conditions.	Annual tracking of habitat restoration and management projects will be used to document implementation of fire management/surrogate projects.	• Plant community mapping will be used to evaluate the status and trends in the mosaic of communities and their protected status. • Plant community sampling will be used to evaluate effectiveness of the treatments and identify the need for additional management.
Community Goal: Promote the natural structure and native species composition of the upland native plant communities of the Baywood fine sand.			
Objective C1: Protect land supporting representative areas of each of the natural communities and their successional stages within the Baywood fine sands ecosystem.	Protect additional areas of coastal sage scrub, central maritime chaparral, and oak woodland that provide habitat for the covered species, as well as the associated	Annual tracking of habitat protection projects will be used to document steps to protect habitat and the acres	• Plant community mapping will track the areal extent of the native plant communities by successional stage, as

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	aquatic, wetland, and riparian communities.	of each community type protected in each project.	feasible, and evaluate their protected status. • Plant community sampling will be used to examine successional changes in protected habitat.
Objective C2: Restore degraded habitat to increase suitability for populations of the covered species and promote native biodiversity.	Restore habitat within the LOHCP Preserve System, within an emphasis on land within the Priority Conservation Area that has been degraded by prior land use, erosion, recreation, and/or dense infestations of exotic plant species.	Annual tracking of habitat restoration and management projects will be used to document the acres of habitat subject to restoration treatments.	• Project-specific monitoring protocols will be used to evaluate the effectiveness of restoration. • Plant community mapping will be used to document expansion of areal extent of communities into previously denuded or degraded areas. • Plant community sampling will be used to evaluate increases in native plant cover and species richness as a result of restoration.
Objective C3: Maintain habitat conditions suitable to support populations of the covered species and promote native biodiversity.	Actively manage habitat within the LOHCP Preserve System, to limit the negative effects of factors that degrade it, including incompatible recreation, erosion, exotic plants, and fire exclusion.	Annual tracking of habitat restoration and management projects will be used to document the acres of habitat subject to management treatments.	• For large-scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management. • Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for the covered species (e.g., various

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
			structure and species composition variables). • Species-specific monitoring will be used to evaluate changes in covered species populations with respect to habitat changes.
Morro Shoulderband Snail Goal: Promote recovery and long-term population viability of Morro shoulderband snail.			
Objective MSS-1: Protect additional native habitat suitable for Morro shoulderband snail.	Protect additional coastal dune and coastal sage scrub communities, prioritizing large blocks of habitat and areas that can buffer and expand existing protected lands within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document protection of additional coastal dune and coastal sage scrub communities.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine conditions of protected habitat to evaluate its suitability for Morro shoulderband snail. • Morro shoulderband snail population monitoring will be used to evaluate the species distribution and abundance in habitat protected as part of the LOHCP.
Objective MSS-2: Connect Morro shoulderband snail populations within and adjacent to the LOHCP Area.	• Maintain permeability of habitat between lands within the LOHCP Preserve System, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural	Annual tracking of habitat protection projects will be used to document protection of additional coastal dune and coastal sage scrub communities.	Plant community mapping will be used to evaluate connectivity of habitat for Morro shoulderband snail between protected habitat areas.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that degrade and fragment habitat, including dense exotic plant infestations and wide trails or other denuded areas.		
Objective MSS-3: Increase the distribution and abundance of Morro shoulderband snail populations, by restoring degraded habitat within the LOHCP Preserve System.	Restore coastal dune and coastal sage scrub vegetation within protected lands that have been degraded by erosion, incompatible recreation, dense invasive species infestations, and/or other factors.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in coastal dune and coastal sage scrub communities that can promote populations of Morro shoulderband snail	• Project-specific monitoring protocols will be used to evaluate the effectiveness of restoring habitat suitable for Morro shoulderband snail. • Morro shoulderband snail population monitoring will be used to evaluate the species distribution and abundance with respect to restoration projects, as feasible.
Objective MSS-4: Maintain or increase populations of Morro shoulderband by addressing factors that can degrade habitat within the LOHCP Preserve System.	• Control populations of invasive plants using methods that avoid or minimize impacts to Morro shoulderband snail. • Control populations of exotic snails and prevent their spread, where doing so can promote Morro shoulderband snail populations. • Limit impacts of recreational use of protected lands, by siting trails in the least sensitive areas, and managing trail use (type, frequency) to limit impacts.	Annual tracking of habitat management projects will be used to document projects in coastal dune and coastal sage scrub communities that can promote populations of Morro shoulderband snail	• For large-scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management. • Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for Morro shoulderband snail.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	• Prevent unnatural succession of coastal dune and scrub which may occur as a result of fire exclusion, by managing fire or vegetation management techniques that mimic its beneficial effects; treatments should occur within the range of variation of the return interval of the natural disturbance regime.		• Species-specific monitoring will be used to evaluate changes in populations with respect to habitat changes.
Morro Bay Kangaroo Rat Goal: Maintain habitat suitable for Morro Bay kangaroo rat.			
Objective MBKR-1: Protect additional suitable habitat for Morro Bay kangaroo rat.	Protect additional coastal sage scrub and central maritime chaparral communities, prioritizing areas featuring open habitat conditions and areas where or near where the species has been most recently observed.	Annual tracking of habitat protection projects will be used to document protection of additional coastal sage scrub and central maritime chaparral communities, particularly those where the species has been most recently observed.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine conditions of protected habitat to evaluate its suitability for Morro Bay kangaroo rat. • Morro Bay kangaroo rat population monitoring will be used to evaluate the species distribution and abundance in habitat protected as part of the LOHCP.
Objective MBKR-2: Maintain connectivity between suitable habitat for Morro Bay kangaroo rat.	• Maintain permeability of habitat between protected areas of coastal sage scrub and central maritime chaparral, particularly those in the Priority Conservation Area and where	Annual tracking of habitat protection projects will be used to document protection of additional coastal sage scrub	Plant community mapping will be used to evaluate connectivity of habitat for Morro Bay kangaroo rat between protected habitat

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	Morro Bay kangaroo rat has been most recently observed, by protecting additional habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Morro Bay kangaroo rat, including dense exotic plant infestations, and areas of dense woody plants.	and central maritime chaparral communities.	areas where the species has most recently been observed.
Objective MBKR-3: Restore habitat that is suitable for Morro Bay kangaroo rat.	Restore open coastal sage scrub and central maritime chaparral communities in the LOHCP Preserve System that have been degraded, particularly where Morro Bay kangaroo rat was most recently observed.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Morro Bay kangaroo rat	• Project-specific monitoring protocols will be used to evaluate the effectiveness of restoring habitat for Morro Bay kangaroo rat. • Morro Bay kangaroo rat population monitoring will be used to evaluate the species distribution and abundance with respect to restoration projects, as feasible.
Objective MBKR-4: Manage habitat to maintain conditions suitable for Morro Bay kangaroo rat, and other species adapted to early-successional coastal sage scrub and central maritime chaparral.	• Use prescribed fire or fire surrogates in the LOHCP Preserve System to maintain open-canopy conditions characterized by relatively high density of herbaceous plants and open sand and relatively sparse cover of shrubs.	Annual tracking of habitat management projects will be used to document projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Morro Bay kangaroo rat, particularly	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	• Control populations of invasive plants that degrade conditions for Morro Bay kangaroo rat, including eucalyptus, veldt grass, and ice plant. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Morro Bay kangaroo rat and other small mammal populations, including by limiting use to defined trails sited in the least impactful areas, and controlling dog use.	projects in areas of suitable habitat where the species was most recently observed	• Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for Morro Bay kangaroo rat, including low cover of relatively short-statured shrubs, with high cover of herbs and subshrubs Species-specific monitoring will be used to evaluate changes in populations with respect to habitat changes.
Morro Manzanita Goal: Promote recovery and long-term viability of Morro manzanita.			
Objective MM-1: Protect additional suitable habitat for Morro manzanita.	Protect additional central maritime chaparral, prioritizing large habitat blocks, areas adjacent to existing protected lands, areas that support a relatively high density of Morro manzanita, and areas located within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document protection of additional central maritime chaparral communities and the acreage supporting Morro manzanita.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine the suitability of habitat for, and distribution of, Morro manzanita. • Morro manzanita population monitoring will be used to examine the distribution and population status (including demography) of Morro manzanita.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Objective MM-2: Promote connectivity of habitat between Morro manzanita populations	• Maintain permeability of habitat between protected areas of central maritime chaparral, particularly those in the Priority Conservation Area and where Morro manzanita occurs, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Morro manzanita, including dense exotic plant infestations and denuded habitat areas.	Annual tracking of habitat protection projects will be used to document protection of additional central maritime chaparral communities, particularly those occupied by Morro manzanita.	Plant community mapping will be used to evaluate connectivity of habitat occupied by Morro manzanita.
Objective MM-3: Restore central maritime chaparral supporting Morro manzanita.	Restore central maritime chaparral communities in the LOHCP Preserve System that have been degraded, particularly those adjacent to existing Morro manzanita chaparral and in the Priority Conservation Area.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in central maritime chaparral and other communities, including degraded and denuded areas, which can support Morro manzanita.	• Project-specific monitoring protocols will evaluate the effectiveness of restoring populations of Morro manzanita. • Morro manzanita population monitoring will evaluate the species distribution, abundance, and demography with respect to restoration projects, as feasible.
Objective MM-4: Manage central maritime chaparral supporting Morro manzanita	• Control populations of invasive plants that degrade habitat for Morro manzanita, including eucalyptus and	Annual tracking of habitat management projects will be used to document projects in central maritime chaparral	• For large scale management projects (e.g., prescribed fire or fire surrogate), project-specific monitoring protocols

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	exotic cypress, as well as veldt grass and ice plant. • Use prescribed fire or fire surrogates conducted within the range of variation of the natural fire return interval in the LOHCP Preserve System, to maintain areas of Morro manzanita chaparral that might otherwise transition to coast live oak woodland or become senescent, and to promote regeneration of Morro manzanita, which is an obligate seeding species. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Morro manzanita, including by limiting use to defined trails sited in the least impactful areas.	communities and other areas, including degraded or denuded areas, which can promote populations of Morro manzanita.	will evaluate effectiveness of management. • Plant community sampling will evaluate suitability of habitat for Morro manzanita. • Morro manzanita population monitoring will evaluate changes in populations with respect to habitat management, including responses to management treatments designed to promote regeneration.
Indian Knob Mountainbalm Goal: Promote recovery and long-term viability of Indian Knob mountainbalm.			
Objective IKM-1: Protect additional suitable habitat for Indian Knob mountainbalm.	Protect additional central maritime chaparral, prioritizing large habitat blocks, areas adjacent to existing protected lands, and areas within the Priority Conservation Area.	Annual tracking of habitat protection projects will document protection of additional coastal sage scrub and central maritime chaparral communities, with potential to support Indian Knob mountainbalm.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will examine the suitability of habitat for, and distribution of, Indian Knob mountainbalm.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
			• Indian Knob mountainbalm population monitoring will evaluate the demography of the species in the LOHCP Preserve System.
Objective IKM-2: Promote connectivity between habitat suitable for Indian Knob mountainbalm.	• Maintain permeability of habitat between protected areas featuring central maritime chaparral, particularly those in the Priority Conservation Area, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Indian Knob mountainbalm, including dense exotic plant infestations and denuded habitat areas.	Annual tracking of habitat protection projects will document protection of additional coastal sage scrub and central maritime chaparral communities.	Plant community mapping will evaluate connectivity of habitat for Indian Knob mountainbalm within the LOHCP Preserve System.
Objective IKM-3: Expand populations of Indian Knob mountainbalm.	Increase the distribution and abundance of Indian Knob mountainbalm within the LOHCP Preserve System by conducting habitat restoration treatments including prescribed fire or fire surrogates designed to promote its vegetative reproduction and/or establishment from seed.	Annual tracking of habitat restoration will document implementation of restoration projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Indian Knob mountainbalm.	• Project-specific monitoring protocols will evaluate effectiveness of restoring habitat for Indian Knob mountainbalm. • Indian Knob mountainbalm population monitoring will evaluate changes in populations with respect to habitat changes.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Objective IKM-4: Manage central maritime chaparral supporting Indian Knob mountainbalm.	• Control populations of invasive plants that degrade habitat for Indian Knob mountainbalm, including eucalyptus and exotic cypress, as well as veldt grass and ice plant. • Use prescribed fire or fire surrogates conducted within the range of variation of the natural fire return interval within the LOHCP Preserve System, to maintain areas central maritime chaparral that might otherwise transition to coast live oak woodland or become senescent, and to promote regeneration of Indian Knob mountainbalm. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Indian Knob mountainbalm, including by limiting use to defined trails sited in the least impactful areas.	Annual tracking of habitat management projects will be used to document projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Indian Knob mountainbalm, particularly projects in areas of suitable habitat where the species was most recently observed	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will evaluate effectiveness of management. • Plant community sampling will evaluate characteristics of habitat that make it suitable for Indian Knob mountainbalm, including measurement of the cover of exotic plants. • Indian Knob mountainbalm population monitoring will evaluate changes in populations with respect to habitat changes.

Table 5-2: Covered Species Avoidance and Minimization Measures

Type	Measure
Ecosystem	E1: Minimize habitat fragmentation and maintain connectivity between aquatic, riparian, and upland habitats by limiting the creation of barriers to species movement, maintaining corridors to connect remaining habitat for the covered species, clustering development, and minimizing length of driveways and other impervious surfaces.
Community	C1: Minimize loss and degradation of the natural communities of the Baywood fine sand ecosystem, including coastal sage scrub, central maritime chaparral, and oak woodlands, by minimizing the area of permanent and temporary habitat disturbance and by siting projects in already developed or degraded areas. C2: Restore all areas of temporary disturbance such as staging areas and impacted areas adjacent to the project footprint, to pre-project conditions or ecologically superior conditions for the covered species. Use plants native to the Baywood fine sand communities from sources located within the LOHCP Plan Area. C3: Avoid use of herbicide and pesticides; where necessary, apply biocides as part of integrated pest management strategies, and following all local, state, and federal regulations. C4: Minimize impacts of vegetation management projects conducted for fire safety, including to create and maintain defensible space, by implementing the best management practices. The list of BMPs will be maintained by the County and reviewed periodically by the USFWS and CDFW and will include specific fuel-reduction prescriptions designed to minimize impacts to the covered species. C5: Install temporary construction fencing to prevent disturbance outside of the designated footprint
Morro Shoulderband snail (MSS)	Avoid and minimize the impacts to Morro shoulderband Snail to the maximum extent practical, by locating projects away from known or likely occupied habitat, as well as suitable but unoccupied habitat. MSS-1: Prior to and during all ground-disturbing activities in habitat suitable for Morro shoulderband snail within designated parcels (Figure 5-2), a biologist approved by the USWFS shall capture and move all Morro shoulderband snails to suitable habitat away from the project impact area (Section F.2). MSS-3: Avoid introducing non-native snails, and the use of snail control applications, such as mulluscicide, beer, or salt.
Morro Bay Kangaroo Rat (MBKR)	MBKR-1: Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat within designated parcels (Figure 5-3), the project proponent will retain a CDFW- and USFWS-approved biologist to conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).

Table 5-2: Covered Species Avoidance and Minimization Measures

Type	Measure
Indian Knob Mountainbalm (IKM)	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the project proponent will retain a USFWS-approved biologist to conduct a survey for the species in the project area. If the species is present, the project proponent will work with the County, USFWS, and CDFW to develop a plan to ensure that no take/impacts of this species occurs during project implementation. If a plan cannot be developed to avoid impacts to the species, the project proponent will be required to obtain a separate permit from CDFW in addition to the certificate of inclusion for this HCP.
Morro Manzanita (MM)	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes at least 10 feet away from the copy of existing plants wherever possible. MM-2: Avoid removal and minimize trimming of Morro manzanita when conducting vegetation management including in association with required hazard abatement activities.[1] MM-3: Avoid planting manzanita species (*Arctostaphylos* spp.) other than Morro manzanita to reduce the likelihood of hybridization.

[1] Does not apply to projects to implement the conservation program, where impacts to individuals will be needed to promote regeneration and maintain suitable habitat.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
Ecosystems	Avoid altering aquatic systems, including streams, lakes, ponds, and the Morro Bay estuary.
Communities	Avoid impacts to open water or riparian vegetation and wetlands, including freshwater, brackish water, and saltwater wetlands. Conduct vegetation management activities that could affect nesting birds outside of the nesting period, which is currently February 1 – August 31, but may change as a result of climate change.
Species: California seablite, Salt marsh bird's beak, and marsh sandwort	Proponents of covered activities that occur within 100 feet of known or potential habitat for one of more of the listed plant species will arrange for a USFWS-approved biologist to conduct a survey to evaluate presence of the species within suitable habitat within the project parcel. Surveys will be conducted within the flowering period of the three species, which may change as a result of global climate change, but currently are as follows: • California seablite: July to October • Salt marsh bird's beak: May to October • Marsh sandwort May to August If one or more species are present, the project will be designed and implemented to avoid impacts to the species or its habitat. The following are specific measures that will be implemented. • The project disturbance envelope will exclude occurrences of the species. • Orange construction fencing shall be placed between the occurrence and the disturbance envelope and signs will be posted to restrict entry into the protected area. • A USFWS-approved biologist will provide a pre-project training to all project personnel regarding the species and the measures that must be taken to avoid impacts; the biologist will monitor project implementation to ensure the measures are being implemented and are effective. • Erosion and sedimentation control measures will be implemented for projects that have the potential to result in the sedimentation of occupied or suitable habitat.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
	• Herbicide application shall be limited to times outside of the rainy season to prevent runoff carrying the herbicide to potential or known habitat. In addition, herbicide application shall be conducted during times of low wind (<10 mph) to prevent herbicide drift into potential or known listed plant habitat.
South-Central California Coast Steelhead (*Oncorhynchus mykiss irideus*)	Proponents of covered activities that occur within or adjacent to habitat for steelhead including Los Osos Creek will implement best management practices to avoid impacts to the threatened species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • All project activities shall minimize disturbance to riparian and upland vegetation. • A NMFS-approved biologist will provide a pre-project training to all project personnel regarding the species and the protection measures that must be taken to avoid impacts; the biologist will monitor the project to ensure the measures are being implemented and are effective. • Projects will be conducted between June 1 and October 15. • Appropriate erosion and sedimentation avoidance measures will be taken to prevent sediment runoff into flowing water. • Measures will be taken to ensure that petroleum products and other materials do not enter nearby streams and surface waters.
California red-legged frog (*Rana draytonii*)	Proponents of covered activities that occur within or adjacent to California red-legged frog breeding, dispersal, or foraging habitat will implement best management practices to avoid impacts to the threatened species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • All project activities shall avoid disturbance to suitable breeding habitat, including ponds and streams. • A USFWS-approved biologist will provide a pre-project training to all project personnel regarding the species and the protection measures that must be taken to avoid impacts; the biologist will monitor the project to ensure the measures are being implemented and are effective. • All construction-related holes capable of entrapping wildlife will either be covered at the end of each workday or ramped in a manner that will prevent entrapment.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
	• Appropriate measures will be taken to ensure petroleum products and other hazardous materials do not enter nearby streams, ponds, and other aquatic habitat.
California Black Rail (*Laterallus jamaicensis coturniculus*)	Proponents of covered activities that occur within or adjacent to California black rail nesting or foraging habitat will implement best management practices to avoid impacts to the state-listed threatened and California Fully Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • In or adjacent to potential or known California black rail habitat, work activities shall be confined to areas outside of known or potential habitat to the extent feasible. Staging, access, and parking areas shall be located outside of salt marsh and brackish marsh habitats. • If woody vegetation within or immediately adjacent to salt marsh habitat must be removed as part of the project, vegetation removal should be conducted between September and January, in order to avoid impacts on nesting birds. If vegetation removal must occur between February and August, a qualified biologist should conduct a pre-construction survey for nesting birds prior to disturbance. If nesting California black rail are identified, protection measures shall include avoiding work activities within 300 feet of the nesting location. • If an active California black rail nest is located closer than 300 feet to a construction or maintenance site and there is the potential for substantial disturbance to nesting birds due to construction activities, a plan to monitor nesting birds during construction shall be prepared and submitted to the CDFW for review and approval. • A qualified biological monitor shall be present during all work activities in or adjacent to California black rail habitat. If California black rail is detected during work activities, work shall be stopped immediately and the CDFW shall be contacted immediately. Work shall not resume at that location until authorization is obtained from the CDFW unless prior approval has been granted by the CDFW.
Golden Eagle (*Aquila chrysaetos*)	Proponents of covered activities that occur within 500 feet of a recorded golden eagle nest site will have a USFWS and CDFW-approved biologist conduct a golden eagle survey to determine whether there is a nest site within 400 yards of the proposed project footprint. Projects with confirmed nesting golden eagles within 400 yards will implement best management practices to avoid impacts to this California Fully Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following:

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
	• Avoid vegetation removal and other project activities that would disrupt nesting behavior during the primary nesting season, which is currently February to August though may change as a result of global climate change, or until the nesting cycle is determined by a USFWS and CDFW-approved biologist to be completed. • Avoid removing any suitable trees or other nest sites.
White-tailed kite (*Elanus leucurus*)	Proponents of covered activities that occur within 500 feet of a recorded or observed white-tailed kite nest site will have a CDFW-approved biologist conduct a white-tailed kite survey to determine whether there is an active nest site within 500 feet of the proposed project footprint. Projects with confirmed nesting white-tailed kite within 500 feet will implement best management practices to avoid impacts to this California Fully Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • Avoid vegetation removal and other project activities that would disrupt nesting behavior during the primary nesting season (February-August), or until the nesting cycle is determined by the USFWS and CDFW-approved biologist to be completed. • Avoid removing any suitable trees or other nest sites.

Table 5-4: **Minimization Measures for the Community Wildfire Protection Plan**

Taxa	Measure	Description
All Covered Species	All-1: Procedures and Training	Clearly defined operational procedures will be developed and implemented by CAL FIRE. A USFWS-approved biologist will develop and deliver environmental awareness training sessions for all personnel involved in hazard abatement activities. The training will inform personnel regarding the identification, status, and presence of covered species likely to be present in each abatement area; those avoidance and minimization measures that must be implemented; and the legal ramifications associated with non-compliance. Training materials will include descriptions and pictures of the covered species, relevant provisions of the State and Federal Endangered Species Acts, and the project boundaries for each abatement action. CAL FIRE will ensure that all personnel who participate in hazard abatement activities within the Plan Area receive this training immediately prior to the start of any hazard abatement activities.
	All-2: Biological Monitor	A USFWS-approved biologist will monitor all vegetation removal activities that will take place within habitat suitable for the covered species. Monitoring activities will be required daily until completion of initial disturbance at each location to ensure that avoidance and minimization measures are implemented. The monitor will be granted full authority to stop work at his or her discretion if abatement-related activities occur outside the demarcated boundaries of the treatment footprint. The monitor will stop work if any of the covered species are detected within the proposed abatement area and take the appropriate species-specific avoidance or minimization measures.
Morro Shoulderband Snail	MSS-1: Pre-Project Survey and Translocation of Morro shoulderband snail	Prior to the start of any abatement activities within habitat suitable for Morro shoulderband snail within the designated parcels (Figure 5-2), a USFWS-approved biologist will conduct surveys to identify the location of any Morro shoulderband snails present in treatment areas. These surveys shall be conducted within 24 hours of the commencement of any activities associated with hazard abatement that could result in take of the species. The primary objective of the pre-activity surveys is to locate as many Morro shoulderband snails as possible so that they can be captured and moved out of harm's way. All live Morro shoulderband snails of any life stage found during pre-activity surveys, or any phase of hazard abatement, will be captured and moved out of harm's way to a pre-determined, USFWS-approved receptor site by the surveying biologist.
	MSS-2: Minimize Impacts to Native Plants Important to	Canopy thinning and limbing up of plant species of particular value to Morro shoulderband snail must be avoided or minimized to the maximum extent possible. Pre-project surveys of treatment areas should be used to identify plant species that should be avoided, which include but are not limited to

Table 5-4: **Minimization Measures for the Community Wildfire Protection Plan**

Taxa	Measure	Description
	Morro shoulderband snail	mock heather (*Ericameria ericoides*), dune bush lupine (*Lupinus chamissonis*), and sand almond (*Prunus fasciculata* var. *punctata*).
	MSS-3: Monitor for Morro shoulderband snail	Prior to initiating any hazard abatement activities, a USFWS-approved biologist will be present to ensure that the limits of work are clearly delineated. This biologist shall have the authority to order any reasonable measure necessary to avoid the take of Morro shoulderband snail and to stop any work or activity not in compliance with the conditions set forth in the HCP/ITP. The biologist will notify the Ventura Fish and Wildlife Office and the County of San Luis Obispo Department of Planning and Building of any "stop work" order that is issued and this order will remain in effect until the issue has been resolved.
Morro Bay Kangaroo Rat	MBKR-1: Avoid Impacts to Morro Bay Kangaroo rat	Prior to initiating any fire hazard abatement activities in areas featuring habitat suitable for MBKR within the designated parcels (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1)
Morro Manzanita	MM-1: Minimize Impacts to Morro Manzanita	No individual Morro manzanita plants will be removed and all canopy thinning and limbing up of lower branches of Morro Manzanita will be avoided or minimized to the extent that abatement goals can still be achieved.
Indian Knob Mountainbalm	IKM-1: Avoid Impacts to Indian Knob Mountainbalm	Prior to initiating any hazard abatement activities, a CDFW and USFWS-approved biologist will survey the treatment area to assess the presence of Indian Knob mountainbalm. If the species is detected within or adjacent to the treatment area, CAL FIRE must consult with the USFWS and CDFW to determine how to proceed as no impacts to individuals this species will be authorized.
Migratory Birds	MBA-1: Avoid Impacts to Migratory Birds	All hazard abatement activities will be conducted outside of the bird breeding season, which is generally considered to be between March 15 and September 15. This seasonal prohibition period will be adjusted, as needed, to reflect changes in the breeding bird season due to climate change or other factors. If it is necessary to conduct abatement activities during this timeframe, a USFWS-approved biologist must be retained to conduct breeding bird and nest surveys; treatments may only proceed if no breeding activity or nests are detected.

Table 5-5: Existing Protected Land within the Priority Conservation Area

Property and Management Entity	Total Acres[1]	Eligible for Mitigation[2]		Restoration[3]		Management[4]		Total Acres Eligible for Preserve System[5]
		Percent	Acres	Percent	Acres	Percent	Acres	
Morro Dunes Ecological Reserve (Department of Fish and Wildlife)	278.7	100%	278.7	13%	35	87%	243.7	278.7
San Luis Obispo County Parks[1]								
Elfin Forest (County Property) [6]	31.7	0%	0	0%	0	0%	0	0
Monarch Grove Natural Area	16.8	14.6%	2.4	15%	0.4	85%	2.0	2.4
State Parks[7]								
Elfin Forest (State Property)	34.8	0%	0	0%	0	0%	0	0
Los Osos Oaks State Natural Reserve	85.7	0%	0	0%	0	0%	0	0
Montaña de Oro State Park	235.9	0%	0	0%	0	0%	0	0
Morro Bay State Park	107.5	0%	0	0%	0	0%	0	0
Bureau of Land Management[8]	4.8	100%	0	0%	0	0%	0	0
Total	**795.9**		**281.1**		**35.4**		**245.7**	**281.1**

[1] Total acres within the LOHCP Priority Conservation Area (Figure 5-1).

[2] Percentage and acres of property held by willing landowners suitable for enrollment of lands in the LOHCP Preserve System, and that features upland habitat of the Baywood fine sands ecosystem.

[3] Percentage of acres eligible for mitigation that is severely degraded and requires restoration.

[4] Percentage of acres eligible for mitigation that would benefit from additional active habitat management.

[5] Total acres within property that is eligible for enrollment in the LOHCP Preserve System.

[6] The acquisition of this property was funded, in part, by a grant from the California Coastal Conservancy, which restricted its use for mitigation.

[7] State Parks has opted to exclude their lands from consideration for inclusion in the LOHCP Conservation Strategy.

[8] As federal land, the BLM parcel is not eligible for inclusion in the LOHCP Preserve System.

Table 5-6: Biological Effectiveness Monitoring Protocol Summary (Appendix E)

Focal Species or System	Description	Study Area	Frequency	
			Permit Term	Post-Permit
Plant Communities and Habitat Conditions				
General Habitat Condition	Qualitatively examine the general condition of habitat within lands being managed as part of the regional conservation strategy, to detect new threats and impacts to habitat and the covered species	Entire Preserve System	Annual	Annual
Exotic Plant Areal Extent Mapping	Track changes in the distribution and abundance of exotic plant species	Entire Preserve System	Every 5 years	Every 5 years
Plant Community Areal Extent Mapping	Map the plant communities according to series with successional stages (e.g., cover) as appropriate	Entire Preserve System	Every 10 years	Every 10 years
Plant Community Structure Monitoring	Quantify plant community structure and species composition to evaluate covered species habitat characteristics, including the diversity and cover of native and exotic plants, to track changes due to or to trigger restoration and management	Entire Preserve System	Every 5 years	Every 5 years
Covered Species Populations				
Morro Shoulderband Snail Population Monitoring	Quantitative monitoring of the species distribution and abundance to evaluate population trends and responses to management	Suitable habitat for MSS (~300 ac.)	Annual	Every 5 years
Morro Manzanita Population Monitoring	Quantitative monitoring of the species areal extent and demography to examine population trends and responses to monitoring	Suitable habitat for MM (~250 ac.)	Every 5 Years	Every 10 Years
Indian Knob Mountainbalm Population Monitoring	Demographic monitoring of the existing occurrences and any new occurrences established through management.	Single occurrences	Every 5 Years	Every 10 Years
Morro Bay Kangaroo Rat Population Monitoring	Presence/absence surveys followed by ongoing surveys to track distribution, abundance, and population demography if the species is detected.	Suitable habitat for MBKR	Every 5 Years	Every 10 Years

Table 5-7: Compensatory Mitigation Requirements for LOHCP Covered Activities[1]

Project Category	Habitat Protection		Restoration, Management, and Administration Fee
	On-Site	Fee	
Vacant, Private Land Development			
Outside of the Priority Conservation Area		✓	✓
Inside the Priority Conservation Area	3:1 ratio for disturbance		✓
Redevelopment of Developed Parcels			
All Residential or Commercial Projects[2]		✓	✓
Public Projects and Private Utility Projects			
All New Disturbance (inside and outside of the Priority Conservation Area)		✓	✓

[1] Covered activities to implement the conservation program in the LOHCP Preserve System (i.e., habitat management, restoration, and monitoring) as well as implementation of the Community Wildfire Protection Plan do not require compensatory mitigation.

[2] Proponents of projects on vacant parcels inside the Priority Conservation Area that are too small to set aside habitat on site for the project impacts (i.e., <2.75 acres for the maximum 30,000 sf or 0.69 acres of impacts) must pay the habitat mitigation fee.

Table 5-8: Mitigation Crediting Ratios for Components of the LOHCP Conservation Strategy. Details provided in Section 5.7.2.3.1.

Conservation Strategy Component	Definition	Example Characteristics	Mitigation Crediting Ratio[1]
Restoration of Existing Protected Lands[2]	Restore the natural community structure and species composition of habitat that has been severely degraded	Denuded trail corridors; eroded gullies; areas of debris or dense infestations of eucalyptus, ice plants, veldt grass, or other exotic species; or other areas where native habitat has been substantially degraded.	1.5:1
Enhanced Management of Existing Protected Land[2]	Improve condition of habitat that has been degraded by anthropogenic factors to enhance its natural community structure and species composition.	Vegetation management (including prescribed fire or fire surrogates), exotic plant species management, unauthorized uses management (e.g., installation of fences and signage), and long-term maintenance-level management and monitoring of conserved lands as part of the LOHCP Preserve System.	1.25:1
Dedication of Habitat Set-Asides[3]	Land protected on vacant parcels located inside the Priority Conservation Area, through conservation easements voluntarily granted by project proponents to the Implementing Entity at a ratio of 3:1 for project impacts (i.e., three square feet are set aside for every one square foot of ground disturbance).	New development on vacant parcels inside the Priority Conservation Area must be clustered and otherwise sited to minimize habitat impacts and fragmentation; the habitat set-aside will be located in areas that are most conducive to long-term species recovery.	1:1
<u>Protection (Acquisition of Fee Title or Conservation Easement) and Management of New Habitat</u>			
Tier 1: Very High Conservation Value	Protection of habitat in these parcels can greatly promote recovery of one or more covered species by securing a relatively large area of habitat that has high recovery value to one or more covered species	Large undeveloped parcels (>10 acres), or moderately sized (3-10 acres) undeveloped parcels that are adjacent to protected lands, that feature habitat that is intact and of high value to one or more of the covered species	2:1

Table 5-8: Mitigation Crediting Ratios for Components of the LOHCP Conservation Strategy. Details provided in Section 5.7.2.3.1.

Conservation Strategy Component	Definition	Example Characteristics	Mitigation Crediting Ratio[1]
Tier 2: High Conservation Value	Protection of habitat in these parcels can facilitate recovery of one or more covered species	Moderate sized (>3 acre) undeveloped parcels with good quality remaining intact habitat of recovery value to one or more of the covered species or partially developed parcels of moderate size where development is consolidated, undeveloped portions contain high quality intact habitat of high values, some of which is adjacent to, or can help connect, existing protected lands or Tier 1 parcels, such that it would contribute to the recovery of one or more of the covered species.	1.5:1
Tier 3: Moderate Conservation Value	Protection of habitat in these parcels can promote habitat connectivity, which can enhance long-term viability.	Smaller parcels (<3 acres) with moderate value in terms of landscape context, habitat condition, and/or habitat viability such as parcels adjacent to existing protected lands	1:1
Tier 4: Low Conservation Value	Protection of habitat in these parcels would do little to promote species recovery such that the benefits are likely not worth the anticipated financial costs	Smaller parcels (<3 acres) with low value in terms of landscape context (e.g., disjunct, isolated), habitat condition, and habitat viability (e.g., subject to edge effect, partially developed). Undeveloped portions would be adjacent to, or can help with connectivity to existing protected lands, such that it would contribute to the recovery of one or more of the covered species.	0.5:1

[1] Acres of mitigation credit earned for every acre of habitat benefited by the conservation strategy. For example, for every acre restored, the County will receive 1.5-acre credits to mitigate the covered activities at a 1:1 ratio (i.e., for every acre of habitat impacted, 1 acre must be benefited).

[2] For mitigation credits to be generated on existing protected lands, the property must be enrolled in the LOHCP Preserve System and restored or managed in accordance with the LOHCP Preserve System AMMP, which will outline the habitat restoration, management, and monitoring approaches that will be used to achieve the biological goals and objectives of the plan.

[3] Although habitat set-asides may vary in their conservation value, and the land itself will be set aside at a ratio of 3:1, the area set aside will be credited at a ratio of 1:1, in which one square foot mitigation credit is generated to offset the covered activities for every square foot set aside.

Table 5-9: Scenario for the LOHCP Preserve System

Conservation Strategy Component	Description	Acres of Land: Total Available	Acres of Land: Used in Scenario[1]	Mitigation Crediting Ratio[2]	Acres or Acre Equivalents
Management and Restoration of Existing Protected Lands					
Restore Habitat within Existing Protected Lands	Recreate the structure and/or functions of habitat in highly degraded areas within existing protected lands, and then actively manage and monitor the habitat in perpetuity	35.4	35.0	1.5:1	52.5
Manage Habitat within Existing Protected Lands	Actively manage and monitor in perpetuity habitat degraded by one or more anthropogenic factors with existing protected lands,	245.7	243.7	1.25:1	304.6
	Subtotal: Existing Protected Lands	**281.1**	**278.7**		**357.1**
New Habitat Protection					
Habitat Set-Asides	Private land protected through conservation easements dedicated at a 3:1 ratio by project proponents developing vacant parcels inside the Priority Conservation Area[3]		31.0	1:1	31.0
New Fee Title or Conservation Easement Acquisitions	New land to be protected through acquisition of fee title or conservation easements from willing sellers				
	Tier 1: Very High Conservation Value	302	63.5	2:1	127
	Tier 2: High Conservation Value	165	10.0	1.5:1	15
	Tier 3: Moderate Conservation Value	84	3.0	1:1	3
	Tier 4: Low Conservation Value	46	0	0.5:1	0
	Subtotal: New Habitat Protection	**597**	**76.5**		**176.0**
	Total Mitigation Credits[4]				**533.1**
	Acres Impacted by the Covered Activities (Table 2-9)				**531.5**

[1] Acres of land estimated to be included in the LOHCP Preserve System in this scenario developed to evaluate conservation benefits and estimate costs.

[2] Ratio reflecting the value of the component of the conservation strategy to the impacts of the covered activities on a per acre basis (Table 5-8)

[3] Estimated based on the anticipated number of privately held parcels inside the Priority Conservation Area that would be developed and are large enough to set aside easements at a 3:1 ratio relative to the disturbance.

[4] The preserve system scenario includes 1.6 acre-credits more than needed, to address computational errors including rounding error.

Table 5-10: Habitat within the LOHCP Preserve System Configuration Scenario

	Existing Protected Lands[1]						Newly Protected Lands[2]						Total Preserve System					
	Restoration & Management[3]		Management Only[4]		Total		Restoration & Management[5]		Management Only[6]		Total		Restoration & Management[3]		Management Only[4]		Total	
Preserve System Habitats	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]	Ac.	Cr.[7]
General Vegetation Types (Table 3-1)																		
Coastal Sage Scrub	26.0	39.0	181.0	226.3	207.0	265.2	3.3	5.5	30.1	49.2	33.4	54.7	29.3	44.5	211.1	275.5	240.4	320.0
Central Maritime Chaparral	8.5	12.7	58.9	73.7	67.4	86.4	4.2	6.9	38.0	62.2	42.2	69.2	12.7	19.6	97.0	135.9	109.6	155.5
Woodland	0.5	0.8	3.6	4.5	4.1	5.3	1.6	2.6	14.5	23.7	16.1	26.4	2.1	3.4	18.1	28.2	20.2	31.6
Grassland	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6	1.0	0.7	1.1	0.1	0.1	0.6	1.0	0.7	1.1
Wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.1	5.8	9.5	6.5	10.6	0.6	1.1	5.8	9.5	6.5	10.6
Other	0.03	0.0	0.17	0.2	0.2	0.3	0.9	1.4	7.7	12.7	8.6	14.1	0.9	1.4	7.9	12.9	8.8	14.3
Total	**35.0**	**52.5**	**243.7**	**304.6**	**278.7**	**357.1**	**10.7**	**17.6**	**96.7**	**158.4**	**107.5**	**176.0**	**45.7**	**70.1**	**340.4**	**463.0**	**386.2**	**533.1**
Covered Species Habitats (Table 4-4)																		
Morro Manzanita Habitat	**22.3**	**33.4**	**188.6**	**235.8**	**210.9**	**269.2**	**5.2**	**8.5**	**46.5**	**76.2**	**51.7**	**84.6**	**27.5**	**41.9**	**235.1**	**311.9**	**262.6**	**353.8**
Morro Shoulderband Snail	**20.7**	**31.0**	**144.2**	**180.2**	**164.9**	**211.3**	**5.5**	**9.0**	**49.2**	**80.6**	**54.7**	**89.6**	**26.1**	**40.0**	**193.4**	**260.9**	**219.6**	**300.8**
Primary Habitat	10.8	16.1	91.0	113.8	101.8	129.9	**3.7**	6.1	**33.6**	55.1	37.4	61.2	14.5	22.3	124.7	168.9	139.2	191.1
Secondary Habitat	9.9	14.9	53.2	66.4	63.1	81.3	1.7	2.8	15.6	25.5	17.3	28.4	11.6	17.7	68.7	92.0	80.4	109.7

[1] Existing protected land to be restored and/or managed as part of the LOHCP. Acreages of habitat based on the Morro Dunes Ecological Reserve, which is anticipated to be enrolled in the LOHCP.

[2] Habitat protected through fee title or easement and then restored and/or managed as part of the LOHCP. Acreages based on unprotected habitat on parcels of at least 2 acres in size in the Priority Conservation Area. Area of restoration presumed to be 10% of the total area.

[3] Habitat subject to intensive activities designed to accelerate recovery of severely degraded habitat, followed by ongoing active habitat management, defined below. Acreages to be restored in each community are calculated based upon the proportion of the total acreage in the respective parcels.

[4] Habitat actively managed to address current and future threats to its condition through ongoing treatments. Acreage managed is the total acres minus the area that will be restored and then managed.

[5] 10% of newly acquired lands are estimated to require restoration.

[6] 90% of newly acquired lands are estimated to require enhanced management only

[7] Number of mitigation credits to be generated, based on mitigation crediting ratios that relate the conservation value of habitat protection, restoration, and management to the covered activity impacts (Table 5-8). For newly protected lands, the ratio was calculated as the weighted average based on the four ratios for new habitat protection: habitat set-asides (1:1), acquisition of Tier 1 parcels (2:1), acquisition of Tier 2 parcels (2:1), and acquisition of Tier 3 parcels (1.5:1).

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities

Covered Activity Category	Covered Species	Potential Effects	Avoidance Measures	Minimization	Compensation
All Public and Private Construction and Facility Maintenance Projects (includes: private land development, public and private utility and capital improvement projects, and maintenance projects)	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators • Potential for spread of rodenticides • Potential increase in diseases • Increased risk of fire	MSS-1: Locate projects away from occupied habitat, as well as suitable but unoccupied habitat, whenever possible. MSS-3: Avoid introducing non-native snails, and the use of snail control applications, such as mulluscicide, beer, or salt.	MSS-2: For projects located in designated parcels (Figure 5-2), have a USFWS-approved biologist survey for, capture, and move all Morro shoulderband snails to the nearest suitable protected habitat away from the project impact area. E1: Minimize habitat fragmentation and maintain connectivity between aquatic, riparian, and upland habitats by limiting the creation of barriers to species movement, maintaining corridors to connect remaining habitat for the covered species, clustering development, and minimizing length of driveways and other impervious surfaces. C1: Minimize loss and degradation of the natural communities of the Baywood fine sand, including coastal sage scrub, central maritime chaparral, and oak woodlands by minimizing the area of permanent and temporary habitat disturbance and by siting projects in already developed or degraded areas. C2: Restore all areas of temporary disturbance such as staging areas or areas adjacent to the project footprint, to pre-project conditions or ecologically superior conditions for the covered species. Avoid installing plants identified as invasive by the California Invasive Plant Council and include plants native to the Baywood Fine Sands communities from local sources (i.e., the LOHCP Plan Area). C3: Avoid use of herbicide and pesticides; where necessary, apply biocides as part of integrated pest management strategies, and following all local, state, and federal regulations. C4: Minimize impacts of vegetation management projects conducted for fire safety, including to create and maintain defensible space, by implementing the best management practices. The list of BMPs will be maintained by the County and reviewed periodically by the USFWS and CDFW and will include specific fuel-reduction prescriptions designed to minimize impacts to the covered species. C5: Install temporary construction fencing to prevent disturbance outside of the designated footprint.	Inside the Priority Conservation Area (PCA): • set aside habitat at a 3:1 ratio for area of disturbance; and • pay 74.88 cents/square foot of disturbance to fund restoration, management, and plan administration. Outside of the PCA: • pay 13.93 cents/square foot of disturbance to fund habitat protection; and • pay 74.88 cents/square foot of disturbance to fund restoration, management, and plan administration.
	Morro Bay kangaroo rat	Direct Negative Effects • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators • Increased pet encounters • Potential for spread of rodenticides • Potential increase in diseases • Increased risk of catastrophic fire	Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts to Morro Bay kangaroo rat habitat. There are no minimization measures for individuals, as take of individuals must be avoided.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for loss of habitat for Morro Bay kangaroo rat.

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities

Covered Activity Category	Covered Species	Potential Effects	Avoidance Measures	Minimization	Compensation
		• Exclusion of fire, resulting in unnatural succession of habitat			
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants • Potential for impacts from herbicides • Increased fire frequency • Exclusion of fire, resulting in unnatural succession of habitat and 'senescence risk' of population • Genetic pollution or introgression (e.g., hybridization)	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes away from existing plants to the maximum extent practicable. MM-2: Avoid or minimize trimming or removing Morro manzanita when conducting vegetation management including in association with required hazard abatement activities. MM-3: Avoid planting manzanita species (*Arctostaphylos* spp.) other than Morro manzanita.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro manzanita habitat. Implement measures MM1-MM 3 at left.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for impacts to Morro manzanita.
	Indian Knob Mountainbalm	Direct Negative Effects • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants • Potential impacts from herbicides (e.g., from nearby landscaping) • Increased fire frequency • Exclusion of fire, resulting in unnatural succession of habitat and 'senescence risk' of population	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the applicant will retain a USFWS-approved biologist to conduct a survey to determine the presence of Indian Knob mountainbalm. If the species is present, the applicant will work with the County, USFWS, and CDFW to develop a project-specific plan to ensure that no take of this species occurs during project implementation.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts to Indian Knob mountainbalm habitat. There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for loss of Indian Knob mountainbalm habitat.
Community Wildfire Protection Plan	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation	All-1: Treatments will follow clearly defined operational procedures and a USFWS-approved biologist will train crews on the identification, status, and presence of covered species in each treatment area.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro shoulderband snail habitat. The avoidance measures for Morro shoulderband snail will also help minimize impacts to the species habitat and individuals. MSS-2: Canopy thinning and limbing up of plant species of particular value to Morro shoulderband snail must be avoided or minimized to the maximum extent possible. Pre-project surveys of treatment areas should be used to identify plant species that	None. The avoidance and minimization measures will render the impacts of the CWPP on Morro shoulderband snail negligible and the treatments will likely improve habitat for the species in the long term,

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Habitat degradation due to the invasion and spread of non-native plants • Increased risk of fire Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy conditions.	All-2: A USFWS-approved biologist will monitor all vegetation removal activities that will take place within habitat suitable for the covered species. MSS-1: Prior to the start of any abatement activities, a USFWS-approved biologist will conduct surveys to capture and relocate to a USFWS-approved receptor site all Morro shoulderband snails identified during surveys.	should be avoided, which include but are not limited to mock heather (*Ericameria ericoides*), coastal busy lupine (*Lupinus arboreus*), and sand almond (*Prunus fasciculate* var. *punctata*). MSS-3: A USFWS-approved biologist will be present during all work to ensure that the limits of work are clearly delineated, take any reasonable measures necessary to avoid the take of Morro shoulderband snail, and to stop any work or activity not in compliance with the conditions set forth in the HCP/ITP.	such that compensatory mitigation is not required.
	Morro Bay kangaroo rat	Direct Negative Effects • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions required by the species.	MSS-3: Prior to initiating any fire hazard abatement activities in areas featuring habitat suitable for MBKR (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1)	There are no minimization measures for individuals, as take of individual Morro Bay kangaroo rats must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro Bay kangaroo rat habitat.	None. The avoidance and measures will avoid take of Morro Bay kangaroo rat through the CWPP treatments, which may improve habitat conditions for the species in the long term, such that compensatory mitigation is not required.
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions that can promote seedling establishment	MM-1: No individual Morro manzanita plants will be removed and all canopy thinning and limbing up of lower branches of Morro Manzanita will be avoided or minimized to the extent that abatement goals can still be achieved.	The avoidance measure for Morro manzanita will also help minimize impacts to individuals of the species. Implementation of Measures E1 and C1-C5 as outlined above will minimize impacts of the covered activities on Morro manzanita habitat.	None. The avoidance and minimization measures will render the impacts of the CWPP on Morro manzanita negligible and the treatments may improve habitat for the species in the long term, such that compensatory mitigation is not required.

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Can facilitates use of prescribed fire to promote recruitment			
	Indian Knob Mountainbalm	Direct Negative Effects • None—all impacts to individuals will be avoided. Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions that can promote recruitment • Can facilitates use of prescribed fire to promote recruitment	IKM-1: Prior to initiating any hazard abatement activities, a CDFW and USFWS-approved biologist will survey the treatment area to assess the presence of Indian Knob mountainbalm. If the species is detected within or adjacent to the treatment area, CAL FIRE must consult with the USFWS and CDFW to determine how to proceed as no impacts to individuals this species will be authorized.	There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Indian Knob mountainbalm habitat.	None. The avoidance measures will avoid impacts of the CWPP on Indian Knob mountainbalm and the treatments may improve habitat condition for the species in the long term, such that compensatory mitigation is not required.
Conservation Program Implementation (Habitat Restoration and Management, and Habitat and Species Monitoring)	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Temporary habitat degradation due to the invasion and spread of non-native plants and animals Benefits • Promote habitat condition in the long term, by increasing the cover and richness of native plants by controlling exotic plants. • Increase distribution and abundance by restoring and managing habitat to address stresses (e.g., exotic plants, erosion, incompatible recreation, and fire exclusion). • Increase understanding of the conservation biology of the species through-long term monitoring and		MSS-2: Prior to and during all ground-disturbing activities in designated parcels (Figure 5-2), a biologist approved by the USWFS shall capture and move all Morro shoulderband snails to suitable habitat away from the project impact area (Section F.2). Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro shoulderband snail.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro shoulderband snail are negligible.

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		adaptive management, to promote management and recovery actions elsewhere.			
	Morro Bay kangaroo rat	Direct Negative Effects • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Temporary habitat degradation due to the invasion and spread of non-native plants and animals. Benefits • As for Morro shoulderband snail (above) • Create and maintain open habitat conditions required for Morro Bay kangaroo rat using fire and/or fire surrogates	MBKR-1: Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).	There are no minimization measures for individuals, as take of individual Morro Bay kangaroo rats must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro Bay Kangaroo rat habitat.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro Bay kangaroo rat are negligible.
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects • Temporary habitat fragmentation and habitat degradation (e.g., to conduct restoration and management projects) Benefits: • As for Morro shoulderband snail (above) • Promote regeneration of the population using fire and/or fire surrogates	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes at least 10' away from the copy of existing plants wherever possible.	MM-2: Avoid or minimize trimming or removing Morro manzanita when conducting vegetation management including in association with required hazard abatement activities. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro manzanita.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro manzanita are negligible.
	Indian Knob Mountainbalm	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the applicant will retain a CDFW and USFWS-approved biologist to conduct a survey to determine the	There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Indian Knob mountainbalm habitat.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the

Table 5-11: Summary of the Potential Effects and Conservation Program Activities for the Covered Species for the Main Categories of Covered Activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Temporary habitat fragmentation and habitat degradation (e.g., to conduct restoration and management projects) Benefits: • As for Morro shoulderband snail (above) • Promote regeneration of the population using fire and/or fire surrogates	presence of Indian Knob mountainbalm. If the species is present, the applicant will work with the County, USFWS, and CDFW to develop a project-specific plan to ensure that no take of this species occurs during project implementation.		conservation program on Indian Knob mountainbalm are negligible.

Figure 5-1: Priority Conservation Area

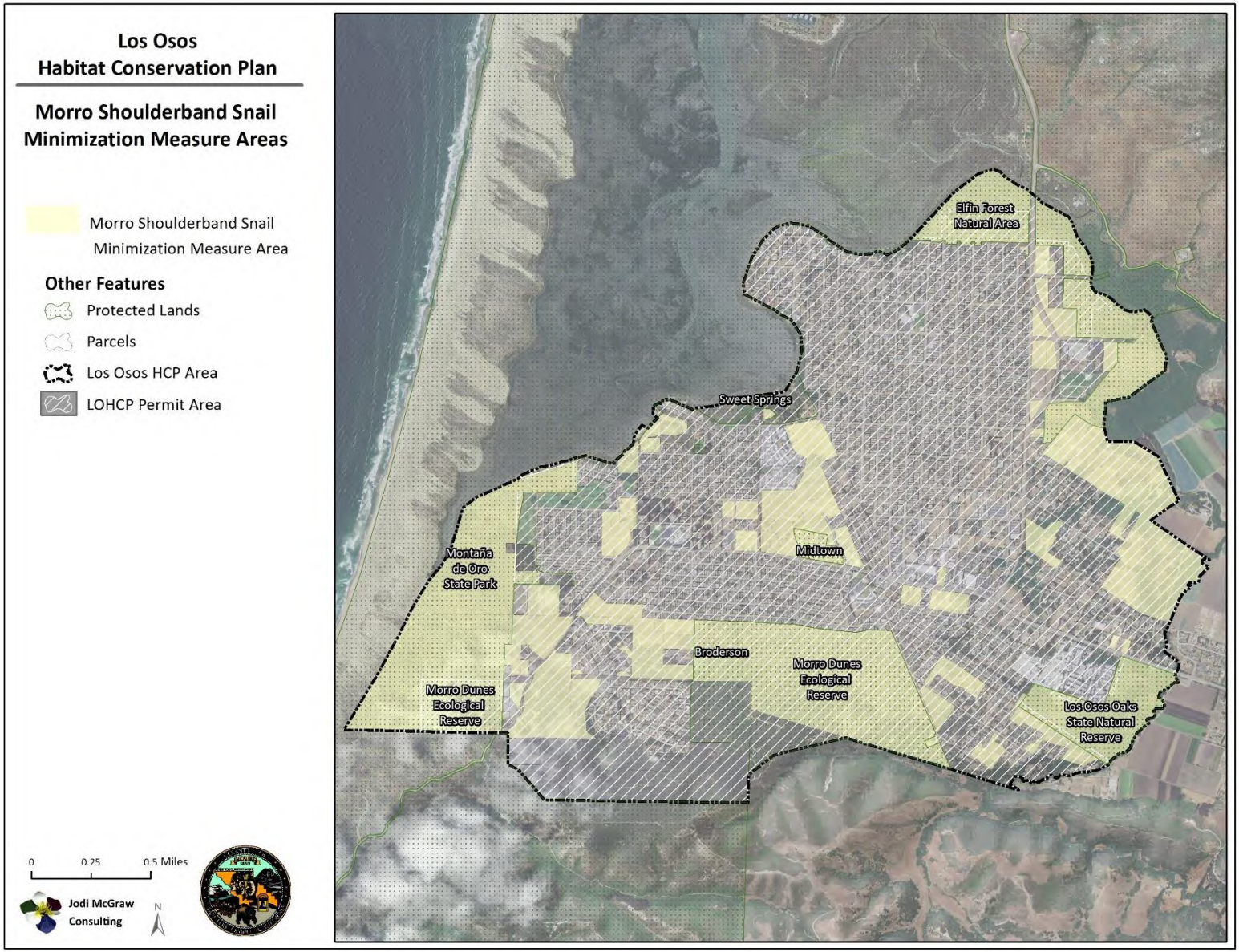

Figure 5-2: Morro Shoulderband Snail Minimization Area

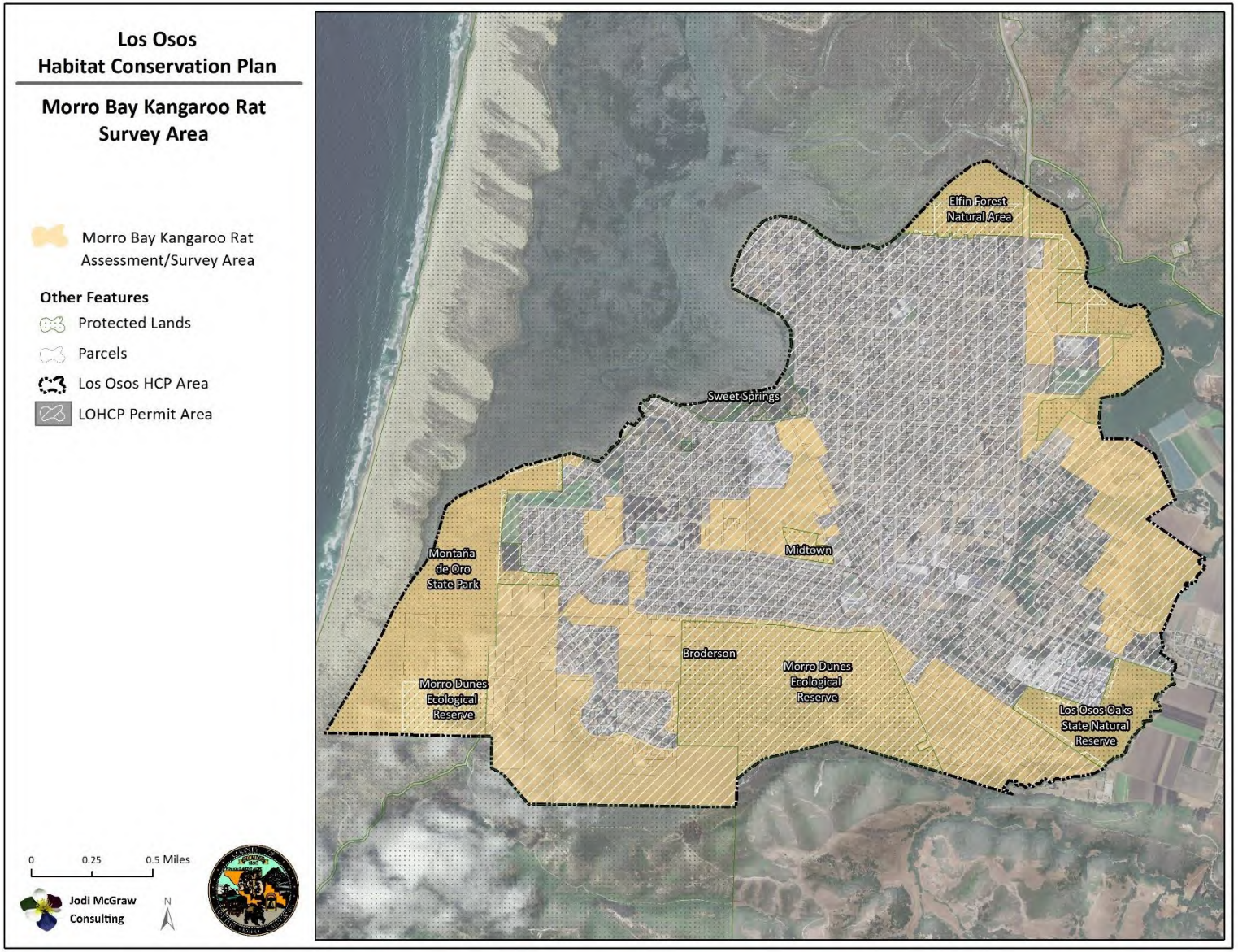

Figure 5-3: Morro Bay Kangaroo Rat Avoidance Area

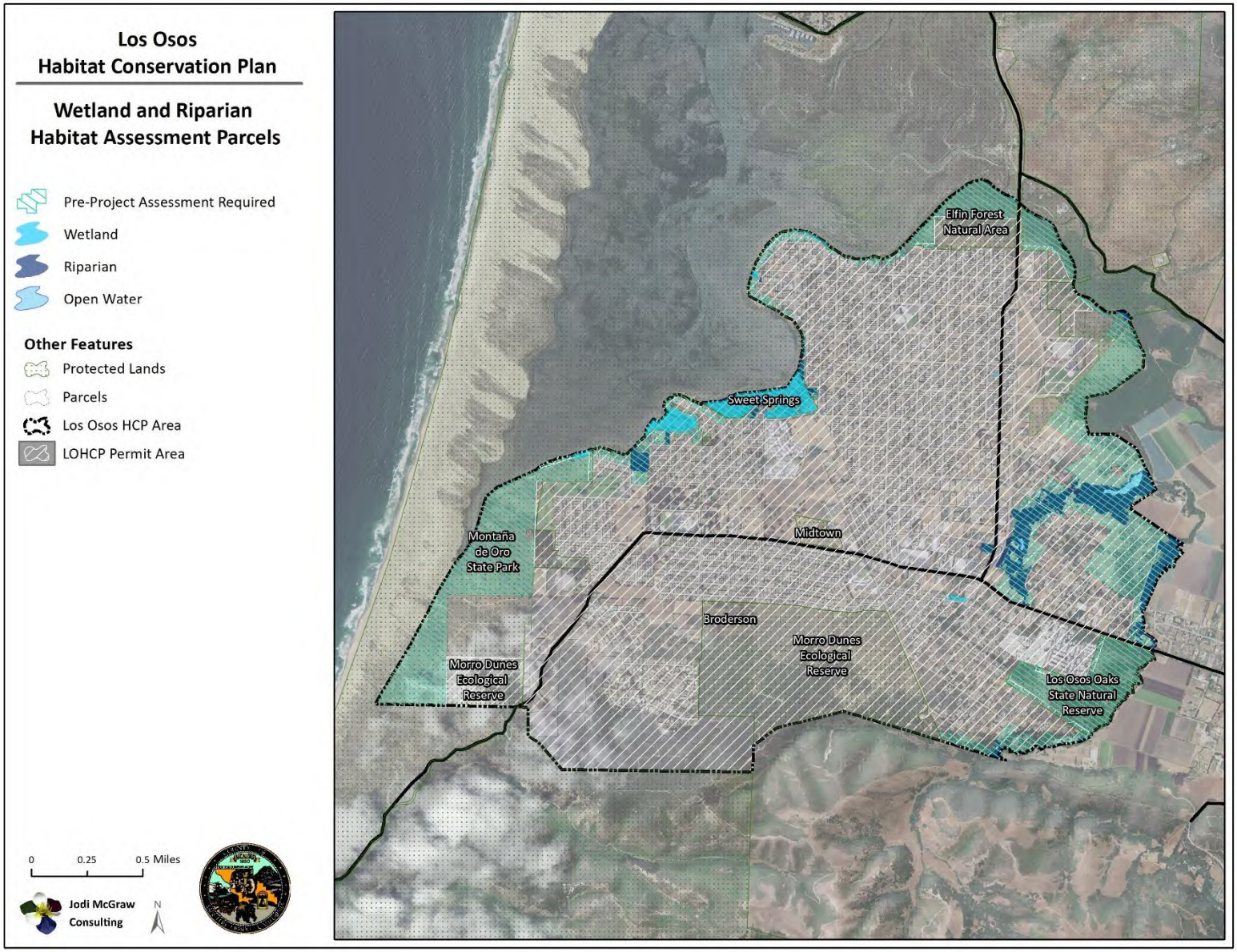

Figure 5-4: Wetland and Riparian Pre-Project Habitat Assessment Area

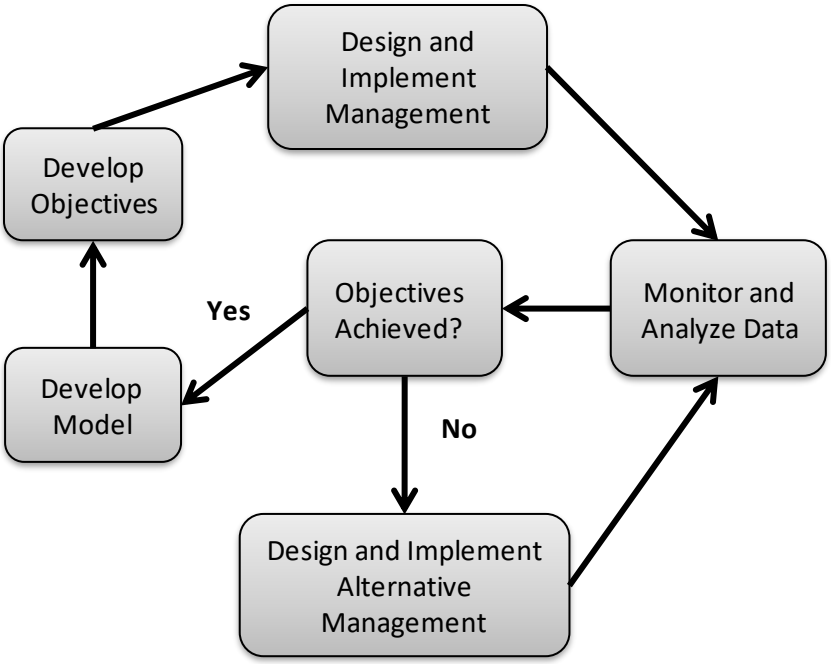

Figure 5-5: Adaptive Management Cycle (Elzinga et al. 2001)

6 Plan Implementation

This chapter describes the LOHCP implementation plan, including organizational structure, project approval and permitting processes, roles and responsibilities, and plan amendment modification procedures.

Implementation of the LOHCP will begin once the MOU is executed between the County and the CDFW, and the USFWS issues to the County the incidental take permit (ITP; Section 1.4).

6.1 Responsibility for Plan Implementation

As the permittee, the County of San Luis Obispo (County) will implement the LOHCP with oversight from the USFWS. The County envisions contracting with an Implementing Entity—an existing or newly created non-profit conservation organization (e.g., land trust or conservancy) approved by the USFWS and CDFW, that will provide expertise in land conservation and management for endangered species, among other skills necessary to implement the conservation program. However, the County remains responsible for implementation of all aspects of the LOHCP.

This plan envisions that the Implementing Entity will take on roles and responsibilities primarily focused on implementing the conservation program including protecting new habitat, restoring habitat, and managing and monitoring habitat incorporated within the LOHCP Preserve System. The County roles and responsibilities are anticipated to include screening and reviewing applications, ensuring participant compliance, and implementing regulatory functions. These respective roles and responsibilities are aligned with the expertise and typical operation of both parties and reflected in the letter of intent regarding the Implementing Entity and County roles in implementing the Plan (Appendix N).

The following sections provide an overview of the anticipated roles of the County, Implementing Entity, and USFWS. The County will work with the Implementing Entity to formalize an agreement that identifies the specific roles of each entity, which may ultimately differ from what is outlined below. As the land manager of the Morro Dunes Ecological Reserve (MDER), CDFW will enter into an MOU with the County (Appendix J) which will allow the MDER to be enrolled into the LOHCP Preserve System at the outset of plan implementation for purposes of restoration and enhanced management under the LOHCP (Section 5.3.3.1.2). The CDFW will also be responsible for implementing CESA and other state regulations administered by the Department (Section 1.5.2); however, CDFW will not be issuing a state incidental take permit under Section 2081 of CESA as the LOHCP will avoid take, as defined by the state act, of state-listed species (Morro Bay kangaroo rat and Indian Knob mountainbalm). County

As the recipient of the ITP based on the LOHCP, the County has primary responsibility for implementing the LOHCP. As noted above and detailed in the following sections, the County intends to delegate specific responsibilities to implement aspects of the LOHCP conservation program through contracts for services with an Implementing Entity. Ultimately, the County is responsible for implementing the LOHCP and otherwise complying with the terms of the ITP so will coordinate closely with the Implementing Entity on all aspects of plan implementation. The County remains responsible for ensuring compliance with the permit by the Implementing Entity and third parties who choose to obtain incidental take coverage through the permits and commits to use its police powers to ensure compliance with the HCP and permit by the Implementing Entity and third-party participants.

6.1.1.1 Identify or Establish the Implementing Entity

With input from and the approval of the USFWS and CDFW, the County will either identify an existing conservation organization that can carry out the responsibilities of the Implementing Entity (Section 6.2) or see that a new entity is formed following bylaws that are approved by the County. In either case, the Implementing Entity will be a non-profit organization designated under Section 501(c)3 of the United States Internal Revenue Code and will be approved by the USFWS and CDFW.

6.1.1.2 Contract with and Oversee the Implementing Entity

The County envisions contracting with the Implementing Entity to fulfill some of its responsibilities, as outlined below. The County will also review work conducted by the Implementing Entity, to ensure that the Plan elements are successfully implemented and that it is in compliance with the terms and conditions of the incidental take permit. The task of County oversight will be headed by the LOHCP Coordinator—a designated County staff member who will be responsible for overseeing the Implementing Entity and coordinating directly with the agencies. The County LOHCP Coordinator will work with the assistance of other County staff or outside personnel with biological expertise, as needed, to review aspects of plan implementation including reviewing biological monitoring reports.

6.1.1.3 Review Applications and Issue Certificates of Inclusion

The County will review all applications from project proponents seeking to implement activities covered under this plan in the LOHCP Area. The County will screen all development and related projects that it permits in the Permit Area as part of its local land-use authority, to determine whether they meet the criteria for take authorization under the LOHCP (Section 6.3). The County will require proponents of these projects to complete an application for a Certificate of Inclusion (COI), which will confer take coverage under the ITP (Appendix H).

The County will also accept and review applications for take coverage from the proponents of projects that are not under County land use authority, but that meet the LOHCP eligibility criteria. The County will refer applicants whose projects are determined to be ineligible for permitting under the LOHCP to the state and federal agencies to discuss alternative options for take coverage.

As part of its review of applications, the County will identify the specific avoidance and minimization measures (AMMs), as well as best management practices (BMPs), that are necessary for each covered activity, based on the general approaches (Section 5.2) as well as site and project-specific conditions. The County will include the relevant AMMs and BMPs as requirements within the COI for each project.

6.1.1.4 Ensure Compliance with Permit Terms

The County will ensure that plan participants comply with the terms of their COI and the ITP. Specifically, the County will:

- Review reports from pre-construction surveys (which will also be reviewed by the USFWS and CDFW) and use results to evaluate the need for the project proponent to implement additional AMMs (Section 5.2), including adjust the project design;

- Ensure compliance of all plan participants to ensure they implement the AMMs and BMPs to prevent impacts to other listed species not covered under the permit; and
- Maintain a database of all avoidance and minimization measures, including survey results, which will be used to develop the annual report as well as to increase understanding of the species distribution and abundance.

Should a participant fall out of compliance, the County will notify them. If voluntary compliance is not provided, the County will revoke the Certificate of Inclusion and issue a stop-work order on any County-permitted projects as described in greater detail in Section 6.3.3. The County remains liable under the permit for compliance with all applicable permit terms by each plan participant. Any violation of or failure to comply by a plan participant with the terms of the permit or the terms of any Certificate of Inclusion issued by or on behalf of the County shall be attributed to the County.

6.1.1.5 Accept the Mitigation Fees

The County will accept from all participants in the LOHCP the mitigation fees required to compensate for the impacts of their projects (Section 5.7). These include Habitat Protection Fees (Section 5.7.2.1.2) for those who do not set aside habitat on site, and habitat restoration and management fees, which are required for all participants identified in Table 5-7 (Section 5.7.2.2). The Implementing Entity will accept easements from landowners who set aside habitat onsite (Section 5.7.2.1.1, Section 6. 2.2.2).The County will work with the Implementing Entity to secure the required on-site mitigation following approval of project applications and before development permits and COIs are issued.

The County will deposit habitat mitigation fees into a dedicated trust account which is anticipated to be held by the Implementing Entity (the trustee) on behalf of the County (the third-party owner), to ensure that they are applied to implement the Plan. A portion of the fees will be used to establish the endowment that will be held by the National Fish and Wildlife Foundation and will be used to fund habitat management and monitoring post permit (Section 7.3.1).

6.1.1.6 Maintain a Covered Activities Database

The County will conduct Covered Activities Implementation Monitoring for the LOHCP (Section 5.4.1). Specifically, the County will create and maintain a database to record relevant information about each COI application submitted:

- The amount and location of habitat impacted by each covered activity;
- Whether all of the required AMMs and BMPs required in the COI were implemented, and the effectiveness of the measures;
- The number and type of COIs issued during each calendar year and cumulatively since the take permit was issued; and
- The mitigation provided (i.e., the acres protected via conservation easement and fees accepted) for each covered activity.

6.1.1.7 Prepare Annual Reports

The County will work with the Implementing Entity to prepare the annual report documenting implementation of the LOHCP (Section 5.6). Each report will be developed based the covered activities database (Section 6.1.1.6) and the conservation program database (Section 6.1.2.2) and will evaluate whether the area protected, restored, and managed as part of the conservation program is sufficient to meet the LOHCP stay-ahead provision (Section 6.2.4). The annual reports will document the steps conducted to promote long-term effectiveness of the plan at achieving the biological goals and objectives (Sections 5.1 and 5.5). These include:

- Updating the overall conservation program as well as the LOHCP Preserve AMMP, based on changed conditions, new scientific information, and results of monitoring;
- Assessing the financial viability of the plan and the need to adjust fees (Section 7.4); and
- Identifying proposed changes to the plan, including administrative changes as well as minor and major amendments (Section 6.7).

6.1.1.8 Conduct Other Implementation Duties

The County will work with the Implementing Entity to complete additional tasks to effectively implement the LOHCP including:

- **LOHCP Communications:** maintain a publicly available website that provides information about the LOHCP, including annual reports and monitoring studies;
- **Promote Partnerships:** engage with agencies and organizations in the LOHCP Area, to promote their support for efforts to achieve the LOHCP goals and objectives. This includes conducting outreach to researchers to engage them in studies that will fill data gaps, evaluate effectiveness of monitoring, and otherwise inform the conservation program (Section 5.4.2.3);
- **Pursue Supplemental Funding**: as feasible, seek outside funds to support research as well as additional restoration, management, and monitoring to complement the LOHCP conservation program. Such funds sources would not replace or otherwise alter the mitigation responsibilities of the County or the plan participants; rather, additional funding would be used to improve the quality of management of the LOHCP Preserve System.
- **Convene Meetings:** at least annually, or sooner if warranted, convene representatives from the Implementing Entity and the USFWS, as well as owners/agency managers of land within the LOHCP Preserve System to keep these parties apprised of progress towards conservation goals and objectives, and provide updates on funding, monitoring, adaptive management, and other topics relevant to long-term effectiveness of the LOHCP.

6.1.2 Implementing Entity

The County will work with the Implementing Entity to implement the conservation program, including protecting new habitat, restoring habitat, and managing and monitoring habitat incorporated within the LOHCP Preserve System. This section describes the anticipated roles and responsibilities of the Implementing Entity.

6.1.2.1 Assemble, Manage, and Monitor the LOHCP Preserve System

The County intends to delegate to the Implementing Entity the tasks associated with assembling the LOHCP Preserve System (Section 5.3) and conducting all activities to restore, manage, and monitor the preserves in order to achieve the biological goals and objectives of the LOHCP (Section 5.1). This includes steps to protect, manage, restore, and monitor habitat.

To protect habitat, the County will work with the Implementing Entity to:

- Secure easements from landowners mitigating on site, by reviewing applications and identifying the set-aside area, and working with the USFWS to ensure the easement will protect habitat that is of high long-term conservation value for the covered species (Sections 5.7.1.1 and 6.2.2.2).
- Use habitat mitigation fees to acquire, from willing sellers, additional lands of high conservation value to be included in the LOHCP Preserve System, by working with the USFWS to identify parcels of greatest conservation value, conducting outreach to identify willing sellers, negotiating with landowners or their agents, and ultimately securing fee title or conservation easements. Lands acquired in fee simple title are anticipated to be held by the County and permanently protected by conservation easements held by the Implementing Entity.
- Monitor and enforce, where necessary, compliance with conservation easements over properties protected as part of the LOHCP to ensure long-term protection of the habitat.

6.1.2.1.1 Accept Conservation Easements for New Preserves

The Implementing Entity will accept conservation easements from plan participants who set aside habitat on site within the Priority Conservation Area (Section 5.7.2.1.1). The Implementing Entity will also accept conservation easements for habitat acquired in fee title by the County using the Habitat Protection Fees (Section 5.7.2.1.2).

The County anticipates having the Implement Entity serve as the easement holder (rather than the County) for a variety of reasons including:

1. As a 501(c)3 land trust, the Implementing Entity will be most qualified to develop easements designed to protect the conservation values, and enforce the terms of the easements, as needed;
2. The Implementing Entity is anticipated to lead habitat restoration, management, and monitoring in conjunction with monitoring the easements, so the Implementing Entity is anticipated to more readily able to detect any violations; and
3. The County envisions holding fee title to lands acquired using mitigation fees collected through the LOHCP, and granting a conservation easement for said lands to the Implementing Entity..

As described in Section 6.2.2.2, the easement grantee will designate a successor to the easement, in the event the easement grantee is dissolved.

6.1.2.1.2 Enroll Existing Protected Lands

The County will work with the Implementing Entity and CDFW and County Parks to enroll lands to be managed, restored, and monitored as part of the LOHCP Preserve System (Section 5.3.3.1.2). This includes:

- Identifying the priority areas for habitat restoration and management and the techniques that will be used to ensure the habitat is protected in perpetuity;
- Determining the management goals and objectives for the property, which will be consistent with the biological goals of the LOHCP (Section 5.1) and the goals and objectives of the LOHCP Preserve System AMMP (Section 5.3.3.2); and
- Developing and executing MOUs or other cooperative agreements with the eligible land management entities who may elect to enroll their lands, including CDFW and County Parks (Section 5.3.3.1); such agreements would specify what they will continue to do (i.e., as part of their maintenance of effort) and what the County and Implementing Entity will do directly, or under contract with the land manager, as mitigation under the LOHCP.

6.1.2.1.3 Restore, Manage, and Monitor the Preserve System

The Implementing Entity is anticipated to conduct all habitat management, restoration, and monitoring within the LOHCP Preserve System directly or through administration of contracts (i.e., cooperative management agreements) with agencies and organizations that own land managed as part of the LOHCP Preserve System. Habitat management and monitoring responsibilities that are anticipated to be carried out by the Implementing Entity include:

- Implement the IAMMP, which identifies high-priority restoration work within the MDER to jump start the conservation program (Section 6.2.5; Appendix M).
- Prepare and implement the LOHCP Preserve System AMMP, which will identify the goals and priority restoration and management projects for the lands within the Preserve System, based on a critical examination of the biological conditions on site, as well as the role of the preserve in the broader landscape (Section 5.3.3.2).
- Prepare annual work plans and budgets to identify the habitat management and monitoring tasks that will be conducted to implement the IAMMP/AMMP each year, based on the priorities and existing funding, derived from habitat mitigation fees and other sources (e.g., grants).
- Conduct or oversee habitat restoration, management, and monitoring. Ensure that habitat management, restoration, and enhancement activities are carried out as outlined in the LOHCP Preserve System AMMP, the LOHCP, and the ITP and facilitate County efforts to ensure that the work is keeping pace with or exceeding the pace of the take/impacts in compliance with the Plan's stay-ahead provision (Section 6.2.4).
- Update the LOHCP Preserve System AMMP as part of the adaptive management process, in which changed conditions, new scientific information, and the results of prior projects and monitoring, among other changes, are addressed to promote long-term effectiveness of the conservation strategy (Section 5.5.2).

6.1.2.2 Document Implementation of the Conservation Program

To document implementation of the conservation program, the Implementing Entity will establish and maintain one or more databases to continuously track the following, which will be used to prepare the annual reports provided to the USFWS (Section 5.6):

- The amount and location of new habitat protected (i.e., habitat acquired by the Implementing Entity and habitat set-aside by project proponents on site; Section 5.7.2.1);
- The amount and location of habitat subject to each type of restoration treatment (e.g., erosion control);
- The amount and location of habitat subject to enhanced management, including the type(s) of management activities conducted in the area (e.g., veldt grass control);
- Progress toward the biological goals and objectives, based on monitoring; and
- A summary of the annual and cumulative costs spent to implement the conservation program.

6.1.3 USFWS

The USFWS will monitor and enforce the County's compliance with the ITP. The agency will review and comment on annual reports, which will identify the projects covered and mitigation provided under the ITP (Section 5.6), and annual work plans for the AMMP (Section 6.1.2.1.3). The USFWS is expected to remain involved in other aspects of implementation of the plan during the term of the ITP. Specific anticipated roles of USFWS include:

- Provide input and ultimately approval in the process of selecting the Implementing Entity;
- Monitor plan implementation through review of annual reports and work plans for the AMMP, and promptly notify the County if implementation of the plan is not proceeding in compliance with the ITP;
- Review and provide timely approval for all land acquisition and conservation easement proposals to ensure consistency with the habitat protection component of the conservation program (Section 5.3.3);
- Review, provide comments on, and approve the LOHCP Preserve System AMMP;
- Review annual reports documenting plan implementation and monitoring; and
- At their discretion and consistent with agency priorities and legal mandates, assist the Implementing Entity in attempting to secure funding to enhance the conservation program.

The USFWS is not expected to be involved in permitting activities on a project-by-project basis. Accordingly, the County will not transmit copies of application materials to the USFWS on a routine basis. If requested, the County will provide such information to the USFWS. The USFWS may identify issues with a particular application and otherwise offer comments to the County with regard to a particular project, but the extension of take authorization to individual covered activities will be carried out by the County in accordance with the ITP conditions. As the sole permittee, the County remains the sole entity liable for any non-compliance with the Plan or its ITP by any entity acting under the ITP.

6.2 Conservation Program Implementation

The County will work with the assistance of an Implementing Entity to implement the Plan conservation program. This will include implementation of the avoidance and minimization measures, and work with willing landowners in the region, to establish and manage the LOHCP Preserve System. The Preserve System is the network of public and private conservation lands, including land protected through implementation of the LOHCP, as well as existing protected lands where additional management and restoration will be conducted to promote the biological goals and objectives (Section 5.3.1). The County will work with an Implementing Entity to protect new habitat, as well as enroll existing protected lands in the LOHCP Preserve System. The County will ensure that habitat benefits in the LOHCP Preserve System keep pace with, or outpace, habitat impacts caused by the covered activities as part of the Plan's Stay Ahead Provision (Section 6.4).

6.2.1 Avoidance and Minimization Measure Implementation

As part of the process to review and permit applications for take coverage, the County will identify the necessary avoidance and minimization measures for each project as set forth in Tables 5-2 through 5-4, verify that projects can be implemented in a way that avoids impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm individuals, condition the COI for each project on their successful implementation, and conduct monitoring to ensure that avoidance and minimization measures are effectively implemented as part of the LOHCP; this includes monitoring to ensure that the impacts are confined to the specified disturbance envelope. The County will address any violations to the COI and ITP as outlined in Section 6.3.3.

The following are specific tasks that the County will conduct to facilitate implementation of the AMMs.

1. **Maintain Database:** The County will establish and maintain a GIS database to identify the locations of known occurrences and suitable habitat for the four covered species and the eight additional listed species not covered by the LOHCP permit, as well as known nests of birds of prey including golden eagle and white-tailed kite. The database will contain the latest available public information (e.g., California Natural Diversity Database), information available from conservation organizations (e.g., California Native Plant Society and Morro Coast Audubon Society), and data synthesized from prior applications and projects (e.g., results of project-specific surveys). The database will be assembled prior to issuance of the permit so that it can be used to screen the first applications (Table 6-1).
2. **Evaluate Covered Activities:** The County will evaluate each project proposed for take coverage under the LOHCP to identify its potential impacts on the covered species and other listed species. This evaluation will consider the location of the project with respect to known occurrences and suitable habitat in the database, characteristics of the project (e.g., type, size, and seasonality) and the ecology and life history of the species that could potentially be affected. The County may require that project proponents prepare a habitat assessment to provide the information needed for the evaluation. The specific protection measures identified based on the above general criteria as well as site and project-specific considerations, will be included as conditions COI that is issued to confer take coverage for the project.
3. **Ensure Avoidance of Other Listed Species:** Prior to issuing a COI, the County will make the following determination for each project:

a. No take: The project can be conducted as designed without causing take of listed species not covered by the permit as well as Indian Knob mountainbalm and Morro Bay kangaroo rat individuals;

b. No take with implementation of avoidance measures: The project can avoid take to additional listed species through implementation of protection measures; or

c. Potential for take: There is a significant potential for take, which cannot be avoided through implementation of avoidance measures.

The County will refer proponents of projects with the potential for take of listed species not covered by the permit (Item 3c, above) and/or Indian Knob mountainbalm or Morro Bay kangaroo rat individuals (Item 3a, above) to the USFWS and CDFW to discuss permitting options; the County will also notify the wildlife agencies of such referrals. Such projects will only be permitted under the LOHCP if the applicant provides the County with documents substantiating compliance with the state and/or federal regulations (Section 6.3.1)

4. **Identify AMMs and BMPs**: The County will identify in each COI issued the AMMs and BMPs that must be implemented during each project to avoid or minimize take/impacts resulting from their covered activity. Tables 5-2 through 5-4 list the avoidance and minimization measures, which may be updated periodically by the County in coordination with the USFWS and/or CDFW, as part of the adaptive management framework to implement the Plan to promote effective species protection.

5. **Implement Species Protection Measures:** Plan participants will be required to implement the applicable measures required by the County in the COI. Plan participants are solely responsible for the costs associated with implementing AMMs and BMPs.

6. **Conduct Implementation Monitoring:** The County will monitor the covered activities to ensure that the requisite AMMs and BMPs are conducted (Section 5.4.1.1). This includes ensuring that the project impacts are confined to the predetermined disturbance envelope. The County may require that plan participants contract with a third-party biologist to implement this monitoring, in which case the County will review the reports provided by such third parties. The County will record the monitoring results into a database, which the County will use to quantify take/impacts including loss of habitat in the annual report (Section 5.6). Violations will be addressed as outlined in Section 6.3.3.

These steps outlined above will be revised, as needed, to ensure effective species protection.

6.2.2 Habitat Protection Process

The County will work with the Implementing Entity to use mitigation fees to acquire habitat in accordance with the biological goals and objectives. The Implementing Entity is anticipated to also receive land conservation easements from plan participants who are required to set aside habitat on-site, to meet the habitat protection requirement of the compensatory mitigation (Section 5.7.2.1). Section 5.3 identifies the important conservation considerations for habitat protection. This section describes the process and provides greater detail about the conservation easements.

6.2.2.1 Land Acquisition

The County will work with the Implementing Entity to use the habitat mitigation fees to acquire additional privately held land for inclusion within the LOHCP Preserve System. This section outlines the general stepwise process that will be followed to secure suitable land.

1. Identify properties with the highest potential to promote attainment of the biological goals and objectives, which include protecting, buffering, or connecting suitable and/or occupied habitat for the covered species (Section 5.3.2).
2. Discuss potential for acquisition of fee title or easement with the landowner and the USFWS.
3. Secure landowner permission to conduct site assessments and surveys, which will be funded using mitigation fees.
4. Determine if the property features encumbrances (e.g., existing easements), title issues, resource extraction rights, hazardous materials, or other issues that conflict with LOHCP goals and objectives. Areas subject to incompatible easements or management will be excluded from the LOHCP Preserve System unless such incompatibilities can be resolved.
5. Reach agreement on the terms of the conservation easement, which must be approved in writing by the USFWS, and will include language enabling the easement grantee, which is anticipated to be the Implementing Entity, to conduct habitat management and monitoring necessary to maintain or restore the conservation values. The Implementing Entity is also anticipated to be the grantee for easements conserving on-site habitat set-asides (Section 5.7.2.1.1). Lands acquired in fee title by the Implementing Entity will be transferred to the County which will grant a conservation easement, approved in writing by the USFWS, to the Implementing Entity.
6. Conduct an appraisal of the property value (easement or fee) or have an appraisal conducted by the property owner reviewed by an independent real-estate specialist or appraiser responsible to the County or Implementing Entity.
7. Obtain written concurrence from the County and USFWS, regarding the land selected for acquisition. The County will work with the Implementing Entity to provide the agencies with all available information about the property (including include maps, legal descriptions, preliminary title documents, Phase 1 Site Assessments, and draft conservation easements) along with a request for concurrence.
8. Negotiate fair-market price and final easement conditions, if applicable, with owner.
9. Acquire or place a conservation easement, approved by the USFWS, on the property.
10. If a site is purchased in fee simple title, fee title will be held by the County and the County will concurrently execute a conservation easement (approved by the USFWS) in favor of the Implementing Entity.
11. The County will work with the Implementing Entity to prepare a preserve-specific management plan, reviewed and approved by the USFWS, that will be integrated into the LOHCP Preserve System AMMP. If a conservation easement is purchased, the County will work with the Implementing Entity to prepare a preserve-specific management plan, which will be developed with the landowner and reviewed and approved by the USFWS. These plans will be consistent with the LOHCP Preserve System AMMP (Section 5.3.3.2) and feature an adaptive management framework (Section 5.5).

12. Initiate preserve management and monitoring and conduct habitat restoration (if applicable). Monitoring and management will be initiated within one year of preserve establishment and will be seasonally timed as outlined in the management plan. The timeline for restoration projects will depend on the circumstances, including habitat conditions and available funding, which will be addressed in the preserve management plan which will be reviewed and approved by the USFWS.

6.2.2.2 Conservation Easements

All habitat to be protected through the LOHCP will have its conservation values permanently protected through dedication of a conservation easement. Conservation easements are anticipated to be granted to the Implementing Entity which, as a 501(c)3 land trust, will be responsible for monitoring and defending the easement terms; however, the County can also serve as the conservation easement grantee.

The County will work with the Implementing Entity to acquire conservation easements to protect habitat in the LOHCP under three circumstances:

1. Private landowners developing vacant land inside the Priority Conservation Area will grant easements to protect the habitat set-asides that they establish on site at a ratio of 3:1, wherein three square feet of habitat is protected via conservation easement for every one square foot impacted by development (Sections 5.7.2.1.1 and Section 6.1.2.1.1);

2. The County will grant to the Implementing Entity conservation easements over properties that the County acquires in fee simple title directly or through transfer from the Implementing Entity, as part of the habitat protection component of the LOHCP (Section 5.3.2); and

3. Landowners willing to donate or sell conservation easements to protect additional intact habitat on their parcels, particularly privately-owned parcels that feature residential development or other improvements for which the landowners wish to maintain fee simple ownership.

These conservation easements must meet the following criteria:

- Be in perpetuity;
- Be developed according to California Civil Code sections 815 et seq.;
- Be voluntarily offered by the holder of the underlying fee, and not as a mandatory condition of any project approval[21];
- Be submitted to the USFWS for review and approval; and
- Name the USFWS, and the County as third-party beneficiaries, with rights of entry and

[21] Although conservation easements are required as mitigation for those developing vacant parcels inside the Priority Conservation Area in order to participate in the LOHCP, such easements are not a mandatory condition of project approval as landowners seeking to develop in these areas can satisfy state and federal endangered species act requirements through other means, including preparing their own HCP.

enforcement.

The terms and prices of the easements will be negotiated on a case-by-case basis with the landowner, who must abide by the terms of the conservation easement. Easement terms will depend on site conditions, including species occurrences and habitat conditions and management needs, and landowner preferences, including land-use activities.

Conservation easements will be drafted to ensure that the area of the property covered by the easement will be kept in its natural or existing condition to protect the conservation values of the property forever, to confine the allowable uses of the property to those activities that ensure or promote the preservation or restoration of those conservation values consistent with the LOHCP, and to prevent any use of the property which would impair or interfere with the conservation values of the property. The conservation values shall be specifically described in terms of both the covered species and their habitat, and other natural communities on the property.

The County will work with the Implementing Entity to obtain the following documentation prior to accepting a conservation easement:

- A baseline survey of the property documenting the presence and of the covered species, condition of their habitat, and factors that threaten their future condition;
- A preliminary title report and legal description of the property;
- Evidence of all other easements, covenants, restrictions, and reserved rights;
- A Phase I environmental analysis for hazardous materials;
- A map of the parcel in relation to other components of the LOHCP Preserve, or other properties subject to other permanent protections for conservation purposes;
- A Property Analysis Report (PAR) or comparable assessment of the initial and capital costs and ongoing funds required to manage and monitor the lands; and
- A detailed list of the allowable uses and use restrictions on the parcel as approved by the USFWS.

The above information shall be provided to the USFWS at their request.

All recorded conservation easements must include the items listed below:

- Provisions for access both by the easement grantee (i.e., the Implementing Entity or the County) or its designee to monitor the terms of the conservation easement and to carry out all applicable management and monitoring requirements. A right of reasonable access to monitor compliance with the terms of the conservation easement shall also be granted to the USFWS. The easement shall include provisions for public access, where appropriate (e.g., trail corridors on properties connecting public lands) and approved by the USFWS.
- Provisions for enforcement and available remedies for the easement grantee or other party in the event that title holder or third party violates the terms of the conservation easement. Such right of enforcement and remedies provisions shall also be granted to the USFWS.

Appendix I contains a template conservation easement, which will be updated early during plan implementation, and as necessary to ensure long-term effectiveness at protecting habitat.

6.2.3 Habitat Restoration, Management, and Monitoring Process

The County will work with the Implementing Entity to manage, restore, and monitor habitat within the LOHCP Preserve System.

6.2.3.1 Enroll Existing Protected Lands in the LOHCP Preserve System

The County and/or the Implementing Entity will meet with the agencies and conservation organizations responsible for the existing protected lands within the Priority Conservation Area, to discuss potential coordination of management and restoration as part of the LOHCP Preserve System (Section 5.3.3). The purpose will be to identify the following:

1. **Habitat to be Enrolled:** the specific habitat areas to be enrolled in the LOHCP Preserve System, which must meet the following criteria:
    - provide suitable habitat for one or more of the covered species; and
    - have management or restoration needs that are not the current responsibility of the landowner/manager and met by available resources.

    If the property will be enrolled over time, the management units and their sequence or phasing will be determined.

2. **Habitat Treatments**: the specific habitat restoration and management activities that will be implemented to improve habitat conditions as mitigation for the LOHCP.

3. **Method of Habitat Protection:** the legal mechanism that will be used to ensure that the enrolled habitat is permanently protected from development, so that the restoration and management benefits resulting from mitigation are not wasted. Legal mechanisms can include conservation easements, permanent deed restrictions, and other legal documents (e.g., contracts) that restrict land use and associated activities, as appropriate and as approved by the USFWS. If the landowner cannot provide written, legal assurances that the enrolled habitat will be permanently protected from development or other activities that could affect habitat, then the County will provide written assurances to the USFWS that the County will be responsible for providing alternative compensatory mitigation acceptable to the USFWS for any loss of mitigation value resulting from a change in condition of the habitat due to such a change in land use.

4. **Maintenance of Effort Plan:** the current management and restoration activities that are being implemented by the landowner. These activities will continue to be implemented by the landowner to ensure that the LOHCP mitigation has added benefits for the covered species.

The information outlined above will be addressed in a legal agreement between the County and the landowner that will establish the basis for cooperative management of the land enrolled in the LOHCP Preserve System. It will also inform development of, or updates to, the LOHCP Preserve System AMMP, which will identify the complete restoration and management treatment plan for each enrolled property, to guide overall coordinated management of the preserves (Section 6.2.3). Section 6.4

describes how the County and CDFW developed a memorandum of understanding that addresses these cooperative management requirements outlined above.

6.2.3.2 Develop Preserve System Adaptive Management Plan

To guide restoration, management, and monitoring of habitat within the LOHCP Preserve System, the County will work with the Implementing Entity to develop the LOHCP Preserve System AMMP—an action plan for the Preserve System, which will identify the coordinated strategies that will be used to achieve the greatest long-term conservation benefits for the covered species (Section 5.3.3.2) and achieve the biological goals and objectives (Section 5.1). Developed during the first three years of implementation of the LOHCP (Table 6-1), this living document will be updated as new preserves are established (e.g., new habitat is protected, or protected lands are enrolled), and otherwise be revised, as needed, to identify the priority restoration and management projects for the lands within the LOHCP Preserve System.

Section 5.3.3.2 outlines the anticipated contents and key functions of the LOHCP Preserve System AMMP. To develop the plan, the County will work with the Implementing Entity to conduct baseline biological effectiveness monitoring studies (Table 5-6) of land anticipated to be included in the Preserve System (Section 5.3.3.1). The surveys, which will be conducted with permission of the landowners, will be designed to identify the distribution and relative abundance of the covered species, characterize the condition of their habitats, and identify initial priorities for restoration and management (Section 5.4.2.1).

To ensure adequate funding for this initial work, which will be conducted prior to accrual of sufficient mitigation fees, development of the LOHCP Preserve System AMMP, including implementation of the baseline monitoring protocols, were included as part of the three-year Preserve Start-Up Costs, that will be funded by the County; the County will be reimbursed for these and other initial costs, over time, using future mitigation proceeds (Section 7.3.2).

6.2.4 Stay-Ahead Provision

During the course of LOHCP implementation, the County will work with the Implementing Entity to ensure that the habitat benefits resulting from habitat protection, restoration, and management stay ahead of or equal the impacts/take. which will be measured in terms of area of Baywood fine sand soil habitat impacted by the covered activities. Evaluation of the status of the LOHCP toward compliance with the Stay-Ahead Provision will be conducted on an ongoing basis using the records maintained in the project databases which the County will use to ensure it does not permit take beyond the available habitat benefits accrued from implementation of the conservation program. The annual reports that the County will provide to the USFWS (Sections 5.4 and 6.1.1.7) will document successfully work to meet the stay-ahead provision, by showing the running total take/impacts covered by the permit do not exceed the total compensatory mitigation credits accrued through implementation of the conservation program.

The County will work with the Implementing Entity to implement the LOHCP conservation program in coordination and collaboration with willing landowners. Habitat mitigation activities will be funded by the fees collected from proponents of projects covered by the ITP issued based on the LOHCP. Given these circumstances, the two most likely factors that would prevent compliance with the Stay-Ahead

Provision are:

1. insufficient time to complete habitat protection projects, or for habitat restoration and management projects to be designed, implemented, and achieve their performance criteria (for restoration projects); and
2. insufficient funding accrued to finance the highest priority projects, which may also be capital intensive.

To address these potentialities and meet the Stay-Ahead Provision, the County developed a plan to jump start the LOHCP.

6.2.5 Jump Start for the LOHCP

During the first three years of plan implementation, while the AMMP is being developed, the County plans to conduct habitat restoration activities within the Morro Dunes Ecological Reserve (MDER). The work will be implemented following the terms of a memorandum of understanding (MOU) between the County and CDFW that will enroll the Morro Dunes Ecological Reserve (MDER) into the LOHCP Preserve System (Section 6.4, Appendix K). The MOU between the County and CDFW addresses the four requirements of cooperative management outlined above (Appendix K).

The Initial restoration and management of the MDER will be implemented as described in the *Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System* (McGraw 2020; Appendix M), which is an appendix to the MOU between CDFW and the County. The IAMMP identifies three initial, high-priority projects to restore habitat that has been degraded by invasive plants and incompatible recreational use. The County is anticipated to implement one or more of the restoration projects in the IAMMP to provide an initial source of mitigation to offset covered activities while the AMMP is being developed based on additional surveys and planning. This 'jump start' will facilitate the County's compliance with the LOHCP's 'stay-ahead provision', which requires that the benefits of the conservation program keep pace with the impacts of the covered activities (Section 6.2.4).

Based on the LOHCP's mitigation equivalency ratios, which relate the value of habitat restoration to habitat impacts (1.5:1; Section 5.7.2.3.1), successful restoration of the total 27.74 acres as outlined in the IAMMP (Appendix M) would mitigate 41.61 acres of habitat impacts. However, the actual mitigation credits generated by initial restoration will be determined based on the acres of habitat that achieves the performance criteria (Section 3.4 in Appendix M). For the eucalyptus removal, the performance criterion is successful removal of the trees and their biomass; this reflects the immediate benefit of tree removal on the natural communities. For the control of veldt grass and co-occurring invasive plants and restoration of denuded trails, the performance criteria relate to establishing native plant community structure and species composition in the restoration treatment areas over a five-year period (Section 4.2 in Appendix M).

The funding analysis for this Plan included implementation of the IAMMP (Appendix M). To implement the IAMMP, the County will develop specific work plans that identify the areas to be treated in the MDER. These areas may be less than those identified in the IAMMP, as the restoration projects will likely exceed County funding to jump start the conservation program (Section 7.2.4). Any remaining areas or projects in the IAMMP that are not treated will be evaluated for inclusion in the LOHCP Preserve System AMMP, which will be developed during the first three years of LOHCP

implementation.

During this same period, the County will work with the Implementing Entity to actively pursue land protection projects with willing landowners, in order to secure fee title or conservation easements to new habitat to be protected as part of the LOHCP Preserve System. Land protection projects will be prioritized with input from the USFWS regarding the properties that are of the greatest long-term conservation value for the covered species and conducting outreach to landowners.

The County will also evaluate whether its existing lands are suitable for permanent protection. Specifically, the County holds two contiguous, undeveloped parcels totaling 2.32 acres which are in the Priority Conservation Area near the Bayview Unit of the Morro Dunes Ecological Reserve. The County may decide to enroll these parcels in the LOHCP Preserve System in order to jump start the LOHCP.

No take/impacts will be authorized under the ITP until the initial mitigation has been implemented and, for habitat restoration, the project has achieved the performance criteria in the IAMMP or mitigation is otherwise credited through land protection.

The County will work with the Implementing Entity to conduct one or more of the following to ensure compliance with the stay-ahead provision:

- Conduct work to complete habitat protection projects, including acquisition using the Habitat Protection Fees paid as mitigation;
- implement additional priority habitat restoration on lands managed as part of the LOHCP Preserve System; and/or
- process applications only for activities that will not cause take that exceeds the mitigation available.

6.3 Application Review, Take Authorization, and Oversight

Upon issuance of the ITP by USFWS and successful work to "jump start" the mitigation (Section 6.2.5), the County will have the ability to extend take coverage to proponents of eligible projects.

The County will issue COIs that confer take coverage for projects, provided that they meet the LOHCP eligibility criteria (Section 2.2.1). Landowners and other project proponents who receive take coverage are collectively referred to as third-party participants.

As part of the permitting process, the County will accept applications for covered activities and review them to determine whether they meet the criteria for take authorization under the LOHCP. The applications for covered activities will be used to:

1. evaluate eligibility of the project for coverage;
2. assess the effects on covered species;
3. identify the applicable avoidance, minimization, and compensatory mitigation requirements, including fees; and
4. ensure compliance with the LOHCP conditions if the project is approved.

If the application is complete and the project meets the eligibility criteria, the County accept the fees and the County will work with the Implementing Entity to accept conservation easements for required on-site habitat set-asides (Section 5.7.2.1.1). Following receipt of the mitigation, the County will issue a COI, which will establish and impose the project conditions of approval including required avoidance and minimization measures (Section 5.7.1). A list and copies of COIs will be included in the annual report provided to the USFWS (Section 5.6). For projects that are under the County land-use authority, the County will not issue local development or building permits until it issues a COI.

The County will monitor all third-party participants to ensure that they implement the required avoidance and minimization measures and comply with other terms of the COI and incidental take permit. Should a participant become out of compliance, the County will notify them. If voluntary compliance is not provided, the County will take steps to address the violation as outlined in Section 6.3.3.

The following sections describe two types of projects for which COIs would not be issued:

- **Ineligible Projects:** activities that may result in take/impacts, but that do not meet the LOHCP eligibility criteria (Section 2.2.4.1) or would result in take of other listed species for which take coverage is not provided by the LOHCP permit, and for which take coverage has not been secured; and
- **Exempt Projects**: activities that meet the LOHCP eligibility criteria (Section 2.2.4.1) but will not be covered by the LOHCP permit, because the project proponent has identified an alternative means of complying with ESA and CESA, such as through Section 7 of ESA.

6.3.1 Ineligible Projects

Projects may be ineligible to receive take coverage under the County incidental take permit if they do not meet the eligibility criteria (Section 2.2.4.1), or if they fall into a category of activity not permitted by the LOHCP (Section 2.3). Most notably, projects that cannot avoid impacts to other listed species not covered by the LOHCP ITP will not be eligible for permitting unless they can demonstrate that they have complied with CESA and ESA protections for the other additional species in the area (Section 3.2.3). The County will require proponents of any such project to demonstrate that the project is not likely to result in the take of any listed species other than species covered under the permit or that, if the project is likely to result in take of non-covered listed species, the project proponent has obtained take authorization for take from CDFW and/or USFWS, as appropriate. Evidence that the project is not likely to result in take may be demonstrated by a letter from CDFW or USFWS, issued at the discretion of the agency, stating that agency's opinion that take is not likely to occur. If take is likely to occur, the County will require a copy of the incidental take permit(s) issued for the covered activity.

Proponents of projects determined by the County to be ineligible for permitting under the LOHCP will be referred to the state and federal agencies to discuss options for take coverage.

6.3.2 Exempt Projects

Proponents of activities that meet the eligibility criteria of the LOHCP but that have already received the necessary take authorizations under CESA and ESA or has otherwise complied with the state and federal endangered species acts will not be required to comply with the LOHCP requirements. In order for such

a project to be deemed exempt from the requirements of the LOHCP, the project proponent must provide a copy of the incidental take permit(s) or biological opinion issued for the covered activity.

6.3.3 Oversight, Enforcement, and Violations

The County will provide the necessary oversight of projects covered under the ITP to ensure that proponents implement the avoidance and minimization measures and do not exceed the take authorization, otherwise enforce the terms of the COI (Appendix H) and address any violations.

The County will conduct implementation monitoring (Section 5.4.1.2) to ensure that plan participants implement covered activities per the terms outlined in the COI for their project, which will specify:

- The requisite avoidance and minimization measures (Tables 5-2 to 5-4); and
- The habitat impacts permitted (i.e., the project disturbance envelope) in terms of location and area (e.g., square feet).

If monitoring reveals that a project proponent has violated the terms of the COI, the County LOHCP Coordinator will notify County staff including County Code Enforcement and County Counsel, as needed, to enforce the terms of the COI.

The County process for addressing violations of the terms of the COI will include the following steps:

1. The County LOHCP Coordinator will contact the USFWS as well as County Code Enforcement to provide the information about the apparent violation;
2. The County will place a 'hold' on the permit, such that no additional work will be permitted until the violation is resolved;
3. A County Code Enforcement Officer will begin to investigate the case within 10 working days, with the assistance of the County LOHCP Coordinator; and
4. For projects that are determined to have violated the terms of the COI, the County will outline the terms that the project proponent must fulfill to address the violation before the County will remove the 'hold' on the permit.

For projects in which the actual area disturbed exceeds the area permitted in the COI, the project proponent will be required to pay on a per-square-foot basis, a fee that covers the additional area impacted. For projects conducted without a COI, the stipulation agreement will require landowners to first restore any habitat that was impacted, and then to obtain a COI (and County permit, if required) to do the work, including through payment of the fees. The County will use its authority to levy fines when/if the project proponent does not resolve the violation as outlined in the stipulation agreement.

6.4 Memorandum of Understanding

The County and CDFW have developed a MOU to establish the terms and conditions upon which the CDFW will authorize the County to conduct habitat management, restoration, and monitoring activities on CDFW lands enrolled within the LOHCP Preserve System including the Morro Dunes Ecological Reserve (MDER; Appendix J). The MOU also addresses the required elements of a cooperative management agreement between the County and CDFW to enroll its existing protected lands in the

LOHCP Preserve System (Section 6.2.3.1).

While the term of the MOU shall be five years, it is the intent of the County, CDFW, and USFWS to have the MOU extended for five consecutive five-year terms, totaling 25 years, to coincide with the term length of the HCP. The requested (and anticipated) permit term will remain 25 years; however; in the event that the MOU established between the County and CDFW lapses, the County commits to (must) suspend its approval of any activities covered under the HCP/ITP.

6.5 Changed Circumstances

6.5.1 Summary of Circumstances

Changed circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by plan developers and the USFWS and for which plan responses can be prepared (50 CFR 17.3). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and these additional measures are provided for in the LOHCP (e.g., the conservation management activities or mitigation measures expressly agreed to in the LOHCP), then the County will work with the Implementing Entity to implement those measures as specified in the LOHCP. However, if additional conservation management and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the LOHCP, the No Surprises rule (50 CFR 17.22(b)(5) and 17.32(b)(5)) generally provides that USFWS will not require these additional measures absent the consent of the County, provided that the LOHCP is being "properly implemented", which is to say that the commitments and the provisions of the LOHCP have been or are being fully implemented.

Section 10 regulations [(69 Federal Register 71723, December 10, 2004, as codified in 50 Code of Federal Regulations (C.F.R.), Sections 17.22(b)(2) and 17.32(b)(2))] require that an HCP specify the procedures to be used for dealing with changed and unforeseen circumstances that may arise during the implementation of the HCP. In addition, the HCP No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the County and the USFWS. The general purpose of the No Surprises Rule is to provide regulatory assurance to the non-federal landowners that obtain incidental take permit under Section 10(a)(2)(B) of the ESA that no additional land restrictions or financial compensation beyond the measures committed to under the plan will be required for species adequately covered by a properly implemented HCP, in light of unforeseen circumstances, without the consent of the permittee.

The following sections outline reasonably foreseeable circumstances and their anticipated effects on the covered species. For each, the LOHCP identifies additional conservation and mitigation measures that will be used to respond to the changes in circumstances. To fund the remedial management to address changed circumstances as well as adaptive management, 10 percent was added to the estimated management costs (Section 7.2.3). This amount is anticipated to cover the costs to address the changed circumstances, based on the anticipated restoration, management, and monitoring costs. It also reflects the remedial management costs budgeted in other recent regional HCPs, which feature similar changed circumstances and plan responses (JSA 2006, County of Santa Clara et al. 2012).

If the USFWS determines that a change circumstance has occurred, triggering the adaptive management provision, and the County has not changed its management practices in accordance with Section 5.5, the USFWS will notify the County and direct the County to make the required changes. Within 30 days of

receiving such notice, the County will make the required changes and report to the USFWS on its actions. Such changes are provided for in the HCP and, hence, do not constitute Unforeseen Circumstances.

6.5.2 Newly Listed Species Not Covered by the LOHCP/Designation of Critical Habitat

During the course of implementation of the LOHCP, the USFWS and/or CDFW (the wildlife agencies) may list as threatened or endangered under ESA or CESA a species that occurs in the LOHCP area but is not covered by the Plan. In the event that a new species is federally listed, the County, in consultation with USFWS, will ensure that LOHCP covered activities are modified if and as necessary to ensure that those activities are not likely to jeopardize, or result in the take of, or adverse modification of the designated critical habitat, if any, of the newly listed species. The County shall work to implement the modifications to the LOHCP covered activities identified by the USFWS as necessary to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat of the newly listed species. The County shall continue to implement such modifications until such time as the County has applied for and the USFWS has approved an amendment to the permit, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species or until the USFWS notifies the County in writing that the modifications to the LOHCP's covered activities are no longer required to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat, if any, of the newly-listed species. In the event that a species becomes state-listed, the County will consult with the CDFW and make similar arrangements to avoid take and secure an incidental take permit, as needed, or otherwise ensure compliance with CESA.

In addition, if critical habitat is designated or revised for an existing covered species, and the USFWS determines that one or more covered activities is likely to result in adverse modification of the newly designated or revised critical habitat of the covered species, the County shall implement the modifications to the LOHCP covered activities identified by the USFWS as necessary to avoid the likelihood of adverse modification of the newly designated or revised critical habitat of the covered listed species. The County shall continue to implement such modifications until such time USFWS notifies the County in writing that the modifications to the LOHCP's covered activities are no longer required to avoid adverse modification of the newly designated or revised critical habitat of the covered species.

6.5.3 Climate Change

Increased greenhouse gases, including primarily carbon dioxide, that are present in the atmosphere as a result of human activities are altering the climate; these alterations are anticipated to continue, and cause secondary effects including sea-level rise (IPCC 2007).

Mean annual temperature in San Luis Obispo County is projected to increase by 2.1 to 3.9 °F by 2045 and 4.1 and 7.6 °F by 2085, with summer temperature increases larger than those in winter (Koopman et al. 2010). Some of the models evaluated predict that temperature increases will be lower on the coast including in the Plan Area, than in inland portions of the county, while others do not (Koopman et al. 2010).Though precipitation projections varied across three models evaluated in a local study, a statewide analysis found consensus between six models that Central California would be drier (Westerling et al. 2009).

Unless global climate change brings substantial increases in precipitation, increased temperatures will have a net negative effect on soil moisture as a result of increased evapotranspiration. This climatic water deficit may be exacerbated by continuation of a trend of 33% reduction in the frequency of summer fog in coastal California (Johnstone and Dawson 2010).

The hotter and likely drier climate could affect natural biological systems within the LOHCP Area through a variety of mechanisms, including:

- shifting plant and animal distributions into regions with currently cooler climatic envelopes, thus increasing or reducing plant and animal species within their current range (Parmesan 1996, Schneider and Root 2001, Loarie et al. 2008);
- causing changes in vegetation structure (i.e., forests transition to shrublands, shrublands transition to grasslands, or potentially new plant communities emerge as a result of novel climates (Ackerly et al 2010);
- altering plant and animal phenologies (Stenseth and Mysterud 2002, Parmesan and Hanley 2015);
- increasing fire frequency, potentially promoting fire-adapted species, and reducing fire-sensitive species (Lenihan et al. 2003, Halofsky et al. 2020);
- increasing pest and pathogen outbreaks due to drought-stress (Kurz et al. 2008); and
- promoting the spread of exotic species, due in part to increased fire (Walter et al. 2009).

While some studies suggest that species that presently co-occur will shift their distributions together in response to climate change, causing communities to move together (Breshears et al. 2008), other studies suggest that the unique combinations of temperature and precipitation not currently found in the region (Ackerly et al. 2010)) will result in new assemblages of species (Stralberg et al. 2009).

Some species may be more vulnerable to climate change, as a result of their greater exposure or sensitivity, and reduced capacity to adjust to change (Hanson and Hoffman 2011). Several aspects of the covered species render them more vulnerable, including:

- they occupy specialized habitat or microhabitats (i.e., they are endemic to the communities of the Baywood fine sand in Los Osos);
- due to their narrow geographic distribution, they may have relatively narrow environmental tolerances that are likely to be exceeded by climate change; and
- they have limited dispersal abilities and thus poor ability to colonize new, more suitable locations if they were to exist.

The effects of climate change on the covered species and communities can be difficult to predict as they will be influenced by a host of indirect effects mediated by complex species interactions. The potential effects of climate change on fog frequency may have important implications for the covered species, which inhabit coastal sage scrub and central maritime chaparral communities, which are tied to the coastal fog. The predictions for future summer fog frequency on California's coast are unclear. While a 33% reduction in the frequency of California summer fog has been observed over the past century (Johnstone and Dawson 2010), the predicted increase in temperature differential between coastal and

inland areas, which is a major driver of fog, may increase the frequency of summer fog, thus mitigating the effects of global change on temperatures in coastal San Luis Obispo County.

If the climate becomes hotter and drier, as currently predicted, fire could become more frequent, and may alter the structure and species composition of the natural communities within the LOHCP Area. Morro manzanita has been found to be vulnerable to frequent fire, which can prevent sufficient seed from being available to replace adult shrubs, which are killed by fire (Odion and Tyler 2002). Research in other shrub-dominated systems has shown that frequent fire in shrublands can convert them to grasslands, as part of a grass-fire cycle (D'Antonio and Vitousek 1992).

Sea-level rise due to thermal expansion and melting ice caps as a result of global climate change may also impact the covered species of the LOHCP, by reducing available habitat. Projections for sea-level rise range from 3.3 to 4.6 feet above current levels by 2100 (Hegeberger et al. 2009). In the LOHCP Area, this will result in increased flooding risk, and in some areas, permanent inundation of the coastal wetlands on the northern perimeter of the Plan Area. Where adjacent land is suitable (e.g., not developed), wetlands may migrate inland (Hebeger et al. 2009), thus inundating current upland habitat including coastal sage scrub and central maritime chaparral, which are occupied by Morro shoulderband snail and Morro manzanita, respectively. Due to the coarse nature of the statewide analysis (Hebeger et al. 2009), the precise amount of habitat loss is difficult to predict; finer-scale models are needed (Moser and Eksrom 2012). Sea-level rise is also anticipated to erode a large area of the dunes west of the Plan Area, which may impact Morro shoulderband snail populations occupying the sand spit.

Given that climate change is a foreseeable event, it is regarded as a changed circumstance. The LOHCP conservation program, including establishment, restoration, management, and monitoring of the LOHCP Preserve System, includes elements designed to confer resiliency of the covered species to climate change impacts (Sections 5.3 and 5.4). Specifically, the LOHCP Preserve System will protect and actively manage large, interconnected habitat areas, which will feature a mosaic of communities that reflect a variety of microhabitat conditions including variation in microclimate. Cooler and moister microsites can potentially provide refugia to Morro shoulderband snail in particular, in a future hotter, drier climate (Morelli et al. 2016). By maintaining and promoting connectivity between protected habitat areas, the conservation program will enable species shifts in response to changing climatic conditions (Keeley et al. 2018).

A major focus of the conservation program is enhancing and actively managing habitat within the LOHCP Preserve System to address the various factors that threaten persistence of the covered species populations, including exotic species, fire outside of the natural disturbance regime, and impacts of historic land uses (e.g., cultivation and incompatible recreation; Section 5.3). Actively addressing these threats to species can enhance their resiliency to climate change by increasing their populations and reducing the potential for climate change to exacerbate other threats (Heller and Zavaleta 2009). Importantly, the LOHCP monitoring program will be designed to detect changes in the covered species populations and habitats that may result directly or indirectly from climate change (Section 5.4.2; Appendix E). Management strategies can be adjusted over time as part of an adaptive management process to promote resiliency of the covered species to climate change (Section 5.5).

As a foreseeable event, the limits of climate change as a changed circumstance must be defined. Based on the best available prediction for San Luis Obispo County (Koopman et al. 2010), the anticipated maximum increase in temperature by 2045 of 3.9 °F (measured as 10-year rolling average) is considered a changed circumstance for which remedial actions will be funded as part of the LOHCP. The nature of

the change will depend on the circumstances caused, and will be identified as part of an adaptive management process involving coordination with the USFWS, but could include:

- increased monitoring of the covered species or the communities to evaluate impacts of climate change on the populations and habitats;
- adjustments to management and restoration treatments to address changes that degrade habitat for the covered species, such as active revegetation with species adapted to current climate conditions, in areas where plant die-offs result from desiccation stress and thus alter the structure of habitat and reduce availability of food for the covered animals; and/or
- expansion of the exotic plant management program to address species that might invade, spread, or become more competitive due to climate change.

6.5.4 Fire

Fire is a component of the natural disturbance regime in the Baywood fine sands ecosystem (Section D.3.1). While the covered species exhibit many important adaptations to fire and/or the habitat conditions it creates, fire can have detrimental effects on the populations, particularly if the fire occurs outside of the range of natural variation of the disturbance regime (e.g., inappropriate season, intensity, severity, or frequency), or if it promotes the invasion and spread of invasive plants.

Due to the differences in plant species and thus fuel availability, the plant communities of the Baywood fine sands ecosystem may have experienced somewhat different fire regimes—characteristics of fire including type (e.g., surface or crown fire, severity (understory burn or stand replacing), areal extent (size), and return interval (time since last fire; Sousa 1984). Like other types of central maritime chaparral, Morro manzanita chaparral is thought to have a natural fire regime characterized by high-intensity, high-severity, stand-replacing fires that occurred every 50 to 100 years; these fires are likely to have occurred during late summer and early fall when fuel moisture is lowest and air temperatures are high (Greenlee and Langenheim 1990, Tyler and Odion 1996, Odion and Tyler 2002).Coastal sage scrub likely historically burned primarily in the late-summer and fall every 20-100 years, as part of moderate to high-intensity crown fires. Coast live oak woodlands experienced a similar regime, though the oldest, most mature stands may have experienced surface fires, rather than crown fires.

At the landscape scale, fire likely played an important role in creating and maintaining a mosaic of these communities in the Baywood fine sands ecosystem. More frequent fire may promote coastal sage scrub species over central maritime chaparral shrubs including Morro manzanita, which requires longer fire-free periods to produce sufficient seed to regenerate (Odion and Tyler 2002). Similarly, longer fire return intervals lead to succession of central maritime chaparral to coast live oak woodland where abiotic conditions (e.g., soils and microclimate) can support oaks. These trees are killed by fire when young (seedlings or saplings), however they are more resilient when mature (adults). In the absence of fire, oaks can eventually shade out chaparral shrubs.

The covered species exhibit many adaptations to fire and the conditions it creates. Fire promotes Morro manzanita seed germination and creates conditions appropriate for seedling establishment (Tyler et al. 2000). Fire also likely promotes establishment of Indian Knob mountainbalm from seed as well as vegetatively (Wells 1962, USFWS 1998a). Fire is thought to have played an important role in maintaining early successional conditions characterized by a low density of subshrubs and perennial herbs (e.g., *Croton* sp.*, Horkelia* sp.*,* and *Acmispon* sp.), which is the preferred habitat of Morro Bay

kangaroo rat (USFWS 1999). Fire may similarly create and maintain habitat for Morro shoulderband snail, which occurs in coastal sage scrub but is not typically observed in later-successional central maritime chaparral. While fire may maintain their habitat, Morro shoulderband snails are vulnerable to mortality due to fire (Roth 1985, Walgren 2003a).

Mortality due to fire could have profound impacts on the covered species populations in the LOHCP Area. Two of the species, Morro Bay kangaroo rat and Indian Knob mountainbalm, occur at extremely low density, such that a fire could extirpate them from the preserve system. Fires could similarly eliminate occurrences of Morro shoulderband snail (Walgren 2003a). Due to the fragmented nature of the remaining habitat, recolonization of habitat following fire may be inhibited.

In addition to killing individuals and potentially extirpating occurrences or populations, fire may negatively impact the covered species populations by causing soil erosion, which can preclude native plant re-establishment, and by promoting the invasion and spread of exotic plant species (D'Antonio and Vitousek 1992).

Many exotic plants are adapted to establishing within the low-litter, open-canopy conditions created by fire (Hobbs and Huenneke 1992, Haidinger and Keeley 1993). The risk of exotic plant invasion and spread following fire is greatest within the Morro manzanita chaparral and the coast live oak woodland: closed-canopy communities which currently feature a relative low abundance and diversity of exotic plant species, which are primarily restricted to old roads, trails, and gaps between shrubs, where competition from dominant shrub and trees is reduced. Fire may promote expansion of exotic plants currently present at low abundance or in high light available microhabitats, and create opportunities for new species to invade (Zedler and Scheid 1988, Hobbs and Huenneke 1992, Haidinger and Keeley 1993).

Negative fire effects are expected to be greater if the fire occurs outside of the natural regime, in terms of seasonality, intensity, and frequency. For example, if the fire return interval (i.e., time between fires) is too short, fire could reduce the population of Morro manzanita, by killing adults prior to establishment of a sufficient density of seeds in the soil (seed bank) to re-establish a cohort of seedlings that can replace the pre-fire population (Odion and Tyler 2002). While carefully planned and implemented prescribed fires will likely be an important tool for maintaining habitat required by the covered species, wildfires have the potential to cause negative impacts (Section D.3). The risk of wildfire may be exacerbated by climate change, which may increase the annual percentage of San Luis Obispo County burned by wildfire from a historical average of 3.7% to 6.8 – 7.3% by 2035 – 45 by 8.1 – 8.5% by 2075-85 (Koopman et al. 2010). A separate study found projected substantial increases in area burned by wildfire, with much of San Luis Obispo County expected to experience 200-350% increase in acreage burned by 2085 as compared to the historic (1961-1990) amount (Westerling et al. 2009).

Given the small size of the LOHCP Plan Area and that fire is a natural part of the disturbance regime of the Baywood Fine Sands Ecosystem, all fires, including a fire that burns the entire LOHCP Preserve System, are foreseeable events and will be subject to remedial measures. If a wildfire occurs within the LOHCP Area, the County will notify the USFWS of this changed circumstance, and then implement the following actions:

- assess the damage caused by the fire, including the areal extent of communities and covered species habitat affected;

- develop and implement an exotic plant early detection and rapid response plan, to prevent the affected area from becoming dominated by invasive plants;
- develop and implement a monitoring program to evaluate recovery of the affected area for five years;
- if monitoring indicates that native plant re-establishment is insufficient, or that the indirect effects of fire including erosion and the invasion and spread of exotic plants, are degrading habitat in ways that impact the covered species, develop and implement a restoration plan designed to improve habitat conditions, through an adaptive management and monitoring program; and
- if monitoring indicates that the fire has reduced populations of the covered species below levels from which they are likely to be able to naturally recover, implement a plan to increase populations through active revegetation (covered plants) or translocation programs (covered animals).

6.5.5 Exotic Species and Diseases

Habitat within the LOCHP Area has been degraded by a suite of species not native to the area, including several invasive species, such as: perennial veldt grass (*Ehrharta calycina*), red brome (*Bromus madritensis* ssp. *rubens*), jubata grass (*Cortaderia jubata*), blue gum (*Eucalyptus globulus*) and other eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), ice plant (*Carpobrotus* spp.) and narrow leaved iceplant (*Conicosia pugioniformis*; Section D.1).

These and other exotic species can have strong, negative impacts on the covered species and their habitats through a variety of direct and indirect mechanisms, including (Levine et al. 2003):

- directly reduce plant population abundance through competition;
- degrade habitat conditions for animals, by altering vegetation structure and species composition, including food availability; and
- promote fire, which can alter vegetation structure and species composition, including convert shrublands to grasslands.

Given their impacts and likelihood of future invasion and spread, exotic species will be a key focus of efforts to restore and manage habitat as part of the LOHCP conservation program. Specifically, the LOHCP Preserve System AMMP will identify measures to control existing occurrences of invasive plants including veldt grass, and ice plant species, and prevent the establishment of new plants and animals through implementation of an early detection and rapid response program (Sections 5.3 and D.1).

Non-native animals in the LOHCP Area that currently pose threats to the covered species include domestic cats (*Felis domesticus*), which can predate upon Morro Bay kangaroo rat, and garden snails (*Helix aspersa*), which may outcompete Morro shoulderband snail due to the exotic species' superior size (Hill 1974), though exotic snails are deemed unlikely to threaten the species' persistence (USFWS 2006).

Diseases can also cause morbidity and mortality to the covered species, as well as impact them directly by modifying their habitat. Notably, sudden oak death (SOD) is a disease caused by the pathogen

Phytophthora ramorum, which infects and kills several tree species including coast live oaks and can infect manzanitas (*Arctostaphylos* spp.). Though not yet observed in San Luis Obispo County, sudden oak death has caused widespread mortality of tan oaks in coastal Monterey County, where it has altered the structure and species composition of forests.

The greatest predictor of sudden oak death is the presence of the host, California bay laurel (*Umbellularia californica*), a tree that is not known from the LOHCP Area, though is documented as occurring in Morro Bay State Park just north of the Plan Area. Given the appropriate climatic conditions and host species abundance, the LOHCP Area has been identified as an area of high risk for SOD (Smith 2002), though a subsequent model classified the region as only marginally suitable based on climate (Vennette and Cohen 2006).

Additional exotic plants, animals, and diseases have the potential to negatively impact the covered species directly, by causing morbidity and mortality to individuals, and indirectly, by degrading habitat conditions. In the LOHCP, the invasion of new invasive plants, animals, or diseases within up to 25% of the total habitat contained within the LOHCP Preserve System is considered a change circumstance for which remedial actions will be implemented. The nature of the actions will depend on the exotic species and its impacts. The County will work with the Implementing Entity to conduct an assessment and develop a plan to:

- control and to the extent possible, eradicate, the species; and
- remediate the impacts it caused to the covered species and habitats, including through restoration of the affected areas.

6.5.6 Drought

Extended periods of below-average precipitation can impact the covered species of the LOHCP through a variety of mechanisms including:

- reducing covered plant abundance due to desiccation stress;
- reducing covered animal abundance, due to scarcity of food plants, free water, and moist microsites required by Morro shoulderband snail; and
- increasing the frequency of wildfire. Although a natural part of the Baywood fine sands ecosystem, fire can also directly kill the covered species and degrade their habitat by promoting the invasion and spread of exotic plants. If fire is too frequent, it can also reduce populations of Morro manzanita (Sections 6.5.4 and D.3).

Multi-year droughts are a natural part of the Mediterranean climate of California's Central Coast. Climate change may increase or decrease their likelihood by altering precipitation patterns. Climate change may also exacerbate the effects of drought if it results in reduced frequency of summer fog (Section 6.5.3).

Droughts can also hamper efforts to restore and manage habitat within the LOHCP Preserve System. Specifically, periods of drought during the typical rainy season (October-April), as well as multi-year droughts, can reduce the success of restoration plantings conducted in areas degraded by erosion, fire, and dense exotic plant infestations.

For purposes of the LOHCP, a drought is defined as two or more consecutive years with rainfall below 75% of average. Over the 53-year period of record for which daily rainfall was measured at the Morro Bay Fire Station Coop weather station (WRCC 2013), 21 years had precipitation under 12.4 inches, which is 75% of the 16.6-inch average; however, two or more consecutive dry years occurred just four times: 1960 - 1961, 1984 - 1985, 1989 - 1990, and 2007 - 2009. These years are the rainfall years, which are defined as July 1 of the prior year to June 30 of the year referenced above.

Recognizing that climate change may increase the frequency of drought, for purposes of the LOHCP, drought is defined as a changed circumstance if it occurs more than four times during the 25-year permit term (nearly twice the frequency of the period of record), or if a single drought extends up to four years in duration.

In the event that a drought during the permit term negatively impacts the covered species or efforts to promote their persistence as part of the conservation strategy, the County will work with the Implementing Entity to prepare a report assessing the impacts and identify strategies to ameliorate or repair them. The strategies will be based upon the monitoring results indicating the effects of the drought on the covered species and their habitats, and the best available scientific information that can guide management responses. For example, if the drought reduces fire has reduces covered species populations levels below that from which they are likely to recover naturally, the County will work with the Implementing Entity to implement a plan to increase populations through active revegetation (covered plants) or translocation programs (covered animals). If the drought causes substantial mortality of native woody vegetation that could create a fire hazard that would threaten the species populations, the County will work with the Implementing Entity to develop and implement a plan to reduce the fuels to protect the area from such a wildfire.

The report will be provided to the USFWS for review and comment and the County will work with the Implementing Entity to implement the remedial measures identified in the report or as recommended by USFWS.

6.6 Unforeseen Circumstances

Unforeseen circumstances as defined in USFWS regulations, are changes in circumstances that affect a species or geographic area covered by the HCP that could not reasonably be anticipated by plan developers and the USFWS at the time of the HCP's negotiation and development and that result in a substantial and adverse change in status of the covered species (50 CFR 17.3). The term "Unforeseen Circumstances" is used to define the limit of the County's obligation under the "No Surprises" regulations set forth in 50 code of Federal Regulations, Sections 17.22 (b)(5) and 17.32 (b)(5).

In case of an unforeseen circumstance, the County shall immediately notify the USFWS. In deciding whether Unforeseen Circumstances exist which might warrant requiring additional conservation measures, the USFWS shall consider, but not be limited to, the factors identified in 50 Code of Federal Regulations, Sections 17.22(b)(5)(C) and 17.32(b)(5)(C) (the No Surprises Rule), which are:

1. the size of the current range of the affected species;
2. the percentage of the range adversely affected by the LOHCP;
3. the percentage of the range conserved by the LOHCP;
4. the ecological significance of that portion of the range affected by the LOHCP;

5. the level of knowledge about the affected species and the degree of specificity of the conservation program for that species under the LOHCP; and
6. whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

As described in 50 C.F.R., Sections 17.22(b)(5)(C) and 17.32(b)(5)(C), the No Surprises Rule, the USFWS shall have the burden of demonstrating that Unforeseen Circumstances exist, using the best data available. Any findings of Unforeseen Circumstances must be clearly documented and based upon reliable technical information regarding the biological status and habitat requirements of the affected species.

Except where there is substantial threat of imminent, significant adverse impacts to a Covered Species, the USFWS will provide the County at least sixty-(60)-calendar-days written notice of a proposed finding of Unforeseen Circumstances, during which time the USFWS will meet with the County to discuss the proposed finding, to provide the County with an opportunity to submit information to rebut the proposed finding, and to consider any proposed changes to the conservation program.

Pursuant to the No Surprises rule, if the USFWS determines that additional conservation and mitigation measures are necessary to respond to the Unforeseen Circumstances, the additional measures required of the County must be as close as possible to the terms of the original LOHCP and must be limited to modifications within any conserved habitat area or to the Plan's operating conservation program for the affected species. Additional conservation and mitigation measures shall not involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under original terms of the LOHCP without the consent of the County.

6.7 Plan Modifications

During the course of LOHCP implementation, it may be necessary to make changes to the Plan. The County and USFWS may seek to modify the LOHCP provided the changes are consistent with the terms of the incidental take permit and other state and federal laws and regulations. The following sections outline three types of plan modifications, administrative changes, minor amendments, and major amendments, which reflect increasing magnitude of change and thus require increasing effort to modify the plan. The USFWS will evaluate proposed plan changes identified by the County, including changes recommended in annual reports (Section 5.6), to determine whether they constitute an administrative change, minor amendment, or major amendment, and identify the course of action to modify the plan based on those outlined below.

6.7.1 Administrative Changes

Administrative changes are modifications to the LOHCP that do not affect the take assessment or other aspects of the impact analysis, implementation of the conservation program, or the decision documents, including the biological opinion. Examples of administrative changes include clerical changes to plan text or maps to address non-substantive errors, as well as adjustments to the mitigation fees that are necessary to implement the conservation strategy over time (Section 7.4).

The County can make administrative changes following a written request, which includes documentation supporting the proposed change, and the concurrence of the USFWS. The County will coordinate with the USFWS when evaluating whether a change is administrative. Administrative changes shall not require any amendment to the LOHCP or the ITP. The annual report shall include a summary of administrative changes made to the LOHCP in the preceding calendar year.

6.7.2 Minor Amendments

Minor amendments are changes that do not materially modify the conservation program, change the amount of take, add new species or new covered activities, or result in impacts to the environment that were not evaluated under applicable laws at the time of permit issuance. The following are examples of minor amendments to the LOHCP:

- minor revisions to survey, monitoring, management, and/or reporting protocols that clearly do not adversely affect covered species or overall LOHCP Preserve System functions and values; and
- minor changes to the Priority Conservation Area boundaries that do not result in less or materially different conservation for the covered species under the plan or encompass new lands not analyzed in the original permit and environmental documents.

The County may propose minor amendments to the LOHCP by providing written notice to the USFWS. Such notice shall include a description of the proposed minor amendment, an explanation of the reason for the proposed minor amendment, an analysis of its environmental effects including any impacts to the conservation of covered species, and a description of why the effects of the proposed minor amendment:

1. are not materially different from, and are biologically equivalent to, the terms in the LOHCP as originally adopted;
2. substantially conform to the terms in the LOHCP as originally adopted; and
3. will not reduce the ability to acquire the additional lands or otherwise implement the conservation strategy.

The USFWS shall use their reasonable efforts to provide comments and concurrence with the proposed minor amendments in writing within sixty days of receipt of such notice. Upon receipt of written concurrence of the USFWS, the minor amendment shall be incorporated into the plan and implemented. If the USFWS does not concur that the proposed amendment qualifies as a minor amendment, the amendment will be processed as a major amendment.

The annual reports shall include a summary of all minor amendments made to the LOHCP in the preceding calendar year.

6.7.3 Major Amendments

Major amendments are those that affect the scope of the LOHCP, materially change the conservation program, increase the amount of take, add new species or covered activities, result in new or different impacts to the environment, or change the boundaries of the permit area. Examples of such changes include:

- all amendments, as determined by the USFWS to not qualify as minor amendments, or administrative changes to the LOHCP;
- non-clerical changes to the permit area of the LOHCP Area;
- addition of one or more species to the covered species list or the addition of new covered activities; and
- material changes in the LOHCP Preserve System assembly, or management and restoration funding, strategies, and schedules.

A major amendment requires an amendment to the permit and requires compliance with all applicable laws and regulations governing permit issuance, including NEPA and ESA, and an opportunity for public review and comment. Major amendments shall be subject to review and approval by the County and the USFWS, as appropriate, at noticed public hearings. The USFWS will use reasonable efforts to process proposed major amendments within one hundred twenty days after publication in the Federal Register.

6.8 Suspension or Revocation of Permits

The USFWS may suspend or revoke the ITP for cause if the County fails to implement the LOHCP in compliance with the terms and conditions of the permit or if suspension or revocation is otherwise required by law. Suspension or revocation of the Section 10(a)(1)(B) permit, in whole or in part, by the USFWS shall be in accordance with 50 CFR 13.27-29, 17.22(b)(8),17.32 (b)(8).

6.9 Permit Renewal

Though the initial permit term requested, 25 years, is anticipated to provide sufficient time for completion of the covered activities, it is possible that some might not have been completed or initiated when the permit expires. The Section 10(a)(1)(B) permit may be renewed in accordance with governing laws and regulations in effect at the time of the proposed renewal.

6.10 Schedule

Table 6-1 outlines the anticipated timeline for initiation of key components of the LOHCP; it begins with steps that will be taken to prepare for implementation prior to issuance of the permit, continues through the permit term, and then covers steps that will take place after the permit has expired. Greater detail about the steps is provided in the sections referenced in the table.

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
Prior to Permit Issuance	Identify or create the Implementing Entity (Section 6.1.1.1)	The County will identify qualified and interested entities to fulfill the responsibilities of the Implementing Entity (Section 6.1.2). If no suitable organizations exist, then the County will determine the necessary steps to establish one. The Implementing Entity will be specified by the County, with the concurrence of the USFWS and CDFW.
	Execute the Memorandum of Understanding (Section 6.4)	The County will finalize and execute the Memorandum of Understanding (Appendix J) between the County and CDFW.
After Permit Issuance but Prior to Issuance of COIs	Establish Application and Review Process (Section 6.3)	The County will prepare the application package that project proponents will complete for take coverage under the LOHCP, outline the detailed application processing steps, develop the database that will be used to determine and track avoidance and minimization measures (Section 6.2.1), and train staff to review and process the applications.
	Apply for State and Federal Grants (Section 6.1.1.8)	As feasible, the County will initiate work with the Implementing Entity and the agencies to prepare applications for state or federal grants that can complement implementation of the LOHCP, which can be submitted once the ITP have been issued.
	Begin Assembling the LOHCP Preserve System	The County will work with the Implementing Entity to take initial steps to prepare lands for enrollment in the Preserve System, following issuance of the ITP, by drafting cooperative management agreements (including memoranda of understanding) with agencies and organizations responsible for existing protected lands (Section 6.2.3.1)

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
	Revise the Template Conservation Easement (Section 6.2.2.2)	The County will work with the Implementing Entity to revise the conservation easement templates to protect habitat set-asides offered in lieu of the Habitat Protection Fee and provide it to the USFWS for review and approval (Appendix I).
	Create and Maintain the Implementation Monitoring Databases (Sections 6.1.1.6 and 6.1.2.2)	The County and Implementing Entity will create the databases that will be used to track applications, certificates of inclusion, implementation of avoidance and minimization measures, and impacts of covered activities, as well as implementation of the conservation program (i.e., habitat protection, management, restoration, and monitoring activities).
After Permit Issuance Year 1	Begin Reviewing Applications for Coverage (Section 6.3)	The County will begin processing applications for take coverage under the LOHCP, and issue COIs pending application approval, and mitigation needed to satisfy the stay-ahead provision.
	Begin Managing the Preserve System	The Implementing Entity will begin managing the LOHCP Preserves including by conducting the baseline surveys, preparing the Preserve System AMMP (Section 6.2.3.2), initiating work to protect habitat, and conducting the initial restoration, if selected to jump start the conservation program, as outlined in the IAMMP (Appendix M) and Section 6.2.4.
	Begin Accepting Mitigation (Section 6.1.2.1.1)	The County will work with the Implementing Entity to begin accepting mitigation, including habitat mitigation fees that the County will deposit in a trust account, and conservation easements granted for habitat set-asides on site in lieu of fees, where allowed (Section 5.7.2.1.1). The accounts will include those designed to fund ongoing management, as well as one

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
		to fund management and monitoring in perpetuity.
	Prepare first Annual Report (Section 6.1..1.7)	The County will work with the Implementing Entity to prepare the first annual report, which will be submitted to the USFWS by March 31 of the year following the first year of plan implementation.
	Document Compliance with the Stay-Ahead Provision (Section 6.2.4)	As part of the first annual report and in every annual report thereafter, the County will document compliance with the stay-ahead provision, by demonstrating how habitat mitigation is keeping pace with, or outpacing, habitat impacts resulting from the covered activities.
Year 3	Complete LOHCP Preserve System Adaptive Management and Monitoring Plan (Sections 5.3.3.2 and 6.2.3.2)	The County will work with the Implementing Entity, in coordination with USFWS and CDFW, to prepare the LOHCP Preserve System AMMP based on the Plan conservation strategy framework and results of surveys of initial preserve(s) (Section 5.3.3.2).
	Initial Financial Update (Sections 6.1.2.3 and 7.4)	The County will work with the Implementing Entity to review the assumptions, unit costs, and other aspects of the financial analysis used to calculate the initial mitigation fees and update the fee schedule, as needed..
Year 22	Evaluate Permit Renewal (Section 6.9)	Within three years of expiration of the permit, the County will evaluate whether to request that the permit be extended and if so, take necessary steps to do so.
After Permit Expiration	Conduct In-Perpetuity Habitat Management	Using funding from the endowment held by the National Fish and Wildlife Foundation, which will be established during the permit term, the County will work with the Implementing Entity to manage and monitor the LOHCP Preserve System, in perpetuity, as part of the broader adaptive management framework,

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
		to ensure that the biological goals and objectives continue to be attained.

7 Funding

This chapter provides planning-level estimates of the cost of implementing the LOHCP conservation program (Chapter 5). As required by Section 10(a)(1)(B) of the ESA, this chapter also identifies a funding approach to cover the plan implementation costs.

These costs were based on the elements of the LOHCP conservation program and the Plan's required compensatory mitigation, in which the proponents of projects permitted by the LOHCP pay fees and, in some cases, set aside habitat on site in order to implement the conservation program (Section 5.7.2). This mitigation approach was developed to ensure that the benefits of the mitigation for the covered species are commensurate with the impacts (Section 5.8).

Mitigation fees for covered activities were developed to cover the full costs (estimated in 2021-dollar terms) that will be incurred by the County to work with the Implementing Entity to administer the Plan including the conservation program designed to mitigate the impacts of the covered activities. Individual project proponents may incur additional costs to implement the required avoidance and minimization measures, such as pre-project surveys to design their projects (Sections 5.2 and 5.7.1). These measures, which were not evaluated as part of this financial analysis, will be required by the County through the approval process for development projects and other covered activities (Section 6.2.1).

During the 25-year period of LOHCP implementation, numerous factors will result in variations and fluctuations in implementation costs. For example, market cycles may affect habitat protection costs and vary the pace of development, and thus mitigation fees; additionally, adaptive management may be needed to achieve the biological goals and objectives of the conservation program. Accordingly, this chapter outlines the financial adaptive management measures to track and review mitigation costs and, as necessary, adjust the financing mechanism to ensure adequate funding is maintained through time.

This chapter begins by summarizing the mitigation costs and funding approach (Section 7.1); it then outlines the costs for various components of the mitigation and the assumptions used to estimate them (Section 7.2). The chapter ends by outlining the initial funding program including mitigation fees (Section 7.3), and the methods that will be used to adapt them over time (Section 7.4).

7.1 Overview of Costs and Funding

The covered activities that are required to pay mitigation fees will disturb a maximum of 531.5 acres of habitat in the LOHCP Area (Tables 2-9, 4-2, and 5-7), with private development impacting an estimated 409.5 acres, and government and private utilities impacting an additional 122 acres. To compensate for the impacts of these activities on the covered species, the County will work with the Implementing Entity to establish and manage the LOHCP Preserve System—a network of public and private protected lands (Section 5.3), which will be managed as part of a coordinated strategy designed to achieve the LOHCP biological goals and objectives (Section 5.1).

The total, planning-level costs to implement the LOHCP Conservation Program is estimated at $27.7 million in 2021 dollars. These costs, which are expected to change over time due to inflationary and market factors, include the following:

- **Habitat protection (14%):** acquire a total of 107.5 acres of unprotected land from willing sellers and participants in this Plan;

- **Preserve start-up (4%):** conduct initial surveys, develop the Preserve System AMMP, which will guide management and restoration, and conduct initial restoration as part of the IAMMP to jump start the conservation program (Section 6.2.5);
- **Restoration (8%):** restore an estimated 45.7 acres of degraded habitat within the Preserve System; and
- **Habitat management and monitoring (32%):** actively manage habitat to promote the covered species and monitor their populations and habitat within the estimated 386-acre Preserve System during the permit term and through a non-wasting endowment that will be used to manage and monitor the land in perpetuity. This component also includes funding to respond to changed circumstances.

The costs also include funds for the County to work with the Implementing Entity to administer the program during the permit term (32%), including process applications and conduct all implementation monitoring and reporting. The remaining costs (10%) will fund the portion of the endowment that will be used to fund program administration, including oversight of management, and monitoring, after the permit has expired.

Funds to implement the Plan will be provided by the proponents of projects covered by the Plan, who will pay fees based on the mitigation approach outlined for the covered activities (Section 5.7.2). To ensure that the fees are proportional to the impacts of the covered activities, they are charged based on the areal extent of the project impacts to habitat on a per-square foot basis. All funding for administrative, management, monitoring, and restoration costs will come from the Restoration /Management/Administration Fee, which will be paid by all those conducting projects outlined in Table 5-7. To protect habitat, plan participants developing vacant parcels inside the Priority Conservation Area will set-aside habitat on-site at a ratio of 3:1 for the habitat disturbed by their project (Table 5-7); these habitat-set-asides will be protected by conservation easements granted to the Implementing Entity. Proponents of all other projects, which will largely occur in areas where on-site habitat set-asides would have limited conservation value (Section 5.7.2.1.2), will pay a Habitat Protection Fee (in addition to the Restoration/Management/Administration Fee), which will be used to purchase fee title or conservation easements from willing sellers of land that that will be managed as part of the LOHCP Preserve System.

Table 7-1 shows the initial mitigation fee schedule, which was developed based upon an updated analysis of the mitigation costs in 2021-2022 and is designed to ensure adequate funding for Plan implementation. Initial funds to jump start the mitigation program will be provided by the County, which will be reimbursed by the mitigation fees (Section 7.3).

This is the anticipated starting mitigation fee schedule for adoption at the start of Plan implementation; adjustments to the plan, or significant delays in its adoption (e.g., three or more years) would necessitate an adjustment to the fee. The mitigation fee schedule will be refined as needed to ensure funding is sufficient to meet implementation plan costs as they fluctuate over time (Section 7.4). The County will fund the initial work to jump start the conservation program to generate mitigation credits that can be used to offset the impacts of covered activities prior to sufficient fees being collected to fund habitat protection, restoration, and management. The County will be reimbursed for this initial outlay over time using the mitigation fees that are collected (Section 7.3.2).

7.2 Mitigation Costs

Mitigation costs were estimated in this Plan based on the LOHCP Preserve System configuration scenario—a hypothetical though plausible scenario for the final preserve system design, which identifies the acres of land that will be acquired, restored, and managed to mitigate the impacts of the covered activities (Section 5.7.2.3.2). This scenario was used to estimate the mitigation costs, based on a series of assumptions outlined in this section. Conservation program implementation costs include:

- **One-time costs:** Costs for habitat acquisition, habitat restoration, and preserve start-up activities (e.g., inventories). They are anticipated to be incurred only during the permit term; and
- **Ongoing costs:** Costs for habitat management, monitoring, and administration that will continue after the permit term.

Because most of the impacts of the covered activities are permanent, the conservation actions must also be permanent and be implemented on an ongoing basis, in order to ensure that the habitat benefits are maintained. Specifically, land within the LOHCP Preserve System must continue to be managed in perpetuity, beyond the permit term, to ensure that it retains the biological values enhanced during the permit term (Section 5.7.2.2).

7.2.1 Habitat Acquisition

As outlined in the LOHCP Preserve System scenario (Section 5.7.2.3.2), the Implementing Entity will protect habitat by accepting easements from plan participants, which are estimated to result in the protection of 31 acres, as well as by purchasing an estimated 76.5 acres of land from willing sellers. The easements granted by plan participants developing parcels inside the Priority Conservation Area to fulfill their habitat protection mitigation requirement (Section 5.7.2.1.1) will be dedicated to the Implementing Entity at no cost; administrative costs for the Implementing Entity to obtain the easements are included as part of program administration (Section 7.2.5).

The cost to acquire the 76.5 acres of land anticipated from willing sellers within the Priority Conservation Area (Section 5.7.2.1.2) was estimated using comparable land sales data available from the County of San Luis Obispo Assessor as well as several private vendors (Table 7-2). The transactions reflected sales of vacant parcels located primarily within the LOHCP Area; however, comparables for larger parcels were also drawn from neighboring areas due to limited sales of large parcels within the Plan Area. Bayside parcels were excluded from the comparables list as they had much higher per-acre values owing to their waterfront location which is dissimilar to parcels in the Priority Conservation Area, where land will primarily be protected. Sales occurred between 2017 and 2021, with most occurring in 2020 and 2021 (Table 7-2). All costs were converted to reflect 2021 dollars using the consumer price index (CPI).

Per-acre land costs vary greatly based on parcel size, which is also a major determinant of the tiers used to rate the conservation value of land that will be incorporated LOHCP Preserve System (Section 5.7.2.3.1, Table 5-8). Accordingly, parcels were divided into three size categories to estimate the per-acre- costs: less than two acres, two to 10 acres, and greater than 10 acres (Table 7-2).

The total cost of acquiring the land in the preserve system scenario was then estimated by multiplying the acreages of land protected in each of the three conservation value tiers by the per-acre costs for the

parcel size category in which the habitat is most likely to occur (Table 7-3). Tier 1 parcels were assumed to be greater than 10 acres while Tier 2 and 3 parcels are anticipated to be two to 10 acres. Tier 4 parcels which will largely be less than two acres, were not included in the preserve system scenario (Table 5-9), as they generally feature low long-term conservation value, as well as significantly higher per-acre costs (Table 7-3).

Based on the land value analysis and assumptions outlined above, the total planning-level estimate for the Implementing Entity to acquire 76.5 acres of vacant land within the Priority Conservation Area in fee title is approximately $3.9 million. This represents an average land cost of $50,345 per acre (Table 7-3).

Actual habitat protection costs will vary depending on a variety of factors including:

- Aspects of the specific parcel, including size, development potential, and location, including proximity to roads, existing improvements, and scenic values; and
- The timing of the acquisition with respect to market conditions that influence land costs, including land supply and demand.

Additionally, the analysis presented here assumes that the County will work with the Implementing Entity to protect habitat by acquiring fee title from willing sellers; the County will, in turn, dedicate conservation easements over said lands to the Implementing Entity, to ensure the conservation values are protected in perpetuity (Section 6.1.2.1.1). This strategy is anticipated to be more conducive to long-term conservation, when compared to acquiring conservation easements, as fee-title lands are easier to manage and experience fewer indirect effects associated with easement lands which are partially developed. However, acquisition of conservation easements to protect remaining habitat on partially developed parcels inside the Priority Conservation Area can also be used to protect habitat of high conservation value as part of work to assemble the LOHCP Preserve System. Acquiring such conservation easements may result in reduced land protection costs relative to fee title acquisition.

The Implementing Entity will track land sales for comparable parcels to continue to update and refine the estimated per-acre, planning-level land cost as part of the process to adapt the funding plan over time (Section 7.4).

7.2.2 Restoration

Of the 386 total acres of habitat included in the LOHCP Preserve System under the scenario used to estimate costs (Section 5.7.2.3.2), 45.7 acres (12%) will require restoration to ameliorate its highly degraded condition, which limits its ability to promote viable populations of the covered species. The total acreage, which includes 35 acres in existing protected lands and an additional 10.7 acres of private lands to be protected as part of the LOHCP, was estimated based on a reconnaissance-level examination of the conditions within the Priority Conservation Area based on prior planning and updated using aerial imagery (Section 5.7.2.3.2).

For cost estimation purposes, a suite of anticipated restoration projects was identified based on examination of existing protected lands eligible to be included in the preserves (Table 5-5), and the assessment of their management and restoration outlined in Appendix D. These restoration projects include (Table 7-4):

- Stabilization of gullies and other erosion issues caused by washed out roads and trails;

- Intensive efforts to control dense infestations of exotic plants, such as veldt grass;
- Active revegetation including seeding and propagation, where it is necessary to promote native plant establishment and prevent exotic plant reinfestation in areas treated for erosion and exotic plant control; and
- Active vegetation management using fire or fire surrogates (e.g., manual or mechanical vegetation removal) to promote the population of Indian Knob mountainbalm, which is senescent and threatened with extirpation (local extinction).

The restoration costs include a 25 percent contingency designed to cover unanticipated components or overages, as well as the need for adaptive management. In total, restoration is estimated to cost $2.19 million for an average of $47,815 per treated acre.

7.2.3 Management and Monitoring

The entire anticipated 386-acre LOHCP Preserve System will require active management to ensure that the condition of habitat is maintained to support the covered species; the Preserve System must also be monitored to evaluate effectiveness of management at achieving the biological goals and objectives (Section 5.1) and inform the need for adaptive management (Section 5.5).

Management and monitoring costs were estimated for the 386-acre preserve system in the scenario based on the estimated per-unit costs of the anticipated activities (Appendices D and E), as well as their frequency (Table 7-5). The actual management projects and monitoring studies will be outlined in the LOHCP Preserve System AMMP, which will be developed as part of the Preserve Start-Up (Sections 5.3.3.2 and 7.2.4). To fund additional items not reflected in the initial list (Table 7-5) and ensure sufficient funds to address habitat needs, a 25 percent contingency was added to the itemized costs. In addition, 10 percent was added to these costs to fund remedial actions necessary to address the changed circumstances of the LOHCP (Section 6.5); this rate reflects remedial management costs budgeted in another recent regional HCP with similar changed circumstances and plan responses (JSA 2006, County of Santa Clara et al. 2012).

The resulting annual cost estimate for management and monitoring of the 386-acre LOHCP Preserve System during the 25-year permit term is $339,900 or $880 per acre of habitat managed. Because the frequency of management and monitoring will be reduced after the permit is expired, the costs decline post permit to $195,525 per year, or $506 per acre, per year. Based on these annual costs, $6.5 million will need to be established within the endowment that will be used to fund management and monitoring post-permit and in perpetuity. To achieve this, $4.8 million will be contributed from participant fees while an estimated $1.7 million will be generated by investment earnings on the fees. To fund the management and monitoring costs post permit, a per-acre-mitigation fee of $9,016 is required. Section 7.2.5.2 describes how additional mitigation fees will be used to establish the portion of the endowment that will be used to fund administration costs post-permit.

The endowment calculations assumed a three percent net capitalization (real interest rate)—the long-term net, real interest rate (i.e., the average interest rate after inflation and money management fees are removed). This net capitalization rate is similar to that used in the Natomas Basin HCP (City of Sacramento et al. 2003) and is consistent with assumptions used by the National Fish and Wildlife Foundation (NFWF) —a foundation established by the U.S Congress in 1984, which acts as program manager and trustee for funds arising from conservation and mitigation plans. The actual net interest

rate will depend on the particular investment strategy and overall market performance. A portion of the total habitat mitigation fees will be placed into the endowment, which is designed to be fully funded by the end of the 25-year permit term (Section 7.3). For the purposes of this analysis, it is assumed that the endowment funds will be held by NFWF.

7.2.4 Preserve System Start-Up

Preserve System start-up costs include the costs to prepare for, and to conduct, restoration and management work within the LOHCP Preserve System. These include conducting baseline monitoring for the covered species and communities, as well as preparing the Preserve System AMMP (Table 7-6). They also include initial costs to install fences and signage to protect areas from trampling and other unauthorized activities.

The total preserve system start-up costs were estimated for the initial 278-acre portion of the Preserve System that will be comprised of existing protected lands, based on the anticipated monitoring and planning tasks (Table 7-6). These preserve start-up costs are estimated to total $1,315,000, or about $4,119 per acre of habitat that will be initially managed as part of the Preserve System.

The preserve system start-up costs were estimated prior to development of the IAMMP, which provided greater detail for the restoration and management activities that can be implemented at the outset of Plan implementation (McGraw 2020; Appendix M). The County will identify final costs to implement initial habitat restoration and management in work plans developed to implement the IAMMP (Appendix M).

7.2.5 Program Administration

Program administration costs include the costs for the County and the Implementing Entity to administer the Plan. They include salaries for the County Planning staff (i.e., the LOHCP Coordinator) and the Implementing Entity, as well as fees for outside professionals including attorneys, auditors, real-estate professionals, and others who will assist with plan implementation (Table 7-7).

Administration costs were estimated separately for the permit term, and the period post-permit, to reflect the greater personnel time to implement the plan during the permit term (Table 7-7). As with other aspects of the program, administration cost will be tracked by the County and the Implementing Entity over time so that adjustments can be made, as needed, to ensure funds are sufficient to implement the plan.

7.2.5.1 Permit Term

During the term of the permit (Years 0 to 25), the County will work with the Implementing Entity to implement the following:

1. **Covered Activities:** The County will process applications for covered activities and tracking permittees' compliance with the avoidance and minimization measures;
2. **Habitat Protection**: With the help of the County, the IE will research habitat protection opportunities, conducting outreach to landowners, negotiating fee title land acquisition, and processing conservation easements including those granted by plan participants in the Priority Conservation Area (Section 6.2.2):

3. **Preserve Management:** The County will oversee work by the IE to implement habitat maintenance, management, restoration, and monitoring projects directly and through contractors;
4. **Reporting:** The County will work with the IE to conduct implementation monitoring and prepare the annual reports; and
5. **Coordination:** The County and IE will coordinate with the USFWS and LOHCP Preserve System landowners including CDFW regarding implementation of the plan.

During the permit term, the County roles will be largely fulfilled by a full-time Supervising Planner, who will be assisted as needed by outside experts. . The County staff costs, combined with fees of outside professionals, are estimated to be $210,000 per year (Table 7-7). The IE staff costs were estimated based on the specific tasks and the hourly rates for participating staff and which total $143,000 per year during the permit term.

7.2.5.2 Post-Permit

When the permit expires 25 years after it is issued, administrative costs to implement the LOHCP will be reduced, as tasks related to covered activities, habitat protection, restoration, and reporting on covered activities will no longer occur. Preserve management and monitoring and some level of coordination will continue, albeit at a reduced level. For example, there will be less administrative oversight needed as a result of completion of the habitat restoration components during the permit term. However, habitat management and monitoring will occur in perpetuity, in order to ensure the conservation benefits for the covered species are maintained (Section 5.7.2.2). Implementation of these tasks is assumed to require work by a quarter-time County Planner, who will be supported by outside experts (consultants) at 25% of the permit-term amount. . The County Planner salary and professional fees are estimated at $52,500 each year post-permit (Year 26 and beyond). The tasks anticipated to be implemented by the IE including easement monitoring and administering ongoing preserve management will cost an additional $55,000 for a total of $107,500 in administrative costs post-permit (Table 7-7).

As with the long-term management, and monitoring of the preserve, the administration post-permit will be funded through the proceeds of a non-wasting endowment. In order to achieve the required $6.52 million in the endowment that will be needed to fund administration, about $4.8 million will be required from mitigation fees with the remaining $1.7 million generated by interest on the fees during the permit period. These contributions are in addition to those that will be used to achieve $5.7 million in the endowment to fund management and monitoring post-permit. To fund the administration costs post-permit, a per-acre-mitigation fee of $4,957 is required. A portion of the total habitat mitigation fees will be placed into the endowment that will be used to fund post-permit administration as well as management and monitoring; the endowment is designed to be fully funded by the end of the 25-year permit term (Section 7.3).

7.2.6 Total Mitigation Costs

Based on the estimates described above, the total planning-level estimated cost to implement the LOHCP is $27.7 million (Table 7-8). Habitat management and monitoring (including both permit term and post-permit costs) represent 32 percent of the total cost. Plan administration (including post-permit

costs) represents 42 percent, habitat acquisition costs comprise 14 percent, and restoration and preserve system start-up constitute 8 percent and 4 percent of the total cost, respectively (Table 7-8).

7.3 Funding

7.3.1 Fees

Plan implementation costs will be fully funded through mitigation fees paid by the project proponents to compensate for the habitat impacts of the covered activities (Section 5.7.2). The fees were calculated by dividing the plan implementation costs by the acres of anticipated permitted habitat impacts (532). The per-acre fee was converted to a per-square-foot fee, as fees charged will be based on the number of square feet of ground disturbance caused by the project; therefore, they are proportional to the project impacts (Section 5.7.2).

Proponents of residential development projects on vacant land inside the Priority Conservation Area, who are required to protect habitat on-site through dedication of conservation easements, are only required to pay the approximately[22] $1.03 per-square-foot Restoration /Management/Administration Fee; proponents of other projects covered by the plan that are listed in Table 5-7 pay this fee as well as the approximately $0.17 per square foot Habitat Protection Fee (Table 7-1). In order to fund management and monitoring and administration post-permit, about 31% or $0.32 of the Restoration/Management/Administration fee will be placed in a non-depleting endowment (Section 7.2.3).

The County will collect these fees from participants whose applications have been approved for take coverage. Fees must be paid before the County will issue plan participants a Certificate of Inclusion, which confers take coverage (Appendix H), and any local land use and building permits (Section 6.3).

The County will deposit the portion of the funds to be used for activities during the permit term into a trust account held by the Implementing Entity (the trustee) on behalf of the County (the third-party owner) for use solely to implement the HCP. A database will be used to separately track Restoration/Management/ Administration Fees and Habitat Protection Fees. However, the funds will be pooled and used to maximize their effectiveness at achieving the biological goals and objectives. That is, Habitat Protection Fees can be used to fund habitat management, and likewise, the Restoration/Management/Administration Fees can be used to fund key habitat acquisitions. Pooling funds enhances flexibility in implementing the conservation program by, for example, enabling funds from the habitat protection fee to be used to complete an in-progress restoration project to achieve the performance criteria needed to receive credit the restoration as mitigation prior to moving forward with habitat acquisition. Nonetheless, the LOHCP Preserve System must still acquire from willing sellers a minimum of 55.25 acres of habitat, assuming that the permit covers the maximum allowed take of 531.5 acres (Section 5.7.3.2). Proposed expenditures will be identified in annual work plans included as part of annual reports provided by the County (Section 6.1.1.7).

The portion of fees needed to establish the endowment that will fund post-permit management and monitoring and post-permit administration will be provided to NFWF for deposit in a separate trust account on behalf of the County. The endowment account will be established in year one of the Plan

[22] The fees will be calculated to the nearest hundredth of a cent (Table 7-8); they are rounded to the nearest cent in the text for simplicity.

and funds will be added throughout the permit term as projects are implemented and mitigation fees are paid. Since the Preserve System will be assembled as covered activities are implemented, and its size will depend on the amount of disturbance caused by the covered activities, the costs to manage and monitor the LOHCP Preserves will be lower if fewer covered activities are permitted than anticipated. Therefore, based on the level of participation and the corresponding amount of management and monitoring necessary, it is anticipated the endowment will be fully funded to necessary levels at the end of the 25-year permit term. Nevertheless, to ensure that the endowment has sufficient funds to manage and monitor the LOHCP Preserves post-permit, as part of the adaptive financial management of the LOHCP (Section 7.4), the funding plan will be reviewed at least once every three year during the permit term and will be modified over time, if necessary, to ensure the endowment is adequately funded, including fee increases as needed.

7.3.2 County Jump Start

7.3.2.1 Background

On December 15, 2020, the Board of Supervisors tentatively approved the following growth rates for new residential development in Los Osos (pending California Coastal Commission certification of the Los Osos Community Plan):

- Before the Phase 1 Basin Plan Programs are implemented - 0% annual growth rate; and
- After the Phase 1 Basin Plan Programs are implemented - 1.3% annual growth rate.

As of December 31, 2021, there is a zero percent growth rate for new residential dwelling units within the Los Osos sewer service area, preventing development of undeveloped parcels in that portion of the Plan Area. However, there is a significant amount of interest to develop currently undeveloped parcels in Los Osos, as evidenced by the established waitlist for residential development: there are 232 parcels on the waitlist for development of single-family dwellings and 17 parcels on the waitlist for development of multi-family dwellings. Once growth is permitted, those on the waitlist will have priority for building permits.

Since development in Los Osos will be limited until sufficient mitigation credits are accrued and a growth rate above 0% is established, the costs to implement the HCP will exceed the mitigation fees collected in the initial years of Plan implementation. To address this, the County intends to allocate general fund support for the implementation of the LOHCP, including, but not limited to, preserve start-up, restoration project, management and monitoring, and administration. The amount of general fund support appropriated for the implementation of the LOHCP each fiscal year would be largely dependent on the credit-accruing actions (such as restoration projects and fee title acquisitions) that the County and Implementing Entity choose to accomplish during that fiscal year. Portions of the mitigation fees paid by Plan participants will go towards replenishing the general fund. Any surplus mitigation fees collected will be deposited into an account specifically for the implementation of the LOHCP.

7.3.2.2 Anticipated Timeline

The County anticipates that the Phase 1 Basin Plan Programs will be implemented by the start of 2025. In the meantime, the County intends to start up mitigation credit accrual by funding implementation

activities that would yield mitigation credits proportional to the anticipated development in Los Osos. By "jump-starting" the accrual of mitigation credits, the County would be able to issue Certificates of Inclusion around the same time a growth rate greater than zero percent would be expected to take effect. The mitigation fees paid by LOHCP participants will replenish the County funds used for the "jump-start" implementation activities. Based on an annual growth rate of 1.3%, it would take approximately five years for undeveloped residential parcels on the waitlists to build out.

The following provides an example timeline for funding of conservation actions to "jump start" the LOHCP as described in Section 6.2.5. The assumptions are based on the best available information as of December 31, 2021; the actual timeline is subject to change based on new information.

July 2022

- County funds and initiates jump-start activities.
- Phase 1 Basin Plan Programs are underway.

July 2025

- Phase 1 Basin Plan Programs are implemented, allowing the 1.3% annual growth rate for new residential development to become effective.
- Sufficient mitigation credits have been accrued from the County jump-start implementation activities, allowing for Certificates of Inclusion to be issued for the undeveloped parcels on the waitlists.
- Development of the waitlist parcels begins.

July 2030

- Undeveloped parcels on the waitlists are built out.
- County funds used to jump-start the Plan are replenished through payment of mitigation fees.

If development activity is low and the amount of mitigation fees collected does not sufficiently replenish the general fund allocation within the anticipated timeline, the County will continue to appropriate general fund support as necessary to maintain minimum upkeep, but will not take on any new credit-accruing actions until the demand for development warrants pursuit of additional credits. The County will perform periodic cost reviews and make mitigation fee adjustments, in addition to the automatic annual mitigation fee adjustments to account for inflation, as part of the Adaptive Financial Management of the Plan.

7.4 Adaptive Financial Management

Just as adaptive management will be used to ensure that the elements of the LOHCP conservation program achieve the Plan's biological goals and objectives (Section 5.5), adaptive financial management will be used to ensure that the Plan is adequately funded, so that the impacts to covered species are fully offset by the mitigation in accordance with the incidental take permit.

The mitigation fees identified in this Plan were developed based on planning-level cost analyses, which required a series of assumptions regarding the cost of land, habitat restoration projects, and administration, among other factors that will influence actual Plan implementation costs. In addition, the mitigation costs and thus fees were developed based a specific scenario for the LOHCP Preserve System configuration (Section 5.7.2.3.2) that is anticipated to be both feasible and achieve the biological goals and objectives. Variation in landowner interests in participating in the voluntary program as well as land costs will almost certainly lead to a different Preserve System Configuration. While the mitigation crediting ratios used to calculate the mitigation benefits (Section 5.7.2.3.1) will ensure that a Preserve System with a different mix of land protection, restoration, and management will be equivalent in conservation benefits to the scenario used for analysis in the Plan (Section 5.7.3.2), the costs for the Preserve System will necessarily differ from those estimated in this Plan. Finally, the scenario used to evaluate funding assumes complete implementation of the covered activities (or other eligible activities impacting the same area); reductions in participation in the Plan and adjustments to the pace of permitting could affect the actual costs of HCP implementation.

To address uncertainties in the actual costs to implement the Plan, as well as general inflationary pressures on costs, a two-part process will be followed to adjust cost estimates and mitigation fees over time:

1. **Annual Adjustments**: Automatic adjustments to mitigation fees will be made annually based on the Consumer Price Index measure of inflation. This will ensure the mitigation fees do not fall behind due to general inflation.
2. **Annual Financial Viability Analysis**: The annual report will assess financial viability of the plan, including sufficiency of the mitigation fees to implement the conservation program to the level needed to ensure that the mitigation is commensurate with the impacts of the covered activities (Section 5.6).
3. **Periodic Detailed Cost Review and Mitigation Fee Adjustment**. Mitigation costs will be reviewed, and mitigation fees adjusted, every three years or as needed to ensure that the conservation program can provide mitigation that is commensurate with the impacts. With the assistance of the Implementing Entity, the County will use the data collected about actual implementation costs, as well current market information that affects the Plan (e.g., land costs), to update the assumptions, unit costs, and overall cost estimates and derive a revised mitigation fee schedule. The County will review the results of the analysis and its recommendation for adjustment of the fees with the USFWS; changes to the fees will constitute administrative changes under the plan (Section 6.7.1). The County's failure to modify the fees as necessary to ensure the Plan is fully funded and implemented would expose the incidental take permit to potential suspension or revocation.

Table 7-1: Mitigation Fee Schedule

Fee Category	Fee Per Disturbed Acre ($)	Fee Per Disturbed Square Foot ($)[1]
Restoration /Management/Administration Fee	44,844.50	1.0295
Habitat Protection Fee[2]	7,389.43	0.1696
Total	**52,233.93**	**1.1991**

[1] Project fees will be calculated by multiplying the area of ground-disturbing activities in square feet by the values listed here. In the text, fees are rounded to the nearest cent for ease of discussion.

[2] Project proponents conducting new residential development projects on vacant parcels located inside the Priority Conservation Area will be required to establish an on-site habitat set-aside rather than pay the Habitat Protection Fee (Section 5.7.2.1).

Table 7-2: Land Sale Comparables used to Assess Habitat Protection Costs

Property and Parcel Size Class[1]	Acreage	Sale Date	Sale Price ($)[2]	Price/ Acre ($)[3]	Adjusted Price/ Acre ($)[3,4]
< 2 Acres					
1442 14th St	0.144	12/18/2020	75,000	522,636	559,411
1324 17th St	0.143	6/18/2020	110,990	776,164	839,405
1565 11th St	0.215	12/6/2021	100,000	464,640	464,640
438 Mitchell Dr	0.180	12/2/2021	280,000	1,553,732	1,553,732
1851 Sunnyhill Rd	0.092	10/12/2021	65,000	707,850	713,514
1262 7th St	0.143	10/27/2021	59,500	414,691	418,009
1662 4th St	0.215	10/7/2021	140,000	650,496	655,701
1491 5th St	0.187	8/2/2021	199,000	1,066,885	1,087,301
2049 Andre Ave	1.000	12/18/2020	325,000	325,000	347,868
1295 San Luis Ave	1.200	3/19/2020	225,000	187,500	202,527
1724 Los Osos Valley Rd	1.000	4/17/2017	175,000	175,000	199,532
Weighted Average for Parcels <2 acres	**0.411**		**159,499**	**388,249**	**407,208**
2 - 10 Acres					
2082 S Bay Blvd	3.710	12/20/2021	251,269	67,727	67,727
1865 N Pecho Rd	2.813	7/21/2021	216,450	76,946	78,580
1610 Sage Ave	5.190	6/14/2019	822,500	158,478	172,497
1549 Nipomo Ave	6.860	1/29/2019	365,000	53,207	58,933
Weighted Average for Parcels 2-10 acres	**4.643**		**413,805**	**89,120**	**95,400**
>10 Acres					
0 Pecho Rd	17.74	4/20/2021	715,000	40,304	42,077
2420 Paradise Ln	11.83	3/18/2019	665,000	56,213	61,653
Pecho Valley Rd	22.53	2/11/2019	850,000	37,727	41,611
2615 Black Walnut Rd	26.50	12/16/2020	765,000	28,868	30,899
Weighted Average for Parcels <10 acres	**19.65**		**748,750**	**38,104**	**41,121**

[1] Land sales predominantly from the LOHCP Area. However, for larger parcels, several sales comparables were drawn from neighboring areas due to limited sales within the plan area.

[2] Sources: Redfin, Zillow, Google Maps and gis.slocounty.ca.gov.

[3] Values may not appear correctly calculated due to rounding error.

[4] Adjusted to 2021 dollars using inflation calculator from the Consumer Price Index (CPI) as reported by the U.S. Bureau of Labor Statistics (https://www.bls.gov/data/inflation_calculator.htm).

Table 7-3: Estimated Costs to Acquire Land from Willing Sellers

Category	Acres in LOHCP Preserve System[1]	Assumed Parcel Size Category[2]	Estimated Per-Acre Land Costs ($) [3]	Total Costs ($)
Tier 1 [4]	63.5	> 10 Acres	41,121	2,611,204
Tier 2 [5]	10.0	2-10 acres	95,400	953,996
Tier 3 [5]	3.0	2-10 acres	95,400	286,199
Tier 4 [6]	0.0	< 2 acres	407,000	0
Total	**76.5**			**3,851,399**
			Average Per Acre	**50,345**

[1] Based on the LOHCP Preserve System scenario (Section 5.7.2.3.2, Table 5-9).

[2] Based on criteria for parcel tiers that reflect their conservation value (Table 5-8).

[3] Rounded values from calculation using comparable land sales (Table 7-2).

[4] The estimated land cost for parcels in this tier was based upon an estimated $1.0 M cost for parcels greater than 10 acres inside the LOHCP Priority Conservation Area, which average 31.5 acres.

[5] The Tier 2 and Tier 3 parcels are anticipated to be 2-10 acres.

[6] Tier 4 parcels, which are assumed to be less than 2 acres, are not included in the LOHCP Preserve System scenario.

Table 7-4: Estimated Restoration Costs[1]

Type	Description	Assumptions	Unit Cost ($)
Road/Trail Restoration	Intensive work to restore eroded and denuded trails and historic roads	15 acres of affected area, which will be addressed in five, 3-acre restoration efforts.	$750,000
Initial Exotic Plant Removal	Initial, intensive work to control veldt grass, ice plants, and pampas grass	Total treatment area is 50 acres. Treatment will occur as part of 10 projects, each of which will take place over 5-10 years and will include phased work as well as follow-up treatment to achieve restoration goals.	$500,000
Active Revegetation	Using seed and some limited propagation and installation of container stock to revegetate denuded areas	50 acres of roads and areas heavily infested by veldt grass, or treated for road/trail restoration, that are not naturally recolonized, or where active revegetation will reduce erosion and/or invasive plant recolonization. Treatment will occur as part of 10 projects each of which will include 2-3 years of seeding, planting, and monitoring.	$300,000
IKM Population Restoration	Vegetation management and other techniques to promote establishment of IKM	Design and implementation of an experimental management program with 3-5 years of effectiveness monitoring.	$200,000
		Base Total	**$1,750,000**
		Contingency (@25%)	**$437,500**
		Total with Contingency	**$2,187,500**
		Assumed Acreage[2]	**45.7**
		Cost Per Acre	**$47,815**

[1] Estimated costs for restoration projects habitat within the LOHCP Preserve System based on the known management and restoration issues (Appendix D) and the Interim Adaptive Management and Monitoring Plan (Appendix M). The Preserve System Adaptive Management and Monitoring Plan will identify actual restoration projects and estimate their costs.

[2] A total of 45.7 acres of habitat within the LOHCP Preserve System includes the 35 acres of existing protected land that are estimated to require restoration (Table 5-5) plus 10.7 acres (10%) of the newly-protected private land to be protected and managed as part of the LOHCP Preserve System: 31 acres of habitat set-asides on the lands of plan participants plus 76.5 acres of lands to be acquired (Table 5-9). of The acres treated is less than the total estimated acres of projects identified in this table, as some areas will receive more than one treatment (e.g., exotic plant control and active revegetation).

Table 7-5: Estimated Habitat Management Costs

				Return Interval (Years)[1]		Frequency[1]		Annual Cost ($)	
Type	**Description**	**Assumptions**	**Unit Cost ($)**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**
Management									
Exotic Plant Control	Control of veldt grass, ice plants, jubata grass, and other invasive species	General treatment of approximately 15 acres of lower infestation each year	$83,000	1	2	1	0.5	$83,000	$41,500
Recreation Management	Trail maintenance including routine erosion control, closures, signage, and patrol to limit impacts to covered species	8 miles of trails to be managed	$15,000	1	2	1	0.5	$15,000	$7,500
Vegetation Management	Prescribed fire and surrogates in maritime chaparral	Treat approximately 50 of the 300 acres of upland habitat on a rotating basis to maintain natural community structure and species composition	$200,000	10	10	0.1	0.1	$20,000	$20,000
IKM Population Management	Vegetation management or other treatments to promote population growth	Treatment conducted once every five years following initial restoration (Table 7-4)	$20,000	5	5	0.2	0.2	$4,000	$4,000
Pre-Project Surveys and Translocation	Pre-project surveys, project monitoring, and salvage for MSS	30 days/year	$30,000	1	2	1	0.5	$30,000	$15,000
Monitoring									
Exotic Plants	Areal Extent Mapping of Exotic Plants	Entire Preserve System (~386 ac.) mapped	$35,000	5	5	0.2	0.2	$7,000	$7,000
Plant Community Mapping	Areal Extent Mapping of Native Plant Communities	Entire Preserve System (~386 ac.) mapped	$22,000	10	10	0.1	0.1	$2,200	$2,200

Table 7-5: Estimated Habitat Management Costs

				Return Interval (Years)[1]		Frequency[1]		Annual Cost ($)	
Type	**Description**	**Assumptions**	**Unit Cost ($)**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**
Plant Community Sampling	Quantitative Sampling of Plant Community Structure and Species Composition	Entire Preserve System (~386 ac.) sampled	$25,000	5	5	0.2	0.2	$5,000	$5,000
General Habitat Condition	Qualitative Examination of Habitat to Detect Impacts from Recreation, New Invasions, and other threats	Entire Preserve System (~386 ac.) assessed	$20,000	1	1	1	1	$20,000	$20,000
Morro Shoulderband Snail	Population Distribution/ Abundance Sampling	Suitable habitat (~300 ac.) sampled	$35,000	1	5	1	0.2	$35,000	$7,000
Morro Manzanita	Population Distribution/ Abundance Sampling	Suitable habitat (~250 ac.) sampled	$40,000	5	10	0.2	0.1	$8,000	$4,000
Indian Knob Mountainbalm Mountain	Demographic Monitoring	Three populations monitored	$25,000	5	10	0.2	0.1	$5,000	$2,500
Morro Bay Kangaroo Rat	Presence/Absence Monitoring	Suitable habitat for MBKR (~300 ac.)	$65,000	5	10	0.2	0.1	$13,000	$6,500
						Total Annual Costs		**$247,200**	**$142,200**
						Contingency (@25%)		**$61,800**	**$35,550**
						Total with Contingency		**$309,000**	**$177,750**
						Remedial Management for Changed Circumstances or Adaptive Management (@10%)		**$30,900**	**$17,775**
						Total		**339,900**	**195,525**
						Cost Per Acre for Preserve (386 ac.)		**$880**	**$506**

[1] Number of years between events. For example, a return interval of 1 indicates the activity is conducted every year, while a return interval of 5 indicates that the activity is conducted every five years.

Table 7-6: Preserve System Start-Up Costs[1]

Type	Description	Assumptions	Unit Cost ($)
Baseline Surveys			
Morro Shoulderband Snail Monitoring	Initial survey to identify the distribution and relative abundance of MSS to inform management	Quantitative sampling within ~160 acres of suitable and potentially suitable habitat in the initial Preserve System	75,000
Morro Manzanita Mapping	Initial surveys to characterize the distribution, relative abundance, and stand condition	Areal extent mapping, canopy cover sampling, and demographic monitoring within ~210 acres of suitable habitat	40,000
Morro Bay Kangaroo Rat Survey	Surveys to evaluate presence/absence of MBKR	Visual Assessment within ~250 acres of suitable habitat followed by limited surveys (track plates and live trapping), if sign detected	65,000
Indian Knob Mountainbalm Monitoring	Survey suitable habitat for the species and then establish demographic monitoring study	Only a single population occurs within the LOHCP Area	20,000
Exotic Plant Mapping	Areal Extent Mapping of Exotic Plants	Mapping throughout the initial Preserve System	35,000
Plant Community Mapping	Areal Extent Mapping of Native Plant Communities	Sampling throughout the initial Preserve System	22,000
Plant Community Structure	Quantitative Sampling of Plant Community Structure	Sampling throughout the initial Preserve System	25,000
General Habitat Condition	Qualitative Examination of Habitat to Detect Impacts from Recreation, New Invasions, and other threats	Assessment within the initial Preserve System	20,000
Preserve System AMMP	Develop management plan for the preserve system through field reconnaissance and mapping and coordination with landowners	Assessment and planning for the initial Preserve System	167,000
Fences and Signage	Install wildlife-friendly perimeter fences and signs where doing so will facilitate trail restoration	As described in the IAMMP	568,000

Table 7-6: Preserve System Start-Up Costs[1]

Type	Description	Assumptions	Unit Cost ($)
Exotic Plant Management	Initial Exotic Plant Management Work to jump start the program	As described in the IAMMP	278,000
		Total	**1,315,000**
		Per Year for Three Years	**438,333**
		Cost Per Acre (278 ac. Initial Preserve) [1]	**4,119**

[1] Estimated costs to begin enhanced management within the 278-acre Morro Dunes Ecological Reserve. Actual costs may differ.

[2]Acreages differ from those in Table 7-5, which addresses costs to manage and monitor the entire preserve system that will created following full implementation of the plan. The per-acre start-up costs exclude the costs to prepare the Preserve System AMMP.

[3] The IAMMP, which was developed after this funding analysis, identified 0.84 acre of eucalyptus, 22.6 acres of veldt grass and co-occurring invasive plants, and ~4.3 acres to be restored through trail closures. Actual treatment areas will be identified by the County in work plans developed to implement the IAMMP (Appendix M).

Table 7-7: Administrative costs for the LOHCP

Type	Description	Permit Term		Post-Permit Term	
		Assumptions	Cost ($)	Assumptions	Cost ($)
Covered Activities and Coordinating Conservation Program	Processing applications, track compliance with permit terms, incl. species protection measures. Create and maintain databases to track impacts and mitigation. Coordinating conservation program implementation.	One Full-Time Planner, County of San Luis Obispo	180,000	One 25% Time Planner, County of San Luis Obispo	45,000
Habitat Protection	Research habitat protection opportunities including conduct landowner outreach; process conservation easements for habitat set-asides offered in lieu of the habitat protection fee; monitor and enforce easements	Based on estimated hours and rates of participating IE staff and indirect costs	53,000	Easement monitoring only	16,000
General Administration, Coordination, and Contracting	Coordinate with the County and agencies to implement plan; coordinate with the contractors implementing preserve management tasks; coordinate with agencies and organizations involved in the Preserve System	Based on estimated hours and rates of participating IE staff and indirect costs	74,000	50% of effort in permit term	37,000
Reporting	Prepare annual report	Based on estimated hours and rates of participating IE staff and indirect costs	16,000	IE provides reports to the County only (Agency reporting not needed post-permit)	2,000
	Total Administration Costs (per year)		**323,000**		**100,000**

Table 7-8: Summary of Mitigation Costs and Fees [1]

Category	Planning Level Mitigation Costs ($)	Percentage of Total Mitigation Costs
Mitigation Cost		
Administration (permit term)	8,825,000	30%
Administration (post-permit)	2,634,814	9%
Management and Monitoring (permit term)	4,248,750	16%
Management and Monitoring (post-permit)	4,792,310	18%
Preserve Start-Up	1,148,000	4%
Restoration	2,187,500	8%
Acquisition of Fee Title	3,851,399	14%
Total Cost	**27,687,773**	**100%**
Mitigation Fee Summary per Acre		
Restoration /Management/Administration Fee	44,844	
Habitat Protection Fee	7,389	
Total	**52,234**	
Mitigation Fee Summary per Square Foot[2]		
Restoration /Management/Administration Fee	1.0295	
Habitat Protection Fee	0.1696	
Total	**1.1991**	

[1] Values may not appear correctly calculated due to rounding error.

[2] Project fees will be charged by multiplying the area of ground-disturbing activities in square feet by the values listed here. In the text, the per-square-foot fees are rounded to the nearest cent for ease of discussion.

8 Alternatives to Take

The federal Endangered Species Act (ESA) requires that habitat conservation plans (HCPs) discuss alternatives to the taking of listed species due to the covered activities (Project) and the reasons why such alternatives are not implemented. These are alternatives to the taking, and not overall Project alternatives and impacts, which are discussed in the LOHCP EIR (County of San Luis Obispo 2020a) and EA (USFWS 2020b).

8.1 Alternative 1: No Take

Under the No-Take Alternative, the USFWS would not approve the Section 10(a)(1)(B) incidental take permit application.

In this scenario, landowners and other project proponents seeking to conduct activities that would result in take/impacts of one or more of the Plan's four covered species, would either have to abandon their activity or apply for an incidental take permit by preparing their own HCP, to avoid violating Section 9 of the ESA. The latter scenario could result in development of potentially hundreds of individual HCPs and associated CEQA/NEPA compliance documents in Los Osos, as well as other regulatory permits and authorizations (e.g., California Coastal Act compliance). This alternative would therefore create a large burden on agencies while delaying development, facilities maintenance, and other covered activities.

The No-Take Alternative would also create an economic burden on landowners and other project proponents, who would need to fund preparation of individual HCPs. As a result of the added costs and time required to receive an ITP in this alternative, some project proponents might be more likely to attempt to conduct activities in violation of ESA, resulting in adverse impacts to the covered species and potential civil and criminal penalties to project proponents.

Permitting the covered activities of this programmatic plan through numerous individual HCPs would likely result in lower conservation benefits for the covered species and their habitats. To mitigate the impacts of the typical project, which would be less than one acre, individual HCPs would protect and/or manage small, often isolated habitat areas. This piecemeal approach to conservation would have dramatically reduced benefit for the covered species relative to implementation of the strategic, coordinated conservation plan outlined in this plan. Moreover, without a mechanism to contribute to off-site mitigation of high-quality habitat, as outlined in the conservation program for this Plan, the individual HCPs would likely conduct habitat protection and management on site. As the vast majority of the projects would occur within the already densely developed area of Los Osos inside the urban services line, the mitigation would likely be of limited long-term conservation value for the covered species relative to habitat protection in the Priority Conservation Area as part of the Project (Section 5.3.1.2). As a result, the No-Take Alternative would provide less conservation benefit than the proposed Project.

Due to the extended timeline and costs for permitting to lawfully conduct projects in the absence of a programmatic permit resulting from this community-wide HCP, the No-Take Alternative would slow the pace and may ultimately reduce the amount of habitat conversion. This could limit the impacts to Morro shoulderband snail and Morro manzanita individuals and populations relative to the proposed Project; however, it would be unlikely to have a net benefit for the species. The benefits of preserving, restoring,

and managing high-quality habitat in the Priority Conservation Area as part of the proposed Project's conservation program will not only outweigh the negative impacts associated with the covered activities, but also promote recovery of the species relative to the No-Take Alternative.

For each of these reasons outlined above, the No-action Alternative was rejected.

8.2 Alternative 2: Reduced Take

Under the reduced-take alternative, the total acres of habitat disturbed by the covered activities would be capped at 266 acres, or 50% of the maximum amount under the proposed Plan (532 acres). Rather than helping protect the covered species, capping habitat disturbance as part of a Reduced-Take Alternative will negatively impact them relative to implementing the proposed Plan for several reasons.

The Reduced-Take Alternative will reduce the benefits of the conservation program for the covered species and their habitat. The ratios relating the benefits of the conservation program for the covered species habitats to the impacts of the covered activities on a per-acre basis are at or exceed 1:1 (Table 8-1). For example, while 41 acres of Morro manzanita habitat are anticipated to be impacted, the conservation program in this Plan is anticipated to benefit 354-acre equivalents, resulting in a more than 8:1 ratio of habitat benefits to impacts. Because the conservation program leverages the mitigation to improve habitat, reducing the amount of take/impacts by 50% will similarly reduce the habitat benefits of the conservation program (Table 8-1). These ratios reflect the fact that habitat protection, restoration, and management will benefit habitat that is of greater long-term conservation value for the covered species, than the habitat impacted by the covered activities (sections 4.2 and 5.8.1).

As a result, for every acre of coastal sage scrub or central maritime chaparral impacted by the covered activities, which generally will occur in degraded and more fragmented habitat, 1.7 acres of coastal sage scrub and 8.5 acres of central maritime chaparral will be benefited (Table 8-1); this habitat will largely occur within the Priority Conservation Area (Figure 5-1), where habitat conservation efforts can better facilitate long-term viability of the covered species.

Habitat not developed (or protected, restored, and managed) under this Reduced-Take Alternative will continue to degrade due to exotic species, incompatible fire management, and incompatible recreational use, among other factors.

The Reduced-Take Alternative will reduce the biological effectiveness of the conservation program. A key approach of the LOHCP conservation program is to conserve and effectively manage the most important land within the Baywood fine sands ecosystem, including existing protected lands as well as land protected as part of the Plan, as part of a coordinated strategy that will maximize effectiveness (Section 5.3). Reducing the amount of take/impacts reduces the mitigation revenue and thus the amount of habitat that is able to be conserved, restored, and managed as part of the LOHCP Preserve System. Unless other funds for habitat protection and management are obtained, habitat outside of the Preserve System will continue to degrade and impede effective management of habitat within the Preserve System. For example, uncontrolled erosion and exotic plant infestations on habitat adjacent to the preserves can degrade habitat contained within and necessitate more intensive management of the preserves.

The Reduce-Take Alternative will reduce the cost effectiveness of the conservation program. There are economies of scale associated with many aspects of habitat restoration, management, and monitoring: per-acre costs associated with such activities are generally lower as the size of the area treated increases (CNLM 2004). Moreover, many components of the administrative costs of the conservation program are fixed. As a result, the Reduced-Take Alternative will increase the per-acre costs of operating the Preserve System, which provides the compensatory mitigation for the covered activities. To address this, the mitigation fee would need to be increased, thus putting added burden on the project proponents. Alternatively, the amount of habitat protection, restoration, management, and monitoring would have to be scaled back, thus reducing the benefits of the Reduced-Take Alternative relative to the Proposed Project.

The above assessment assumes that if the Reduced-Take Alternative is implemented, the other covered activities will not be conducted. However, this is unrealistic, as many of these activities important for the Los Osos community (e.g., library and parks expansions, facilities maintenance). After the cap on maximum disturbance for the LOHCP permit is reached, project proponents would instead need to prepare individual HCPs in order to receive take coverage. The increased timeline and costs for project permitting may result in issues similar to the No-Take Alternative, including projects being conducted without take coverage, and therefore without mitigation. Projects that are permitted as a result of individual HCPs would result in small, piecemeal mitigation and uncoordinated and inconsistent management that is less effective than what would be accomplished under the Proposed Plan.

8.3 Alternative 3: Greater Mitigation Requirement

Under the Greater-Mitigation Requirement Alternative, project proponents would be required to mitigate the impacts of their projects at a ratio of 2:1; for every acre of habitat disturbed, two acres of habitat be benefited through habitat protection, restoration, and/or management, rather than just one acre, as in the Proposed Plan (Alternative 4). The anticipated covered activities (Section 2.2) would impact 532 acres of habitat[23] and would be offset by 1,064-acre equivalents of mitigation activities in the LOHCP Preserve System.

This higher mitigation alternative could be achieved by doubling the acres of habitat presumed to be restored, managed, and/or protected within the LOHCP Preserve System based on the scenario used for this Plan (Section 5.7.2.3.2). Doubling the habitat protection would entail protecting 772 rather than 386 acres (Table 5-10). When compared with the Proposed Plan, the preserve system scenario under this alternative would protect 215 acres of currently unprotected habitat, rather than 107.5 acres; restore and manage 70 acres of existing protected lands, as opposed 35 acres; and manage 487 acres of existing protected lands rather than 243.5 acres. The Preserve System under this scenario would be expected to have double the benefits (and double the ratios) of the Proposed Project for vegetation and species habitat (Table 8-1).

This alternative is likely infeasible because there is not enough suitable habitat available for use as mitigation. Of the 948 acres of existing protected lands within the LOHCP Area (Table 2-4), only 796 acres are within the Priority Conservation Area where habitat management and restoration activities can most effectively promote long-term persistence of the covered species (Section 5.3.1.2, Table 5-5).

[23] Does not include take due to implementation of the conservation program and the Community Wildfire Protection Plan, which will result in temporary impacts to habitat.

Of this area, 498 acres were identified by the landowners as unavailable for use as mitigation (Section 5.3.3.1).

It would also be infeasible to achieve this higher mitigation ratio through protection of twice as much habitat. The Priority Conservation Area contains only approximately 621 acres of unprotected upland habitat of which only 386 acres are in undeveloped vacant parcels; the remaining 235 acres of habitat is within existing developed parcels. The Plan already assumes that 107.5 acres of unprotected land would be protected through acquisition of conservation easements or fee title (Table 5-9). Protecting additional acreage to bring the mitigation ratio to 2:1 would require participation of numerous additional landowners who may not be interested in selling their parcels or conservation easement over portions of them. Protecting additional habitat outside of the Priority Conservation Area would be possible but would not achieve the full desired additional benefits intended by a higher ratio, because land outside of the Priority Conservation Area is less suitable for long-term conservation and management, though it could still contribute to species conservation (Section 5.3.1.2).

Doubling the mitigation ratio would therefore be unlikely to double the benefits for the covered species, as might be intended in such an alternative. This is because the additional habitat that would be protected, restored, and managed, would be of generally lower long-term conservation value for the covered species. Including habitat within parcels that are smaller, partially developed, and/or located outside of the Priority Conservation Area, would result in a more fragmented preserve system that has lower habitat connectivity and is more challenging to cohesively manage.

Increasing the mitigation ratio from 1:1 to 2:1 would also likely more than double the mitigation fees for Plan participants. The Habitat Protection fee required to protect the additional habitat would be expected to more than double, because doubling the land protected would require acquisition of a larger number of smaller parcels, thus resulting in higher per-acre land costs (Section 7.2.1) as well as higher transactional costs (i.e., administration). The Restoration/Management/Administration fee would also be expected to double as a result of the 100% increase in the amount of habitat to be restored, managed, and monitored. Any economies of scale associated with increasing the area managed would likely be outweighed by the increased management costs associated with managing multiple, smaller, and likely disjunct parcels. All else being equal, such parcels are anticipated to experience greater threats to the covered species, such as higher richness and abundance of exotic plants, due to their greater edge effects resulting from their lower area-to-perimeter ratios.

More than doubling the mitigation fees for Plan participants would increase the costs associated with habitat mitigation as well as the overall costs associated with infrastructure, capital facilities, and mitigation fees collectively. Plan participants will need to pay other existing infrastructure and capital facility fees such as water and school fees. In addition, some Plan participants will also be required to separately fund required avoidance and minimization measures. For example, some participants will be required to contract the services of a qualified biologist to conduct pre-project habitat assessment and surveys, and to salvage and relocate Morro shoulderband snail (Section 5.2). The costs for these services will be determined by the market and will depend on the nature of the survey and the project. Given these additional costs, doubling LOHCP mitigation fees could challenge the feasibility of new development.

Doubling the mitigation fees would also increase the cost of public capital improvement projects, such as bike lane construction, water utility improvements, library expansion, and park development. In an era of constrained public resources, these additional costs could make some of these projects cost

prohibitive for public agencies. As a result, requiring greater mitigation could impede the goals for development and enhancement of the Los Osos community, which the proposed Plan is designed to achieve along with the biological goals and objectives for the covered species (Section 5.1).

To summarize, the greater mitigation requirement alternative would make implementation of the LOHCP potentially infeasible due to the anticipated limited habitat available from willing sellers, which would have reduced per-acre conservation value for the covered species due to the higher per-acre costs and lower conservation value. The greater mitigation alternative would similarly present a higher cost burden to plan participants and could render cost prohibitive some development and enhancement projects including those that can benefit the Los Osos Community.

8.4 Alternative 4: Proposed Plan

Under the Proposed Plan, private landowners, public agencies, and private utilities will receive take coverage for their respective development, infrastructure, and facilities maintenance activities, provided that their projects meet the eligibility criteria and they agree to implement the required mitigations of this voluntary program.

The covered activities will collectively impact a maximum of 532 acres of land within the Baywood fine sands ecosystem. The habitat impacts will be concentrated (87%) inside the Urban Services Line (USL)—the existing, largely-developed portion of community, where additional development will be focused as part of the Estero Area Plan (County of San Luis Obispo 2009, 2015). Concentrating development within the USL will minimize impacts to the largely intact habitat on the perimeter of the Plan Area. Nearly 40% of the impact area was characterized as developed, as it features some existing improvements. Due to the small size of parcels, this habitat is already highly fragmented and degraded though may support the covered species.

To mitigate the impacts of the covered activities on the covered species, the Implementing Entity will protect, restore, manage, and monitor habitat at a 1:1 ratio relative to the impacts. The protected habitat will be within the LOHCP Preserve System—a network of protected lands located on the perimeter of the Plan Area in the Priority Conservation Area (Figure 5-1), where habitat has been identified as most essential to the recovery of the covered species (Section 5.3.1.2). The Preserve System will feature habitat protected through implementation of the Plan, as well as existing protected lands where habitat will be restored and managed to achieve the Plan's biological goals and objectives (Section 5.1).

The Preserve System will be assembled during implementation of the Plan as project proponents pay fees that are calculated based on their project impacts. The fees will be used to acquire new land from willing sellers via acquisition of fee title or conservation easements. Fees will also be used to restore habitat, such as by controlling erosion or conducting fire management, and actively manage habitat to address other factors that degrade it, including exotic plants and incompatible recreational uses. The Implementing Entity will also accept conservation easements granted by proponents of new private development projects in the Priority Conservation Area, who will set aside habitat on-site rather than paying the Habitat Protection Fee paid by others to fund off-site habitat protection.

The precise configuration of the Preserve System will depend on a variety of factors, including the interest of landowners in developing or conserving their land. Based on the Preserve System

configuration scenario used to assess impacts and develop funding strategy for the Plan (Section 5.7.2.3.2), the 386-acre Preserve System will:

- **Protect 107.5 acres** of currently unprotected land, of which 10 acres will be restored and then managed (the other 97.5 acres will be actively managed);
- **Restore 35 acres** of degraded habitat within existing protected lands, to increase its ability to support the covered species; and
- **Actively manage 244 acres** of habitat within existing parks and reserves, to meet the unmet management needs and address factors that threaten long-term persistence of the covered species.

Based upon the mitigation crediting ratios, which relate the conservation value of protecting new habitat, and managing and restoring existing protected lands to the benefits of *not* implementing the covered activities (Section 5.7.2.3.1), the 386-acre Preserve System will provide 533-acre equivalents of habitat benefits, thus mitigating the impacts of the covered activities at a ratio of 1:1 (Table 5-10). Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act, effectively increasing the ratio of habitat protected through activities covered in this Plan above 1:1 (Section 5.7.2.1.1).

To issue a Section 10(a)(1)(B) permit, the USFWS must have sufficient evidence to find that take has been avoided and minimized to the maximum extent practicable and that the mitigation is commensurate with the impacts of the taking. The County believes the mitigation and avoidance and minimization measures of the Proposed Plan address the impacts of the proposed take under ESA including by fully offsetting the impacts of the taking, as illustrated in the analysis of the Greater-Mitigation Requirement Alternative (Section 8.3). The minimization and mitigation measures are also the maximum extent practicable, given the circumstances in the landscape including availability of habitat and also financial resources to fund its protection.

In addition, the coordinated conservation program of this Plan will promote recovery of the four covered species by protecting and managing habitat that has the greatest long-term viability for conservation. It will also help conserve other native plants and animals that comprise the endemic communities of the Baywood fine sands ecosystem.

Unlike the greater-mitigation alternative, which would protect, manage, and restore more habitat and thus have greater benefit for the covered species, the Proposed Plan is more feasible to implement, as it will not encounter limitations of land available from willing sellers. The Proposed Plan also provides a more cost-effective permitting solution for project proponents, which are anticipated to include public as well as private entities seeking to conduct much needed infrastructure and utility projects, as well as development projects that can enhance the Los Osos Community.

Table 8-1: Proposed Project and Reduced-Take Alternative Acreages

	LOHCP Area[1]		Proposed Project					Reduced Take[5]	
			Impacted[2]						
	Total	Protected	Inside USL	Outside USL	Total	Benefited[3]	Ratio[4]	Impacted	Benefited
General Vegetation/Land Cover (Table 3-1)									
Coastal Sage Scrub	866	382	160	28	189	320	1.7	94	160
Central Maritime Chaparral	503	309	6	13	18	156	8.5	9	78
Woodland	367	192	22	11	33	32	1.0	16	16
Grassland	39	2.2	21	0.5	21	1.1	0.1	11	1
Wetland	43	31	2.9	0	2.6	0.0	0.0	1	0
Riparian	77	9	3.1	0	3.1	11	3.4	2	5
Other (Primarily Developed)	1,750	23	248	18	265	14	0.1	133	7
Total	**3,644**	**948**	**464**	**70**	**532**	**533**	**1.0**	**266**	**267**
Covered Species Habitats (Table 4-5)									
Morro Manzanita Habitat	798	491	21	20	41	354	8.6	21	177
Morro Shoulderband Snail[6]	2,833	580	429	49	478	301	0.6	239	150
Primary Habitat	935	445	160	29	189	191	1.0	95	96
Secondary Habitat[6]	1,898	135	269	20	289	110	0.4	145	55

[1] Total and protected acres of vegetation and other land cover (Table 4-3), and covered species habitat (Table 4-5), based on the crosswalk of vegetation and habitats (Table 4-4).

[2] Total proposed acres of vegetation and other land cover (Table 4-3) and covered species habitat (Table 4-5) to be impacted inside the Urban Services Line (USL), an area which is already densely developed, and outside the USL. Impacts will be limited to the 3,209-acre permit area.

[3] Total acres to benefit from acquisition of new protected lands, and restoration and management of existing protected lands (Table 5-10).

[4] Total acres to be benefited divided by the total acres to be impacted by the anticipated covered activities.

[5] Take reduced by 50% relative to the Proposed project (266 acres rather than 532 acres).

[6] These ratios are below 1, because secondary habitat includes developed areas where the species can be found, and where many covered activities (redevelopment, infill development, etc.) will occur. Such areas lack the long-term conservation value of the intact habitat, which will be protected at a higher ratio (1.0).

9 Literature Cited

Ackerly, D.D., Loarie, S.R., Cornwell, W.K., Weiss, S.B., Hamilton, H., Branciforte, R. and N. J. B. Kraft N.J. 2010. The geography of climate change: implications for conservation biogeography. Diversity and Distributions, 16: 476-487. doi:10.1111/j.1472-4642.2010.00654.x

Adams, M. S., E. Reeves, V. L. Holland, and T. Richards. 2000. Morro shoulderband snail initial study: Montaña de Oro State Park and the Elfin Forest Final Report. California Polytechnic State University, San Luis Obispo.

Albert, M. 2000. *Carpobrotus edulis*. in C. C. Bossard, J. M. Randall, and M. C. Hoshovsky, editors. Invasive Plants of California Wildlands. University of California Press, Berkeley, CA.

Albert, M., and C. M. D'Antonio. 2000. *Conicosia pugioniformis*. in C. C. Bossard, J. M. Randall, and M. C. Hoschovsky, editors. Invasive Plants of California Wildlands. University of California Press, Berkeley, CA.

Alexander, J., and C. M. D'Antonio. 2003. Seed bank dynamics of French broom in coastal California grasslands: Effects of stand age and prescribed burning on control and restoration. Restoration Ecology 11:185-197.

Axelrod, D. I. 1958. Evolution of the Madro-Tertiary geoflora. The Botanical Review 24:433-509.

Bakry, F., Ismail, S., and M. A. El-Atti. 2015. Glyphosate herbicide induces genotoxic effect and physiological disturbances in *Bulinus truncatus* snails. Pesticide Biochemistry and Physiology. 123: DOI: 10.1016/j.pestbp.2015.01.015.

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. *2012*. The *Jepson manual*: vascular plants of California, second edition. University of California Press, Berkeley.

Ballantyne, K. 2016. Description of observations of Morro shoulderband snail sent by Kate Ballantyne, Division Manager, County of San Luis Obispo Public Works Department, to Biologist Julie Vanderwier, US Fish and Wildlife Service. August 25, 2016.

Barker, D. 2015. Email from Doug Barker, California State Park District Services Manager, to Trevor Keith, County of San Luis Obispo Planner. May 6, 2015.

Baskin, C. A., and J. M. Baskin. 2001. Seeds: Ecology, biogeography, and evolution of dormancy and germination. Academic Press, San Diego, CA.

Bean, C. 2003. An assessment of the endangerment status of the Santa Cruz Kangaroo rat. Master's Thesis. San Jose State University, San Jose, CA.

Bebawi, F. F., and S. D. Campbell. 2002. Effects of fire on germination and viability of bellyache bush (*Jatropha gossypiifolia*) seeds. Australian Journal of Experimental Agriculture 42:1063-1069.

Beebe, F. L. 1974. Field studies of the Falconiformes of British Columbia. Brit. Col. Prov. Mus. Occas. Pap. No. 17. 163pp.

Behnke, R. J. 1992. Native trout of western North America. American Fish Society. Monograph no. 6. 275 pp.

Belt, T. 2016. Description of observations of Morro shoulderband snail sent by Travis Belt, Senior Biologist, SWCA, to Julie Vanderwier, Fish and Wildlife Biologist, US Fish and Wildlife Service. August 25, 2016.

Bossard, C. C. 2000. *Cytisus scoparius*. Pages 145-150 in C. C. Bossard, J. M. Randall, and M. C. Hoschovsky, editors. Invasive plants of California's wildlands. University of California Press.

Bossard, C. C., J. M. Randall, and M. C. Hoschovsky, editors. 2000. Invasive plants of California's wildlands. University of California Press, Berkeley, CA.

Boyd, D. 2000. *Eucalyptus globulus*. Pages 183-187 in C. C. Bossard, J. M. Randall, and M. C. Hoshovsky, editors. Invasive plants of California's wildlands. University of California Press, Berkeley.

Breshears, D. B., T. E. Huxman, H. D. Adams, C. B. Zou, J. E. Davidson. 2008. Vegetation synchronously leans upslope as climate warms. Proceedings of the National Academy of Sciences 105: 11591-11592.

Brooks, M. L. 1999. Alien annual grasses and fire in the Mojave Desert. Madroño 46:13-19.

Brooks, M. L. 2000. *Bromus madritensis* ssp. *rubens*. in C. C. Bossard, J. M. Randall, and M. C. Hoschovsky, editors. Invasive Plants of California's Wildlands. University of California Press, Berkeley, CA.

Brooks, M. L. 2003. Effects of increased soil nitrogen on the dominance of alien annual plants in the Mojave Desert. Journal of Applied Ecology 40:344-353.

Brown, J. H., and A. Kodric-Brown. 1977. Turnover rates in insular biogeography: effect of immigration on extinction. *Ecology*, *58*(2), 445-449.

Bulger, J. B., N. J. Scott Jr., and R. B. Seymour. 2003. Terrestrial activity and conservation of adult California Red-legged Frogs *Rana aurora draytonii* in coastal forests and grasslands. Biological Conservation. 110:85–95.

Bureau of Labor Statistics. 2021. Consumer price index. Accessed at: https://www.bls.gov/cpi/.

Bureau of Land Management (BLM). 2014. Record of Decision and Approved Resource Management Plan for the Bakersfield Office. December 2014. Accessed at: http://www.blm.gov/style/medialib/blm/ca/pdf/bakersfield/planning/Bakersfield_ARMP_ROD.Par.35153.File.dat/Bakersfield_ROD-ARMP.pdf

Burgner, R. L., J. Y. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (Oncorhynchus mykiss) in offshore waters of the north Pacific Ocean. International North Pacific Fisheries Commission. Bull. No. 51.

California Academy of Sciences Herbaria (CASH). 2007. Digital images of herbarium specimens from the Herbarium of the California Academy of Sciences (CAS) and the Dudley Herbarium: (DS): CAS

82447, CAS 418057, CAS 456473, CAS 456474, CAS 456475, CAS 456476, DS 94452, DS 94453, DS 94784, DS 211896, DS 317283, DS 415160, DS 512180.

California Consortium of California Herbaria (CCH). 2007. Information regarding *Arenaria paludicola* herbarium specimens deposited in the following herbaria: JEPS, SBBG, CHSC, DAV, IRVC, UCR, UCSB, UCSC, UC, RSA-POM, SJSU, SD, PGM. http://ucjeps.berkeley.edu/chc_form.html.

California Consortium of Herbaria (CCH). 2014. California Consortium of Herbaria database search for *Cordylanthus maritimus* ssp. *maritimus.* January 9, 2014.

California Department of Forestry and Fire Protection (CAL FIRE). 2020. Defensible Space Requirements. Accessed at: https://www.fire.ca.gov/programs/communications/defensible-space-prc-4291/. April 11, 2020.

California Department of Fish and Wildlife (Game; CDFW). 1982. Morro Dunes Ecological Reserve management plan. Prepared by James Lidberg. Revised October 1982. 28 pages.

California Department of Fish and Wildlife (CDFW). 1982. Morro Dunes Ecological Reserve Management Plan. Revised October 1982. 28 pages.

California Department of Fish and Wildlife (CDFW). 1996. Steelhead Restoration and Management Plan for California. 246 pages. Available at: http://www.dfg.ca.gov/fish/Resources/SteelHead/

California Department of Fish and Wildlife (CDFW) 2012. Policy for mitigation on publicly owned, Department owned, and conserved lands. Department of Fish and Game (Wildlife) Department Bulletin. March 1, 2012. 6 pages.

California Department of Fish and Wildlife (CDFW). 2016. Special Animals List. July 2011. Accessed at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf

California Invasive Pest Plant Council (CalIPC). 2016. Inventory of Invasive Plants in California. Online at: http://www.cal-ipc.org/paf/. Accessed August 19, 2016.

California Native Plant Society (CNPS). 2016. On-line Inventory of Rare and Endangered Plants of California., California Native Plant Society. Sacramento, CA. Accessed at: http://www.rareplants.cnps.org/. August 19, 2016.

California Natural Diversity Database (CNDDB). 2016. Database of rare species and community occurrences maintained by the California Department of Fish and Wildlife. Updated July 31, 2016.

California State Parks. 2008. Habitat Conservation Plan for the Federally Endangered Morro Shoulderband Snail at the Proposed Marina Peninsula Trail and Rehabilitation Project Site Morro Bay State Park San Luis Obispo County, California. Submitted to the Ventura Field Office of the US Fish and Wildlife Service. December 31, 2008. 48 pp.

Callaway, J., V.T. Parker, M.C. Vasey, and L.M. Schile. 2007. Emerging issues for the restoration of tidal marsh ecosystems in the context of predicted climate change. Madroño 54:234-248.

Carlsen, T. M., J. W. Menke, and B. M. Pavlik. 2000. Reducing competitive suppression of a rare annual forb by restoring native California perennial grasslands. Restoration Ecology 8:18-29.

Carnie, S. K. 1954. Food habits of nesting golden eagles in the coast ranges of California. Condor 56:3-12.

Caswell, H. 2000. Matrix population models, Second Edition. Sinauer Associates, Sunderland, MA.

Center for Natural Lands Management (CNLM). 2004. Natural Lands Management Cost Analysis: 28 Case Studies. Prepared for the Environmental Protection Agency. October 2004. 22 pages.

Chesnut, J. 1999. A review of weed threats to the Nipomo Dunes. The Land Conservancy of San Luis Obispo, San Luis Obispo.

Chesnut, J. pers. comm. Personal communications by Crawford, Multari, and Clark Associates staff with John Chesnut regarding biological resources within the LOHCP Area as part of work to develop the 2005 draft Los Osos HCP.

Chipping, D.H. 1987. The geology of San Luis Obispo County: a brief description and field guide. California Polytechnic State University. San Luis Obispo, California. 190 pp.

Christensen, N. L. 1977. Fire and soil-plant nutrient relations in a pine-wiregrass savanna on the coastal plain of North Carolina. Oecologia 31:27-44.

City of Sacramento, Sutter County, Natomas Basin Conservancy, Reclamation District No. 1000, and Natomas Central Mutual Water Company. 2003. Final Natomas Basin Habitat Conservation Plan. Submitted to the California Department of Fish and Game and US Fish and Wildlife Service. April 2003. Accessed at: http://www.natomasbasin.org/HelpfulDocuments/2003NBHCPRelatedDocs.aspx.

Clark, B. C. 1989. Soils, water, and watersheds. Pages 8 in National Wildfire Coordinating Group: Prescribed fire and fire effects working team. Fire Effects Guide: National Interagency Fire Center.

Congdon, J. D. 1971. Population estimate and distribution of the Morro Bay kangaroo rat. California Department of Fish and Game, Wildlife Management Branch Administrative Report Number 71-11. 13 pages.

Congdon, J. D. and A. I. Roest. 1975. Status of the endangered Morro Bay kangaroo rat. Journal of Mammalogy. 56: 679-683.

Corbin, J. C., C. M. D'Antonio, and S. J. Bainbridge. 2004. Tipping the balance in the restoration of native plants: experimental approaches to changing the exotics: natives ratio in California grasslands. in M. Gordon and S. Bartol, editors. Experimental approaches to conservation biology. University of California Press. County of San Luis Obispo. 2006. Parks and Recreation Element of the San Luis Obispo County General Plan. December 19, 2006. 97 pages. Accessed at: http://www.slocounty.ca.gov/Assets/PL/Elements/Parks+and+Recreation+Element.pdf

County of San Luis Obispo. 2007. Coastal Access Guide. Prepared by Sara Kocher Consulting for the County of San Luis Obispo Parks Department. April 2007.

County of San Luis Obispo. 2009. Estero Area Plan. Program Certified by the California Coastal Commission February 25, 1988. Revised January 2009. 384 pages. https://www.slocounty.ca.gov/getattachment/5137ff06-8d2a-4f9a-b9eb-e9926afe8b28/Estero-Area-Plan.aspx

County of San Luis Obispo. 2012. Letter from Paavo Ogren, Director of Public Works, to Charles Lester, Executive Director of the California Coastal Commission, regarding Coastal Permit A-3-SLO-09-055/069; Los Osos Wastewater Project Ownership of the Broderson Site. May 2, 2012. 3 pages.

County of San Luis Obispo et al. 2015. Updated basin plan for the Los Osos Groundwater Basin. January 2015. 346 pages. Accessed at:

County of San Luis Obispo. 2020a. Final Environmental Impact Report. Prepared with the assistance of Rincon Consultants, Inc. July 2020.

County of San Luis Obispo. 2020b. Los Osos Community Plan. December 15, 2020. 244 pages. County of San Luis Obispo, Los Osos Community Services District, Golden State Water Company, and S&T Water Company. 2015. Updated Basin Plan for the Los Osos Groundwater Basin. January 2015. 346 pages.

County of Santa Clara, City of San Jose, City of Morgan Hill, City of Gilroy, Santa Clara Valley Water District, and Santa Clara Valley Transportation Authority.2012. Final Santa Clara Valley Habitat Plan. Santa Clara County, CA. August 2012. Accessed at: http://scv-habitatplan.org/www/site/alias__default/346/final_habitat_plan.aspx.

Courchamp, F., T. Clutton-Brock, and B. Grenfell. 1999. Inverse density dependence and the Allee effect. Trends in ecology & evolution *14*(10): 405-410.

Crawford, Multari, and Clark Associates (CMCA). 2005. Draft Los Osos Habitat Conservation Plan. Draft plan as well as GIS Vegetation and land cover map of the Los Osos region.

D'Antonio, C. M. 1990a. Invasion of coastal plant communities in California by the introduced iceplant *Carpobrotus edulis* (Aizoaceae). Ph.D. Dissertation. University of California, Santa Barbara.

D'Antonio, C. M. 1990b. Seed production and dispersal in the non-native, invasive succulent, *Carpobrotus edulis* in coastal strand communities in central California. Journal of Applied Ecology 27:693-702.

D'Antonio, C. M. 1993. Mechanisms Controlling Invasion of Coastal Plant-Communities by the Alien Succulent *Carpobrotus edulis*. Ecology 74:83-95.

D'Antonio, C. M., and B. E. Mahall. 1991. Root profiles and competition between the invasive exotic perennial *Carpobrotus edulis* and two native shrub species in California coastal scrub. American Journal of Botany 78:885-894.

D'Antonio, C. M., and P. M. Vitousek. 1992. Biological invasion by exotic grasses, the grass/fire cycle, and global change. Annual review of Ecology and Systematics 23:61-87.

D'Antonio, C. M., D. Odion, and C. Tyler. 1993. Invasion of maritime chaparral by the introduced succulent *Carpobrotus edulis*. Oecologia 95(1):14-21.

DiTomaso, J. M. 2000. *Cortaderia jubata*. Pages 124-128 in C. C. Bossard, J. M. Randall, and M. C. Hoshovsky, editors. Invasive plants of California's wildlands. University of California Press, Berkeley.

DeLong, J. P. 2004. Effects of management practices on grassland birds: Golden Eagle. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/grasbird/goea/goea.htm (Version 28MAY2004).

Dunk, J. R. 1995. White-tailed kite (*Elanus leucurus*). *In* The Birds of North America, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Dunk, J. R., and R. J. Cooper. 1994. Territory-size regulation in black-shouldered kites. Auk 111: 588-595.

Eddleman, W.R., R.E. Flores, and M.L. Legare. 1994. Black Rail (*Laterallus jamaicensis*). *In* A. Poole and F. Gill, editors, The Birds of North America, No. 123. Academy of Natural Sciences, Philadelphia, and American Ornithologists Union, Washington, DC. 20 pp.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon and Schuster, New York. 785pp.

Elam, D. 1995. Influence of population genetic structure on reproductive output in rare plants. in American Journal of Botany.

Elzinga, C. L., D. W. Salzer, J. W. Willoughby, and J. P. Gibbs. 2001. Monitoring plant and animal populations. Blackwell Science, Malden, MA.

Evens, J., G. W. Page, S. A. Laymon, and R. W. Stallcup. 1991. Distribution, relative abundance, and status of the California black rail in western North America. Condor 93:952-966.

Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. Annual review of ecology, evolution, and systematics, 487-515.

Fellers, G. M. and P. M. Kleeman. 2007. California red-legged frog (*Rana draytonii*) from movement and habitat use: Implications for conservation. Journal of Herpetology. 41(2): 276-286.

Florentine, S.K., Fox, J.E.D., 2003. Allelopathic effects of *Eucalyptus victrix* L. on Eucalyptus species and grasses. Allelopathy Journal 11, 77–83.

Gambs, R.D., and V.L. Holland. 1988. Ecology of the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*). Final report submitted to the U.S. Fish and Wildlife Service, Sacramento, California. 138 pp.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society. 407 pp.

Gilpin, M. E., and M. E. Soulé.1986. Minimum viable populations: processes of species extinction. Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, Massachusetts, 19-34.

Greenlee, J., and J. Langenheim. 1990. Historic fire regimes and their relation to vegetation patterns in the Monterey Bay Area of California. American Midland Naturalist 124:239-253.

Grinnell, J., and A. H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna Number 27. Copper Ornithological Club, Berkeley, California. Reprinted by Artemisia Press, Lee Vining, California. April 1986. 617 pp.

Gustafson, K.D., Belden, J.B., and M. G. Bolek. 2015. The effects of the herbicide atrazine on freshwater snails. Ecotoxicology (2015) 24: 1183. doi:10.1007/s10646-015-1469-x

Haidinger, T. L., and J. Keeley. 1993. Role of fire frequencies in destruction of mixed chaparral. Madroño 40:141-147.

Halofsky, J.E., Peterson, D.L. and B. J. Harvey. 2020. Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. Fire Ecology 16: 4 https://doi.org/10.1186/s42408-019-0062-8

Hannah, L., G. F. Midgley, T. Lovejoy, W. J. Bond, M. L. Bush, J. C. Lovett, D. Scott, and F. I. Woodward. 2002. Conservation of biodiversity in a changing climate. Conservation Biology 16: 264-268.

Hansen, L. J., and J. R. Hoffman. 2011. Climate Savvy: Adaption conservation and resource management to a changing world. Washington, D.C.: Island Press.

Hanski, I. 1998. Metapopulation dynamics. Nature 396(6706): 41-49.

Hanski, I., T. Pakkala, M. Kuussaari, and G. Lei. 1995. Metapopulation persistence of an endangered butterfly in a fragmented landscape. Oikos 21-28.

Hastings, M. S., and J. M. DiTomaso. 1996. Fire controls yellow star thistle in California grasslands: test plots at Sugarloaf Ridge State Park. Restoration and Management Notes 14:124-128.

Haubensak, K. 2001. Controls over invasion and impact of broom species (*Genista monspessulana and Cytisus scoparius*) in coastal prairie ecosystems. Ph.D. Dissertation. University of California, Berkeley, CA.

Hayes, G. F., and K. D. Holl. 2003. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. Conservation Biology 17:1694-1702.

Hayes, M. P., and M. M. Miyamoto. 1984. Biochemical, behavioral and body size differences between *Rana aurora aurora* and *R. a. draytonii*. Copeia 1984(4):1018-1022.

Hayes, M. P., and M. R. Tennant. 1985. Diet and feeding behavior of the California red-legged frog, *Rana aurora draytonii* (Ranidae). The Southwestern Naturalist 30(4):601-605.

Hayes, M. P., and M.R. Jennings. 1986. Decline of ranid frog species in western North America: are bullfrogs (*Rana catesbeiana*) responsible? J. Herpetology, 20(4):490-509.

Hayes, M. P., and M. R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): Implications for management. Pages 144-158.

Heagy, D. 1980. A distribution study of the endangered banded dune snail (*Helminthoglypta walkeriana*) *in* Roth, B. Status survey of the banded dune snail, *Helminthoglypta walkeriana* Final report. Fish and Wildlife Service, Sacramento Endangered Species Office, California

Heberger, M., H. Cooley, P. Herrera, P. Gleick, and E. Moore. 2009. The impacts of sea level rise on the California coast. Pacific Institute. May 2009.

Hedrick, P. W., and S. T. Kalinowski. 2000. Inbreeding depression in conservation biology. Annual Review of Ecology and Systematics, 139-162.

Heller, N.E. and E.S. Zavaleta. 2009. Biodiversity management in the face of climate change: a review of 22 years of recommendations. Biological Conservation 142: 14 – 32

Hickman, J. C., editor. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA.

Hiebert, R. D., and J. Stubbendieck. 1993. Handbook for ranking exotic plants for management and control. U.S. Department of the Interior, National Park Service, Natural Resources Publication Office, Denver Colorado.

Hill, D. L. 1974. *Helminthoglypta walkeriana*: a rare and endangered land mollusk. Senior. California Polytechnic State University, San Luis Obispo.

Hobbs, R. J., and L. F. Huenneke. 1992. Disturbance, diversity, and invasion: implications for conservation. Conservation Biology 6:324-337.

Holland, V. F., and D. J. Keil. 1995. California Vegetation. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Holland, V.L. and D. Keil. 1985. An Assessment of the Impact of the Southbay Wastewater Treatment Facility's Groundwater Recharge Basins on the Vegetation of Site 6, Los Osos, California. A Botanical Survey Prepared for the Morro Group, Inc. pp. 1-4.

Horowitz, M. 2003. Alternatives to Chemical Stump Treatment of *Acacia dealbata*. in California Invasive Plant Council, Lake Tahoe, California.

Hoshovsky, M. C., and J. M. Randall. 2000. Management of invasive plant species. in C. C. Bossard, J. M. Randall, and M. C. Hoshovsky, editors. Invasive plants of California's wildlands. Pickleweed Press.

Huffman, E.L., L.H. MacDonald, and J.D. Stednick, 2001. Strength and persistence of fire-induced soil hydrophobicity under ponderosa and lodgepole pine, Colorado Front Range . Hydrological Processes 15: 2877-2892.

Hunt, W.G., R. E. Jackman, T. L. Brown, D. E. Driscoll, and L. Culp. 1997. A population study of Golden Eagles at the Altamont Pass Wind Resource Area: second year progress report. Report to National Renewable Energy Laboratory, Subcontracts XAT-5-15174-01 and XAT-6-16459-01. Predatory Bird Research Group, University of California, Santa Cruz. Santa Cruz, California. 93 pages.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

Jacobson, A. 1994. Nectar robbery of the silver leaf manzanita. Senior Thesis. University of California, Santa Cruz, CA.

James, J. J., R. E. Drenovsky, T. A. Monaco, and M. J. Rinella. 2011. Managing soil nitrogen to restore annual grass-infested plant communities: effective strategy or incomplete framework? Ecological Applications 21:490–502. Accessed at http://dx.doi.org/10.1890/10-0280.1

Janzen, D. H. 1986. The eternal external threat. Pages 286-303 in M. E. Soule, editor. Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, MA.

Jennings, M. R. 1988. Natural History and decline of native ranids in California. Pages 61-72 In: H. F. DeLisle, P. R. Brown, B. Kaufman, and B. M. McGurty (editors). Proceedings of the conference on California herpetology. Southwest Herpetologists Society, Special Publication (4):1-143.

Jennings, M. R., and M. P. Hayes. 1985. Pre-1900 overharvest of California red-legged frog (*Rana aurora draytonii*): The inducement for bullfrog (*Rana catesbeiana*) introduction. Herpetologica, 41(1):94-103.

Jennings, M. R., and M. P. Hayes. 1990. Status of the California red-legged frog (*Rana aurora draytonii*): The inducement of bullfrog (*Rana catesbeiana*) introduction. Herpetologica 41(1):94-103.

Jennings, M. R., M. P. Hayes, and D. C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California red-legged frog (*Rana aurora draytonii*) and the western pond turtle (*Clemmys marmorata*) on the list of endangered and threatened wildlife and plants. 21 pp.

Johnson, D. W., R. B. Susfalk, R. A. Dahlgren, and J. M. Klopatek. 1998. Fire is more important than water for nitrogen fluxes in semi-arid forests. Environmental science and policy 1:79-86.

Johnson, N. D., S. A. Brain, and P. R. Ehrlich. 1985. The role of leaf resin in the interaction between *Eriodictyon californicum* (Hydrophyllaceae) and its herbivore *Triryhabda diducta* (Chrysomelidae). Oecologia 66:106-110.

Johnstone, J. A., and T. E. Dawson. 2010. Climatic context and ecological implications of summer fog decline in the coast redwood region. Proceedings of the National Academy of Sciences. 107: 4533-4538.

Jones and Stokes Associates (JSA). 1997. Los Osos/Baywood Park Greenbelt Conservation Plan. The Land Conservancy of San Luis Obispo, Sacramento, CA.

Jones and Stokes Associates (JSA). 2006. East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. Prepared with assistance from Economic and Planning Systems and Resources Law Group for the Contra Costa County Community Development Department. October 2006.

Keeley, A., Ackerly, D.D., Cameron, D.R., Heller, N.E., Huber, P.H., Schloss, C.A., Thorne, J. H., and A.M. Merenlender. 2018a. New Concepts, models and assessments of climate-wise connectivity. Environmental Research Letters 13 (7).

Keeley, J. 1977. Seed production, seed populations in soil, and seedling production after fire for two congeneric pairs of sprouting and nonsprouting chaparral shrubs. Ecology 58:820-829.

Keeley, J. 1991. Seed germination and life history syndromes in the California chaparral. Botanical Review 57:81-116.

Keeley, J., and R. L. Hays. 1976. Differential seed predation on two species of *Arctostaphylos* (Ericaceae). Oecologia 24:71-81.

Keeley, J., and S. Keeley. 1987. Role of fire in the germination of chaparral herbs and suffrutescents. Madroño 34:240-249.

Keeley, J., B. A. Morton, A. Pedrosa, and P. Trotter. 1985. Role of allelopathy, heat, and charred wood in the germination of chaparral herbs and suffrutescents. Journal of Ecology 73:445-458.Keller, L. F., and D. M. Waller. 2002. Inbreeding effects in wild populations. Trends in Ecology & Evolution 17(5): 230-241.

Keller, L. F., P. Arcese, J. N. Smith, W. M. Hochachka, and S. C. Stearns. 1994. Selection against inbred song sparrows during a natural population bottleneck. Nature *372*(6504): 356-357.

Kelley, J., and D. McDonough. 2013. Low-Effect Habitat Conservation Plan Morro Shoulderband Snail (*Helminthoglypta walkeriana*) Kelley-McDonough Parcel (APN 074-471-002) 2285 Bay Vista Lane Los Osos, San Luis Obispo County, California. Submitted to the Ventura Field Office of the US Fish and Wildlife Service. January 2013. 27 pp.

Knick, S. T., and D. L. Dyer. 1997. Distribution of black-tailed jackrabbit habitat determined by GIS in southwestern Idaho. Journal of wildlife management 61 (1):75-85.

Kochert, M. and K. Steenhof. 2002. Golden Eagles in the US and Canada: status, trends, and conservation challenges. Journal of Raptor Research. 36: 32-40.

Koopman, M. E., R. S. Nauman and J. L. Leonard. 2010. Projected Future Climatic and Ecological Conditions in San Luis Obispo County. National Center for Conservation Science and Policy Report. 33 pp.

Kurz, W. A., Dymond, C.C., Stinson, G., Rampley, G.J., Neilson, E.T. and A.L. Carroll, *et al.* 2008. Mountain pine beetle and forest carbon feedback to climate change. Nature, 452: 987

Langenheim, J., and J. Greenlee. 1983. Vegetation, fire history, and fire potential of Big Basin Redwoods State Park, California. Pages 107 in Unpublished report for the California Department of Parks and Recreation.

Lee, K. N. 1999. Appraising adaptive management. Conservation Ecology 3.

Lefcort, H., and A. R. Blaustein. 1995. Disease, predator avoidance, and vulnerability to predation in tadpoles. Oikos 74: 469-474.

Legato, J. 2004. Telephone conversation between Jodi McGraw and Jeff Legato, GIS Analyst with Crawford Multari and Clark Associates regarding the methods used to map vegetation.

Leidy, R.A. 2000. Steelhead. Pp. 101-104 In P.R. Olofson (ed.). Goals Project. Baylands Ecosystem Species and Community Profiles: Life histories and environmental requirements of key plants, fish and wildlife. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Lenihan, J.M., Drapek, R., Bachelet, D., and R. P. Neilson. 2003. Climate change effects on vegetation distribution, carbon, and fire in California. Ecological Applications 13: 1667–1681.

Levine, J. M., and C. M. D'Antonio. 2003. Forecasting biological invasions with increasing international trade. Conservation Biology 17:322-326.

Levine, J. M., Montserrat, V. D'Antonio, C.M., Dukes, J. S., Grigulis, K. and S. Lavorel. 2003. Mechanisms underlying the impacts of exotic plant invasions. Proc. R. Soc. Lond. B.270775–781 http://doi.org/10.1098/rspb.2003.2327

Loarie, S.R., Carter, B.E., Hayhoe, K., McMahon, S., Moe, R., and C. A. Knight et al. 2008. Climate Change and the Future of California's Endemic Flora. PLoS ONE 3(6): e2502. https://doi.org/10.1371/journal.pone.0002502

Longworth, S., and R. Longworth. 2012. Habitat Conservation Plan for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*) Longworth Parcel (APN 074-483-036) 292 Madera Street Los Osos, County of San Luis Obispo, California. Submitted to the Ventura Field Office of the US Fish and Wildlife Service. February 1, 2012. 42 pp.

LSA Associates, Inc. 1992. An assessment of the status of the Morro manzanita (*Arctostaphylos morroensis*). Prepared for Central Coast Engineering, San Luis Obispo, California.

MacDonald, L.H., E.L. Huffman, 2004. Post-fire soil water repellency: persistence and soil moisture thresholds. Soil Science Society of America Journal 68: 1729-1734.

Matthies, D., I. Bräuer, W. Maibom, and T. Tscharntke. 2004. Population size and the risk of local extinction: empirical evidence from rare plants. Oikos *105*(3): 481-488.

McGraw, J. M. 2004a. Interactive effects of disturbance and exotic species on the structure and dynamics of an endemic sandhills plant community. University of California, Berkeley, California.

McGraw, J. M. 2004b. Sandhills conservation and management plan: a strategy for preserving native biodiversity in the Santa Cruz sandhills. Report submitted to the Land Trust of Santa Cruz County, Santa Cruz, CA.

McGraw, J. M. 2005. Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System. Prepared for Crawford, Multari, and Clark Associates. January 2005. 211 pages.

McGraw, J. M. 2020. Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System. Prepared for the County of San Luis Obispo. October 2020.

McGuire, T., and S. C. Morey. 1992. Report to the Fish and Game Commission on the status of Morro Bay manzanita. Natural Heritage Division status report 92-4 California Department of Fish and Wildlife, Sacramento.

Michael Brandman Associates (MBA). 2008. Draft Environmental Impact Report for the County of San Luis Obispo Los Osos Wastewater Project. County of San Luis Obispo Department of Public Works. November 14, 2008. 790 pages plus appendices.

Miller, W. B. 1985. A new subgenus of *Helminthoglypta* (Gastropoda: Pulmonata: Helminthoglyptidae). The Veliger 28:94-98.

Morelli, T.L., Daly C., Dobrowski, S.Z., Dulen, D.M., Ebersole, J.L., Jackson, S.T., et al. 2016. Managing Climate Change Refugia for Climate Adaptation. PLoS ONE 11(8): e0159909. doi:10.1371/journal. pone.0159909

Moreno, J. M., and W. C. Oechel. 1991. Fire intensity effects on germination of shrubs and herbs in southern California chaparral. Ecology 72:1993-2004.

Moser, S., and J. Eksrom. 2012. Developing adaptation strategies for San Luis Obispo County. Preliminary climate change vulnerability assessment for Social Systems. California's Energy Commission Climate Change Center. July 2012. 92 pp.

Moyle, P.B. 1976. Inland fishes of California. University of California Press, Berkeley, California. 408 pp.

Moyle, P.B. 2002. Inland fishes of California: revised and expanded. University of California Press, Berkeley, California. 502 pp.

Moyle, P.B., H.W. Li, and B.A. Barton. 1986. The Frankenstein effect: impact of introduced fishes on native fishes in North America. in Fish culture in fisheries management, edited by R.H. Stroud (Bethesda, Maryland: American Fisheries Society), pp. 415-26.

Mullany, M. 1990. The distribution and variation of *Arctostaphylos morroensis* (Ericaceae). Master's Thesis. California Polytechnic State University, San Luis Obispo.

Myers, N., R. A Mittermeier, C. G Mittermeier, G. A. B da Fonseca, and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403 (6772): 853–858.

National Marine Fisheries Service (NMFS). 2013. South-Central California Coast Steelhead Recovery Plan. West Coast Region, California Coastal Area Office, Long Beach, California.477 pages. Available at: http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/south_central_southern_california/2013_scccs_recoveryplan_final.pdf

National Marine Fisheries Service (NMFS). 2005. Final Critical Habitat for South Central California Coast Steelhead. National Oceanic and Atmospheric Administration. Federal Register 70: 52488.

National Oceanic and Atmospheric Administration and National Marine Fisheries Service (NOAA and NMFS). 2011. South-Central California Coast Steelhead DPS. Available on the Internet at: http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Steelhead/Index.cfm

New, T. R. 1995. Introduction to invertebrate conservation biology. Oxford University Press, Oxford.

Nowell, G. 2004. Memo regarding effectiveness of treatments to control veldt grass. October 22, 2004.

Nyberg, J. B. 1998. Statistics and the practice of adaptive management. Pages 1-7 in V. Sit and B. Taylor, editors. Statistical methods for adaptive management studies. Research Branch, B. C. Ministry of Forests, Victoria, B.C.

Odion, D. C. 2000. Seed banks of long-unburned stands of maritime chaparral: composition, germination behavior, and survival with fire. Madroño 47:195-203.

Odion, D. C., and F. W. Davis. 2000. Fire, soil heating, and the formation of vegetation patterns in chaparral. Ecological Monographs 70:149-169.

Odion, D., and C. Tyler. 2002. Are long fire-free periods needed to maintain the endangered, fire-recruiting shrub *Arctostaphylos morroensis* (Ericaceae)? Conservation Ecology 6:4 online URL: http://www.consecol.org/vol6/iss2/art4.

Odion, D., and C. Tyler. 2003. Recent fire history of maritime chaparral dominated by *Arctostaphylos morroensis*. Conservation Ecology 7.

Oregon Plant Atlas. 2007. Checklist of plants occurring in Oregon. http://www.oregonflora.org/oregonplantatlas.html

Oregon State University Herbarium (OSUH). 2007. List of plant species from Oregon with herbarium specimens at OSU. http://ocid.nacse.org/cgibin/aml/herbarium/plants/vherb.qml

Parker, I. M. 2000. Invasion dynamics of *Cytisus scoparius*: a matrix model approach. Ecological Applications 10:726-743.

Parker, V. T. 1987. Effects of wet-season management burns on chaparral vegetation: implications for rare species. Pages 233-237 in T. S. Elias, editor. Conservation and management of rare and endangered plants. California Native Plant Society, Sacramento, CA.

Parmesan, C. 1996. Climate and species' range. Nature 382: 765–766.

Pauley, G.B. and B.M. Bortz. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific northwest): steelhead trout. U.S. Fish and Wildlife Service. Biological Report 82 (11.62). 24 pp.

Pavlik, B. M., D. L. Nickrent, and A. M. Howald. 1993. The recovery of an endangered plant I: Creating a new population of Amsinckia grandiflora. Conservation Biology 7:510-526.

Perry, D. A. 2000. Forest Ecosystems. The Johns Hopkins University Press, Baltimore.

Pickart, A. J. 2000. *Ehrharta calycina*, *Ehrharta erecta*, and *Ehrharta longiflora*. in C. C. Bossard, J. M. Randall, and M. C. Hoshovsky, editors. Invasive Plants of California's Wildlands. University of California Press, Berkeley, CA.

Pilsbry, H. A. 1939. Land Mollusca of North America. Academy of Natural Sciences, Philadelphia.

Primack, R. B. 2002. Essentials of Conservation Biology. Sinauer Associates, Inc., Sunderland, MA.

PRISM Climate Group (PRISM). 2011. High resolution spatial climate data (precipitation and temperature) for the United States. 1980-2010. Accessed at: http://www.prism.oregonstate.edu/

Rathburn, G. B., M. R. Jennings, T. G. Murphy, and N. R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico creeks, San Luis Obispo County, California. U.S. Fish and Wildlife Service, National Ecology Research Center, San Simeon, California. Prepared for the California Department of Parks and Recreation. 103 pp.

Reeves, E., L. S. Bowker, A. Shaffner, E. Frenzel, and T. Richards. 2000. Habitat and distribution of the Morro shoulderband snail Helminthoglypta walkeriana. California Polytechnic State University, San Luis Obispo.

Roest, A.I. 1973. Morro Bay kangaroo rat habitat evaluation study. Report submitted to the California Department of Fish and Game (Wildlife), Sacramento, California. 19 pp.

Roth, B. 1985. Status survey of the banded dune snail, Helminthoglypta walkeriana. Prepared for the US Fish and Wildlife Service Endangered Species Office. Sacramento, CA.

Roth, B., and J. Tupen. 2004. Revision of the systematic status of *Helminthoglypta walkeriana morroensis* (Hemphill, 1911) (Gastropoda: Pulmonata). Zootaxa 61: 616: 1-203.

San Luis Obispo County Community Fire Safe Council (SLOCCFSC). 2009. Los Osos Community Wildfire Protection Plan. 17 pages.

Sarafian, P. 2004. Telephone conversation with Pete Sarafian regarding effective methods to control veldt grass. November 11, 2004.

Sasikumar, K., Vijayalakshmi, C., Parthiban, K.T., 2002. Allelopathic effects of eucalyptus on blackgram (*Phaseolus mungo* L.). Allelopathy Journal 9, 205–214.

Schneider, S.H. and T.L. 2001. Wildlife responses to climate change. Washington, D.C.: Island Press.

Shaffer, H.B., G. M. Fellers, S. R. Voss, J. C. Oliver, and G.B. Pauly. 2004. Species boundaries, phylogeography and conservation genetics of the red-legged frog (*Rana aurora/draytonii*) complex. Molecular Ecology. 13:2667-2677.

Simmons, T., R. Myers, P. Seamon, and J. Selby. 1995. Bugs in your burn. Prescription Fire Notes Newsletter: The Nature Conservancy 4.

Skinner, M. W., and B. M. Pavlik. 1994. Inventory of rare and endangered vascular plants of California. California Native Plant Society, Sacramento, CA.

Smith, M., and A. K. Knapp. 2001. Size of the local species pool determines invasibility of a C4-dominated grassland. Oikos 92:55-61.

Smith, W. 2002. Sudden Oak Death National Detection Survey and for Forests and Risk/Hazard Map. United States Forest Service.

Soulé, M. E., and D. Simberloff. 1986. What do genetics and ecology tell us about the design of nature reserves? *Biological conservation* 35: 19-40.

Soulé, M. E., and J. W. Terborgh. 1999. eds. Continental conservation: scientific foundations of regional reserve networks. Island Press. 1999.

Sousa, W. P. 1984. The role of disturbance in natural communities. Annual review of Ecology and Systematics 15:353-391.

Stafford, R. 2016. Telephone conversations between Jodi McGraw and Robert (Bob) Stafford, Senior Environmental Scientist, California Department of Fish and Wildlife, Region 4. 2016.

Stewart, G. R. 1958. Notes on the Morro Bay kangaroo rat. Senior Project, Cal Poly State University, San Luis Obispo, CA. 49 pages.

Storer, T. I. 1925. A synopsis of the Amphibia of California. University of California Publications in Zoology 27:1-342.

Stralberg D., D. Jongsomjit, C.A. Howell, M. A. Snyder, J. D. Alexander, et al. 2009. Re-Shuffling of Species with Climate Disruption: A No-Analog Future for California Birds? PLoSONE 4(9): e6825. doi:10.1371/journal.pone.0006825.

Swank, S. E., and W. C. Oechel. 1991. The effects of herbivory, competition and resource limitation on chaparral herbs. Ecology 72:104-115.

SWCA Environmental Consultants (SWCA). 2011. Morro Shoulderband Snail Recovery Action Plan for the Sweet Springs Nature Preserve, Los Osos, San Luis Obispo County, California. Prepared for the Morro Coast Audubon Society. June 2011. 50 pp.

SWCA Environmental Consultants (SWCA). 2012. Habitat Management Plan for the Los Osos Wastewater Project, Los Osos, San Luis Obispo County, California. Prepared for the County of San Luis Obispo Department of Public Works. June 2012. 110 pp.

SWCA Environmental Consultants (SWCA). 2013. 2012 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. January 2013. 46 pp.

SWCA Environmental Consultants (SWCA). 2014. 2013 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. January 2014. 50 pp.

SWCA Environmental Consultants (SWCA). 2015. 2014 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. January 2015. 32 pp.

SWCA Environmental Consultants (SWCA). 2016. 2015 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. April 2016. 30 pp.

SWCA Environmental Consultants (SWCA). 2017. 2016 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. February 2017. 56 pp.

Tate, T., Spurlock, J., and F. Christian. 1997. Effect of Glyphosate on the Development of *Pseudosuccinea columella* Snails**.** Archives of Environmental Contamination and Toxicology. 33: 286. doi:10.1007/s002449900255

Tenera Environmental, Inc. 2006. Letter from Dan Dugan to Steve Kirkland, Ventura Fish and Wildlife Office, regarding presence of Morro and Chorro shoulderband snails on the Lee Property. April 3, 2006.

Tu, M., C. Heard, and J. M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy.

Tupen, J. and B. Roth. 2005. New study confirms restricted status of endangered California land snail. *Tentacle*. 13: 9-10

Tyler, C. 1995. Factors contributing to postfire seedling establishment in chaparral: direct and indirect effects of fire. Journal of Ecology 83:1009-1020.

Tyler, C. M. 1996. Relative importance of factors contributing to post-fire seedling establishment in maritime chaparral. Ecology 77:2182-2195.

Tyler, C., and D. Odion. 1996. Ecological studies of Morro manzanita (*Arctostaphylos morroensis*). Marine Sciences Institute, University of California, Santa Barbara, CA.

Tyler, C., D. Odion, and D. Meade. 1998. Ecological studies of Morro manzanita (Arctostaphylos morroensis): seed ecology and reproductive biology. University of California, Santa Barbara.

Tyler, C., D. Odion, D. Meade, and M. Moritz. 2000. Factors affecting regeneration of Morro Manzanita (*Arctostaphylos morroensis*): Reproductive Biology and Response to Prescribed Burning. University of California, Santa Barbara, CA.

U.S. Department of Agriculture (USDA). 1984. Soil Survey of San Luis Obispo County coastal part. United States Department of Agriculture Soil Conservation Service.

U.S. Fish and Wildlife Service (USFWS). 1970. United States List of Endangered Native Fish and Wildlife. Federal Rule. 35-16047. October 12, 1970.

U.S. Fish and Wildlife Service (USFWS). 1977. Determination of critical habitat for six endangered species. Federal Register Document 77-3094. Federal Register V. 42 No. 155. Thursday August 11, 1977.

U.S. Fish and Wildlife Service (USFWS). 1978. Endangered and threatened wildlife and plants: Determination of five plants as endangered species. 44810, Vol. 42, No. 189. Rules and Regulations. Department of the Interior, United State Fish and Wildlife. Thursday, September 28, 1978.

U.S. Fish and Wildlife Service (USFWS). 1984. Recovery Plan for Salt Marsh Bird's Beak (*Cordylanthus maritimus* subsp. *maritimus*), U.S. Fish and Wildlife Service. Portland, Oregon. 92 pp.

U.S. Fish and Wildlife Service (USFWS). 1994. Endangered or Threatened Status for Five Plants and the Morro Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59:64613-64623.

U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Red-Legged Frog, Final Rule. 25813, Vol. 61, No. 101. Rules and Regulations. Department of the Interior. United States Fish and Wildlife Service. Thursday, May 23, 2996.

U.S. Fish and Wildlife Service (USFWS). 1998a. Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California. US Fish and Wildlife Service, Portland, OR. September 26, 1998. 85 pp.

U.S. Fish and Wildlife Service (USFWS). 1998b. Recovery plan for marsh sandwort (*Arenaria paludicola*) and Gambel's watercress (*Rorippa gambelii*). U.S. Fish and Wildlife Service, Region 1. Portland, Oregon. September 28, 1998.

U.S. Fish and Wildlife Service (USFWS). 1999. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) Draft Revised Recovery Plan. Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 2000. Federal Register 65:54892. Accessed September 11, 2000.

U.S. Fish and Wildlife Service (USFWS). 2001. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*). Federal Register 66:9233-9246.

U.S. Fish and Wildlife Service (USFWS). 2002. Final recovery plan for the California red-legged frog (*Rana aurora draytonii*).

U.S. Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in

California; Final Rule. 52488, Vol. 70, No. 170. Rules and Regulations. Notational Oceanic and Atmospheric Administration. National Marine Fisheries Service. September 2, 2005.

U.S. Fish and Wildlife Service (USFWS). 2006. Banded Dune Snail (*Helminthoglypta walkeriana*) [=Morro shoulderband snail (*Helminthoglypta walkeriana*) and Chorro shoulderband snail (*Helminthoglypta morroensis*)], 5-year review: summary and evaluation. USUSFWS Ventura Fish and Wildlife Office, Ventura, California. 25 pp.

U.S. Fish and Wildlife Service (USFWS). 2008. *Arctostaphylos morroensis* (Morro manzanita) 5-year review: summary and evaluation. USFWS Ventura Fish and Wildlife Office, Ventura, California. March 2008. 17 pp.

U.S. Fish and Wildlife Service (USFWS). 2009. *Chloropyron maritimum* subsp. *maritimum (Cordylanthus maritimus* subsp. *maritimus)* (salt marsh bird's-beak) Five-Year Review: Summary and Evaluation. USFWS Ventura Fish and Wildlife Office, Ventura, California. August 2009.38 pp.

U.S. Fish and Wildlife Service (USFWS). 2010a. *Suaeda californica* (California seablite) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office Ventura, California. February 2010. 20 pages.

U.S. Fish and Wildlife Service **(**USFWS). 2010b. Endangered and Threatened Wildlife and Plants: Revised Designation of Critical Habitat for California Red-Legged Frog; Final Rule. March 17, 2010.

U.S. Fish and Wildlife Service (USFWS). 2011a. Biological Opinion for the Los Osos Wastewater Project, San Luis Obispo County, California (8-8-11-F-5R). Ventura Fish and Wildlife Office, Ventura, California. February 9, 2011. 38 pp.

U.S. Fish and Wildlife Service (USFWS). 2011b. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) 5-year review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California. May 26, 2011. 33 pp.

U.S. Fish and Wildlife Service (USFWS). 2011c. Search for the endangered Morro Bay kangaroo rat July 26-29. Power point presentation prepared by the Ventura Fish and Wildlife Office, Ventura, California. 40 pp.

U.S. Fish and Wildlife Service (USFWS). 2013a. Final Species Report *Eriodictyon altissimum* (Indian Knob Mountainbalm). USFWS Ventura Fish and Wildlife Office, Ventura, California. 34 pp. August 20, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013b. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California. August 27, 2013. 432 pp.

U.S. Fish and Wildlife Service (USFWS). 2014. Marsh sandwort fact sheet. Accessed at: http://www.fws.gov/wafwo/species/Fact%20sheets/MarshSandwort_factsheet.pdf. January 10, 2014.

U.S. Fish and Wildlife Service (USFWS). 2016. Activities over the past several years for Morro Bay kangaroo rat (MBKR) and Indian Knob mountainbalm (IKM). Write up provided by the Ventura Fish and Wildlife Office, Ventura, California. 2 pp.

U.S. Fish and Wildlife Service (USFWS). 2020a. Reclassification of Morro shoulderband snail (*Helminthoglypta walkeriana*) from endangered to threatened with a 4(d) Rule. Federal Register. 85(143) 44821-44835. https://www.govinfo.gov/content/pkg/FR-2020-07-24/pdf/2020-15175.pdf

U.S. Fish and Wildlife Service (USFWS). 2020b. Los Osos Habitat Conservation Plan Environmental Assessment. Ventura Fish and Wildlife Office, Ventura, California. Prepared with assistance from Rincon Consultants, Inc. August 2019. 50 pages.

U.S. Fish and Wildlife Service (USFWS). 2022. Reclassification of Morro shoulderband snail from Endangered to Threatened with Section 4(d) Rule. Federal Register: 87(23) 6063-6077. February 3, 2022.

U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (Wildlife; CDFW). 1996. Survey protocol for the Morro Bay Kangaroo rat (*Dipodomys heermanni morroensis*). April 3, 1996.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 2000. Habitat Conservation Planning and Incidental Take Permit Processing Handbook. December 21, 2016. United States Department of the Interior. Washington, DC. 409 pages. U.S. Forest Service. Pesticide-Use Risk Assessments and Worksheets. Available at: https://www.fs.fed.us/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml

Van der Laan, K. L. 1971. The population ecology of the terrestrial snail, *Helminthoglypta arrosa* (Pulmonata: Helicidae). Ph.D. Dissertation. University of California, Berkeley, CA.

Vanderwier, J. 2017. Personal communication with Julie Vanderwier, Biologist with the Ventura Fish and Wildlife Office of the United States Fish and Wildlife Service. September 20, 2017.

Venette, R.C., and Cohen, S.D. 2006. Potential climatic suitability of the eastern United States for establishment of *Phytophthora ramorum*. Forest Ecology and Management. 231: 18-26.

Villablanca, F. 2004. Morro Bay Kangaroo Rat Survey: Broderson and Tri-W Sites of the Los Osos Wastewater Treatment Facility. Prepared for Morro Group, San Luis Obispo, CA. 8 pp.

Villablanca, F. 2009. Protocol surveys for the Morro Bay Kangaroo Rat (Year 1) 2008. Report submitted to the US Fish and Wildlife Service, Ventura, CA. 26 pp.

Villablanca, F. 2010. Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*) habitat assessment and protocol visual survey: Mid Town Site, Los Osos, CA. Memo submitted to County of San Luis Obispo Public Works, San Luis Obispo, CA. 5 pp.

Waian, L. B., and R. C. Stendell. 1970. The white-tailed kite in California with observations of the Santa Barbara population. Calif. Fish and Game 56:188-198.

Waddell, J, 2014. Personal communications between Walker Toma (EPS, Inc.) and John Waddell (County of San Luis Obispo) regarding sewer fees for the Los Osos Wastewater Treatment project. April 2014.

Walgren, M. 2003a. The current status of the Morro shoulderband snail (*Helminthoglypta walkeriana*). Master's Thesis. San Luis Obispo, California Polytechnic State University.

Walgren, M. 2003b. Distribution and morphotypes of the federally endangered land snail *Helminthoglypta* (Charodotes) *walkeriana* (Hemphill, 1911). Bulletin of the Southern California Academy of Sciences 102:96-98.

Walgren, M. 2004. State Parks Resource Ecologist, Morro Bay, California. Personal communications. June 30, 2004.

Wallace Group. 2011. Los Osos Community Services District 2010: Water Master Plan Capital Improvements Update. Technical Memorandum to Dan Gilmore, LOCSD General Manager. January 7, 2011. 25 pages.

Walgren, M. J. and L. E. Andreano. 2012. Pulmonate gastropod species composition inside and outside eucalyptus forests. California Fish and Game. 98: 164-170.

Walters, C., and C. S. Holling. 1990. Large-scale experiments and learning by doing. Ecology 71:2060-2068.

Weed Society of America. 2002. Herbicide handbook. Eighth Edition. Allen Press. Lawrence, Kansas.

Weiss, Stuart B. 1999. Cars, cows, and checkerspot butterflies: Nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology 13: 1476-1486.

Wells, P. V. 1962. A subarborescent new Eriodictyon (Hydrophyllaceae) from San Luis Obispo, California. Madroño 16.

Westerling, A. L., Bryan. B. P., Preisler, H. K., Holmes, T. P., Hidalgo, H. G., Das, T., and S. R. Shrestha. 2009. Climate Change, Growth, and California Wildfire. California Climate Change Center. CEC-500-2009-046-F.

Western Regional Climate Center (WRCC) 2013. Daily precipitation and temperature data from the Morro Bay Fire Department Weather station (COOP ID: 45866): 1959-2012. Accessed at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5866. July 12, 2013.

Wilcove, D. S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience 48:607-615.

Young, A., T. Boyle, and T. Brown. 1996. The population genetic consequences of habitat fragmentation for plants. Trends in Ecology & Evolution, 11(10): 413-418.

Young, J. A., R. A. Evans, R. E. Eckert, Jr., and B. L. Kay. 1987. Cheatgrass. Rangelands 9:266-276.

Zedler, P. J., and G. A. Scheid. 1988. Invasion of *Carpobrotus edulis* and *Salix lasiolepis* after fire in a coastal chaparral site in Santa Barbara, California. Madroño 35:196-201.

Zeiner, D.C., W. F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1988-1990. California's Wildlife, Vol. I-III. CDFG species account. California Department of Fish and Game (Wildlife). Sacramento, California.

EXHIBIT B

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
2024-0026986

January 17, 2024

Memorandum

To: Field Supervisor, Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service, Ventura, California

From: Assistant Field Supervisor, Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service, Ventura, California

Subject: Intra-Service Biological Opinion on the Issuance of the Incidental Take Permit associated with the Los Osos Habitat Conservation Plan, in the community of Los Osos, San Luis Obispo County, California

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed issuance of an incidental take permit (ITP) to the County of San Luis Obispo pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.) for activities described in the Los Osos Habitat Conservation Plan (HCP) and their effects on the federally threatened Morro shoulderband snail (*Helminthoglypta walkeriana*), the federally endangered Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), the federally threatened Morro manzanita (*Arctostaphylos morroensis*), and the federally endangered Indian Knob mountainbalm (*Eriodictyon altissimum*). Additionally, this document addresses effects to critical habitat for the Morro shoulderband snail and the Morro Bay kangaroo rat as a result of the Service's issuance of an ITP to the County of San Luis Obispo.

The ITP would authorize incidental take of the Morro shoulderband snail that may result from the covered activities described in the HCP. The covered activities include development or redevelopment of private and commercial properties, capital improvement projects, facilities operations and maintenance activities by San Luis Obispo County (County or applicant) and community and private utility purveyors, fire fuels reduction, and habitat restoration and management activities in the community of Los Osos. The ITP would not authorize take of

Morro Bay kangaroo rats, Morro manzanita[1], and Indian Knob mountainbalm[1], but they are included as covered species in the HCP.

We prepared this biological opinion using the HCP, the integrated Interim Adaptive Management and Monitoring Plan (McGraw 2020) (IAMMP), and information from our files.

Not Likely to Adversely Affect Determination

The Service determined that the proposed action may affect but is not likely to adversely affect the Indian Knob mountainbalm. The action area contains two occurrences of Indian Knob mountainbalm, and both locations are on the Bayview unit of the Morro Dunes Ecological Reserve (MDER). The IAMMP contains habitat management strategies for the Bayview unit that will facilitate improvement of the habitat for Indian Knob mountainbalm. These strategies include trail closure and erosion control which degrade and fragment the central maritime chaparral habitat, and restoration actions designed to establish more early seral stages of central maritime chaparral habitat to promote an expansion of the existing Indian Knob mountainbalm occurrences (McGraw 2021). In addition, the HCP conservation program will facilitate recovery of Indian Knob mountainbalm by implementing habitat management required to promote population growth, including fire management that could increase the species distribution and abundance and thus promote long-term persistence and recovery. Chapter 5 of the HCP includes the conservation program for the Indian Knob mountainbalm and is incorporated here by reference (McGraw 2022).

Direct impacts to Indian Knob mountainbalm will be avoided as part of the HCP conservation program. Two occurrences of Indian Knob mountainbalm occur on the Bayview unit of the MDER where habitat restoration and management activities and fire fuels reduction activities are proposed. Pre-activity surveys for these covered activities will be conducted to detect and avoid Indian Knob mountainbalm individuals.

To prevent die back (loss of biomass) or mortality due to use of herbicides to control invasive plants, herbicides will be applied using techniques that will prevent their contact with Indian Knob mountainbalm, such as cut stump treatment or wicking; foliar spray will only be permitted when winds are calm and will not be allowed within 50 feet of Indian Knob mountainbalm individuals (McGraw 2021, McGraw 2022).

Section 4.3.2 of the HCP contains information on how to proceed if Indian Knob mountainbalm cannot be avoided, which may include obtaining a State 2081(a) permit. However, we expect that avoidance is possible because the location and the status of the species has been well studied in the action area. There are seven known occurrences of Indian Knob mountainbalm, three of

[1] Section 9(a)(2) of Act provides limited protection for listed plant species and the prohibitions of take only apply to endangered and threatened wildlife. However, because the proposed issuance of an ITP is a Federal action, section 7 of the Act requires all Federal agencies ensure that any action authorized by an agency is not likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of critical habitat.

which are in the action area: one (Occurrence 1- likely extirpated) is located in the Broderson site; and the other two (Occurrence 4, Occurrence 6) are within the Bayview Unit of the MDER. A census of the three sites within the action area found 22 plants (Occurrence 6) and 23 plants (Occurrence 4) in the two occurrences within the Bayview Unit; however, no Indian nob mountainbalm plants were observed in the Broderson Unit (Occurrence 1; Service 2016). More recent surveys of the species found no individuals at Occurrence 1, further supporting the conclusion that this occurrence has been extirpated. In 2018, field observations confirmed these occurrences were extant, but no population surveys were completed (Kofron et al. 2019).

Based on the applicant's avoidance measures and species survey information, as described above, we concur with our determination that the proposed issuance of the ITP may affect, but is not likely to adversely affect the Indian Knob mountainbalm.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Service proposes to issue an incidental take permit (ITP) to the applicant, pursuant to section 10(a)(1)(B), which would authorize take of the Morro shoulderband snail. The proposed issuance of the ITP would adversely affect the Morro shoulderband snail and its critical habitat, the Morro Bay kangaroo rat and its critical habitat, and Morro manzanita as a result of private development, capital projects, facilities operations and maintenance, fire fuel hazard abatement activities, and conservation program implementation as described in section 2 of the HCP (McGraw 2022).The permit will cover activities in a 3,209-acre permit area for a period of 25 years (Figure 1: Los Osos Habitat Conservation Plan Area and 3,209-acre Incidental Take Permit Area). Section 5.2 of the HCP describes the suite of avoidance and minimization measures proposed by the applicant. As mitigation for unavoidable take of the Morro shoulderband snail, the applicant proposes to implement restoration and management activities on the Morro Dunes Ecological Reserve (MDER); and, if acquired, protect and restore additional parcels with suitable habitat for the species. Additionally, the HCP conservation program includes measures to minimize impacts to Morro Bay kangaroo rat and Morro manzanita, and their habitats.

The covered activities identified in the HCP serve as the basis for the effects analysis conducted for the covered species and critical habitat. The covered activities include:

1. Private development: commercial and residential development and redevelopment (including remodels or additions) on privately-owned legal parcels;
2. Capital projects: public and private infrastructure development projects, such as building or expanding roads, libraries, parks, and water facilities;
3. Facilities operations and maintenance: public and private activities to operate and maintain, including repair and replace, existing facilities, such as roads, drainage basins, water systems, and parks;
4. Fire hazard abatement activities on private parcels: this includes conservation measures implementation, mowing and thinning of vegetation to create a defensible space from

structures as required by California State Public Resources Code (PRC) 4291 (State of California 2022), and the California Department of Forestry and Fire Protection (CALFIRE) to comply with statutory hazard abatement and fire protection measures as part of the Community Wildfire Protection Plan (SLOCCFSC 2009); and

5. Conservation program implementation: pre-activity surveys and relocation of Morro shoulderband snails prior to construction, fuel abatement, or restoration activities; and implementation of the conservation program described in Chapter 5 of the HCP, which includes activities associated with restoration, management, maintenance, and monitoring of habitat preserves used to mitigate the effects of covered activities.

Additionally, Chapter 5 of the HCP includes avoidance, minimization, and compensatory measures and is hereby incorporated by reference (McGraw 2022). The County will implement these measures to avoid or reduce the likelihood, amount, and severity of adverse effects to the covered species and their habitats.

Conservation Measures Included in the ITP

The Service proposes to include terms and conditions in the County's ITP. Terms and conditions are non-discretionary and must be undertaken by the County for the exemptions under section 10(a)(1)(B) and section 7(o)(2) to apply. The terms and conditions in the County's ITP will include the codified terms and conditions (Subpart B of 50 CFR 13), and those pertaining to permit validity, authorized entities, lawful activities, incorporation of the HCP into permit terms and conditions, definition of take coverage, permit transfer, permit modification and amendment process, changed and unforeseen circumstances, physical possession of the permit (or certificate of inclusion (COI)) during covered activities, deposition of remains of covered species, and the correspondence address. We also included terms and conditions to clarify the financial assurances for adaptive management and maintenance of compensatory mitigation in perpetuity.

As a component of the HCP, the County will implement the IAMMP which describes restoration and management activities on the California Department of Fish and Wildlife (CDFW)-owned MDER and required performance criteria to accrue mitigation credits to offset covered activities. The ITP contains a specific condition for the County to develop an Adaptive Management and Monitoring Plan (AMMP) within 3 years of permit issuance in collaboration with the Service and CDFW, which also is indicated in section 5.3.3.2 of the HCP (McGraw 2022, p. 5-13).

The County and CDFW finalized and signed a memorandum of understanding (MOU), which sets forth the terms by which the County may access and undertake habitat enhancement and restoration activities within the MDER (CDFW 2021a). The MOU will expire 5 years from the signature date unless it is renewed by both parties prior to expiration. The County will notify the Service immediately in writing if the MOU is not renewed by either party, or if the MOU is breached. No new certificates of inclusion will be issued until the MOU is renewed or an alternative Service-approved mitigation strategy is developed and implemented (McGraw 2022, section 6.4). Additional terms and conditions in the ITP include the necessary timeline for the MOU renewal process between the County and CDFW.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which describes the current rangewide condition of the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita, the factors responsible for that condition, and their survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determines all consequences to the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita caused by the proposed action that are reasonably certain to occur in the action area; and (4) the Cumulative Effects, which evaluates the effects of future, non-Federal activities, that are reasonably certain to occur in the action area, on the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, and distribution of the Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita.

Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

The destruction or adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the rangewide condition of the critical habitat for the Morro shoulderband snail and the Morro Bay kangaroo rat; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area,

the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which are all consequences to critical habitat caused by the proposed action that are reasonably certain to occur in the action area; and (4) Cumulative Effects, which evaluate the effects of future non-Federal activities in the action area that are reasonably certain to occur.

For the section 7(a)(2) determination regarding destruction or adverse modification, the Service begins by evaluating the effects of the proposed Federal action and the cumulative effects. The Service then examines those effects against the condition of all critical habitat described in the listing designation to determine if the proposed action's effects are likely to appreciably diminish the value of critical habitat as a whole for the conservation of the species.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Morro Shoulderband Snail

Legal Status

The Service listed the Morro shoulderband snail as endangered on December 15, 1994 (Service 1994). We completed a recovery plan for the species and four plants from western San Luis Obispo County in September 1998 (Service 1998). We designated critical habitat on February 7, 2001 (Service 2001) and completed a 5-year status review for the species in 2006 (Service 2006). In 2019, we completed a species status assessment (SSA) report the recommended downlisting the Morro shoulderband snail from endangered to threatened status (Service 2019). We published the reclassification of Morro shoulderband snail from endangered to threatened with a section 4(d) rule on February 3, 2022 (Service 2022a).

Natural History

The Morro shoulderband snail is a member of the terrestrial snail family Helminthoglyptidae. Its genus, *Helminthoglypta*, is a complex of many species of shoulderband snail, each with a relatively small range (Burke et al. 1999). The Big Sur shoulderband snail (*H. umbilicata*) occurs sympatrically (occupies the same geographic area but does not interbreed) with the Morro shoulderband snail (Walgren 2003). We once considered that the Chorro shoulderband snail (*H. morroensis*) occupied a distinctly different geographic distribution from the Morro shoulderband snail (Roth and Tupen 2004); however, now have information that Morro and Chorro shoulderband snails occur sympatrically (Tenera Environmental 2006). Walgren (2003) previously documented intermediate forms of these two species.

The Morro shoulderband snail shells are umbilicate (having a depression at the center), globose (spherical), reddish brown to chestnut in color, thin, and slightly translucent (Roth 1985). The shell has five to six whorls and a single, narrow (2 to 2.5 millimeters (mm) [0.08 to 0.1 inch (in.)]), dark spiral band on the "shoulder" with thin light-yellowish margins above and below. Sculptural features of the shell include incised spiral grooves, spiral and transverse striae

(grooves) that give the surface a checkerboard-like look, and papillae (small, round protrusions) at the intersections of some of the striae (Walgren 2003). Adult shell dimensions range from 18 to 29 mm (0.7 to 1.1 in.) in diameter and from 14 to 25 mm (0.6 to 1.0 in.) in height (Roth 1985).

The Morro shoulderband snail occupies approximately 6,520 acres located in and around the community of Los Osos/Baywood Park and City of Morro Bay. The Morro shoulderband snail is found almost exclusively on Baywood fine sand soils but also occurs on dune land soils. While the preferred native habitat for the Morro shoulderband snail is coastal dune and coastal sage scrub habitats, they also occur in maritime chaparral habitat. They are also present in other native and nonnative plant species, dense clumps of native and nonnative grasses, such as non-native perennial veldt grass (*Ehrharta calycina*); non-native iceplant species (e.g., *Carpobrotus edulis, C. chilensis*); cactus (*Opuntia* spp.); and anthropogenic features and debris (e.g., stockpiled construction materials, wood, cement, plastic) (Roth and Tupen 2004, SWCA 2017).

Past and current observations (Walgren 2003, SWCA 2013, SWCA 2014) indicate that the microclimate necessary for Morro shoulderband snails' survival and reproduction is defined more by plant species physiognomy and soils than presence of any particular plant species. In native habitat underlain by Baywood fine sand soils, the Morro shoulderband snail typically occurs in accumulated organic understory or duff and on the undersides of shrub branches near the soil surface. Plant species commonly associated with the presence of Morro shoulderband snail include mock heather (*Ericameria ericoides*), dune lupine (*Lupinus chamissonis*), seaside wooly sunflower (*Eriophyllum staechadifolium*), deerweed (*Acmispon glaber* [*Lotus scoparius*]), and sand almond (*Prunus fasciculata var. punctata*). Morro shoulderband snails also occur in non-native iceplant species (e.g., *Carpobrotus edulis, C. chilensis*) and the nonnative grassland dominated by perennial veldt grass (*Ehrharta calycina*). They have also been observed sheltering in anthropogenic structures such as wood piles, accumulated debris, and tarps (SWCA 2013, SWCA 2014).

Morro shoulderband snails are most active when increased moisture availability facilitates their ability to disperse, find food, and mate. In the dry season, Morro shoulderband snails, like other terrestrial snail species, aestivate in accumulated litter or attached to the branches of shrubs. As with other snails in the genus *Helminthoglypta*, this species aestivates by producing an epiphragm (a seal of dried mucus in the aperture of the shell) to reduce water loss during the dry season. Information on the bronze shoulderband (*Helminthoglypta arrosa*), a similar terrestrial snail species found in coastal scrub in northern California, indicates that smaller individuals are more often found aestivating under vegetation and leaf litter. They also aestivate under vegetation on the ground (van der Laan 1973a) or on the twigs of shrubs. This may also be the case for Morro shoulderband snail as it if found in habitats with a similar plant species composition to that of the bronze shoulderband.

Like most terrestrial snails, the Morro shoulderband snail is an herbivore, feeding predominantly on detritus. Fungi may be a potential food source for Morro shoulderband snails although as with the bronze shoulderband, dead material is strongly preferred over living material for those acceptable plant species (van der Laan 1973b).

Rangewide Status

At the time of listing, the Service believed Morro shoulderband snails were restricted to sandy soils of coastal dune and dune scrub habitats in the area of Los Osos, Baywood Park, and Morro Bay. Roth (1985) speculated perhaps as few as several hundred Morro shoulderband snails remained throughout the geographic range of the species. A very limited survey for the species conducted in 1992 did not identify any live snails (Service 1994); however, subsequent surveys conducted primarily in association with proposed development projects have consistently identified live individuals indicating the population is more robust than previously thought. Pre-construction surveys conducted as part of the Los Osos Wastewater Project demonstrate that the Morro shoulderband snail occupies a diversity of both native and non-native habitats, as well as anthropogenic substrates and refugia throughout its geographic range (SWCA 2013, SWCA 2014).

Based on the recovery plan and our SSA report (Service 1998, Service 2019), we conclude that the status of the Morro shoulderband snail has improved throughout its range due to the substantial amount of habitat that has been preserved that was previously at risk for development, along with land use decisions and management activities undertaken by the County, California Department of Parks and Recreation (State Parks), and landowners since the time of listing. The SSA report contains an accounting of conservation and management efforts (Service 2020a). Overall, our analysis indicates that the intent of the downlisting criteria for the Morro shoulderband snail has been met, and the Service reclassified the snail from endangered to threatened in 2022 (Service 2022a). The delisting criteria for the snail have not yet been achieved (Service 2022a).

At the time of its listing, threats to the Morro shoulderband snail included habitat loss and degradation, competition from non-native snail species, negative effects of off-highway vehicle activity, and use of pesticides. Since then, several of these threats have been ameliorated; however, habitat loss from development, and especially habitat degradation due to changes in habitat community structure and composition, continue to constitute a substantial threat to the species. Dehydration is a major threat to all terrestrial mollusks; therefore, another threat to the Morro shoulderband snail is exposure resulting from partial or complete removal of protective, sheltering vegetation that provides a more mesic microclimate which may be exacerbated by the effects of climate change (Service 2022a). Morro shoulderband snail, as with other species of *Helminthoglypta*, suffers predation by small mammals and snakes (van der Laan 1980, Huntzinger et al. 2008), however there have been no studies that show that predation is a significant or worsening threat to Morro shoulderband snail recovery.

There have been numerous development and infrastructure projects in occupied habitat that have not only resulted in habitat loss and degradation, but loss of Morro shoulderband snails as well. Many of these projects have captured and relocated snails, especially in the wet season when snails are more active, to reduce the loss of Morro shoulderband snails. However, snails may be captured and relocated during the dry season while they are aestivating. Although no formal studies have been completed to provide evidence that disturbance during aestivation may

negatively affect Morro shoulderband snails, individuals likely survive careful capture and relocation into nearby suitable habitat (SWCA 2014). There was a recent study completed to determine the relative survivorship of relocated Morro shoulderband snails but the small sample size was inconclusive (EcoVision 2022a). A follow up study is being proposed that will increase the sample size and examine relocated snails in both the wet and dry seasons (EcoVision 2022b).

Recovery

The Service prepared a recovery plan for Morro shoulderband snail and four plants from western San Luis Obispo County in 1998 (Service 1998). In the plan, there are four Conservation Planning Areas (CPAs) defined: Area 1: Morro Spit; Area 2: West Pecho; Area 3: South Los Osos; Area 4: Northeast Los Osos. In 2019, the SSA for Morro shoulderband snail concluded that the downlisting criteria defined in the recovery plan have been met, resulting in the reclassification of the snail from endangered to threatened. In 2020, the Service published a proposed downlisting and 4(d) rule for the Morro shoulderband snail (Service 2020a), which resulted in the reclassification of the Morro shoulderband snail from endangered to threatened in 2022 (Service 2022a). The proposed downlisting provided details regarding legal status, natural history, and rangewide status, for the species (Service 2020a). Thus, the current recovery goal for the Morro shoulderband snail is delisting. According to the recovery plan, delisting criteria will be met when habitats from all CPAs are successfully managed to maintain the desired community structure, secured from threats of development, invasion of nonnative species, structural changes due to senescence, recreational use and pesticides. The Service's recovery priority number for the Morro shoulderband snail is 8C, which indicates a subspecies with moderate threats and high recovery potential, but conflicts from increasing residential development still exist, which has not changed since the publishing of the recovery plan.

Recovery actions for the Morro shoulderband snail focus on securing and protecting suitable occupied habitat in all identified CPAs sufficient to support populations of the species in the long-term (i.e., at least 50 years). The recovery plan specifies that Morro shoulderband snail populations and their habitats are secured in all four CPAs with populations large enough to minimize the short-term chance of extinction, as shown by life history studies. There must be adequate progress on control of exotic pest plants (including veldt grass) to ensure that occupied habitat can remain intact and usable to the snail. Progress must have been made toward assessing possible threats, including competition from, or predation by, non-native snails and use of pesticides. It is important to continue efforts to survey for Morro shoulderband snail in potential habitat within the snail's historic range to ascertain whether undiscovered populations exist; if so, delisting criteria will have to be reviewed.

Delisting criteria for the Morro shoulderband snail are the following: sufficient populations and suitable habitats (as shown by life history studies) from each of the four CPAs (and, if necessary, any newly located populations) must be secured from the known threats, including exotic pest plants. Possible threats, including competition from non-native snails, predation by non-native snails, and use of pesticides, must have been assessed and effectively controlled or removed. The sites must be under permanent management to maintain the desired vegetation structure and

control pests and human incursions. Additionally, in order to delist the Morro shoulderband snail, the threat of habitat loss and degradation from development needs to be addressed.

Critical Habitat for Morro Shoulderband Snail

The Service designated critical habitat for the Morro shoulderband snail on February 7, 2001 (Service 2001). It includes three units covering 2,576 acres in western San Luis Obispo County: Unit 1-Morro Spit and West Pecho, Unit 2-South Los Osos, and Unit 3-Northeast Los Osos.

The phrases "primary constituent elements" (PCEs) and "physical and biological features" (PBFs) are synonymous. Critical habitat rules published before February 11, 2016 used the term PCE, while critical habitat rules published after that date use the term PBF. In cases where a critical habitat rule numbers PCEs specifically (e.g., PCE 1), we will use the terms as defined in the critical habitat designation to avoid confusion.

The critical habitat designation for Morro shoulderband snail does not contain a numerical list of what are termed in the document as "primary constituent elements", but instead, describes designated units as providing the following PBFs: sand or sandy soils needed for reproduction; a slope not greater than 10 percent to facilitate movement of individuals; and the presence of native coastal dune scrub vegetation. This vegetation is typically, but not exclusively, represented by mock heather, buckwheat (*Eriogonum* spp.), wooly stars (*Eriastrum* spp.), dune lupine, *Dudleya* species, and in more inland locations, California sagebrush (*Artemesia californica*), coyote brush (*Baccharis pilularis*), and black sage (*Salvia mellifera*).

Much of the designated critical habitat units for Morro shoulderband snail have been placed in conservation status. Of the total 2,576 acres of Morro shoulderband snail critical habitat, 2,192 acres (85 percent) is within existing protected lands, including Montaña de Oro State Park and MDER (Unit 1), the Broderson Parcel and the Bayview Unit of the MDER (Unit 2), and Morro Bay State Park and the Elfin Forest Natural Preserve (Unit 3) (Figure 2: Los Osos Habitat Conservation Plan Action Area and Morro Shoulderband Snail Critical Habitat). The habitat on the Pecho and the Bayview units of the MDER, the Broderson parcel, and Montaña de Oro State Park are degraded with infestation of nonnative veldt grass and ice plant, and the native habitat that remains is senescent due to fire suppression. Therefore, although portions of these units are conserved, they may not provide the habitat that has a complete suite of PBFs described in the designation.

Morro Bay Kangaroo Rat

Legal Status

The Service listed the Morro Bay kangaroo rat as endangered in 1970 (Service 1970). It also was designated as fully protected pursuant to the California Fish and Game Code in 1970 (California Fish and Game Commission 1970). Field research from the late 1950s to mid-1980s (reviewed in Kofron and Villablanca 2016) documented a rapid population decline. Despite many searches

that covered most of the known geographic range, the Morro Bay kangaroo rat has not been captured or seen in the wild since 1986. The last captive individual died in 1993 (Thompson et al. 1995). In 2021, the Service reviewed the best available scientific information on the species' status and concluded that threats affecting the Morro Bay kangaroo rat remain accurate. Therefore, the Morro Bay kangaroo rat still meets the definition of an endangered species (Service 2021).

Natural History

The Morro Bay kangaroo rat is a small, nocturnal, burrowing rodent (family Heteromyidae) with elongated hind legs for hopping. The species occurs on old, stabilized sand dunes (windblown sand deposited late to middle Pleistocene; Wiegers 2009) in the vicinity of Los Osos in San Luis Obispo County, California. The documented historic range of the species is approximately 4.8 square miles, or 3,072 acres corresponding to the distribution of Baywood fine sand soils south and southeast of Morro Bay (Service 1999).

Several genetics studies have been conducted to evaluate the distinctiveness of the Morro Bay kangaroo rat and other subspecies of *Dipodomys heermanni* that occur within San Luis Obispo County, and the Morro Bay kangaroo rat has been regarded as a genetically distinct, monophyletic taxon (Matocq and Villablanca 2001, Villablanca 2007). However, Benedict et al. (2019) concluded that none of the nine subspecies of *D. heermanni* are valid, which included the Morro Bay kangaroo rat (*D. heermanni morroensis*). It is notable that methods employed in Benedict et al. (2019) do not satisfy recommended best practices for questioning genetic distinctness of listed taxa (McCormack and Maley 2015).

Rangewide Status

Because the Morro Bay kangaroo rat has not been observed in the wild since 1986 and because there are no longer any in captivity, the 2011 5-year review considered it as possibly extinct (Service 2011, Service 2021). Kofron and Villablanca (2016) also recognized that the Morro Bay kangaroo rat could be extinct and speculated that, if it was indeed extant, it is likely extirpated from most of the historic range, but may be persisting at extremely low densities in isolated colonies on both public and private land. Therefore, Kofron and Villablanca recommended that surveys continue on the public lands where the greatest concentrations of potential signs were observed during a survey effort in 2011, specifically on conserved State Park and California Department of Fish and Wildlife lands on the western and northeastern sections of the known historic range.

The conclusion by Kofron and Villablanca that the Morro Bay kangaroo rat is likely extirpated from most of its historic range is supported by many comprehensive survey efforts since the last captures in 1986. In 1986, Gambs concluded that out of the historic 3,072-acre range, just 205 acres of occupied habitat remained within the CDFW-owned Morro Dunes Ecological Reserve (Gambs 1986). However, since then, comprehensive range-wide surveys in 1995–2002 (O'Farrell 2003) and 2008–2012 (Villablanca 2009; Kofron and Villablanca 2010, 2011; Service

2012), were not successful in capturing any Morro Bay kangaroo rats within the MDER or anywhere throughout the historic range. In 2016, wildlife scent-detection dog and baited camera trap surveys were conducted in four historically-occupied areas: Pecho South, Junior High/Santa Ysabel, Bayview unit of the MDER (MDER East) where the last capture of a Morro Bay kangaroo rat occurred in 1986, and in the vicinity of the parking lot in north Hazard (Montaña de Oro State Park). These locations were chosen because they had potential signs of Morro Bay kangaroo rat presence in 2011 and 2013 (Villablanca et al. 2021). The dog alerted at two sites in Pecho South and showed special interest at two sites in vicinity of the parking lot in north Hazard. The four sites were in open, low-growing coastal sage scrub with scattered Morro manzanita in Montaña de Oro State Park and comprised of typical habitat for the Morro Bay kangaroo rat (Villablanca et al. 2021). The surveys produced no evidence (photographic images) of Morro Bay kangaroo rats, despite using a trained wildlife scent-detection dog and baited camera traps at alert sites. However, a degree of uncertainty remains because the scent-detection dog committed no false-positive errors during final testing, and the dog was excited and persistent in searching at each alert site.

In addition to the sites surveyed in 2016, the Morro Bay sand spit (total area 1,075 acres) was surveyed from 2021 to 2022. The Morro Bay Sand Spit is a peripheral area of the geographic range with suitable habitat that had never been searched. Unfortunately, these surveys were negative and concluded that it is unlikely that Morro Bay kangaroo rats occupy the Morro Bay sand spit (Hopkins and Villablanca 2023).

Even though no Morro Bay kangaroo rats have been captured since 1986 despite exhaustive survey efforts, Villablanca et al. (2021) concluded that their results, combined with all other existing data, do not allow a determination as to whether the Morro Bay kangaroo rat is extinct or extant. For a definitive determination of extinction, the international standard is that a species should be considered extinct only when there is no reasonable doubt that the last individual has died (International Union for the Conservation of Nature 2012), and this standard has not been met. In 1999, the Morro Bay kangaroo rat recovery team concluded that the last remaining Morro Bay kangaroo rats likely reside on privately-owned lands where access by species experts has been curtailed (Service 1999). Therefore, we support the conclusion that the Morro Bay kangaroo rat is possibly extant based on the best available scientific information on this species.

There are two primary causes of decline of the Morro Bay kangaroo rat, which were identified in the 1982 recovery plan (Service 1982), still remain. First, development in and around Los Osos, including homes, shopping centers and parking lots, has resulted in direct loss of habitat. The Morro Bay kangaroo rat inhabits predominantly early and midseral stages of coastal dune scrub on sandy soil. Only pockets of Morro Bay kangaroo rat habitat remain in the subspecies' historic range, with less than 1 percent of historically available optimal habitat (early seral stages of coastal dune scrub) remaining (Kofron and Villablanca 2016). Second, in the absence of fire, most former optimal habitats for the Morro Bay kangaroo rat have matured to later successional stages of vegetation. Later successional stages of vegetation are denser, have substantially fewer annual food plants, negatively impact the locomotion of kangaroo rats, and change the diversity of the small mammal community with a likely increase in competition (Kofron and Villablanca

2016). The Service also identified the following continuing threats: predation by cats, habitat fragmentation, stochastic events, invasive plant species, competition with other burrowing rodents, and effects of climate change (Service 2011).

Recovery

The Service completed a recovery plan in 1982 (Service 1982). The Morro Bay Kangaroo Rat Draft Revised Recovery Plan was published in 1999, but never finalized (Service 1999). The latter document (Service 1999) states the following: "…Morro Bay kangaroo rats may be reclassified as threatened when an effective genetic population size (Ne) of 500 has been achieved (translating to an actual census size of about 2,000 individuals), and then sustained with a mean at that level for 10 consecutive years, with adequate geographic distribution." Given a mean density of 4 Morro Bay kangaroo rats per acre, we estimated that 500 acres of suitable habitat is required to support the necessary 2,000 Morro Bay kangaroo rats needed to sustain a viable population to reclassify the species. However, the reclassifying the Morro Bay kangaroo rat from endangered to threatened is not likely due to the insufficient amount of remaining historic habitat needed to sustain a stable population (Service 1999).

According to Kofron and Villablanca (2016), out of the 3,072-acre historic range, there remains a total of 1,097 (35 percent) of suitable habitat: 921 acres on conserved lands, and potentially 176 acres on privately-held parcels. However, of that, Kofron and Villablanca (2016) estimate that just 31 acres (1 percent) support optimum early seral stage coastal dune scrub habitat. If these parcels have suitable habitat for Morro Bay kangaroo rat, the remaining habitat could ideally support 4,388 individuals, a sufficient number for recovery if the subspecies is still extant. More comprehensive habitat assessments are needed to determine the quality of habitat of these remaining parcels.

The Morro Bay kangaroo rat has a recovery priority number 6C which means there is a high degree of threat to its continued existence and a low potential for recovery, and that conservation efforts may be in conflict with construction or development projects. This recovery priority number has not changed since 1999 because there has been no improvement on the level of threat to the species (Service 1999, Service 2011, Service 2021).

Critical Habitat for the Morro Bay Kangaroo Rat

The Service designated critical habitat for the Morro Bay kangaroo rat in April 1977 (Service 1977). There is one critical habitat unit, a 689-acre area that includes the southern portion of the Morro Bay sand spit and adjacent habitat west of Pecho Valley Road (Figure 3: Los Osos Habitat Conservation Plan Action Area and Morro Bay Kangaroo Rat Critical Habitat). The critical habitat unit is composed mostly of conserved lands within the Pecho unit of the MDER and the northern portion of Montaña de Oro State Park. The unit also contains private land, some of which is zoned for residential development (McGraw 2022).

The phrases “primary constituent elements” (PCEs) and “physical and biological features” (PBFs) are synonymous. Critical habitat rules published before February 11, 2016 used the term PCE, while critical habitat rules published after that date use the term PBF. In cases where a critical habitat rule numbers PCEs specifically (e.g., PCE 1), we will use the terms as defined in the critical habitat designation to avoid confusion.

The critical habitat designation for Morro Bay kangaroo rat does not describe a list of PCEs or PBFs (Service 1977). However, from what we know of the species and the areas within the critical habitat unit, the Morro Bay kangaroo rat critical habitat includes the following PBFs: compact sandy soils (predominantly Baywood fine sands, not active dunes, low clay content); slope less than 15 percent; and early seral stage coastal dune scrub vegetation (Gambs and Holland 1988, Service 1999).

Morro Manzanita

Legal Status

The Service listed the Morro manzanita as threatened in 1994 (Service 1994). Morro manzanita was included in the Recovery Plan for Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County published on September 28, 1998 (Service 1998). The Service completed a 5-year review for Morro manzanita on December 12, 2013 (Service 2013). The Service published the most recent 5-year review in April 2022. The Service concluded that all threats identified in the 2013 5-year review are on-going. Low germination rate and the Sudden Oak Death pathogen are new threats to the species (Service 2022b).

Natural History

Morro manzanita is a long-lived shrub in the heath family (Ericaceae), with mature individuals reaching 12 feet in height. Morro manzanita produces white to pink downward-facing, urn-shaped flowers starting in December. Orange-red fruits mature in summer and contain 8 to 10 seeds each; seed dispersal occurs in the fall.

Although we do not know whether the flowers are self-compatible, extensive research revealed that pollination is required for reproduction. In 1998 and 1999, Tyler and Odion found that bumblebees (*Bombus vosnesenskii*) are the dominant pollinators, though anthophorid bees (*Anthophora urbana*), several bee flies (*Bombylius* spp.), and syrphid flies (family Syrphidae) are also known pollinators. The authors also noted surprisingly low pollinator activity for both years surveyed (Tyler et al. 1998 and 2000). Only 10 percent of flowers examined in 1998 produced fruits. Pollinator abundance and abiotic factors (i.e., climate) may play a role in annual and seasonal variation (Tyler et al. 1998).

Birds and large mammals (coyote (*Canis latrans*) and mule deer (*Odocoileus hemionus*) are thought to aid Morro manzanita in seed dispersal (Keeley and Hays 1976). This secondary dispersal (which occurs after the parent plant initially sets seed) is limited, however, as

evidenced by 90 percent fewer seeds present in soil cores 5 feet (1.5 meters) away from Morro manzanita compared to samples taken from beneath the canopy (Tyler and Odion 1996).

There is a clear difference in a basic life history trait that separates the genus *Arctostaphylos* into two functional groups. One group resprouts from a woody burl following canopy removal by fire or mechanical action. The other group has lost this ability to resprout and, as such, reproduce only by seed. Lacking a woody burl from which it can resprout, Morro manzanita is an obligate-seeding species. Seeds of obligate seeders are long-lived and inhibited from germinating until primary dormancy is released by a specific mechanism. The dormancy mechanism allows the species to build up a seed bank that is persistent (Tyler and Odion 1996).

For Morro manzanita and other obligate-seeding species of manzanita, maintenance and regeneration are dependent upon mass germination triggered by fire (Tyler and Odion 1996). Fire breaks also create open areas where seedlings can germinate and individuals establish. The life history of an obligate seeder can only be successful if the interval between fires is long enough for seeds to accumulate the quantity required to replace the parent generation. The number of seeds in the soil that must accumulate is very high because seed mortality is substantial in chaparral burns (Tyler et al. 2000). However, suppressing fire for too long could lead to the development of climax, closed-canopy chaparral stands, eventually having an adverse effect on populations of Morro manzanita by precluding expansion into otherwise suitable habitat and maintenance of even-aged, eventually senescing stands; this is referred to as "senescence risk" (Ne'eman et al. 1999). Morro manzanita occurs in association with coastal dune scrub, maritime chaparral, and coast live oak woodland communities (Service 1998). In openings between the shrubs, these communities support a diversity of native and nonnative herbaceous species.

Morro manzanita is primarily found on Baywood fine sand soils (ancient wind-blown beach sands) developed on ancient sand dunes deposited during the Pleistocene epoch. The species is present on a variety of slopes and aspects, though cover is concentrated within two slope categories: 9 to 15 percent slopes, and 15 to 30 percent slopes (McGraw 2005, Tyler and Odion 1996). On steep slopes, particularly on the north-facing slopes of the Irish Hills, it can be found in almost pure stands. This narrow habitat preference makes this species particularly vulnerable to habitat loss and fragmentation. Approximately 75 percent of its historical habitat has been converted for residential use, resulting in highly fragmented populations. The limited dispersal abilities of this species further exacerbate the threat of habitat fragmentation.

Rangewide Status

Morro manzanita ranges from the northeast side of Morro Bay to the southern end of Montaña de Oro State Park, a distance of less than 10 miles. The distribution of Morro manzanita is correlated with the distribution of Baywood fine sands. Based on the distribution of these sands, the historical distribution of Morro manzanita is estimated to have comprised between 2,000 and 2,700 acres (Service 2013). In 1994 when the species was listed, it was estimated that the range covered by Morro manzanita was 840 to 890 acres (Service 1994). In 2013, we estimated that

approximately 75 percent of the former range of the species had been converted to urban development, and the existing extent of Morro manzanita has been reduced to less than 400 acres (Service 2013). Using the California Natural Diversity Database, we estimate the range of Morro manzanita to be 1,271 acres, although current data is needed to better inform our estimate (Service 2022b).

Because stands of Morro manzanita, and maritime chaparral in general, grow so densely, it is difficult to count numbers of individuals during surveys. The variation in stand density and the growth habits of the species make demographic studies difficult (McGuire and Morey 1992). Therefore, estimates of abundance have typically been based on the density of cover instead. During surveys in 1991, LSA Associates Inc. (LSA) (1992) used five cover classes and percent, 50 to 75 percent, 25 to 50 percent, 5 to 25 percent, and 1 to 5 percent. Based on this approach, LSA estimated approximately 153,000 Morro manzanita plants occurred across the species' range at the time of listing. LSA made these estimates based on a helicopter flyover and pedestrian surveys of Morro manzanita populations within Montaña de Oro State Park and above Cabrillo Estates. LSA assumed that an individual plant covered approximately 100 square feet (9.3 square meters) or 11.3 feet (3.4 meters) in diameter. However, McGuire and Morey produced a lower estimate than LSA (using a 15-foot diameter per individual), estimating that the total species population would be closer to 86,500 individuals (McGuire and Morey 1992).

Recovery

The recovery objective for Morro manzanita is delisting. Morro manzanita can be considered for delisting when all three of the following have been achieved: (1) 90 percent of existing acreage supporting high (75-100 percent) and medium (25-75 percent) cover of Morro manzanita and 85-90 percent of low (1-24 percent) cover supporting Morro manzanita are secured from human-induced threats in preserves in the Northeast Los Osos, South Los Osos and West Pecho CPAs with no greater fragmentation by roads, residences, or other areas of human use than currently exists, (2) evidence that the acreage and approximate cover classes of Morro manzanita in preserves can be maintained over time and that preserves are not made unmanageable by small size, proximity to urban development, or fragmentation, and (3) site-specific management plans have been successfully implemented for the preserves (Service 1998). Because habitat in the CPAs must remain unfragmented to recover this species, habitat attrition must be restricted to isolated or remnant patches of Morro manzanita that are unlikely to be viable over the long term. Highest priority for securing sites should be given to stands where Morro manzanita is the dominant in terms of cover, where large blocks of occupied habitat are still present, and where Morro manzanita habitat can be secured that abuts other protected lands, as in the South Los Osos CPA.

Since it was listed in 1994, the recovery priority number given to Morro manzanita has changed from 2C to 8 (Service 2013; C. Kofron, Service, pers. comm. 2023). The current recovery priority number denotes a full species with a moderate degree of threat and a high potential for recovery. The recovery priority number change in status since the time of listing is based on the reduction of the threat of development (Service 2022b).

The recovery plan for Morro manzanita was updated to include delisting criteria that incorporate the biodiversity principles of representation, resiliency, and redundancy (Schaffer and Stein 2000) and threats addressed under the five factors. The criteria for delisting Morro manzanita provides more detailed needs of the species to improve the chances of recovery for the species. Delisting may be warranted when the downlisting criteria have been met and the species exhibits sufficient resiliency, redundancy, and representation to support its long-term viability.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Act (50 CFR 402.02) define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The action area is the 3,209-acre Los Osos Habitat Conservation Plan Permit Area (Figure 1: Los Osos Habitat Conservation Plan Area and 3,209-acre Incidental Take Permit Area).

Condition (Status) of the Species in the Action Area

Morro Shoulderband Snail

There has been no rangewide population census conducted to estimate the size or density of the snail population within the action area. Most of the distributional information available on the Morro shoulderband snail is presence and absence data, from which the size, density, or viability of populations cannot be inferred (Service 1998). From the frequency of Morro shoulderband snail observations in the action area documented in numerous protocol survey reports submitted by recovery-permitted biologists, it is reasonable to conclude that the size of the Morro shoulderband snail population in Los Osos is large and distributed ubiquitously throughout the range in both native and non-native habitats and substrates (D. Kirkland, pers. comm., October 27, 2023). A study by EcoVision (2019) measured the relative density of snails in various native and nonnative habitats on conserved parcels. The study provides an indication of the high variability of Morro shoulderband snail occurrence and density in both native and non-native conserved habitat.

There have been numerous residential development infrastructure repair projects in occupied habitat in the action area that have implemented the capture and relocation of small numbers of Morro shoulderband snails as a conservation measure (D. Kirkland, pers. comm., October 27, 2023). The Service has not calculated the total number of Morro shoulderband snails relocated annually from this activity, nor do we know how many of these Morro shoulderband snails survive, nor whether there are deleterious effects to existing Morro shoulderband snails at the relocation site. Although no formal studies have been completed to provide evidence that disturbance during aestivation may negatively affect Morro shoulderband snails, individuals likely survive careful capture and relocation into nearby suitable habitat (SWCA 2014).

Within the action area, there is primary and secondary habitat for Morro shoulderband snail (McGraw 2022). Primary habitat is presumed to support a greater abundance of Morro shoulderband snail than secondary habitat. Primary habitat is defined as coastal sage scrub, Morro manzanita-California sagebrush, and wedgeleaf ceonothus-California sagebrush communities. Secondary habitat is defined as Morro manzanita-wedgeleaf ceonothus community and developed areas. The IAMMP delineates and quantifies the primary and secondary habitat on the CDFW-owned MDER where the County will focus habitat restoration projects to benefit the Morro shoulderband snail as mitigation for the impacts to the species incurred as a result of the covered activities. The 102 acres (36 percent) of primary habitat on the MDER is comprised of coastal sage scrub and wedgeleaf ceanothus-California sagebrush communities. Secondary habitat comprised of Morro manzanita-wedgeleaf ceanothus community covers 63 acres (23 percent) of the MDER (McGraw 2021). The primary habitat on the MDER is moderately degraded by invasive species and unauthorized trails, and the secondary habitat is somewhat degraded from unauthorized trails and erosion and decadent condition of habitat from lack of fire.

There have been no comprehensive Morro shoulderband snail population surveys conducted on the MDER. However, CDFW biologists that conducted Morro shoulderband snail surveys during the creation of a fuel break on the MDER in 2020 observed numerous Morro shoulderband snails in both primary and secondary habitat (McGraw 2021). Although the fuel break surveys did not provide a Morro shoulderband snail population estimate or density, the frequency of observations of the species could indicate a robust population of snails within the MDER.

Morro Bay Kangaroo Rat

The Morro bay kangaroo rat has not been observed in the wild since 1986 despite exhaustive searches throughout its historic range (Service 2021). Of the 1,097 acres that are considered to support suitable habitat for the Morro Bay kangaroo rat, most (921 acres) are on conserved lands, 738 acres of which are within the action area (Kofron and Villablanca 2016). The remaining 176 acres of Morro Bay kangaroo rat habitat assumed to persist on private land is within the action area (Figure 4: Historic Known Range of the Morro Bay Kangaroo Rat (Kofron and Villablanca 2016)). The action area includes 914 acres of potential Morro Bay kangaroo rat habitat. The quality of habitat on both the conserved and private parcels has not been assessed, and so actual acres of suitable habitat could be much lower. Surveys have been conducted since 1986 on most of the parcels and on additional undeveloped land have not been successful. In fact, except for the 54-acre undeveloped parcel in the center of the action area and Urban Services Line (USL), the remainder of undeveloped land within the action area is not considered to support suitable habitat for the Morro Bay kangaroo rat due to fragmentation and degradation from development, recreation, increase in domestic pets from residential development, fire suppression leading to habitat succession and an increase in invasive species that has replaced most of the native coastal scrub and open maritime chaparral habitats (Villablanca et al. 2021). There have been many surveys conducted in the past that have not detected the subspecies in these areas. Except for the 54-acre parcel, the Morro Bay kangaroo rat is considered to be extirpated from these areas. Although surveys have been negative, the species may still be present in the action area below

detectable levels (Service 2021). The areas in the action area that have been identified for further surveys are several private parcels where the species has been detected in the past but recent survey efforts have been prohibited. These private parcels are located on the east side of the action area within the Priority Conservation Area, and the 54-acre parcel in the center of the urban service line in the action area. There is a slight chance that suitable habitat may still exist on those parcels where the species has been observed in the past and there may be remnant isolated populations or individuals of Morro Bay kangaroo rat that may persist (Villablanca et al. 2021). Also, large areas of public lands were previously occupied by the Morro Bay kangaroo rat and many patches of habitat remain on public lands in the action area at the Pecho Unit and Bayview units of the MDER and these areas need to be thoroughly searched (Villablanca 2021).

Morro Manzanita

At the time of the 1994 listing, the historic range of Morro manzanita was estimated to be between 2,000 and 2,700 acres (800 and 1,100 hectares) based on the distribution of Baywood fine sands in the Morro Bay area. Within that historic range, estimates of the area occupied by Morro manzanita varied between 840 to 890 acres (LSA 1992) to less than 400 acres (Tyler and Odion 1996), depending on the method used to determine density of stands (Service 2013). Over time, much of the flat and gently sloped area covered by Baywood fine sands has been subject to urban development, primarily by the communities of Los Osos, Baywood Park, and Cuesta-by-the-Sea on the south and east sides of Morro Bay (Service 2013). In 2013, we estimated that approximately 75 percent of the former range of the species had been converted to urban development, and the existing extent of Morro manzanita had been reduced to less than 400 acres (Service 2013). In 2022, we estimated total area of occupancy for the species using the California Natural Diversity Database (CNDDB) (CDFW 2021b, entire) to estimate the range to be 1,271 acres (514 hectares) consisting of six recorded occurrences. It was noted that, although the data in the CNDDB is not recent, we used the best available information to help inform our estimate (Service 2022).

The action area overlaps with 840 acres of the current estimated range, and occurs within central maritime chaparral communities (Figure 5: Current Known Range of Morro Manzanita in the Los Osos HCP Action Area). It is the dominant species (i.e., in terms of canopy cover) within the Morro manzanita chaparral and co-dominates with wedgeleaf ceanothus and California sagebrush. Morro manzanita also occurs at low abundance in the coast live oak woodland, in the understory or canopy gaps of coast live oak. Scattered Morro manzanita also occurs in other communities including in the developed areas within the action area (McGraw 2022). Note that while dense patches of individuals may be important for the long-term persistence of the species, patches with low densities of individuals may be equally as important, especially if they contain other components of the ecosystem that contribute to long-term persistence, such as open spaces between other maritime chaparral shrubs for recruitment of new individuals (Service 2013).

Morro manzanita is adapted to recurring fire, an important component of the disturbance regime within the Baywood fine sands ecosystem. Fire kills adult Morro manzanita, which lack a burl from which to resprout; however, it promotes seed germination and establishment, and therefore regeneration (Tyler et al. 2000). Effective fire management, or management that mimics the effects of fire, will likely be essential to the species' long-term persistence. Too-frequent fire may decrease populations by killing adults prior to accumulation of sufficient viable seed to replace them (Odion and Tyler 2002). At the same time, fire exclusion may cause 'senescence risk'. As adult shrubs senesce and die, seed production decreases; at some point, seed availability could be reduced to a level below which seedling establishment following an eventual fire is insufficient to replace the stand (Odion and Tyler 2002). Fire has been suppressed in the action area, and therefore, most stands of Morro manzanita are senescent with very little if any new recruitment.

Morro manzanita is also impacted by vegetation management in the action area, including fire hazard abatement on private and public lands. Because Morro manzanita does not resprout from its burl like other manzanita species, excessive pruning to reduce fire fuels can kill Morro manzanita plants by removing too much foliage leaving too little to sustain the plant, as can be observed in the Cabrillo Estates fuel break. Plus, with ongoing fire suppression in the action area, Morro manzanita seeds in fire fuels treatment areas are not being activated by fire to induce sprouting, so seedling establishment, and thus stand recovery, is limited (Tyler et al. 1998, McGraw 2022).

Morro manzanita is threatened by habitat loss, including land conversion, and habitat degradation from invasive species and incompatible recreational uses that cause erosion (Service 2008, McGraw 2021, McGraw 2022). Morro manzanita was once widespread in the action area where residential and commercial development is now sited and unavailable for Morro manzanita recovery. Invasive species, such and veldt grass and iceplant, cover open areas in Morro manzanita habitat where Morro manzanita could germinate if its seeds were activated by fire. Incompatible recreational uses on the MDER, such as equestrians and unauthorized and poorly sited user-created trails, have caused severe erosion of the fragile soils. Land managers have attributed Morro manzanita trimming to equestrians to maintain excessively wide trails for their unauthorized use (McGraw 2021). Stormwater runoff is channeled in the deep and wide trails caused by unauthorized creation and use and removes topsoil, the Morro manzanita seedbank, and in some cases, entire Morro manzanita individuals (McGraw 2021). If not managed, the invasive species and erosion will continue to impact Morro manzanita.

Recovery

Morro Shoulderband Snail

The action area overlaps with the eastern portion of CPA 2, the northern portion of CPA 3, and the very southwestern edge of CPA 4. Both the Pecho and Bayview units of the MDER are contained in CPA 2 and 3 within the action area (Service 1998). These areas were identified to encompass those locations the Service believed were of greatest importance to secure the

recovery of Morro shoulderband snail and the other listed Morro Bay species discussed in the recovery plan: Indian Knob mountainbalm, and Morro manzanita. A focal criterion for the general delineation of the CPAs was that each contained native habitats supporting one or more of these three species (Service 2019). The recovery plan also described these areas as predominantly in protected status and containing large areas of mostly intact coastal dune scrub and maritime chaparral communities (Service 1998).

Morro Bay Kangaroo Rat

Although the action area overlaps with much of the historic range of the Morro Bay kangaroo rat (Service 1999), very little suitable habitat remains for the species. The HCP identifies that there are 1,363.6 acres of potential Morro Bay kangaroo rat habitat within the action area, as shown in Figure 6: Los Osos HCP 5-3: Morro Bay Kangaroo Rat Survey Area. The Service determined that within this area, only pockets of habitat remain on 914 acres of conserved and private parcels in the action area, with optimal habitat (early seral stages of coastal dune scrub) comprising an estimated 1 percent or 31 acres of the historical geographic range (Kofron and Villablanca 2016). In the HCP, Figure 3-3 General Vegetation and Land Cover in the HCP shows most of the coastal dune scrub is located in the PCA, with the exception of the 54-acre undeveloped parcel and surrounding area in the center of the action area within the USL near the Midtown site (Figure 7: Distribution of Coastal Dune Scrub within the Action Area). The figure shows dispersed small disjunct pockets of habitat throughout the portion of the action area within the USL (McGraw 2022). However, the quality of this habitat is not known and many areas that were formerly coastal dune scrub have been replaced with invasive species such as veldt grass. Although only a small portion of suitable habitat remains in the action area, conservation of remaining habitat and improving the quality of degraded habitat is essential to recover the Morro Bay kangaroo rat (Service 2021).

Morro Manzanita

The action area overlaps with the eastern portion of CPA 2, the northern portion of CPA 3, and the very southwestern edge of CPA 4. Both the Pecho and Bayview units of the MDER are contained in CPA 2 and 3 within the action area (Service 1998, McGraw 2022). These areas were identified to encompass those locations that are of greatest importance to secure the recovery of Morro manzanita and the other listed Morro Bay species discussed in the recovery plan: Morro shoulderband snail and Indian Knob mountainbalm (Service 1998). A focal criterion for the general delineation of the CPAs was that each contained native habitats supporting one or more of these three species (Service 2019). These areas as predominantly in protected status and contain large areas of mostly intact coastal dune scrub and maritime chaparral communities (Service 1998, Service 2019).

Condition (Status) of Critical Habitat in the Action Area

Morro Shoulderband Snail

The action area overlaps with 674.7 acres of Morro shoulderband snail critical habitat within the southeastern edge of Unit 1, all of Unit 2, and the southwestern portion of Unit 3. Of those 674.7 acres of critical habitat in the action area, 394.2 acres are in conservation lands, and 280.5 acres are unprotected (McGraw 2022). In those unprotected acres, there are approximately 412 parcels already developed within critical habitat, and 60 parcels that are zoned for development but are currently undeveloped.

Some of the land within both the protected and unprotected critical habitat in the action area lacks the physical and biological features that are essential to conservation of the species as defined as Morro shoulderband snail critical habitat. These PBFs are "sand or sandy soils needed for reproduction, a land slope not greater than ten percent to facilitate movement of individuals, and the presence of native coastal sage scrub vegetation, which was defined as typically but not exclusively represented by mock heather, buckwheat, wooly stars, dune lupine, and *Dudleya* species; and in more inland locations by California sagebrush, coyote brush and black sage (Service 2001). While the majority of the undeveloped parcels zoned for development within the critical habitat units are on sandy soils with less than 10 percent slope, few are vegetated with native coastal dune scrub species, but instead are dominated with veldt grass and iceplant. However, the acreage of undeveloped parcels zoned for development that do or do not possess all of the PBFs within critical habitat in the action area are not known.

Morro Bay Kangaroo Rat

The 1977 critical habitat designation for Morro Bay kangaroo rat does not describe PCEs or PBFs. However, from what we know of the species and the areas within the critical habitat unit, the Morro Bay kangaroo rat critical habitat includes the following physical and biological features: compact sandy soils (predominantly Baywood fine sands, not active dunes, low clay content); a slope of less than 15 percent; and early seral stage coastal dune scrub vegetation or open, early seral stage coastal maritime chaparral (Gambs and Holland 1988, Service 1999). The openness of the early seral stage vegetation is likely the most important characteristic Morro Bay kangaroo rat habitat (Stewart and Roest 1960, Villablanca 1987).

Of the 689 acres of Morro Bay kangaroo rat critical habitat, 92.3 acres are within the action area. Of those acres, 47.7 acres are in protected status and 44.6 acres are unprotected. The protected acres of critical habitat within the action area contain the needed slope and soil, and some portions also have the needed early seral stage coastal dune scrub, and therefore possess all the PBFs essential to support Morro Bay kangaroo rat recovery. The unprotected critical habitat contains 27 acres zoned for single-family residential land use and consists of mostly developed parcels. There are only four remaining undeveloped parcels of critical habitat in the action area. One 0.51-acre parcel is slated for development, two parcels are bisected with road right-of-ways to access adjacent residential parcels. One 17-acre parcel remains that is intact and adjacent to

conserved land. This parcel has suitable soil and slope for critical habitat; however, the presence or condition of early seral stage coastal dune scrub vegetation is unknown.

EFFECTS OF THE ACTION

The implementing regulations for section 7(a)(2) define effects of the action as "all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action" (50 CFR 402.02).

The covered activities identified in the HCP serve as the basis for the effects analysis conducted for the covered species and critical habitat. The covered activities include development and construction on previously undeveloped parcels, facilities maintenance and operation, fire fuels reduction, and restoration and land management activities. Much of the impacts to listed species from the covered activities will result from vegetation removal or habitat modification, as describe in more detail below.

Morro Shoulderband Snail

Morro shoulderband snails occur in both native and nonnative habitats and anthropogenic structures throughout the action area. They are found on large contiguous expanses vegetated with both native habitat and nonnative veldt grass and iceplant. They are found in isolated fragments of native and nonnative vegetation on roadsides, path and sidewalk edges, and along parkways, and on small and large vacant residential parcels. Therefore, impacts to any vegetation from the covered activities, whether native or nonnative, will potentially impact Morro shoulderband snails. We expect that the covered activities would result in the loss or degradation of up to 532 acres, or 7 percent of the species range.

The covered activities will impact Morro shoulderband snails and its habitat directly and indirectly, causing harm, injury, or mortality to individuals. Because of their small size and cryptic nature, Morro shoulderband snails could be directly impacted when vegetation is disturbed, altered or removed. The pre-activity surveys, required for all covered activities, may result in mortality and injury to individuals, if not handled and moved appropriately by a qualified biologist. If not relocated during pre-activity surveys, snails could be killed or injured during vegetation clearing. Biologists conducting biological effectiveness monitoring within potentially occupied Morro shoulderband snail habitat may impact snails by inadvertently trampling them and crushing them resulting in injury or mortality of Morro shoulderband snails. An increase in residential development could indirectly impact snails and their habitat by increasing the recreational use and potential degradation of remaining habitat areas.

Fuel hazard abatement treatment activities are anticipated to impact both native and nonnative Morro shoulderband snail habitat. These treatments can include removal of dead plants, thinning

and selective removal of shrubs and trees, as well as mowing of non-native grasslands. These activities will be conducted by certificate holders on their land, the County on their parcels, as well as CAL FIRE conducting fire fuels reduction to create other fuel breaks to protect lands within the HCP preserve system from wildfire. In the Service's 4d rule, we determined fire fuels reduction activities will have short-term effects to Morro shoulderband snails, but will reduce the risk of catastrophic wildfires which would otherwise could result in local extirpation of the species (Service 2022, p. 6076). The anticipated short-term impacts on Morro shoulderband snail are the removal of plants used by the species for food and sheltering. Fire hazard abatement activities may reduce available vegetation for refugia when nonnative grasses are mowed or shrubs are thinned or removed to create defensible space. By targeting invasive plants, such as eucalyptus, veldt grass, and exotic annual grasses, fuel hazard abatement projects have the potential to promote growth of native plant species and enhance habitat conditions in the long term for the species. However, it is possible that these activities could result in long-term impacts to Morro shoulderband snail habitat if required maintenance of these areas precludes the vegetation from recreating conditions that provide sheltering and feeding for Morro shoulderband snails.

Morro shoulderband snail could also be impacted by habitat restoration and management activities, including erosion stabilization and revegetation, exotic plant control projects, and fire hazard abatement activities. Specifically, Morro shoulderband snails may be impacted by the use of herbicides to control exotic plants to restore habitat in the HCP preserve system. As mentioned previously, Morro shoulderband snail can occur in high numbers in nonnative veldt grass and iceplant. During restoration of habitat degraded by veldt grass, exotic annual grasses, and iceplants, Morro shoulderband snails could be exposed to herbicides by ingestion and absorption while living in, or migrating through, a recently treated area. Direct herbicide spray or drift from spray could contaminate soil; leaves, stems, and branches of shrubs and other live plants; leaves, mold, and fungi in plant litter; and potential shelter sites for Morro shoulderband snails, including downed wood, rocks, or debris piles.

The potential effects of herbicide exposure for Morro shoulderband snail are unknown as most standard toxicology analyses do not test effects of pesticides on snails (Service 2018). A study found that the herbicide glyphosate caused genotoxicity to *Bulinus truncates*, an air-breathing, freshwater snail (Bakry et al. 2015). Aquatic snails exposed to glyphosate exhibited abnormalities in development and reproduction (Tate et al. 1997). However, atrazine was concluded to have no effect on four species of freshwater snails (Gustafson et al. 2015).

Habitat restoration activities have the potential to impact snails directly when occupied nonnative vegetation is removed or treated with herbicide. Occupied habitat may be removed to be replaced by native habitat, temporarily decreasing the amount of available habitat for the species. The effects of these impacts will be offset by the protection, restoration, and management of habitat in the HCP preserve system and are not anticipated to affect the long-term persistence of the species within the action area.

As part of the conservation program, prior to vegetation clearing, fire hazard reduction, and habitat restoration, a qualified biologist will survey the project area and capture any observed Morro shoulderband snails and relocate them out of harm's way to conserved sites outside the treatment area. The relocation of Morro shoulderband snails is intended to reduce impacts by minimizing the potential crushing and trampling of snails from activities. However, capture and relocation of Morro shoulderband snails has the potential to result in killing or injuring individuals by damaging their shells or their epiphragm, or by harming individuals by disrupting normal feeding, breeding, or sheltering behaviors. Absent any completed studies, we must consider that some individuals could suffer physiological stress or even death if their epiphragm is affected or individuals experience desiccating conditions because of disturbance during aestivation during capture and relocation. It is expected that the level of take from capture and relocation will be less than if there was no effort to locate, capture and relocate snails, and they were crushed and killed during vegetation clearing activities.

The conservation program included in the HCP will result in positive effects to Morro shoulderband snail from restoration and management of existing protected lands, as well as providing an active program for acquiring additional lands that can be restored and managed to benefit the species. Restoration of protected lands will increase the quality and quantity of native coastal dune and central maritime chaparral habitats, and reduce the amount of nonnative species that disrupt the function of native habitats. Management of protected lands will repair damage caused by overuse and lack of erosion control methods that will result in additional available habitat for the species. The measures that will be implemented during fire hazard abatement activities will reduce the intensity of vegetation treatment to allow the physical features for Morro shoulderband snail feeding, sheltering and reproduction to take place if possible while still achieving hazard reduction prescriptions. By reducing the threat of catastrophic wildfire that could decimate Morro shoulderband snail populations and habitat, fuel hazard reduction activities ensure the security of Morro shoulderband snail habitat (Service 2020a).

Morro Bay Kangaroo Rat

The ITP will not authorize take of Morro Bay kangaroo rats. Therefore, all covered activities must result in full avoidance of the species. The HCP conservation program includes pre-activity surveys by a qualified biologist to visually assess proposed project areas to determine if they contain potential Morro Bay kangaroo rat habitat. If potential habitat is observed, the site will be thoroughly surveyed by a qualified biologist to locate any identifying sign for the species, such as unique borrow openings, tail drags, or grain caches. If sign is observed, surveys to detect presence or absence will be completed by a qualified biologist. If the species is detected, all work will stop immediately, and the project proponents will contact CDFW and the Service to determine next steps.

It is presumed that the majority of the covered activities will occur in the central portion of the action area within the USL. Exhaustive efforts have been made to detect Morro Bay kangaroo rats and locate potentially occupied habitat in these areas, except for the 54-acre privately-owned parcel in the center of the action area within the USL. All surveys have resulted in no detections

of the Morro Bay kangaroo rat and this species is considered to be extirpated from these areas. However, species experts agree that there is a chance that the Morro Bay kangaroo rat may exist in small, isolated colonies and has eluded detection (Kofron and Villablanca 2016, Villablanca et al. 2021, Service 2021). As a precaution, pre-activity surveys will be conducted in all potential project areas defined on Figure 5-8: Morro Bay kangaroo rat Avoidance Area (Included here as Figure 6: Los Osos HCP 5-3: Morro Bay Kangaroo Rat Survey Area) (Section 5.7.1 and Table 5-2: Covered Species Avoidance and Minimization Measures). The pre-activity surveys would provide much needed information about the Morro Bay kangaroo rat on private land, such as those large undeveloped parcels where access during previous survey efforts had been precluded. Unless pre-activity surveys indicate possible presence by the Morro Bay kangaroo rat, we do not expect direct effects to the species. However, we do expect that the loss of habitat (although highly degraded but part of the historic range of the species) would indirectly impact the Morro Bay kangaroo rat because it would no longer be available for restoration and subsequent use by this species. Furthermore, except for the remaining large undeveloped parcels, the remaining degraded habitat within the USL where the majority of covered activities will occur does not support recovery due to fragmentation and increased threats, such as from domestic cats and human activity (Service 2021).

The proposed restoration activities have the potential to harm, kill, or injure Morro Bay kangaroo rats if they are present or occupy restoration sites. Pre-activity surveys to identify Morro Bay kangaroo rat sign will be conducted before implementing restoration activities to avoid harm, injury, or mortality to the subspecies. Although the further degradation of habitat considered no longer suitable for the Morro Bay kangaroo rat may occur as a result of covered activities and this habitat would be no longer available for restoration, the applicant has proposed implementation of the restoration activities on conserved lands. By focusing on the needs of the Morro Bay kangaroo rat, the proposed restoration could result in improvements to habitat that could potentially support Morro Bay kangaroo rats if they occur thereby increasing quantity and quality of the available habitat for the subspecies. Pre-activity surveys within the Morro Bay kangaroo rat avoidance area will be conducted prior to implementing fire hazard abatement activities by certificate holders, the County, or CAL FIRE. These activities could protect remaining habitat from catastrophic wildfire, or allow prescribed fire to safely occur to improve habitat conditions by restoring the optimal early seral stage of the coastal dune scrub habitat.

Morro Manzanita

The covered activities will impact Morro manzanita individuals that cannot be avoided during project siting. Development and the creation of roads and other impermeable surfaces or landscaping elements will result in the removal and killing of individuals and prevention of viable seed in the soil from germinating. Minimization measures for implementation of fire hazard abatement activities precludes the removal of individual Morro manzanita and the minimum canopy thinning and limbing necessary to achieve fire hazard reduction goals. However, some mortality may result from this covered activity. Vegetation clearing may result in the removal and killing of Morro manzanita plants and excessive trimming of individuals may

reduce vigor and result in killing of the plant. Removal of topsoil could remove Morro manzanita seeds from the area preventing them from sprouting.

Morro manzanita may also be impacted during implementation of the conservation program. Individuals could experience die back (loss of biomass) or mortality due to use of herbicides to control invasive plants. However, the potential for this will be reduced through implementation of an integrated pest management approach to exotic plant control, in which: 1) non-chemical treatments are used in areas supporting Morro manzanita, wherever possible, and 2) chemical treatments deemed necessary to achieve the management objectives are conducted using techniques that will prevent chemical contact with Morro manzanita, such as cut stump treatment or wicking, and foliar spray only away from Morro manzanita and when winds are calm.

Adult Morro manzanita shrubs are also anticipated to be killed by fire or fire surrogates - treatments that simulate the beneficial effects of fire, including mechanical vegetation removal. These treatments will be used to maintain the mosaic of natural communities of the Baywood fine sands ecosystem and promote regeneration of Morro manzanita, among other fire-dependent species. Vegetation clearing may result in the removal and killing of Morro manzanita plants. Removal of topsoil during vegetation clearing could remove Morro manzanita seeds from the seedbank preventing germination.

Although these activities will result in direct, negative, short-term impacts to the individuals, they are anticipated to promote long-term persistence of the populations by facilitating regeneration through germination of seeds of this obligate seeding plant from the soil seed bank. Fire and fire surrogates have the potential to facilitate the invasion and spread of exotic plants that are adapted to such disturbance and the conditions it creates. The County proposes to monitor fire and fire surrogate treatment areas for early detection of exotic plants, and implement remedial treatments to limit exotic plant competition with Morro manzanita seedlings and other native plants. Other habitat management and restoration treatments, including revegetation of denuded areas, and control of exotic plants such as eucalyptus, will similarly enhance habitat for Morro manzanita (McGraw 2022).

Effects on Critical Habitat

Morro Shoulderband Snail

The action area overlaps with 674.7 acres of Morro shoulderband snail critical habitat. While private parcels of relatively high conservation value will be targeted for protection as part of the HCP conservation program (HCP sections 5.3.2 and 6.2.2), the HCP will also result in private development and other public and private infrastructure projects in these areas. Based on the maximum disturbance envelope and parcel size distribution, development of vacant parcels could result in the removal of up to 37.5 acres of critical habitat. Residential redevelopment projects, which are assumed to affect 10 percent of the residentially developed parcels, could impact another 14.2 acres. Finally, small public and private utility projects (e.g., road or pipeline work along South Bay Boulevard), as well as the potential construction of the Los Osos Perimeter

trail, and as some facilities maintenance projects have the potential to impact an estimated 2 acres of Morro shoulderband snail critical habitat. In total, the covered activities are estimated to impact up to 53.7 acres of Morro shoulderband snail critical habitat within the action area.

Importantly, some, if not most, of the land within the unprotected parcels lacks all the physical and biological features that are essential to conservation of the species (McGraw 2022). These primary constituent elements are "sand or sandy soils needed for reproduction, a land slope not greater than 10 percent to facilitate movement of individuals, and the presence of native coastal sage scrub vegetation, which was defined as typically but not exclusively represented by mock heather, buckwheat, wooly stars, dune lupine, and *Dudleya* species; and in more inland locations by California sagebrush, coyote brush and black sage (Service 2001).

Implementation of the HCP's conservation program will result in the improvement of the critical habitat PBFs for Morro shoulderband snail in all three units, by contributing to the restoration and management of the existing protected lands with the exception of the Broderson property within Unit 2, which the County is managing as part of a separate habitat management plan (SWCA 2012). In doing so, the HCP will help achieve the objectives for designating the three units (Service 2001). The HCP conservation program may also protect additional critical habitat, through fee title acquisition or through on-site habitat set asides dedicated as part of partial residential development of the remaining undeveloped private parcels described above. Therefore, the conservation program could result in the conserved parcels in other areas of critical habitat that are currently lacking the physical and biological features, such as native coastal dune scrub, to be restored to functioning units of critical habitat through habitat rehabilitation or improved management (e.g., removal of nonnative species). For example, the IAMMP proposes to restore the Bayview unit of the MDER, replacing 22 acres nonnative veldt grass with native coastal scrub species which will reestablish the complete suite of physical and biological features to 22 acres of Unit 2 (McGraw 2020). Other restoration actions that will improve the condition of critical habitat Unit 2 are trail closure and erosion control. A total of 4.3 acres of critical habitat will be regained as a result of these closures and habitat restoration, however, only a portion of that work is located within coastal dune scrub and open maritime chaparral with less than 10 percent slope (McGraw 2020).

Morro Bay Kangaroo Rat

The unprotected critical habitat in the action area contains 27 acres zoned for single-family residential land use and consists of mostly developed parcels (McGraw 2022). There are only four remaining undeveloped parcels of critical habitat in the action area located outside the USL. One 0.51-acre parcel is in the permitting process for development prior to the completion of the HCP. The three remaining parcels could be developed under the HCP. The HCP limits development of parcels outside the USL to 30,000 square feet. Two parcels, (APN 074-024-019, 3.31 acres; 074-024-036, 2.45 acres) may have suitable soil and slope, but habitat quality is unknown. Both these parcels are bisected and fragmented with rights-of-way access to adjacent residential parcels, and could be developed under the HCP. Just one 17-acre intact parcel remains that is adjacent to conserved land in Montana de Oro State Park. This parcel has suitable soil and

slope for critical habitat, however, the presence of early seral stage coastal dune scrub vegetation or open, early seral stage coastal maritime chaparral is unknown. If the owners of these three parcels choose to develop, pre-activity surveys will be required to detect the Morro Bay kangaroo rat and assess the habitat to support the subspecies. If no Morro Bay kangaroo rats are detected, development could take place under the HCP. The disturbance footprint will require 3:1 on-site habitat conservation in the form of a conservation easement. As per the conservation program in the HCP, the disturbance envelope and the conservation easement will be sited in areas which will cause the least impact to the covered species as possible. Such as, siting the easement adjacent to other protected habitat, like the State Park-owned lands that are within the designated critical habitat unit, and siting the development on the lowest quality habitat within the parcel, such as near Pecho Valley Road or other developed parcels. The resulting impacts to Morro Bay kangaroo rat critical habitat from development of these three parcels would be 86,680.5 feet of habitat loss, and the addition of 260,041.5 square feet (about 6 acres) of conservation easement.

As mentioned, the unprotected portion of critical habitat is divided between both developed and undeveloped land. There are 18 developed residential parcels on 16 acres. The County estimates that 10 percent of those 16 developed acres will undergo redevelopment under the HCP which will result in 1.6 acres of impacts to Morro Bay kangaroo rat critical habitat from the covered activities. Finally, construction of the conceptual Los Osos Perimeter Trail could impact an estimated 1.2 acres of critical habitat. It is estimated that the covered activities could result in the loss of 208,648.5 square feet (4.8 acres) of land within Morro Bay kangaroo rat designated critical habitat.

The County proposed to compensate for the loss of Morro Bay kangaroo rat critical habitat by enhancing critical habitat for the species within the Pecho unit of the MDER, which is proposed for inclusion in the HCP Preserve System. Covered activities proposed for this location include habitat restoration, management, and monitoring, all of which are intended to improve the quality of habitat for the covered species, including the Morro Bay kangaroo rat. As part of the HCP conservation program, the County may also protect additional critical habitat, through fee title acquisition or through on-site habitat set asides dedicated as part of partial residential development of the remaining private parcels described above.

Effects on Recovery

Morro Shoulderband Snail

The issuance of the ITP will result in increased development as well as increased conservation in the form of habitat restoration and conservation land and easement acquisition. The County anticipates that most development will be for small in-fill residential parcels in the central portion of the action area. The eastern edge of CPA 2 and the northwestern edge of CPA 3, and the southwestern edge of CPA 4 are zoned for residential or suburban development. However, these same CPAs are included in the PCA as part of the HCP conservation program (Figure 8: Los Osos Habitat Conservation Plan Priority Conservation Area). Any development that occurs

in these areas will be mitigated at a 3:1 ratio. If parcels identified for development in the Priority Conservation Areas are greater than 2 acres in size, the development will be limited to 30,000 square feet and the remainder of the parcel will be set aside in a conservation easement and managed for the covered species by the County. The conservation program for restoration and conservation land acquisition will focus on habitats in the periphery of the action area, and overlaps with CPA 2, 3, and 4.

The goals of the conservation program are consistent with the recovery goals of the species. While there may be habitat within the CPAs that overlap with the action area proposed for development, the impacts of that development to the Morro shoulderband snail will be offset with mitigation fees that will fund habitat restoration and acquisition of habitat, which will help facility recovery for the species.

Morro Bay Kangaroo Rat

The covered activities would result in development of up to 532 acres of the 1,363.6 acres of potential Morro Bay kangaroo rat habitat within the action area. Development is anticipated to occur mainly in the central portion of the action area. The HCP conservation program mitigates for the loss of habitat through implementation of the IAMMP and AMMP that will identify goals and objectives to support recovery of the covered species, including Morro Bay kangaroo rat. Some of the few pockets of suitable Morro Bay kangaroo rat habitat that remain are predominantly located within the PCA of the action area where restoration and conservation efforts will be focused (McGraw 2022). The County will conduct pre-activity surveys and if a Morro Bay kangaroo rat is detected, the County will implement avoidance measures that ensures no injury or mortality to the species occurs as result of covered activities. Overall, we expect that the implementation of the HCP conservation program, including the IAMMP and AMMP, would result in the improvement of the quantity and quality of protected habitat for Morro Bay kangaroo rat. Additionally, proposed development within the PCA will be appropriately sited to avoid important habitat features, and the County will acquire on-site habitat set asides on larger parcels to include within the Preserve System for restoration and management for the benefit of Morro Bay kangaroo rat and the other covered species.

The most recent 5-year review listed conducting surveys on private lands with suitable habitat where previous survey efforts have been precluded as a primary recovery goal (Service 2021). The implementation of the HCP will require assessment of each proposed project location for Morro Bay kangaroo rat habitat suitability, including the larger undeveloped parcels zoned for residential development within the action area. If habitat is found to be suitable and characteristic sign of presence is observed, protocol presence and absence surveys will be required. Pre-activity and presence and absence surveys will benefit recovery by obtaining needed information to inform the Service on the current status of the species on these sites.

Although the covered activities include development, a leading threat of recovery to the Morro Bay kangaroo rat, the majority of the development will occur in areas from which the subspecies has been extirpated. As a precaution, all areas in the Morro Bay kangaroo rat avoidance area,

even those where it is believed to be extirpated, will require pre-activity surveys to identify for any sign of the subspecies. The areas recommended for further surveys and restoration (Kofron and Villablanca 2016) are either in protected status where habitat restoration is proposed, or are on large privately-owned parcels. Pre-activity surveys will be required if these private parcels are slated for development. The pre-activity surveys will provide data to inform the Service on recovery status of the species. If the species is not found and development is proposed, the development will be limited to 30,000 square feet of development on the parcel. Development will be sited to minimize impacts to remaining habitat on site which will be preserved with an on-site habitat set aside to be included in the HCP conservation program and restored and managed to support covered species recovery, including Morro Bay kangaroo rat. According to the estimates from the 1999 draft revised recovery plan, there is enough conserved land with potential suitable habitat to support a sustaining population of Morro Bay kangaroo rats to accomplish reclassification of the subspecies, if it exists. Much of this conserved land is in the action area and will be enrolled in the conservation program to restore and manage habitat for the Morro Bay kangaroo rat and the other covered species. And, pre-activity surveys will be conducted prior to restoration activities to ensure that no Morro Bay kangaroo rats are harmed, killed or injured by the restoration activities.

Morro Manzanita

The conservation program included in the HCP incorporates all the recovery goals identified for Morro manzanita (Service 2022, McGraw 2022). The implementation of the HCP will initially involve the implementation of the IAMMP, which includes actions to reduce human-caused impacts to Morro manzanita on the Bayview unit of the MDER by closing unauthorized trails and controlling erosion, stressors that are currently fragmenting the existing stands of Morro manzanita. The Morro manzanita population in the action area within the USL, where the County expects most of the dense development to occur, consists of smaller isolated stands that, by definition, do not support the recovery goals for the species. The development activities will exacerbate the isolated and disjunct nature of these urban stands through removal of individual Morro manzanita in the development footprint or the implementation of fire fuels reduction activities. Increased development within the USL in and around these fragmented stands and isolated individuals of Morro manzanita has the potential to reduce cross pollination between individuals that may exacerbate an already narrow gene pool. However, the conservation measures are intended to avoid or reduce these impacts whenever possible. In addition, the conservation program includes measures to improve the stability and condition of existing stands of Morro manzanita on conserved lands within the PCA, and the acquisition of unprotected Morro manzanita stands for conservation and restoration and to improve connectivity between existing conserved lands.

Further, the conservation program of the HCP includes the creation and maintenance of an endowment to manage and maintain restored Morro manzanita habitat in perpetuity, which will fulfill recovery objective 2. The development and implementation of the AMMP will establish the site-specific management plan for the preserve system, fulfilling the third benchmark for recovery.

Summary of Effects

Morro Shoulderband Snail

The proposed project could adversely affect a large number of Morro shoulderband snails. By implementing the conservation measures during covered activities designed to avoid and minimize direct and indirect impacts to the species, we anticipate that the number of Morro shoulderband snails adversely affected will be lower than without those measures in place. In addition, the conservation program is expected to increase the value of Morro shoulderband snail habitat on existing conserved land and newly acquired habitat and by restoration and management of on-site habitat set asides. The improved value and function is expected to help increase the population of snails, and achieve recovery goals to facilitate recovery of the species.

Morro Bay Kangaroo Rat

The proposed project is designed to minimize adverse impacts to Morro Bay kangaroo rat. The County will implement conservation measures that ensures no Morro Bay kangaroo rats are injured or killed during covered activities. The reduction in undeveloped habitat caused by development concentrated in the central part of the action area will be offset by the proposed restoration of existing conserved land and newly acquired habitat in areas more conducive for Morro Bay kangaroo rat recovery. In addition, the implementation of the pre-activity surveys within suitable habitat on private land will achieve one of the highest priority recovery goals for the species: comprehensive surveys on all remaining suitable habitat.

Morro Manzanita

The proposed project may adversely affect a small number of Morro manzanita plants. We estimate that the number of individuals killed and removed will be low due to the conservation measures included in the project description. In addition, the conservation program is expected to increase the value and function of Morro manzanita habitat on existing conserved land and newly acquired habitat and by the restoration and management of on-site habitat set asides. The improved habitat value and function is expected to increase the number of Morro manzanita plants and facilitate recovery of the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act.

We do not anticipate additional projects that will impact the covered species in the action area, other than the covered activities (HCP Section 2.2) and those activities that are specifically not covered by the HCP (Section 2.3). As part of work to develop this regional plan, the County

contacted local and State agencies and private organizations that manage land within the action area, to ascertain whether they anticipate conducting activities, including ongoing maintenance and operations and capital projects, that would impact the covered species. The activities identified by these entities were all included in the covered activities.

CONCLUSION

The regulatory definition of "to jeopardize the continued existence of the species" focuses on assessing the effects of the proposed action on the reproduction, numbers, and distribution, and their effect on the survival and recovery of the species being considered in the biological opinion. For that reason, we have used those aspects of the status of Morro shoulderband snail, Morro Bay kangaroo rat, and Morro manzanita as the basis to assess the overall effect of the proposed action on the species.

Morro Shoulderband Snail

Reproduction: The project would have a moderate effect on reproduction of the species, but would not appreciably reduce reproduction of the species rangewide.

Numbers: The project would cause a moderate decrease in the number of individuals.

Distribution: The project would not reduce the species' distribution rangewide.

Recovery: The project would not cause any effects that would preclude our ability to recover the species.

Morro Bay Kangaroo Rat

Reproduction: The project would not negatively affect reproduction because individuals will be avoided. Thus, the project would not appreciably reduce reproduction of the species rangewide.

Numbers: The project would not cause a decrease in the number of individuals.

Distribution: The project would not reduce the species' distribution rangewide.

Recovery: The project would not cause any effects that would preclude our ability to recover the species.

Morro Manzanita

Reproduction: The project would have a moderate effect on reproduction of the species, but would not appreciably reduce reproduction of the species rangewide.

Numbers: The project would cause a low decrease in the number of individuals.

Distribution: The project would not reduce the species' distribution rangewide.

Recovery: The project would not cause any effects that would preclude our ability to recover the species.

Critical Habitat

The regulatory definition of "adverse modification" focuses on assessing if the proposed action will result in alterations that appreciably reduce the value of critical habitat for the conservation of a listed species. This includes assessing the impacts of the proposed action on the physical or biological features essential to the conservation of a listed species or assessing if those alterations preclude or significantly delay development of such features. For that reason, we have used those aspects of the Morro shoulderband snail and Morro Bay kangaroo rat designated critical habitat status as the basis to assess the overall effect of the proposed action on the critical habitat.

Morro Shoulderband Snail

After reviewing the current status of the critical habitat of Morro shoulderband snail, the environmental baseline of critical habitat for the action area, the effects of the proposed issuance of the ITP for the Los Osos HCP on critical habitat, and the cumulative effects, it is the Service's biological opinion that the ITP issuance and the activities for which take would be authorized, as proposed, is not likely to result in the destruction or adverse modification of critical habitat of the Morro shoulderband snail because:

1. The project would have a moderate effect on physical and biological features if they exist on the remaining 60 undeveloped parcels within the 280.5 acres of unprotected critical habitat in the action area. The HCP conservation program proposes to restore physical and biological features within up to 278.7 acres of critical habitat on the MDER. Therefore, the implementation of the HCP conservation program proposes to counterbalance adverse effects to physical and biological features caused by development.
2. The project would have a high positive effect on the conservation value and function of critical habitat, by focusing conservation, restoration and acquisition of designated critical habitat into larger cohesive areas to enhance habitat function and connectivity to support resiliency of the species.

Morro Bay Kangaroo Rat

After reviewing the current status of the critical habitat of Morro Bay kangaroo rat, the environmental baseline of critical habitat for the action area, the effects of the proposed issuance of the ITP for the Los Osos HCP on critical habitat, and the cumulative effects, it is the Service's biological opinion that the ITP issuance and the activities for which take would be authorized, as proposed, is not likely to result in the destruction or adverse modification of critical habitat of the Morro Bay kangaroo rat because:

1. If any coastal dune scrub habitat (one of three PBFs) is present on the unprotected undeveloped portions of Morro Bay kangaroo rat critical habitat in the action area, development as part of the project would have adverse effects on 4.8 acres of the 689-acre critical habitat unit. The covered activities also include the restoration and maintenance of coastal dune scrub habitat within the 49-acre Pecho unit of the MDER which would result in positive effects to Morro Bay kangaroo rat critical habitat.
2. The project would have a moderate effect on the conservation value and function of critical habitat from the restoration and maintenance of coastal dune scrub habitat within the 49-acre Pecho unit of the MDER which would result in positive effects to Morro Bay kangaroo rat critical habitat. The conservation program includes the acquisition of additional conservation lands that could add protections and management to currently unprotected critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened wildlife species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Regulations allow for incidental take statements to rely on the use of "surrogates" for estimating the amount of take that is reasonably certain to occur as a result of the proposed action in certain circumstances. To use a surrogate to estimate take, the following criteria must be met: (1) the incidental take statement must describe the causal link between the surrogate and the take of the listed species; (2) the incidental take statement must explain why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species; and (3) the incidental take statement must set a clear standard for determining when the level of anticipated take of the listed species has been exceeded.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species; however, limited protection of listed plants is provided at section 9(a)(2) to the extent that the Act prohibits the removal and reduction to possession of federally listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed plants on non-Federal areas in violation of State law or regulation or in the course of a violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE

Morro shoulderband snails are difficult to locate due to their small size and cryptic aestivation habitat preferences such as deep within leaf litter or culms of bunch grass. Therefore, it is not reasonable to expect that all Morro shoulderband snails within the permit area will be located if killed or injured as a result of the covered activities, or to capture for relocation. Therefore the ITP, if issued, proposes to authorize the County under the Act, to incidentally take all Morro shoulderband snails of all life stages in the form of harm, capture, injury, and mortality caused by the implementation of the covered activities on 532 acres within the permit area as a result of activities proposed in the HCP for the 25-year permit term. The ITP contains the take limits authorized to the County for activities proposed in the HCP.

REPORTING REQUIREMENTS

The HCP, the IAMMP, and the ITP's terms and conditions of the ITP include robust annual reporting requirements. For example, annual reporting will include status of restoration and management activities for mitigation credit, acres of habitat impacted, funding assessment, non-compliance of COIs, performance assessment of restoration activities completed for mitigation credit, and number and location of relocated and killed Morro shoulderband snails. The Service will review the annual reports to ensure compliance with this biological opinion and the associated incidental take statement.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured Morro shoulderband snail, initial notification within 3 working days of its finding must be made by telephone and in writing via electronic mail to the Ventura Fish and Wildlife Office (805-644-1766). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

The County or its agent must take care in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. The County or its agent must transport injured animals to a qualified veterinarian. Should any treated Morro shoulderband snails survive, the County or its agent must contact the Service regarding the final disposition of the animal(s).

Any remains of dead, intact Morro shoulderband snail must be collected by a Service-approved biologist and biodeposited at a professional facility that is widely accessible for scientific study, which includes either the California Academy of Sciences (Golden Gate Park, San Francisco, California 94118, (415) 750-7037 and 7239) or the Santa Barbara Museum of Natural History (2559 Puesta del Sol Road, Santa Barbara, California 93105, (805) 682-4711). Arrangements regarding the deposition of potential museum specimens must be made with a receiving institution prior to the implementation of any fieldwork. Other arrangements for deposition of specimens may be made with prior written approval from the Ventura Fish and Wildlife Office.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the HCP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may have lapsed and any further take could be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending reinitiation.

If you have any questions about this biological opinion, please contact Debora Kirkland of my staff by electronic mail at debora_kirkland@fws.gov.

LITERATURE CITED

Bakry, F., Ismail, S., and M. A. El-Atti. 2015. Glyphosate herbicide induces genotoxic effect and physiological disturbances in *Bulinus truncatus* snails. Pesticide Biochemistry and Physiology. 123: DOI: 10.1016/j.pestbp.2015.01.015.

Benedict BD, Castellanos AA and Licht JE. 2019. Phylogeographic assessment of the Heermann's kangaroo rat (*Dipodomys heermanni*). Journal of Mammalogy 100:72–91.

Burke, T.E., J.S. Applegarth, and T.E. Weasma. 1999. Management recommendations for survey and manage - Terrestrial Mollusks. USDA Forest Service R-5/6, DOI Bureau of Land Management OR/WA/CA.

[CDFW] California Department of Fish and Wildlife. 2021a. Memorandum of Understanding between California Department of Fish and Wildlife and the County of San Luis Obispo. Central Region, California Department of Fish and Wildlife, Sacramento, California.

[CDFW] California Department of Fish and Wildlife. 2021b. California Natural Diversity Database: occurrence report for *Arctostaphylos morroensis*. Unpublished cumulative data dated 1 October 2021 and valid to 1 April 2022 (retrieved 15 October 2021). Sacramento, California. 10 pp.

California Fish and Game Commission. 1970. 1970 supplement to Fish and Game Code. Sacramento: California Fish and Game Commission.

California Code, Public Resources Code § 4291 (2022) (CA PRC).

EcoVision. 2022a. Morro shoulderband snail (*Helminthoglypta walkeriana*): An Investigation of the Relative Success of Morro Shoulderband Snail Relocation. EcoVision Partners LLC. Prepared for U.S. Fish and Wildlife Service Ventura Office. June 2022. 25 pp.

EcoVision. 2022b. Proposal for Dry Season Study of the Relative Success of Morro Shoulderband Snail (*Helminthoglypta walkeriana*) Relocation. December 23, 2022.

Gambs, R.D. and V.L Holland. 1988. Ecology of the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*). Final Report; U.S. Fish and Wildlife Service; Contract No. 14-16-0001-85154 NR.

Gustafson, K.D., Belden, J.B., and M. G. Bolek. 2015. The effects of the herbicide atrazine on freshwater snails. Ecotoxicology (2015) 24: 1183. doi:10.1007/s10646-015-1469-x.

Hopkins, J. and F. Villablanca. 2023. Determining extinction for small cryptic species: a sand spit survey for Morro Bay kangaroo rat. Draft final report. Biological Sciences Department, California Polytechnic State University, San Luis Obispo, California. January 2023. 24 pp.

Huntzinger, M., R. Karban, and J.H. Cushman. 2008. Negative effects of vertebrate herbivores on invertebrates in a coastal dune community. Ecology 89:1972-1980.

International Union for the Conservation of Nature. 2012. IUCN red list categories and criteria: version 3.1. 2nd edition. Gland, Switzerland: International Union for the Conservation of Nature. 32 pp.

Kofron, C.P., and N. Havlik. 2016. Status of the endangered Chorro Creek bog thistle *Cirsium fontinale* var. *obispoense* (Asteraceae) in coastal central California. Bulletin of the Southern California Academy of Sciences 115:156-175.Langridge, Ruth. (University of California, Santa Cruz). 2018. Central Coast Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-006.

Kofron CP, Villablanca FX. 2010. Status of the endangered Morro Bay kangaroo rat. Abstract of oral presentation at the 57th Annual Meeting of the Southwestern Association of Naturalists, Llano River Field Station, Junction, Texas (see Supplemental Material, Reference S15, http://dx.doi.org/10.3996/ 102014-JFWM-078.S15).

Kofron CP, Villablanca FX. 2011. Status of the endangered Morro Bay kangaroo rat in 2011. Abstract of oral presentation at the 2011 Annual Conference of the Western Section of the Wildlife Society, Riverside, California (see Supplemental Material, Reference S16, http://dx.doi.org/10.3996/102014-JFWM-078.S16).

Kofron CP and Villablanca FX. 2016. Decline of the endangered Morro Bay kangaroo rat in California. Journal of Fish and Wildlife Management 7:237–254.

Kofron, Christopher P., Rutherford C., Andreano L., Walgren M., and Schneider H. 2019. Status of the Endangered Indian Knob Mountainbalm *Eriodictyon altissimum* (Namaceae) in Central Coastal California. Bulletin of Southern California Academy of Sciences 118(1), 2019, pp. 21-41.

LSA Associates Inc. (LSA). 1992. An assessment of the status of the Morro manzanita (*Arctostaphylos morroensis*). Prepared for Central Coast Engineering. November 3. San Luis Obispo, California. LSA Project #CCE201.

Matocq MD and Villablanca FX. 2001. Low genetic diversity in an endangered species: recent or historic pattern? Biological Conservation 98:61–68.

McCormack JE and Maley JM. 2015. Interpreting negative results with taxonomic and conservation implications: another look at the distinctness of coastal California gnatcatchers. Auk: Ornithological Advances 132:380–388.

McGraw, Jodi. 2005. Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System. Prepared for Crawford, Multari, and Clark Associates, San Luis Obispo, California. January 18, 2005. 17 pp.

McGraw, Jodi. 2021. Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System. Prepared for the San Luis Obispo County Planning Department. Jodi McGraw Consulting. 117 pp.

McGraw, Jodi. 2022. Los Osos Habitat Conservation Plan. Prepared for the San Luis Obispo County Planning Department. Jodi McGraw Consulting. 321 pages plus appendices.

Ne'eman, G., C.J. Fotheringham, and J.E. Keeley. 1999. Patch to landscape patterns in post fire recruitment of a serotinous conifer. Plant Ecology 145:235–242.

O'Farrell MJ. 2003. April 2003 final report: trapping survey of Morro Bay kangaroo rats. Unpublished report to California Polytechnic State University Foundation, San Luis Obispo, and California Department of Fish and Game, Sacramento (see Supplemental Material, Reference S18, http://dx.doi.org/10.3996/102014-JFWM-078.S18).

Roth, B. 1985. Status survey of the banded dune snail *Helminthoglypta waIkeriana*. Prepared for the U.S. Fish and Wildlife Service, Sacramento Endangered Species Office, Sacramento, California.

Roth, B., and J. Tupen. 2004. Revision of the systematic status of *Helminthoglypta walkeriana morroensis* (Hemphill 1911) (Gastropoda: Pulmonata). Zootaxa. 616:1-23.

[County] San Luis Obispo County. 2023. San Luis Obispo County Planning: Land Use and Zoning online mapping tool. Accessed online on January 11, 2023 at: https://www.slocounty.ca.gov/Departments/Planning-Building/Department-Services/Cannabis/General-Information/Land-Use-Zoning.aspx.

Schaffer, M. L., and B. A. Stein. 2000. Safeguarding our precious heritage (Chapter 11), in B.A. Stein, L.S. Kutner, and J.S. Adams editors, Precious heritage: the status of biodiversity in the United States. Oxford University Press, New York: 301-321.

State of California. 2022. Public Resource Code, Division 4. Forests, Forestry and Range and Forage Lands; Part 2. Protection of Forest, Range, and Forest Lands; Chapter 3. Mountainous, Forest-, Brush- and Grass-Covered Lands; § 4291 entire. Accessed online on February 16, 2023, at: https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=4.&title=&part=2.&chapter=3.&article=.

(SWCA) SWCA Environmental Consultants. 2011. Morro Shoulderband Snail Recovery Action Plan for the Sweet Springs Nature Preserve, Los Osos, San Luis Obispo County, California. Prepared for the Morro Coast Audubon Society. June 2011. 50 pp.

(SWCA) SWCA Environmental Consultants. 2012. Habitat Management Plan for the Los Osos Wastewater Project, Los Osos, San Luis Obispo County, California. Prepared for the County of San Luis Obispo Department of Public Works. June 2012. 110 pp.

(SWCA) SWCA Environmental Consultants. 2013. 2012 annual construction monitoring report for the Los Osos wastewater project, San Luis Obispo, California. Prepared for the County of San Luis Obispo, Department of Public Works.

(SWCA) SWCA Environmental Consultants. 2014. 2013 annual construction monitoring report for the Los Osos wastewater project, San Luis Obispo, California. Prepared for the County of San Luis Obispo, Department of Public Works.

(SWCA) SWCA Environmental Consultants. 2015. 2014 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. January 2015. 32 pp.

(SWCA) SWCA Environmental Consultants. 2016. 2015 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. April 2016. 30 pp.

(SWCA) SWCA Environmental Consultants. 2017. 2016 Annual Construction Monitoring Report for the Los Osos Wastewater Project, San Luis Obispo, California. Prepared for the County of San Luis Obispo Public Works Department. February 2017. 56 pp.

Tate, T., Spurlock, J., and F. Christian. 1997. Effect of Glyphosate on the Development of *Pseudosuccinea columella* Snails. Archives of Environmental Contamination and Toxicology. 33: 286. doi:10.1007/s002449900255.

Tenera Environmental, Inc. 2006. Correspondence from Dan Dugan (Tenera) to Steve Kirkland (VFWO) regarding presence of Morro and Chorro shoulderband snails on the Lee Property. April 3.

Thompson KV, Roberts M and Rall WF. 1995. Factors affecting pair compatibility in captive kangaroo rats, *Dipodomys heermanni*. Zoo Biology 14:317–330.

Villablanca FX. 2007. Morphological and genetic divergence of Morro Bay kangaroo rats: agreement #P0485102 and #S0685103, draft final report. Report to California Department of Fish and Game, Sacramento. 34 pp.

Villablanca FX. 2009. Protocol surveys for the Morro Bay kangaroo rat (year 1). Unpublished report to U.S. Fish and Wildlife Service, Ventura, California (see Supplemental Material, Reference S40, http://dx.doi.org/10. 3996/102014-JFWM-078.S40).

Villablanca FX, Kofron CP, Oliver L, Walgren MJ, Andreano LE and Thiel A. 2021. Survey for Morro Bay Kangaroo Rat: A Rare Mammal of Uncertain Status. Journal of Fish and Wildlife Management 12:263–270.

[Service] U.S. Fish and Wildlife Service. 1970. Appendix D, United States list of endangered native fish and wildlife. Federal Register 35:16047–16048.

[Service] U.S. Fish and Wildlife Service. 1982. Morro Bay kangaroo rat recovery plan. Portland, Oregon. 69 pp.

[Service] U.S. Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Endangered or Threatened Status for Five Plants and the Morro Shoulderband Snail from Western San Luis Obispo County, California. Federal Register 59(240): 64613-64623.

[Service] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Morro shoulderband snail and four plants from western San Luis Obispo County, California. U.S. Fish and Wildlife Service, Portland, Oregon. 75 pp.

[Service] U.S. Fish and Wildlife Service. 1999. Draft revised recovery plan for the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*). Portland, Oregon: U.S. Fish and Wildlife Service. 96 pp.

[Service] U.S. Fish and Wildlife Service. 2000. Notice of Availability: Draft revised recovery plan for the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*). *Federal Register* 65(16): 3973.

[Service] U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Morro Shoulderband Snail. *Federal Register* 66(26): 9233-9246.

[Service] U.S. Fish and Wildlife Service. 2006. Banded Dune Snail (*Helminthoglypta walkeriana)* [=Morro shoulderband snail (*Helminthoglypta walkeriana)* and Chorro shoulderband snail (*Helminthoglypta morroensis)*]; 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2009. *Eriodictyon altissimum* (Indian Knob mountainbalm). 5-year review: summary and evaluation. Ventura, California. 16 pp.

[Service] U.S. Fish and Wildlife Service. 2011. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) 5-Year review: summary and evaluation. Ventura Fish and Wildlife Office. Ventura, California. 33 pp.

[Service] U.S. Fish and Wildlife Service. 2012. 2011 annual report, FWSVFWO-19/TE-034093-19 Ventura Fish and Wildlife Office, April 20, 2012. Unpublished report. Ventura, California (see Supplemental Material, Reference S34, http://dx.doi.org/10.3996/102014-JFWM-078.S34).

[Service] U.S. Fish and Wildlife Service. 2013. Morro manzanita (*Arctostaphylos morroensis)* 5-Year review: summary and evaluation. Ventura Fish and Wildlife Office. Ventura, California. 21 pp.

[Service] U.S. Fish and Wildlife Service. 2018. Species status assessment report for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*) and the Chorro Shoulderband Snail (*Helminthoglypta morroensis*), Version 1.0. June 2018. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2019a. Species status assessment report for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*) and the Chorro Shoulderband Snail (*Helminthoglypta morroensis*), Version 1.1. February 2019. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2019b. 5-year review, Indian Knob mountainbalm (*Eriodictyon altissimum*). Ventura Fish and Wildlife Office. March 2019. 7 pp.

[Service] U.S. Fish and Wildlife Service. 2019c. Amendment to the Recovery Plan for the Morro shoulderband snail and Four Plants from Western San Luis Obispo County, California. Ventura Fish and Wildlife Office. September 2019. 15 pp.

[Service]. U.S. Fish and Wildlife Service. 2020a. Endangered and Threatened Wildlife and Plants; Reclassification of Morro Shoulderband Snail (*Helminthoglypta walkeriana*) from Endangered to Threatened with a 4(d) Rule – Proposed Rule. *Federal Register* 85(143): 44821-44835.

[Service]. U.S. Fish and Wildlife Service. 2020b. Endangered and threatened wildlife and plants: initiation of 5-year status reviews of 66 species in California and Nevada. Federal Register 85:4692–4694.

[Service] U.S. Fish and Wildlife Service. 2021. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) 5-Year review: summary and evaluation. Ventura Fish and Wildlife Office. Ventura, California. 6 pages.

[Service] U.S. Fish and Wildlife Service. 2022a. Endangered and Threatened Wildlife and Plants; Reclassification of Morro Shoulderband Snail (*Helminthoglypta walkeriana*) from Endangered to Threatened with a 4(d) Rule. *Federal Register* 87(23): 6063-6077

[Service] U.S. Fish and Wildlife Service. 2022b. Morro manzanita (*Arctostaphylos morroensis*); 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Ventura, California.

Van der Laan, K.L. 1973a. Aestivation in the land snail *Helminthoglypta arrosa* (Binney) (Pulmonata: Helicidae). The Veliger 17:360-368.

Van der Laan, K.L. 1973b. Feeding preferences in a population of the land snail *Helminthoglypta arrosa* (Binney) (Pulmonata: Helicidae). The Veliger 17:354-359.

Van der Laan, K. L. 1980. Terrestrial pulmonate reproduction: seasonal and annual variation and environmental factors in *Helminthoglypta arrosa* (Binney) (Pulmonata: Helicidae). The Veliger, volume 23, number 1, pages 48-54, July 1.

Villablanca FX, Kofron CP, Oliver L, Walgren MJ, Andreano LE and Thiel A. 2021. Survey for Morro Bay Kangaroo Rat: A Rare Mammal of Uncertain Status. Journal of Fish and Wildlife Management 12:263–270.

Walgren, M. 2003. The current status of the Morro Shoulderband snail (*Helminthoglypta walkeriana*), California Polytechnic State University, San Luis Obispo, California. Unpublished MS Thesis.

Wiegers MO. 2009. Geologic map of the Morro Bay South 7.5' quadrangle, San Luis Obispo County, California: a digital database. Version 1.0. California Geological Survey, Sacramento, California.

IN LITTERIS

California Department of Fish and Wildlife. 2020. Draft Memorandum of Understanding between the California Department of Fish and Wildlife and the County of San Luis Obispo: This Memorandum of Understanding (MOU) is entered into by and between the California Department of Fish and Wildlife (Department) and the County of San Luis Obispo (County) and sets forth the terms by which the County may access and undertake certain habitat enhancement, restoration, monitoring, and management activities (Mitigation) actions within the Morro Dunes Ecological Reserve (Property). June 24, 2020.

Kirkland, Debora. 2023. Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service, Ventura, California. Memorandum to file documenting review of Los Osos project files documenting widespread and dispersed Morro shoulderband snail occupation of all habitats and substrates.

Kofron, Chris. 2023. Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service, Ventura, California. Electronic mail to Debora Kirkland, Ventura Fish and Wildlife Office, confirming that the Morro manzanita Recovery Priority Number changed from 2C to 8 during the 2013 5-Year Review.

Figures

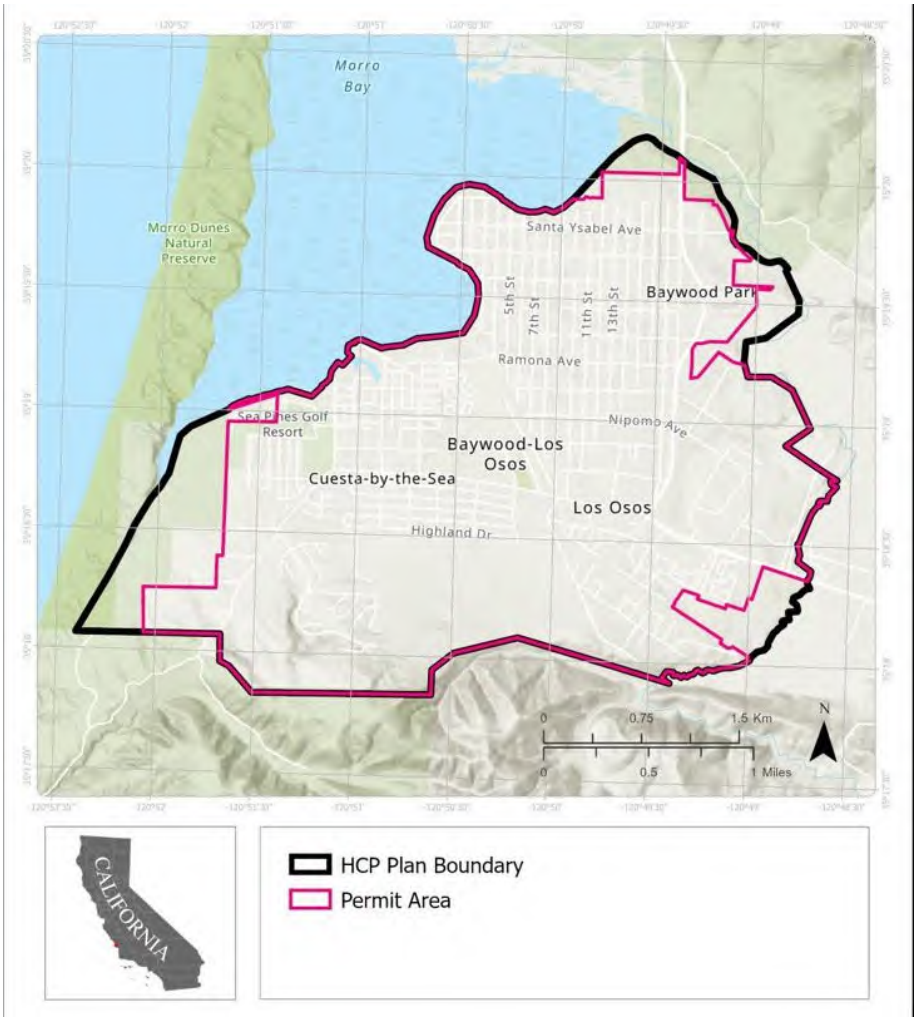

Figure 1. Los Osos Habitat Conservation Plan Area and Incidental Take Permit Area.

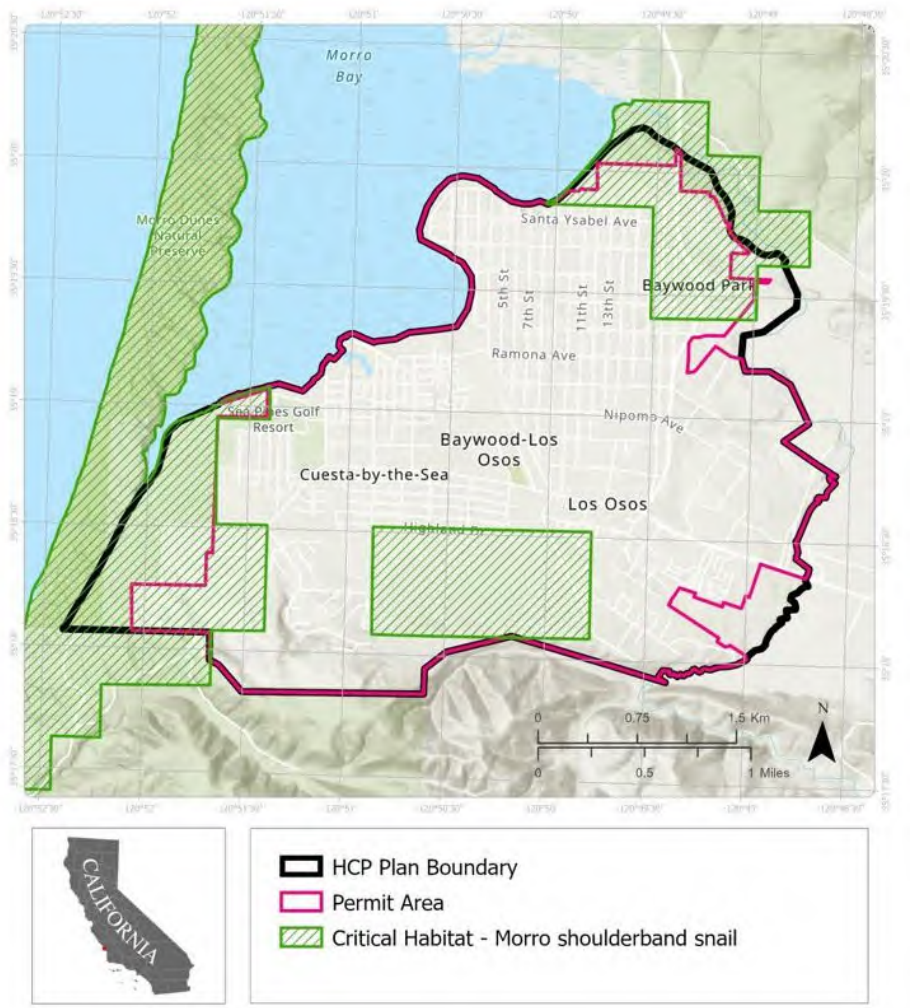

Figure 2. Los Osos Habitat Conservation Plan Action Area and Morro Shoulderband Snail Critical Habitat.

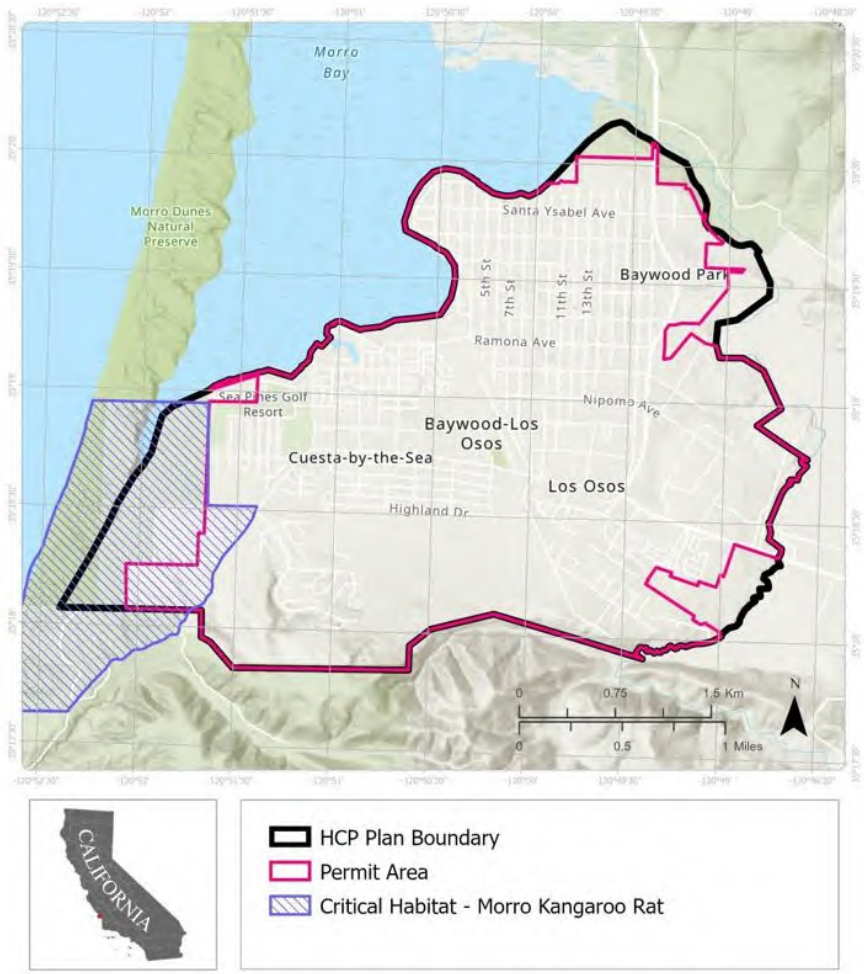

Figure 3. Los Osos Habitat Conservation Plan Action Area and Morro Bay Kangaroo Rat Critical Habitat.

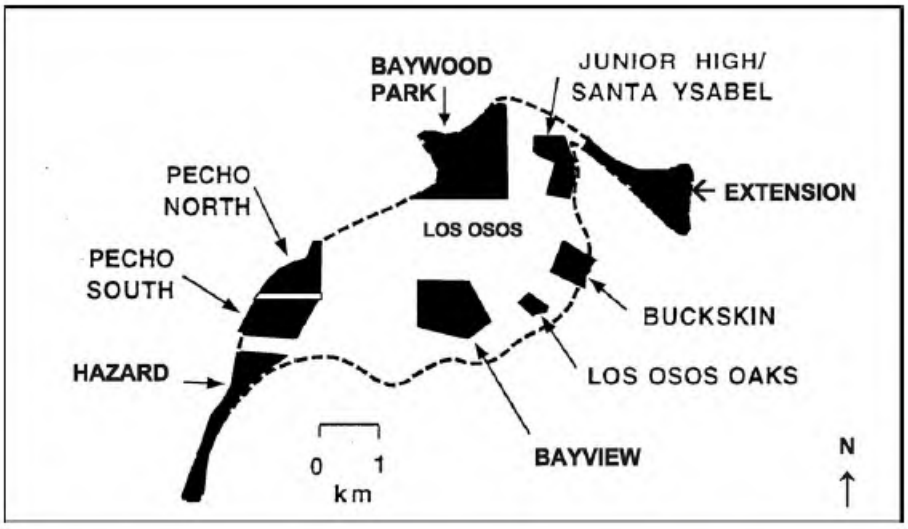

Figure 4. Historical areas for the Morro Bay kangaroo rat *Dipodomys heermanni morroensis* in the vicinity of Morro Bay (specifically in and near Los Osos) in western San Luis Obispo County, California. This figure is adapted from U.S. Fish and Wildlife Service (1999).

Historical areas for the occurrence of Morro Bay kangaroo rat from the 1999 Morro Bay kangaroo rat draft revised recovery plan are shown in the above figure. Of those eight sites, Kofron and Villablanca (2016) conclude that only pockets of habitat remain, and in two areas, has likely been removed due to unauthorized activities or development.

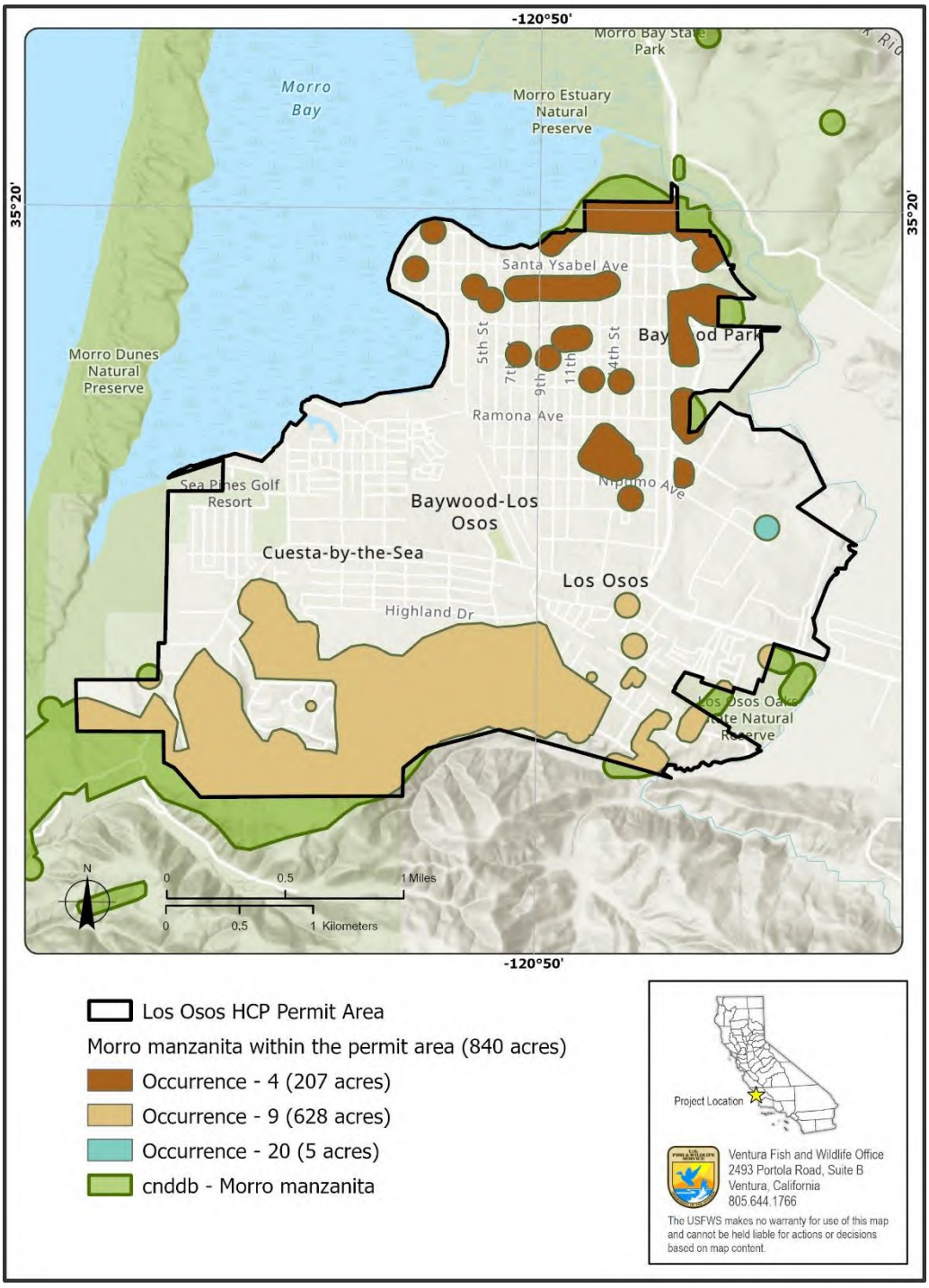

Figure 5. Current Known Range of Morro Manzanita in the Los Osos HCP Action Area.

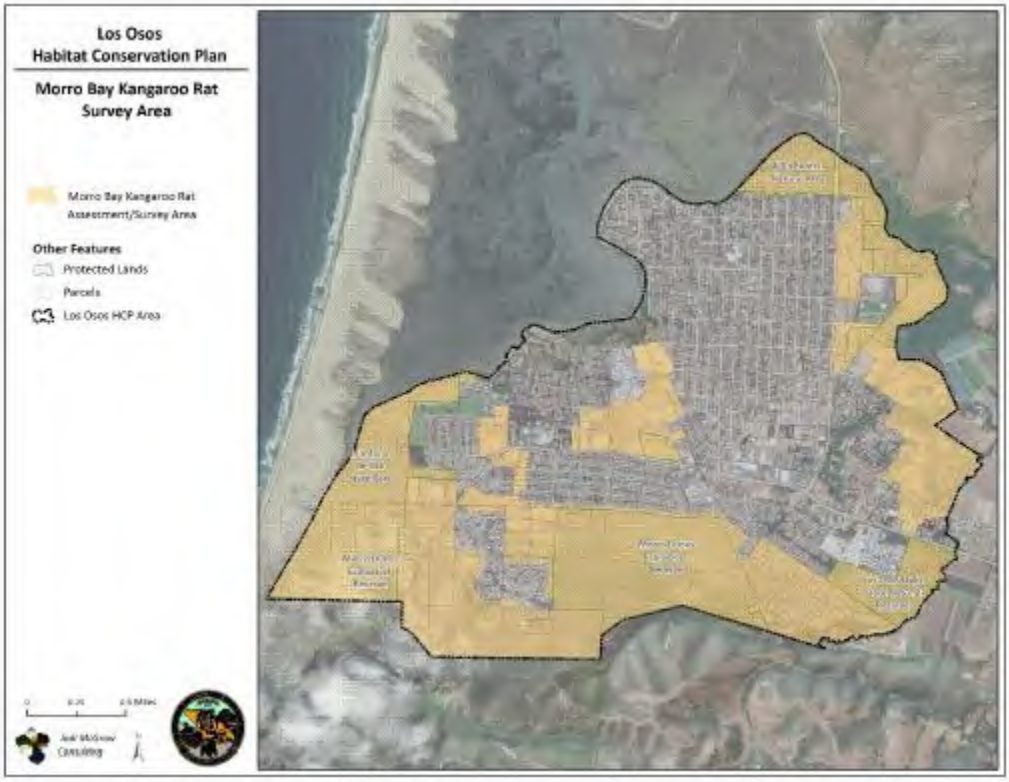

Figure 5-3: Morro Bay Kangaroo Rat Avoidance Area

Figure 6. Los Osos HCP 5-3: Morro Bay Kangaroo Rat Survey Area.

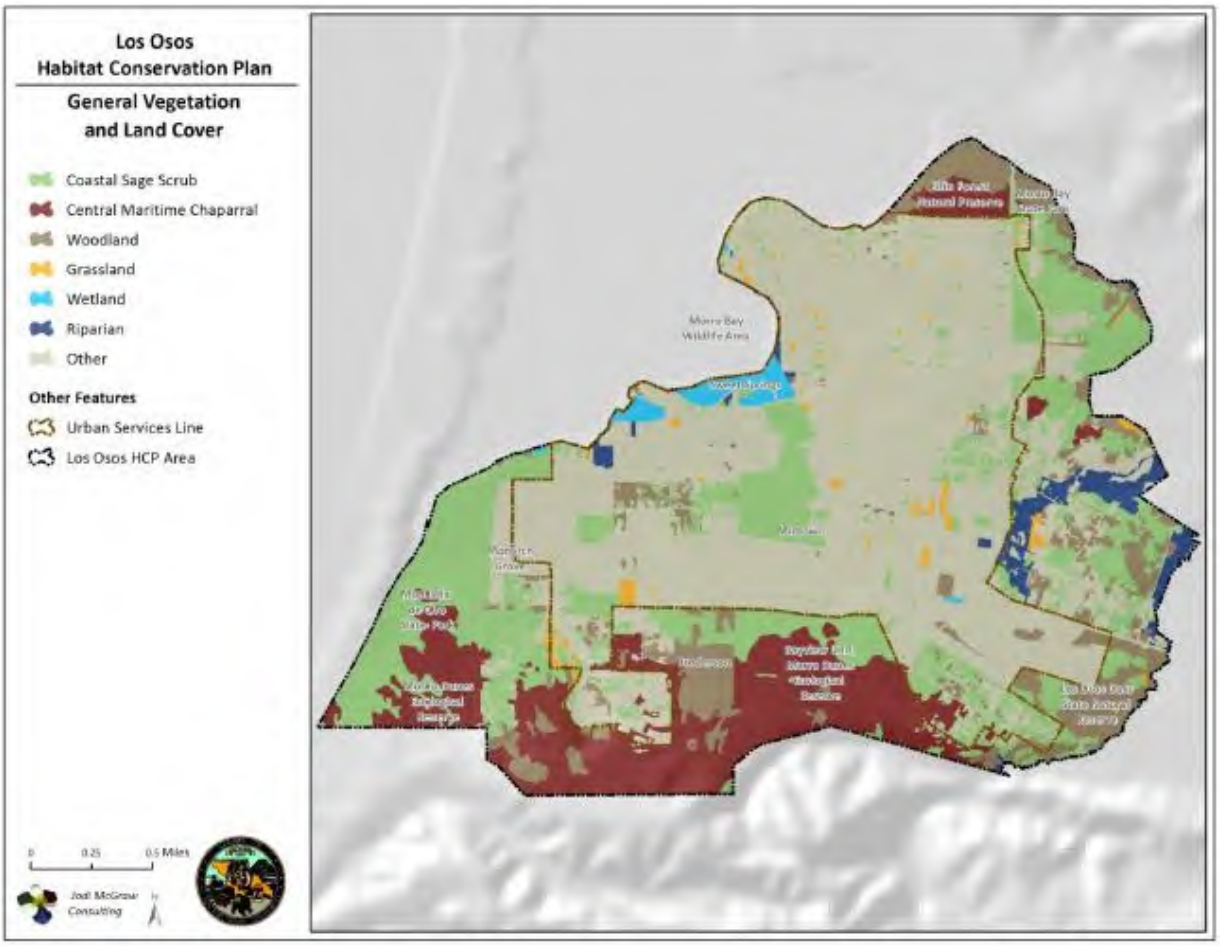

Figure 3-3: General Vegetation and Land Cover

Figure 7. Distribution of Coastal Dune Scrub within the Action Area.

Figure 8. Los Osos Habitat Conservation Plan Priority Conservation Area.

EXHIBIT C

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
2024-0026986

February 15, 2024

FINDINGS AND RECOMMENDATIONS PURSUANT TO THE ENDANGERED SPECIES ACT AND FINDING OF NO SIGNIFICANT IMPACT PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT FOR THE ISSUANCE OF SECTION 10(A)(1)(B) INCIDENTAL TAKE PERMIT ESPER8245217 ASSOCIATED WITH IMPLEMENTATION OF THE HABITAT CONSERVATION PLAN FOR THE UNINCORPORATED COMMUNITY OF LOS OSOS IN SAN LUIS OBISPO COUNTY, CALIFORNIA

I. DESCRIPTION OF PROPOSAL

The County of San Luis Obispo (County or Applicant) has submitted the Los Osos Habitat Conservation Plan (HCP) and application to the U.S. Fish and Wildlife Service's (Service) Ventura Fish and Wildlife Office for an incidental take permit (ITP or Permit) for the federally threatened Morro shoulderband snail (*Helminthoglypta walkeriana*) under the authority of section 10(a)(1)(B) of the Endangered Species Act, as amended (Act). The HCP also addresses impacts to designated critical habitat for Morro shoulderband snail and the federally endangered Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), as well as impacts to the Morro Bay kangaroo rat, the federally threatened Morro manzanita (*Arctostaphylos morroensis*) and federally endangered Indian Knob mountainbalm (*Eriodyctyon altissimum*).

The permit area for the HCP encompasses 3,209 acres in the unincorporated community of Los Osos, within which 532 areas are proposed to be impacted by the HCP covered activities. The covered activities are listed below and will result in impacts on the covered species from development and construction on previously undeveloped parcels, facilities maintenance and operation, fire fuels reduction, and restoration and land management activities. The covered activities include:

1. Private development: commercial and residential development and redevelopment (including remodels or additions) on privately-owned legal parcels;
2. Capital projects: public and private infrastructure development projects, such as buildings or expanding roads, libraries, parks, and water facilities;

3. Facilities operations and maintenance: public and private activities to operate and maintain, including the repair and replacement of existing facilities such as roads, drainage basins, water systems, and parks;
4. Fire hazard abatement activities: this includes mowing and thinning of vegetation to create a defensible space from structures as required by California State Public Resources Code 4291 (State of California 2022), and the Los Osos Community Services District Weed Abatement Ordinance (LOCSD 2020) to comply with statutory hazard abatement and fire protection measures; and
5. Conservation program implementation: pre-activity surveys and relocation of Morro shoulderband snails prior to construction, fuel abatement, or restoration activities; and implementation of the conservation program described in Chapter 5 of the HCP which includes activities associated with restoration, management, maintenance, and monitoring of habitat preserves used to mitigate the effects of the covered activities.

The covered activities would result in direct impacts to the Morro shoulderband snail and Morro manzanita. The covered activities would result in indirect impacts to all the covered species from conversion of occupied or potential habitat to development. All covered activities will include pre-activity surveys for Morro shoulderband snails which may result in the capture and relocation of individuals. Pre-activity surveys will also include habitat assessment for the Morro Bay kangaroo rat. The Morro Bay kangaroo rat is both federally listed as endangered, and also State-listed as endangered and fully protected. Therefore, if warranted by evidence of potential Morro Bay kangaroo rat occupancy in suitable habitat, qualified biologists will conduct a Morro Bay kangaroo rat detection methodology approved by both the Service and the California Department of Fish and Wildlife. The Applicant seeks an ITP for 25 years for the take of the Morro shoulderband snail associated with its proposed development and restoration activities throughout the permit area.

Effects to Indian Knob mountainbalm will be avoided through implementation of the HCP conservation program which includes pre-activity surveys to locate, avoid, and protect individuals in the project areas. The conservation and restoration activities proposed as part of the HCP conservation strategy will enhance the health and vitality of the maritime chaparral habitat which supports Indian Knob mountainbalm.

The Service published the reclassification of Morro shoulderband snail from endangered to threatened with a section 4(d) rule on February 3, 2022 (Service 2022). The 4(d) rule exempts habitat restoration and fire hazard reduction activities from take prohibitions if implemented under a Service-approved plan. Although the 4(d) rule was published while the HCP was in draft, while producing the final HCP, the County opted to retain fire fuel reduction as a covered activity with the measures within the HCP that are designed to minimize impacts to Morro shoulderband snail and Morro manzanita and avoid impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm. A signed ITP is the Service's approval of an HCP. As such, if fire hazard reduction activities are implemented following the measures in the final HCP, they would be exempt from take prohibitions.

Although the HCP can serve as a Service-approved plan under the 4(d) rule exempting these activities from take prohibitions for the Morro shoulderband snail, the County has decided to include the creation and maintenance of defensible space in the impact analysis and mitigation fee assessment for covered activities, such as residential development, because the HCP covers species other than the Morro shoulderband snail.

II. SECTION 10(a)(2)(A) HCP CRITERIA – ANALYSIS AND FINDING

1. The Impact to Result from Such Taking

The Service has determined that the impacts to the covered species likely to result from the proposed action will be minimized and mitigated to the maximum extent practicable by measures described in the HCP and the associated permit. The effects of the proposed action on the covered species are fully analyzed in the HCP and the Service's biological opinion, which are incorporated by reference. A summary of the analysis is provided below.

Direct impacts to Morro shoulderband snail individuals could occur if they are present within the project area during implementation of the covered activities. Indirect impacts to Morro shoulderband snail may include effects resulting from changed distribution of suitable habitat vegetated with coastal dune scrub and other suitable vegetation and refugia, and impacts associated with increased human presence. Effects would be offset through conservation and restoration activities within the HCP Preserve System.

Direct impacts to Morro Bay kangaroo rat will be avoided through implementation of the HCP conservation strategy of pre-activity habitat suitability surveys, followed by presence/absence surveys if unique sign of the species is observed. Indirect impacts to Morro Bay kangaroo rat would include removal or degradation of remaining fragmented habitat in the permit area. Indirect effects would be offset by restoration of degraded habitat within the HCP Preserve System.

Direct impacts to Morro manzanita within the permit area would be from habitat removal or modification during the development of residential and commercial project sites and in some cases, implementation of the fire fuels abatement activities. Indirect impacts to Morro manzanita would include habitat degradation from invasive species and incompatible and intensified recreational use of the habitat leading to erosion of habitat. Effects would be offset through conservation and restoration activities within the HCP Preserve System.

Direct impacts to Indian Knob mountainbalm will be avoided through implementation of the HCP conservation strategy of pre-activity surveys to locate the species and create avoidance areas in the project design. Indirect impacts to Indian Knob mountainbalm would include removal or degradation of potential habitat in the permit area. Indirect effects would be offset by restoration of degraded habitat within the HCP Preserve System that will prioritize the recovery needs of Indian Knob mountainbalm.

2. The steps taken to minimize and mitigate such impacts, and the funding that will be available to implement them.

The Applicant has developed an HCP that would minimize and mitigate the impact of the proposed take through a variety of measures including, but not limited to pre-activity surveys, biological monitors, capture and relocation, design and planning requirements, best management practices, and habitat restoration. A more detailed list and description of the proposed minimization and mitigation measures can be found in section 5.2 of the HCP (McGraw 2022).

The responsibility for ensuring implementation of the measures included in the HCP is understood and has been accepted by the Applicant (Gibson 2023). The cost for implementing the HCP including the conservation program will be funded through County discretionary funds until fees can be generated through the issuance of Certificates of Inclusion as described in section 7.3. The County will offer Certificates of Inclusion after they accrue mitigation credits through reaching success criteria for restoration of habitat or by obtaining habitat for preservation through fee title, rezoning and dedication of County-owned land, or conservation easement as described in section 5.3.

3. Alternative actions to the take were considered by the Applicant and reasons why such alternatives are not being utilized.

The Applicant considered two alternatives to the proposed action: the No Project Alternative and the Reduced Take Alternative.

Under the No Project Alternative, the HCP would not be implemented. Activities would continue in a manner consistent with current practices. Project proponents would prepare individual ITP applications, including HCPs. Due to the purpose and need of the project, the No Action Alternative was rejected.

Under the Reduced Take Alternative, development would occur on 266 acres, which is 50 percent of the maximum amount in the HCP Alternative. After the cap is reached, no additional permits would be issued and project proponents would instead prepare individual ITP applications, including HCPs, in order to receive take coverage. The Reduced Take Alternative would not achieve the goal to streamline the permitting process and consolidate mitigation to provide landscape-level conservation at a level to accommodate the anticipated need. Therefore, the Reduced Take Alternative was not selected.

4. Other measures the Secretary may require as being necessary or appropriate for purposes of the plan.

The ITP includes terms and conditions to clarify details for HCP implementation related to: the Implementing Entity, reporting, mitigation, funding, Certificates of Inclusion, surveys for Morro Bay kangaroo rat, and adapting methodologies to utilize the best available science.

III. SECTION 10(A)(2)(b) PERMIT ISSUANCE CRITERIA - ANALYSIS AND FINDINGS

1. The taking will be incidental.

The HCP supports the issuance of an ITP that would only authorize take incidental to otherwise lawful activities associated with the covered activities. Take of Morro shoulderband snail would occur on 532 acres within the 3,209-acre permit area.

2. The Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking.

The Service finds that the HCP contains those measures necessary to minimize and mitigate the effects of the taking. The Applicant will retain a qualified restoration entity approved by both the Service and California Department of Fish and Wildlife (CDFW) for restoration work on the CDFW-owned Morro Dunes Ecological Reserve (MDER) as well as protected lands throughout the Preserve System, as acquired. The permit area is divided between the centrally-located and highly fragmented and degraded area within the Urban Services Line, and the peripheral Priority Conservation Area where habitat has been less impacted and is, in general, of higher quality. Within the Urban Services Line and outside the Priority Conservation Area, the Applicant will mitigate at a ratio of 1:1 for habitat loss. For projects within the Urban Services Line, the project footprint plus all direct and indirect impacts will be included in impact assessment and fee calculation, including areas needed to create and maintain defensible space around structures. Covered activities within the Priority Conservation Area will result in a mitigation ratio of 3:1 to reflect the higher conservation value of those more intact habitat areas. Whenever possible, projects will be sited near developed areas or in lower habitat quality areas with fewer sensitive resources. For larger parcels in the Priority Conservation Area, a maximum 30,000 square foot disturbance area will minimize impacts to the higher valued habitat.

Within predefined areas within the permit area, participants will be required to hire a qualified biologist to conduct pre-activity surveys to locate, capture and relocate Morro shoulderband snails out of harm's way in the project site. In other predefined areas, pre-activity surveys will also be required to identify sign of the Morro Bay kangaroo rat so that, if warranted, further surveys can ensure Morro Bay kangaroo rats do not occupy the site. Pre-activity surveys will also locate and avoid Indian Knob mountainbalm

throughout the permit area where suitable habitat occurs. Pre-activity surveys throughout the permit area will locate Morro manzanita so that impacts to the species can be minimized.

Restoration and management of the MDER will mitigate for unavoidable impacts to habitat and species by restoring coastal dune scrub and maritime chaparral, and repairing and restoring erosion and impacts from unauthorized use. In addition, the Applicant will acquire conservation land through fee title or easement for preservation and management in perpetuity as part of the Preserve System.

The Service published a final rule to downlist the Morro shoulderband snail from endangered to threatened prior to the finalization of the HCP (Service 2022). The rule included a 4(d) take exemption for restoration activities and fire hazard reduction activities if conducted under a Service-approved plan. The HCP includes fire hazard abatement to create defensible space for new structures as a covered activity (section 2.2.3, McGraw 2022). The impacts associated with these activities are subject to mitigation fees. However, the construction of 89.4 acres of fuel breaks at the wildlife urban interface surrounding the community of Los Osos as part of a community-wide fire protection plan is also a covered activity but will not be subject to mitigation fees. Although there are no take prohibitions for the Morro shoulderband snail for conducting fire hazard reduction activities if conducted under a Service-approved plan, such as the HCP, the County has decided to retain fire hazard reduction as a covered activity and will include areas where these activities occur outside the community-wide fuel break in the impact assessment and fee calculation in order to retain the integrity of the HCP impact assessment and conservation program as written.

3. The Applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided.

The responsibility for ensuring implementation of the measures included in the HCP is understood and has been accepted by the Applicant. These measures include avoidance, minimization, and mitigation measures as described in section 5 and the changed circumstances as described in section 6. Furthermore, the Applicant will use general funds authorized by the County of San Luis Obispo Board of Supervisors to implement restoration and HCP administration prior to the issuance of Certificates of Inclusion and the assessment of mitigation fees. The County of San Luis Obispo Board of Supervisors have expressed their commitment to the success of the HCP (Gibson 2023). The HCP includes adaptive financial management to ensure the HCP funding is sustainable and provides an endowment for management of mitigation in perpetuity.

The Applicant also assumes responsibility for the full cost of the restoration and land protection on the MDER and elsewhere in the Preserve System, once acquired, for compensatory mitigation, as well as the operation and maintenance of the conserved areas in perpetuity funded by the creation of a sustaining endowment. The restoration, operation, and maintenance activities and associated costs are described in HCP sections 5, 6, and 7, in the Interim Adaptive Management and Monitoring Plan (IAMMP)

(McGraw 2021), and in the Adaptive Management and Monitoring Plan (AMMP) that will be developed during the first 3 years of permit implementation.

As mentioned above and pursuant to the Service's "No Surprises" regulations [50 CFR 17.22(b)(5) and 17.32(b)(5)], the HCP includes mechanisms to deal with unforeseen circumstances. In the event of an unforeseen circumstance that would affect the covered species, the Applicant would not, absent their consent, be required to provide the additional commitment of land, water, or financial compensation or made subject to additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for this species, provided the HCP has been properly implemented throughout the permit term.

4. The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

The wording of this criterion is identical to the "jeopardy" definition in the Service's section 7 implementing regulation (50 C.F.R.§ 402.02), which defines "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." In accordance with section 7 of the Act, the Service prepared an intra-agency biological opinion to evaluate whether the project effects and/or taking associated with the HCP would jeopardize the continued existence of the covered species. In the biological opinion, which is incorporated herein by reference, the Service concluded that the proposed issuance of an incidental take permit for the Morro shoulderband snail and implementation of the HCP, is not likely to jeopardize the continued existence of the covered species (Service 2024a).

5. Additional measures as required by the Director of the Service will be implemented.

The HCP and the ITP terms and conditions incorporate all elements necessary for issuance of a section 10(a)(1)(B) permit. The ITP includes terms and conditions to clarify details for HCP implementation related to: the Implementing Entity, reporting, mitigation, funding, Certificates of Inclusion, surveys for Morro Bay kangaroo rat, and adapting methodologies to utilize the best available science.

6. The Director of the Service has received the necessary assurances that the plan will be implemented.

As described in the HCP, the Applicant has committed to implementing the conservation strategy, monitoring, and reporting requirements. Any permit issued in this matter would only be effective when the mitigation measures have been carried out in accordance with the special conditions of the permit. Failure to perform the obligation outlined by the conditions of the section 10(a)(1)(B) permit may be grounds for suspension or revocation of the permit.

IV. GENERAL CRITERIA AND DISQUALIFYING FACTORS

The Service has no evidence the ITP application should be denied on the basis of criteria and conditions set forth in 50 CFR § 13.21(b)-(c).

V. PUBLIC COMMENTS

On October 2, 2019, a Notice of Availability (NOA) was published in the Federal Register announcing the availability of the draft Environmental Assessment (EA) and draft HCP for public comment (Service 2019). Publication of the NOA initiated a 45-day comment period. The NOA, draft EA, and the draft HCP were made available in the Service's Ventura Fish and Wildlife Office and via the internet. Twelve individuals provided a total of 54 comments on the EA, and 33 individuals provided 79 comments on the HCP during the public comment period.

Collectively, comments on the EA were focused on outdated impact analysis, wildfire risk management, future development, subdivisions, project impacts to water quality and quantity, impacts to Morro manzanita individuals and habitat, and management of the MDER. The comments received on the EA are included in Appendix F, and the responses to the comments received are in Appendix G of the final EA. The comments received on the draft EA did not necessitate substantive modifications to the final EA (Service 2024b).

Collectively, comments received on the draft HCP focused on the impacts of future development on water quality and quantity, wildfire risk management, and the need to preserve open space within the center of the community. Comments on the draft HCP can be found in Appendix K of the final HCP; the responses to draft HCP comments can be found in Appendix L of the HCP (McGraw 2022). The responses to the comments on the draft HCP did not necessitate substantive changes in the final HCP (McGraw 2022).

VI. Changes between the Draft and Final HCP

Some substantive and clarifying changes were made between the draft and final HCP as a result of coordination between the County and the Service. Some of the changes were made to update the status of the Morro shoulderband snail, to redefine roles and responsibilities of the Implementing Entity, to update the financial chapter and clarify the funding mechanisms, to clarify the inclusion of defensible space in impact and mitigation fee assessment, and the influence from the relative condition of the water table on the scope of covered activities due to resulting development quantity and timing restrictions. The changes are summarized in a document provided by the County in December 2023, and included in this document as Appendix A (McGraw 2023).

VII. National Environmental Policy Act – Analysis and Findings

Issuance of the ITP will result in the authorization of take of the Morro shoulderband snail incidental to residential and commercial development and redevelopment, infrastructure installation and maintenance, implementation of fire hazard reduction, and restoration activities within the 3,209-acre permit area. Issuance of the Permit would be predicated on the full implementation of the Permittee's HCP and compliance with all other requirements for ITP issuance, including the terms of the permit. The Applicant modified drafts of the HCP based on pre-application consultations with the Service and provided mitigation and minimization measures for incidental take associated with the proposed activities.

Our evaluation in the EA of the direct, indirect, and cumulative impacts of issuing the ITP concluded in finding that the action would not have a significant effect on the human environment. The total effects from issuing the ITP would not cause permanent and irreversible changes in the current state of the physical and biological environment, infrastructure, societal issues, economics, aesthetics, or public health and safety and, therefore, not affect the sustainability of the human environment. The incremental impact of the proposed action, when added to past, present, and reasonably foreseeable future actions, will not be significant to the human environment.

VIII. RECOMMENDATIONS ON ISSUANCE OF PERMIT

Based on our findings with respect to the ITP application, HCP, EA, and section 7 biological opinion, we recommend the issuance of the section 10(a)(1)(B) ITP, ESPER8245217, to the County of San Luis Obispo. Within the spirit and intent of the Council of Environmental Quality's regulations for the implementation of the National Environmental Policy Act of 1969 (as amended), other statutes, orders, and policies that protect fish and wildlife resources, I have determined a finding of no significant impact for the proposed action. I have also determined that this application meets the issuance criteria of section 10(a)(2)(B) of the Act.

STEPHEN HENRY Digitally signed by STEPHEN HENRY Date: 2024.02.15 14:47:33 -08'00' February 15, 2024

Stephen P. Henry, Field Supervisor, Date
Ventura Fish and Wildlife Office

Reference Cited

Gibson, Bruce. (April 18, 2023). [Letter of commitment by the County of San Luis Obispo to support the Los Osos Habitat Conservation Plan, 2023]. Received by D. Kirkland, Ventura Fish and Wildlife via electronic mail on April 19, 2023.

McGraw, Jodi. 2021. Interim Adaptive Management and Monitoring Plan for the Los Osos Habitat Conservation Plan Preserve System. Prepared for the San Luis Obispo County Planning Department. Jodi McGraw Consulting. 117 pp.

McGraw, Jodi. 2022. Los Osos Habitat Conservation Plan. Prepared for the San Luis Obispo County Planning Department. Jodi McGraw Consulting. 321 pages plus appendices.

McGraw, Jodi. 2023. Los Osos Habitat Conservation Plan Substantive Changes in the Final Draft. Unpublished report submitted to the Ventura Fish and Wildlife Service via electronic mail on January 2, 2024.

[LOCSD] Los Osos Community Services District. 2020. Title 4 of the Los Osos Community Services District: Fire Prevention Code. Amended March 5, 2020. Accessed online on December 21, 2023 at https://www.losososcsd.org/files/3cf283900/Title+4+-+3.05.2020.pdf.

State of California. 2022. Public Resource Code, Division 4. Forests, Forestry and Range and Forage Lands; Part 2. Protection of Forest, Range, and Forest Lands; Chapter 3. Mountainous, Forest-, Brush- and Grass-Covered Lands; § 4291 entire. Accessed online on February 16, 2023, at: https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=4.&title=&part=2.&chapter=3.&article=.

[Service] U.S. Fish and Wildlife Service. 2019. Notice of Availability: Los Osos Habitat Conservation Plan; Environmental Assessment and Receipt of Application; Community of Los Osos, San Luis Obispo County, California. *Federal Register* 84(191): 52528-52529.

[Service] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Reclassification of Morro Shoulderband Snail (*Helminthoglypta walkeriana*) from Endangered to Threatened with a 4(d) Rule. *Federal Register* 87(23): 6063-6077.

[Service] U.S. Fish and Wildlife Service. 2024a. Intra-Service Biological Opinion on the Issuance of the Incidental Take Permit associated with the Los Osos Habitat Conservation Plan, in the community of Los Osos, San Luis Obispo County, California (2024-0026986). Ventura Fish and Wildlife Office, Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2024b. Los Osos Habitat Conservation Plan: Final Environmental Assessment. Ventura Fish and Wildlife Office, Ventura, California.

FINDINGS AND RECOMMENDATIONS PURSUANT TO THE ENDANGERED SPECIES ACT AND FINDING OF NO SIGNIFICANT IMPACT PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT FOR THE ISSUANCE OF SECTION 10(A)(1)(B) INCIDENTAL TAKE PERMIT ESPER8245217 ASSOCIATED WITH IMPLEMENTATION OF THE HABITAT CONSERVATION PLAN FOR THE UNINCORPORATED COMMUNITY OF LOS OSOS IN SAN LUIS OBISPO COUNTY, CALIFORNIA

Appendix A:

Los Osos Habitat Conservation Plan Substantive Changes in the Final Draft

Jodi McGraw Consulting
December 2023

Los Osos Habitat Conservation Plan
Substantive Changes in the Final Draft
December 2023

Introduction

This document outlines the substantive changes that were made to the Los Osos Habitat Conservation Plan (LOHCP) between the Public Draft Plan that was provided for public review on the Federal Register in fall 2019 (JMc 2019), and the Final Plan (JMc 2023) which was submitted with the incidental take permit application package in summer 2023.

It was developed per the request of the United States Fish and Wildlife Service (USFWS) for a table showing what changes were made to the draft in response to public comments or as a result of correspondence between the County and the USFWS.

Table 1 lists the substantive changes to the LOHCP by section and topic. For each change, it identifies the commentor(s) that requested the change, and provides the rationale for the change. It also identifies other sections of the LOHCP that were adjusted to reflect the change, other than the Executive Summary which was also revised where needed to reflect the changes outlined in Table 1.

For purposes of this analysis, substantive changes were operationally defined as changes to the plan components including plan/ permit area, covered activities, covered species, impacts analysis, conservation strategy, implementation, financial/funding analysis, and alternatives.

Substantive changes exclude text additions, deletions, and other modifications including reorganization that don't alter these fundamental elements of the plan.

A complete redline document (*LOHCP Public Draft 2018 to Final HCP 2023 compare 10-10-23.docx)* was created to show all of the changes to the public draft to create the final draft. It was created using the "Compare" function in MS Word to compare the April 5, 2019, public draft, and the July 17, 2023, final draft, and is provided along with this document.

Table 1: Substantive Changes to the Los Osos Habitat Conservation Plan between the Fall 2019 Public Draft and the Summer 2023 Final Draft					
Change #	Section and Topic	Additional Sections Affected	Change	Requestor(s)	Rationale
Chapter 1: Introduction and Background					
1	Plan Area and Permit Area (Section 1.3)	Sections 2.1.3.3, 2.2.1, 2.2.2, 2.2.7	The permit area was revised from 3,644 acres to 3,209 acres, by excluding BLM land as well as all land owned by State Parks except those portions of State Parks lands proposed for a fuel break as part of the Community Wildfire Protection Plan, which is one of the covered activities.	USFWS	BLM lands were excluded since take from federal actions cannot be covered under Section 10. State Parks lands were excluded at USFWS request. During development of the LOHCP, State Parks did not identify any activities requiring take coverage through the LOHCOP and also declined to have their lands used for mitigation in the LOHCP Conservation Program. Because the LOHCP is a 25-year, programmatic plan, State Parks lands were included in the Public Draft LOHCP to provide flexibility should State Parks identify activities for coverage at a later date. However, USFWS requested that State Parks lands be excluded from the permit area in the Final LOHCP.
Chapter 2: Covered Activities					
2	Basin Plan influence on Anticipated Development (Section 2.1.2.2)		The LOHCP was updated to outline implications of the Basin Plan for anticipated future development.	USFWS	The Basin Plan may alter the pace of development as well as the types of covered activities relative to what is described in the LOHCP. Since the LOHCP is a programmatic plan, it is not necessary to reflect the precise implications which are unknown.

3	Definition of Defensible Space (Section 2.2.3)	Section 2.2.4	The LOHCP was revised to describe defensible space and how impacts associated with development would incorporate the need for landowners to maintain defensible space.	USFWS	The methods to calculate defensible space were expanded to facilitate plan implementation including calculation of impact areas and thus mitigation obligations during County permitting.
4	Prohibitation against parcel subdivision (Section 2.2.4)	Section 2.3	The LOHCP text was updated to further clarify that the requested incidental take permit cover only development of existing legal parcels at the time the LOHCP is adopted by the County.	USFWS	These changes reflect now additional impacts associated with parcel subdivision will be avoided.
5	Community Wildfire Protection Plan Responsibility (Section 2.2.7)		The Plan text was updated to clarify the entities responsible for implementing the CWPP (Calfire) and that landowner permission is required.	USFWS	This language was needed to clarify that the CWPP activities must be authorized by landowners and that the LOHCP and incidental take permit do not grant Calfire permission to modify land.
Chapter 3: Environmental Setting and Biological Resources					
6	Morro shoulderband snail status (Section 3.2.2)	Sections 1.4, B.1	The status of Morro shoulderband snail was changed from endangered to threatened	USFWS	This change was needed to address the downlisting of Morro shoulderband snail in 2022.
Chapter 4: Potential Biological Impacts/Take Assessment					
7	Low-Effect HCPs (Section 4.5.2)		The description of the prior LEHCPs in the Baywood Fine Sands Ecosystem was updated to reflect additional LEHCPs since the Public Draft.	USFWS	The section was updated to include the additional LEHCP permitted during the four-year period following public review of the LOHCP.
Chapter 5: Conservation Program					
8	IAMMP (Appendix M)	Numerous including: Section 2.2.8.3, many sections in Chapter 5, including 5.3.3.3. Also Appendices G,	The LOHCP was updated to include an *Interim Adaptive Management and Monitoring Plan,* which was developed for the conservation strategy. The plan was inserted into Appendix N and all related sections on restoration, management, and monitoring were updated to reflect development of the IAMMP.	USFWS	The USFWS requested a plan to guide restoration and management while the overall AMMP is being developed during initial plan implementation.

9	Breeding bird season (Section 5.2.3)		The language describing the breeding bird season for purposes nest protection was adjusted to reflect the potential for the calendar dates defining nesting bird season to be adjusted during the permit term to reflect changes in the timing of nesting.	USFWS	Climate change may change the seasonality of breeding.
10	Restoration and Management Definitions and Phases (Section 5.2.4)	IAMMP	The operational definitions for "restoration" and "management" were refined in the LOHCP as part of work to develop the IAMMP. The Plan further describes how 'restoration' areas will be transitioned into 'management' areas following successful restoration.	USFWS	Clearer distinctions between "restoration" and "management" were needed to guide mitigation crediting methods.
11	Reporting on (Section 5.6)	Section 7.4	The "Reporting" section was updated to state: financial reports will include an assessment of the financial viability of the plan. The County and Implementing Entity will meet in the second quarter of each year to discuss plan changes and in the fall to discuss preliminary implications of monitoring for next steps.	USFWS	This financial reporting information will ensure the plan maintains viability. The revised meeting schedule was designed to reflect the annual cycle of monitoring and work planning.
12	Collaborative Mitigation Projects (Section 5.7.2.3.1)		A new subsection was added describing how mitigation credits can be assigned during collaborative mitigation projects between the county and other entities.		The language was developed to enable the County to collaborate with other entities to leverage the conservation program without 'double dipping': having mitigation counted for two or more projects.
Chapter 6: Plan Implementation					
13	Roles and Responsibilities for Plan Implementation (Section 6.1)	Many sections in Chapters 5 and 7, as well as the text throughout Chapter 6	The County and Implementing Entity roles were updated to describe the County will handle all aspect of permitting (application review, determination of species protection measures, fee collection, and compliance, etc.) and the Implementing Entity will assist with implementation of the compensatory mitigation for the conservation program	USFWS, Anticipated Implementing Entity	The Land Conservancy of San Luis Obispo County, which is anticipated to serve as the Implementing Entity, indicated that they did not wish to participate in managing the covered activities and instead only implementation of the conservation strategy.

		(habitat restoration, management, and monitoring). Additionally, the Plan was revised to clarify that the County is ultimately responsible for implementation of all aspects of the plan. Accordingly, language describing tasks attributed to the Implementing Entity was updated to read "the County will work with the IE to…"		The USFWS requested that the Plan state that the County is responsible for Plan implementation.
14	Easement Grantee (Section 6.2.2.2)	The County was designated as a potential grantee of conservation easements by participants dedicated land as mitigation rather than paying the habitat protection fee.	Anticipated Implementing Entity	The Land Conservancy of San Luis Obispo County (LCSLOC), which is anticipated to serve as the Implementing Entity, indicated that they did not wish to be granted small conservation easements on developed lots. Accordingly, the Plan was updated to enable the County to receive these easements while still allowing LCSLOC to hold easements on new fee-title acquisitions.
15	Alternative Compensatory Mitigation (Section 6.2.3.1)	The Plan was revised to state that the County will be responsible for providing alternative compensatory mitigation acceptable to the USFWS for any loss of mitigation value resulting from a change in condition of the habitat due to a change in land use where landowners cannot provide written, legal assurances that the enrolled habitat will be permanently protected from development or other activities that could affect habitat.	USFWS	Some public landowners cannot record easements or deed restrictions on their lands. By agreeing to replace any habitat impacted, the Plan is meeting the durability requirement for mitigation in HCPs.
16	Stay Ahead Provision (Section 6.2.4)	The Plan was updated to state that the County will ensure it does not permit take beyond the available habitat benefits accrued from implementation of the conservation program and document this in annual reports showing the	USFWS	The USFWS requested that the Stay Ahead provision be updated to ensure that the mitigation exceed take at any given period, rather than at just the end of the

			running total take/impacts covered by the permit do not exceed the total compensatory mitigation credits accrued through implementation of the conservation program.		year as was stated in the public draft plan.
17	Jump Start for the LOHCP (Section 6.2.5)		This section was updated to provide additional specificity about the methods that will be used to initiate mitigation for (i.e., jump start) the LOHCP. Specifically, it describes how the County will either implement restoration projects identified in the IAMMP or new habitat protection, including protection of two existing parcels managed by the County Department of Public Works.	USFWS	These adjustments provided more specificity about the anticipated initial mitigation relative to what was in the Public Draft LOHCP, which stated that the County will conduct approximately 15 acres of initial exotic plant management.
18	Exempt Projects (Section 6.3.2)		The Plan was revised to state that the landowners with biological opinions or incidental take permits issued for the specific covered activity for which they are seeking permits will be exempt from participating in the LOHCP. The option to provide a letter from the USFWS stating that their project is not anticipated to result in take (i.e., a no-take concurrence letter) was removed.	USFWS	The USFWS stated it will not be providing project proponents with letters stating that their projects will not result in take (i.e., no-take concurrence letters). A biological opinion can be used to substantiate take coverage under Section 7 of the ESA.
19	Climate Change (Section 6.5.3)		Additional links to the scientific literature were added to the section on Climate Change in the Changed Circumstances (Section 6.5).	USFWS, Public Comment	More current and specific information was needed to clarify what level of climate change would constitute a changed circumstance.
Chapter 7: Funding					
20	Updated Mitigation Fees (Section 7.1)	Chapter 7 text and tables	The habitat protection fee was updated (increased) from $0.1393/sf to $0.1696/sf based on a 2021-22 analysis of the costs to protect habitat based on comparable land sales between 2017-2021 (Table 7-2). The restoration, management, and administrative fee was updated from 0.7488/sf to $1.0295/sf to reflect a variety of new information including:	USFWS, Anticipated Implementing Entity	The financial analysis in the Public Draft plan was several years old and also needed to be updated to reflect the new Plan implementation roles as outlined in Chapter 6.

			Estimates of costs to implement compensatory mitigation including habitat restoration, management, and monitoring, which were provided by the anticipated IE (LCSLOC), as outlined in Tables 7-4 and 7-5; The specific restoration and management projects identified in the IAMMP (Appendix M) which will constitute a portion of the preserve system start up (Table 7-6). County assumptions about County about staff costs to conduct all permitting (which was previously attributed to the IE), as outlined in Table 7-7.		
21	County Jump Start (Section 7.3.2)		Section 7.3.2 was added to describe development restrictions from the Basin Plan and how the County will use general fund appropriations, as necessary, to maintain existing mitigation areas.	USFWS	This section was developed to provide financial assurances given the uncertainty posed by development restrictions from the Basin Plan.
22	Financial Viability Analysis (Section 7.4)	Section 5.4	The financial adaptive management process was revised to include an element of annual financial viability analysis.	USFWS	This financial reporting information will ensure the plan maintains viability.
Chapter 8: Alternatives to Take					
23	Alternative 3: Greater Mitigation Requirement (Section 8.3)		The text describing the infeasibility of greater mitigation was revised to eliminate reference to Cost Burden Analysis, which was not updated as part of the updated financial analysis in 2021-22.	County	The old cost burden analysis information was no longer relevant.
Appendices					
24	Cost Burden Analysis (Former Appendix J)	Section 8.3	The cost burden analysis was eliminated.	County	The analysis was based on the financial analysis conducted for the Public Draft plan and was not updated per the revised financial analysis.

25	Public Comments (Appendix K)		This new appendix provides the 33 letters (incl. emails) received from the public during the public comment period in fall 2019. The letters were bracketed to track responses to the public comments, which are provided in Appendix L.	USFWS	Providing the original letters enables those engaged in the public process to view the actual comments.
26	Response to Public Comments (Appendix L)		This new appendix provides responses to the written comments on the Public Draft LOHCP, which are included in Appendix K. Responses address the questions and issues raised by the commenters and indicate where and how the LOHCP was revised to address the comments.	USFWS	This analysis is required as part of the HCP development process.
26	IAMMP (Appendix M)	Chapters 5, 6, and 7	This new appendix contains the *Interim Adaptive Management and Monitoring Plan* which describes restoration, management, and monitoring anticipated to be implemented during the first five years of the LOHCP, including to jump start the conservation strategy. It also describes how management of the Morro Dunes Ecological Reserve will help reduce the risk of wildfire.	USFWS, Public Comment	The USFWS requested a plan to guide restoration and management while the overall AMMP is being developed during initial plan implementation. The IAMMP addresses public concerns about the risk of wildfire by reducing fuel in a shaded fuel break between the LOHCP Preserve and adjacent development.
27	Letter of Intent (Appendix N)	Chapter 6	This new appendix contains a letter from the County of San Luis Obispo to the United States Fish and Wildlife Service, which describes the intent of the County to contract with the Land Conservancy of San Luis Obispo County to serve as the Implementing Entity for the Los Osos Habitat Conservation Plan (LOHCP).	USFWS	This letter of intent was requested by the USFWS.