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# M E M O R A N D U M

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TO: Amber Dobson, Coastal Program Analyst

SUBJECT: Site-specific analysis of wetlands and ESHA on Banning Ranch

DATE: April 29, 2016; Revised August 25, 2016

## Executive Summary

The identification of environmentally sensitive habitat areas (ESHAs) and wetlands and associated maps produced by staff that were before the Commission in October 2015 were primarily based on the identification of wetlands, rare natural communities, and rare species by the applicant's consultants. Although Dr. Engel made multiple site visits with the applicant's biologists prior to October 2015, the focus of those visits was on resolving ambiguities and errors in the mapping efforts and insuring that the descriptions of natural resources were accurate and complied with the standards established by the California Department of Fish and Wildlife (CDFW) and the Manual of California Vegetation, 2nd edition, not on an independent evaluation of the status of the areas identified. The applicant's consultants completed their field work in April 2015 and final maps were supplied by the applicant in August 2015. This information was the basis for Dr. Engel's ESHA and wetland determination that supported the staff's recommendation to the Commission in October 2015.

Since the October 2015 Commission Hearing on this matter, we have completed a site-specific review and analysis of all the resource constraints at Banning Ranch. This has involved a critical assessment of the applicant's biological submissions, three site visits to examine the natural resources on the ground, and an extensive review of pertinent literature. The applicant has facilitated this analysis by conducting several additional field studies.

The recent field studies have demonstrated that some sensitive habitats have expanded and others have contracted and the constraints maps have been revised to reflect these changes. After examining areas that the applicant had identified as CCC wetlands in the field, we critically reviewed the applicant's wetland delineation and found errors in the interpretation of the wetland guidance in the Commission's Regulations. Correcting those errors resulted in a reduction in the number of wetlands on the site. We also conducted a site-by-site analysis of the rare vegetation communities, taking into account

the size of patches, relative isolation, impacts of legal development, and importance to rare wildlife species. As a result of this analysis, small isolated patches and patches surrounded by development were not designated as ESHAs, whereas other patches that were contiguous with areas used by the rare and threatened coastal California gnatcatcher were added to the ESHA. Most recently, areas that appear to serve as foraging habitat for the western burrowing owl(s) that are wintering on the site were added to the delineation of on-site ESHAs. The salient changes in wetlands and upland ESHA on the Banning Ranch are summarized below.

*Wetlands*

Following heavy rainfall during the unusually wet winter of 2010-2011, 49 ponds of water were identified and mapped using aerial photographs and later examined in the field. In spring 2012, the applicant's consultant assessed each of these ponds for wetland characteristics using the standard methodology developed by the Army Corps of Engineers. Nine of these features had no wetland characteristics when examined on the ground. Each of the remaining 40 were described by the applicant's consultant as "CCC Wetland since at least one wetland criterion was met." Although each had at least one field indicator of wetland hydrology, 28 of those features were both lacking wetland soil and either had upland vegetation or were unvegetated or occurred on asphalt. We found that these were not wetlands because they did not meet the definition in the Commission's Regulations. The remaining 12 periodically ponded areas do meet the definition of wetland under the Coastal Act and the Commission's Regulations and are mapped in Figure 1. We recommend a 100-ft development setback from wetlands.

*Rare Vegetation Community: Coastal Sage Scrub*

"Coastal sage scrub" (CSS) is a generic vegetation type referring to habitats dominated by semi-woody, low-growing species with shallow, dense roots that enable them to respond quickly to rainfall. These communities perform extremely important roles in the Mediterranean ecosystem, including providing critical habitat for many rare and endangered species. Most of the historic extent of this habitat along the southern California coast has been destroyed by development, and many types of coastal sage scrub are now considered rare and imperiled by the CDFW.

There are three rare coastal sage shrub communities that occur in the areas proposed for development at Banning Ranch: southern coastal bluff scrub, maritime succulent scrub, and California brittle bush scrub. With the exception of small isolated patches and patches surrounded by industrial development, these habitat types meet the definition of ESHA under the Coastal Act because they are rare and easily disturbed by human activities. Large areas on Banning Ranch support healthy stands of CSS ESHA (Figure 4). Of these, the most abundant and widely distributed is California brittle bush scrub. This vegetation type is dominated (≥ 30% cover) by California bush sunflower, *Encelia californica*, which often appears as a monoculture, especially after colonizing previously disturbed areas. This drought-adapted species has recruited and is thriving in many parts of Banning Ranch where it was previously absent or in low abundance,

including in areas where routine mowing has ceased`. During our March 2016 site visit, most of the slopes and canyons were painted yellow with blossoms. We recommend a 50-foot development setback around CSS ESHA to prevent impacts that would significantly degrade the ESHA.

*Rare Vegetation Community: Purple Needlegrass Grassland*

Purple needlegrass grasslands (PNGG) have become increasingly rare in California and the Department of Fish and Wildlife finds this vegetation community to be of high conservation value. On Banning Ranch, purple needlegrass (*Nassella pulchra*) has occurred in patches of various sizes and with various coverage. Where it occurs with greater than ten percent relative vegetative cover, it is classified as purple needlegrass grassland, a rare habitat type that meets the definition of ESHA in the Coastal Act. In 2012 PNGG was present in many areas. Although we did not identify small isolated patches of PNGG and patches that were surrounded by industrial development as ESHA we concluded that patches in larger clusters that aggregated to several acres were ESHA due to the rarity of such grassland communities and because PNGG is easily disturbed and degraded by human activities and development. Since 2012 there has been a severe and continuing drought that has resulted in a general reduction in the vegetative cover of purple needlegrass due to a lack of growth, increased herbivory, and death of individual plants. Although there was a significant reduction in the extent of PNGG by 2015, this rare vegetation community was still widely present on the southern terrace. Since the plants were still present in all the mapped polygons, albeit reduced in cover because of the drought, we continued to use the 2012 PNGG polygons in our constraints analysis based on the expectation that the needlegrass would quickly recover with rainfall. Despite the El Niño event, Orange County continues to suffer drought and needlegrass has continued to decline with many plants dead or reduced to tiny rosettes at ground level in many areas. A focused survey of PNGG in areas proposed for development was conducted by the applicant's consultants in March and April of 2016. At that time, most of the areas examined had from <1% to 5% relative vegetative cover of purple needlegrass, a few areas had between 5% and about 8% relative cover, but only three areas had sufficient relative cover (> 10%) to be classified as PNGG. These are the only areas that we have continued to map as ESHA (Figure 6). We recommend a 50-foot development setback around PNGG ESHA to prevent impacts that would significantly degrade the ESHA.

*Rare Animals: Coastal California Gnatcatcher*

The coastal California gnatcatcher is an obligate and permanent, non-migratory resident of coastal sage scrub (CSS) in southern California and northern Baja California. It was listed as threatened under the Endangered Species Act in 1993 as a result of the extirpation or severe decline of populations throughout its original range due to habitat loss from agricultural and urban development. The gnatcatcher preys upon invertebrates, especially insects and other arthropods, by "gleaning" or plucking them from the foliage of native and non-native plants within or adjacent to their primary habitat. Although not dependent on any particular shrub species, their preferred habitat,

especially during the breeding season is coastal sage scrub with at least 50 percent shrub cover about one meter in height that is dominated by California sagebrush, California brittle bush, California buckwheat, or a combination of these species. Although territories are maintained throughout the year, they are most strongly defended during the breeding and nesting season from February through July. Extra-territorial wandering is common outside the nesting season and foraging in non-CSS habitats, such as mulefat scrub and riparian scrub, is most frequent during that time. All of Banning Ranch is mapped as "critical habitat" under the federal Endangered Species Act. U.S. Fish and Wildlife biologists believe that gnatcatchers utilize most of the upland areas at one time or another.

In past actions, the Commission has designated relatively undisturbed coastal sage scrub that is appropriate habitat for California gnatcatchers as ESHA, regardless of whether gnatcatchers were documented on any particular parcel, in recognition of the likelihood of gnatcatcher use and the fact that only through the protection of their habitat can the rare species persist. In such cases, the ESHA is coincident with the extent of the appropriate habitat and is easily mapped. In one previous case where the habitat was highly degraded and fragmented, the Commission found that only the estimated use areas during the nesting season based on the cumulative locations of gnatcatcher sightings over several years, which included both remnant scrub habitats and ruderal vegetation, were ESHA. The situation at Banning Ranch is intermediate between the two previous examples. The coastal sage scrub, although degraded in many areas, in all cases considered meets both the membership rules for the California Brittle Bush Scrub Alliance or other rare scrub type, and the definition of ESHA under the Coastal Act. Although the habitat is contains some roads and other oil field development, from 1992 through 2015 the vegetation on the site has supported an average of 17 pairs of gnatcatchers. We mapped the gnatcatcher habitat by first creating cumulative use areas based on all the years of observations and then clipping these areas to currently existing appropriate vegetation, such as California brittle bush scrub. This excluded inappropriate habitat, such as roads, oil field infrastructure, debris piles, and iceplant. We then defined and mapped gnatcatcher ESHA as the remaining use areas and any contiguous appropriate vegetation because all such areas are used during the year, regardless of whether birds were observed there during the brief survey periods. Those defined areas of vegetation that constitute coastal California gnatcatcher habitat meet the definition of ESHA because they are especially valuable due to their role in the ecosystem of providing habitat that supports a rare species and they are easily disturbed or degraded by human activities and developments (Figures 13-15). In a few areas, ESHA takes the form of several linear patches because the habitat areas used by the gnatcatchers are divided by roads or other bare space. The small gaps created by these roads and bare spaces do not affect foraging by gnatcatchers and it is important that these linear patches of habitat be recognized as gnatcatcher habitat and be protected.

Scattered areas of non-native species (e.g., black mustard) and common native species (e.g., quailbush or upland patches of mulefat) that are not recommended for protection are known to be periodically used for foraging, especially during the non-breeding

season when territory defense is lax and adults commonly forage outside their usual territories. However, in such a disturbed location, we believe that the only strong and defensible basis for identifying particular areas as important gnatcatcher habitat and ESHA is the testimony of the birds themselves over time. Given that the actual area used throughout the year by these rare birds is undoubtedly larger by some unknown amount, it is critical for the continued maintenance of a significant gnatcatcher population at Banning Ranch that the identified areas be conserved, restored where appropriate, and buffered from the impacts of development as part of the approved Habitat Management Plan (HMP). We recommend a 100-foot development setback around gnatcatcher ESHA to prevent impacts that would significantly degrade the ESHA.

*Rare Animals: Western Burrowing Owl*

In our October 2015 and April 2016 ESHA determinations we identified a 1.5 acre area of winter western burrowing owl burrow habitat as ESHA. At that time we did not treat the owl's ecological requirement for foraging habitat by establishing additional ESHA. We received several comment letters from the Banning Ranch Conservancy's biological consultant (Hamilton, 2015a,b, 2016a,d,e,f) documenting the formal survey and public observations of burrowing owls on Banning Ranch, covering the ecological requirements of burrowing owls, and stating that the likely significance of those prior ESHA determinations was extirpation of the owls at this site. This was pointedly expressed by Dr. Peter H. Bloom, a renowned avian biologist and with extensive field experience in southern Californian, in a letter to Dr. John Dixon dated June 24, 2016, in which he concludes:

> *Based on everything known about the habitat requirements of the Burrowing Owl, as reported in the scientific literature, and my own direct experience with this species in Orange County, I feel very confident in concluding that implementation of either the applicant's plan or Staff's alternative would almost certainly lead to extirpation of the Burrowing Owl as a wintering species on Banning Ranch.*

In response, we have gone back and more thoroughly reviewed the peer-reviewed literature on burrowing owls, the Banning Ranch burrowing owl survey reports, documentation of public burrowing owl sightings on Banning Ranch, the California Department of Fish and Wildlife's (CDFW) burrowing owl conservation guidelines, other burrowing owl reports and our burrowing owl ESHA determination.

Western burrowing owls (*Athene cunicularia hypugaea*), "burrowing owls", are identified as a rare species by CDFW's California Natural Diversity Database (CNDDB) and are also listed as a California Species of Special Concern (CSSC) by CDFW, a bird of conservation concern by USFWS, and as a sensitive species by the Bureau of Land management (BLM).

Burrowing owls, once a widely distributed common grassland bird in California, have been in continuous decline since the 1940's (Grinnell and Miller 1944, De Sante 1996). While the most significant declines in California have occurred in central and southern

coastal counties, where habitat loss due to rapid urbanization over the last several decades has resulted in drastic population decreases or extirpation (De Sante et al. 1997a, 2004) burrowing owl numbers have declined throughout their range in the western United States (Collins 1979, Evans 1982). Other significant factors contributing to the decline of burrowing owls is the loss of burrow habitat from disking and grading, ground squirrel eradication efforts that include the use of anti-coagulant poisons, increased predation by non-native or feral species, habitat fragmentation, and other human-caused mortality such as vehicle strikes, electrified fences, shooting, and vandalism of nesting sites (Gervais et al. 2008).

As a result of this renewed review, we have revised our initial burrowing owl ESHA determination to include additional burrowing and foraging habitat. We identified a second area of burrowing owl burrow habitat ESHA because of Dudek's 2014 documentation of a burrowing owl associated with a burrow on the southern mesa.

In considering burrowing owl's dependence on suitable foraging habitat, we recognize that Banning Ranch, in its current state as open space with active oil operations, with approximately 122 acres of open grassland and ruderal areas, does not support the estimated amount of foraging acreage (approx. 300 to over 400 acres) needed for adult male burrowing owls. However, as documented below, the site consistently supports one or more wintering burrowing owls. We identified suitable burrowing owl foraging habitat on Banning Ranch by applying the following area characteristics required for burrowing owl survival and persistence:

- habitat consisting of native and non-native grassland, grassland sparsely vegetated with low shrubs, and ruderal and disturbed areas.

- contiguous block of suitable habitat with ground squirrel burrows and consistent evidence of burrowing owl presence and use of burrows.

- large contiguous area where human disturbance has been limited and can be minimized to the greatest extent possible.

By employing these criteria, we identified a 64-acre area of burrowing owl burrow and foraging habitat ESHA.

Section 30107.5 of the Coastal Act defines environmentally sensitive areas or ESHA 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". Burrowing owl burrow and foraging habitats on the project site meet the Coastal Act definition for environmentally sensitive area or ESHA as outlined below.

*Rare Animals: Raptor/Burrowing Owl Foraging Habitat*

Both native and non-native grasslands provide important foraging opportunities for burrowing owls and other birds of prey. In recent years wildlife biologists have realized that most of the remaining raptor foraging habitat along the southern California coast was largely comprised of non-native species and, being unprotected, was rapidly being developed. As a result, the California Department of Fish and Wildlife (CDFW) began recommending in their CEQA analyses and Natural Community Conservation Planning that losses of such raptor foraging habitat be mitigated at a ratio of 0.5:1.0. The Commission has required such mitigation for loss of foraging habitat in past actions.

On Banning Ranch much of the coastal terrace that is proposed for development is currently grassland that provides foraging habitat for burrowing owl and other birds of prey. In recognition of the importance of this habitat for the survival and persistence of burrowing owls, we have recommended that 64 acres be protected as ESHA as discussed above. We further recommend that all grassland and ruderal areas, that are not protected by burrowing owl foraging habitat ESHA and that are appropriate for raptor foraging and that are lost to development, be mitigated on the upper mesas at the ratio of 0.5 acres of preserved foraging habitat for every 1.0 acre of lost foraging habitat as part of the approved HMP. Such mitigation has independently been proposed in the applicant's Habitat Conservation and Conceptual Mitigation Plan (Dudek 2013b).

*Rare Animals: San Diego Fairy Shrimp*

The federally endangered San Diego fairy shrimp is a small aquatic crustacean that is restricted to vernal pools in coastal southern California and northwestern Baja California, Mexico. San Diego fairy shrimp are usually found in small, shallow vernal pools that range in depth from approximately 2 to 12 inches. Their lifecycle includes an embryonic egg stage in the form of cysts that have reduced metabolic activity and are resistant to harsh drying conditions. The embryonic cysts persist as a cyst bank consisting of different generations. Adult San Diego fairy shrimp are typically found from January to March; however, during years with extended rainfall they may occur earlier and later. While each generation of adults lives for approximately one month, San Diego fairy shrimp exhibit staggered hatching such that adults may be present throughout an entire wet season.

A portion of Banning Ranch has been identified as "critical habitat" for the San Diego fairy shrimp under the federal Endangered Species Act. San Diego Fairy Shrimp have been identified in 8 pools in or near the area designated as critical habitat for the species (Figure 1: Pools VP1, VP2, VP3, E, G, H, I, & K). This area is not proposed for residential or commercial development. However, the soil in and around some of the pools is contaminated and will require remediation. To maintain the viability of this endangered species, we recommend that vernal pools be created in several areas as part of the approved HMP to provide habitat for the San Diego fairy shrimp and that destruction of vernal pools containing San Diego fairy shrimp due to remediation be mitigated at a 10:1 ratio (area created or restored:area impacted) by restoring the vernal

pools in place and creating vernal pools nearby or in other areas approved by the U.S. Fish and Wildlife Service.

*Combined Biological Constraints*

The revised constraints analysis based on the appropriately delineated wetlands and ESHAs has resulted in the identification of 19.65 acres of potentially developable land within the area of interest demarcated by the applicant. The results of our biological constraints analysis are shown in Figures 19 - 21.

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Introduction

An earlier assessment of the location and extent of wetlands, vegetation communities and rare species on the Banning Ranch (Engel, 2015) was based on the report of resources provided by the applicant's consultants. Vegetation communities mapped by those consultants and categorized as rare and "highly imperiled" in California (S1-S3) by the CDFW were designated ESHA due to their rarity classification without regard to size, condition, location, or adjacent land use. Reported use areas of rare wildlife species were also designated ESHA. All areas that were designated "CCC wetland" in the applicant's wetland determination (Dudek 2013a) were mapped as such and those that supported aquatic invertebrates commonly found in vernal pools were given the latter designation. Although we performed several site visits prior to fall of 2015, they were narrowly focused on resolving problems regarding the accuracy of the vegetation mapping rather than on site-specific assessments of wetland or ESHA status. At staff's request, several areas were resurveyed by the applicant in April 2015 and the final vegetation map was completed by the applicant on August 24, 2015 and served as the basis for the habitat maps in Engel (2015), which were prepared for the Commission Hearing conducted in October 2015

Since that time we have more critically reviewed the earlier mapping effort. We have conducted a site-specific analysis of the applicant's submissions, including three site visits. On November 12, 2015 we examined areas where ponding had been observed and on January 19 and March 16, 2016 we examined specific areas of native vegetation to assess their ESHA status, including areas where native vegetation has become established following the cessation of mowing and other areas where native vegetation has declined due to drought and invasion by non-native species. In the course of this work, several errors or ambiguities were found in the 2013 wetland report, which have been resolved by the applicant's consultant (Bomkamp, 2015a,b,c, 2016a,c). During the November site visit there were a few areas identified that appeared incorrectly mapped and there were also changes in the character of the vegetation in several areas since April 2015. These areas have been remapped by the applicant's consultants (Davis 2016; Bomkamp 2016a,b,c,d) and GIS files reflecting the changes have been provided to the Commission's mapping unit. We also extensively reviewed the scientific

literature concerning vernal pools and their biota, which has altered our characterization of several of the periodically ponded features that have supported aquatic invertebrates. More detailed descriptions of the rare species and rare vegetation communities present on Banning Ranch may be found in Engel (2015).

The purpose of this memorandum is to provide the scientific rationale for changes to the determinations and recommendations in Engel (2015) and to respond to comments from the applicant and the interested public.

Wetlands

The applicant mapped 53 areas on the upland terraces at Banning Ranch that at least periodically have ponded water following rainstorms. These areas were identified by low-level aerial photographs taken during the winter of 2010-2011 and provided by the Banning Ranch Conservancy, or documented during various fairy shrimp surveys by the applicant's consultants. The winter of 2010-2011 was a good time to identify potential wetlands because rainfall was about 170% of normal and depressions capable of ponding water were unlikely to be overlooked. One of the 53 features was outside the property line and three were not apparent during a 2011 ground-level survey and so were not sampled. The remaining 49 features (Figure 1) were analyzed for field indicators of the hydric soil parameter and the wetland (hydrophytic) vegetation parameter in May or June 2012, following the Army Corps of Engineers' protocols[1]. Field indicators of wetland hydrology were not assessed at that time. Wetland hydrology was apparently assessed based on previous observations of field indicators, including during fairy shrimp surveys. Thirty-six of the 49 features were examined for fairy shrimp during the 2010-2011 wet season and 34 were sampled during the 2012 dry season for fairy shrimp and other aquatic invertebrates. A few of these features were also surveyed for fairy shrimp during the wet seasons of 2000, 2008, 2009, and 2012. The delineation report provides estimates of the size of ponded areas but does not include a map of the pond boundaries, the features used to define those boundaries, or the location of sample points. However, GIS files provided later by the applicant do show pond boundaries.

Nine of the 49 features had no wetland indicators when examined in the field[2]. Most of the remaining 40 ponded areas did not have hydric soils and were lacking wetland

[1] Wetland parameters are defined attributes of wetlands that are the basis of wetland delineation. It is generally accepted among scientists and regulators that there are three wetland parameters: wetland hydrology, hydrophytic vegetation, and hydric soils. An intrinsic feature of wetland parameters is that they cannot be directly observed in the field during one or more site visits. This is most obvious in the case of quantitative definitions of wetland hydrology that require a minimum frequency and duration of inundation or soil saturation. With intensive observations the duration of water-logging could be determined for a given year, but the determination of long-term frequency would require years of observations. There are analogous problems with directly observing hydric soil and hydrophytic vegetation parameters. The solution to the problem of identifying wetland parameters in nature is the use of field indicators. Field indicators are physical, chemical, or biological features of an area that can be easily observed or assayed and that are usually correlated with the presence of a wetland parameter. Unlike parameters, which are either present or not, the field indicators of those parameters are subject to error.

[2] Areas F, O, AA, JJ, NN, QQ, RR, SS, and TT.

vegetation, but most did have one or more field indicators of wetland hydrology: the presence of the common fairy shrimp or other aquatic invertebrates, an observation of standing water or saturated soils, or surface soil cracks. In the 2013 Dudek report, all 40 of these periodically ponded depressions were designated "CCC Wetland since at least one wetland criterion was met." In most cases (29 of the 40 depressions), this determination was based only on the presence of a field indicator of hydrology. In 2012 when the field sampling was done, 28 of those 29 features did not have hydric soils and all were either unvegetated (2) or had upland vegetation (26). For one feature, Pond KK, the wetland determination was based on field indicators of hydrology and hydric soil.

Wetland delineation in the Coastal Zone is based upon the wetland definition in Section 13577 of the Commission's Regulations:

> Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salts or other substances in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deep-water habitats. For purposes of this section, the upland limit of a wetland shall be defined as
>
> (A) the boundary between land with predominantly hydrophytic cover and land with predominantly mesophytic or xerophytic cover;
> (B) the boundary between soil that is predominantly hydric and soil that is predominantly nonhydric; or
> (C) in the case of wetlands without vegetation or soils, the boundary between land that is flooded or saturated at some time during years of normal precipitation, and land that is not.

None of the 40 periodically ponded depressions on Banning Ranch that were characterized as a CCC wetland by Dudek (2013a) are areas where "vegetation is lacking and soil is poorly developed" for the enumerated reasons and circumstances, and we interpret the boundary determination described in (C) as only applying to the latter, specified type of wetlands under natural, unaltered conditions[3]. Because none of those reasons and circumstances existed for the ponds that were surveyed on the upland terraces, subdivision (C) does not apply and, in such cases, hydrology alone does not define a wetland.

[3] We know of no normal circumstances, other than those enumerated in the regulation, where wetland hydrology would be present but wetland vegetation would be absent. Under "atypical" circumstances where indicators of hydric soils or wetland vegetation have been removed by human activities or natural events, the Commission has identified wetlands based solely on hydrology (e.g., Shea Homes, CDP 5-11-068).

Under most circumstances, the presence of upland vegetation[4] is *prima facie* evidence that the wetland hydrology parameter[5] is not met even though hydrology field indicators, such as soil cracks, aquatic invertebrates or ponded water, may sometimes be present. Were wetland hydrology present, a predominance of upland vegetation could not persist.[6] Therefore, we conclude that 24 periodically ponded areas that have upland vegetation and that do not have hydric soil are not Coastal Commission jurisdictional wetlands[7].

Of the remaining 16 periodically ponded areas, three, Ponds R, T and U, occur in a roadway or parking area, do not have hydric soils, and were unvegetated at the time of our November 2015 site visit[8]. The lack of vegetation appears to be a result of the highly compacted substrate and of frequent disturbance from traffic. This is the normal situation in these areas and under these conditions wetlands cannot develop[9]. We conclude that these areas that did not have hydric soils and that were unvegetated are not Coastal Commission wetlands.

Two periodically ponded areas, Pond P and Pond T, were located on asphalt. Pond P had strong wetland vegetation, including vernal pool species, and indicators of wetland

[4] Where fewer than 50% of the dominant species are wetland indicator species classified as OBL, FACW, or FAC, the plants (including the wetland indicator species) are generally presumed not to be growing as hydrophytes and the vegetation community is defined as "upland."

[5] The definition of wetlands in the Commission's Regulations defines the hydrology parameter as inundation or shallow soil saturation sufficient to support a predominance of hydrophytes or the development of predominantly hydric soil. The Regulations do not provide a quantitative definition of hydrology. For the Corps, the hydrology parameter is defined as continuous inundation or shallow soil saturation for at least 14 days during half of all years (i.e., 50 out of 100). In unusual circumstances, which are generally due to human disturbance of the vegetation and soil, a quantitative hydrology criterion is needed for the Commission's analysis. In such cases, the Commission has relied on technical staff's recommendation that continuous inundation or soil saturation for at least 14 days during most years is sufficient to support hydrophytes and the development of hydric soil, for less than 7 days is insufficient, and for 7 – 14 days is indeterminate and requires additional site-specific assessment.

[6] After several years of drought, wetlands could be taken over by upland species. However, in this case the vegetation was assessed at the end of the 2011-2012 rain year which was the first year of relative drought. There were 6.18 inches of rainfall in 2011-2012 compared to an average of 10.67 inches (Orange County Public Works Station 88 Newport Harbor, 40-year record). Although the winter was dry, the spring (Mar-May 2012) rainfall of 2.71 inches was similar to the average of 2.67 inches. The vegetation was assessed on June 9. A similar rainfall pattern was observed at the Costa Mesa Station 219 (35-year average: 11.67"; 2011-2012: 7.31"; Av Mar-May: 2.84"; 2012 Mar-May7 2.77") Rainfall in the 2010-2011 rain year when extensive ponding was documented was 18.66 inches at Newport Harbor and 19.28 inches at Costa Mesa, roughly 170% of normal. We think it unlikely that the character of the vegetation would shift from wetland to upland following one dry winter after a year of extreme rainfall. However, diagnostic vernal pool species may well have been suppressed by the lack of winter rainfall.

[7] Areas VP3, B, D, G, H, I, J, K, L, N, Q, S, X, Y, Z, BB, DD, EE, FF, GG, HH, II, LL, PP. Area PP was shown as having wetland vegetation in Dudek (2013a), but we found that to be a transcription error when we examined the original field notes and this was verified by Bomkamp (2015c).

[8] Area R is located along the edge of an unpaved roadway and supported wetland indicator species in June 2012. This vegetation is no longer present probably because of vehicular disturbance.

[9] Commission staff did allege that some of the development that occurred on the site occurred in violation of the Coastal Act, and in that situation, the Commission generally considers what conditions would likely have existed in the absence of such development. However, there was never any allegation that the roadways or parking areas in this area were the result of any Coastal Act violation.

hydrology. Both areas have been shown to be shallow depressions with a thin veneer (0-5") of sediment that has accumulated over a layer of asphalt that was installed as part of the oil field operations (Bomkamp 2015b). We recommend that these features not be considered wetlands under the meaning of the Coastal Act and Commission's Regulations, not because they are anthropogenic, but rather because they are based on an artificial substrate and are unable to support the normal processes that promote the formation of hydric soils[10]. Although Pond P supports a predominance of wetland indicator species, we do not believe that "lands" in the wetland definition in Section 30121 of the Coastal Act[11] was meant to include asphalt, concrete, and the like, even where sediments sufficient to support some plants have accumulated at the surface. We have mapped the 12 remaining periodically ponded areas[12] as wetlands as defined by the Coastal Act and the Commission's Regulations (Figure 1).

*Wetlands C and CC*

Within the proposed disturbance area, Pond C and Pond CC had a predominance of wetland vegetation and indicators of wetland hydrology and meet the definition of wetlands under the Coastal Act and the Commission's Regulations.
In a letter to the Commission and staff dated July 11, 2016, the applicant contests the delineation of C and CC as wetlands and raises a series of points in support of its position. To help frame the disagreement regarding C and CC, each of these points is copied below in italics along with a response.

*With respect to the proposed development plan, only two man-made seasonal features in question (Features C and CC) remain within the proposed development plan footprint, and based on additional field studies, the applicant maintains that these features do not qualify as sensitive wetland habitat and do not meet the Coastal Act definition of wetland for the following reasons:*

*• The features are the direct result of documented oil operation activities and consist of small excavations for pipeline repairs. Both features consist of oil spill locations and still contain contaminated soils (crude oil) that impact any habitat value and must be remediated.*

This point raises two issues – the origin of the wetlands and the presence of contamination in them. The issue of contamination is also raised in another point below and is addressed in that response. Regarding the origin of the wetlands, we agree that these wetlands appear to be partially or completely the result of man-made excavations. However, it is not known whether wetland conditions were present prior to disturbance. Additionally, even assuming that the wetland conditions are entirely anthropogenic, the Commission's Regulations do not exclude such features from the definition of wetlands,

[10] Because the "soil" is so shallow and underlain by impermeable asphalt many processes such as iron depletion cannot take place and anaerobic conditions are unlikely to prevail long enough or frequently enough to produce characteristic hydric features.
[11] "Wetland" means lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.
[12] Ponds VP1, VP2, A, C, E, M, V, W, CC, KK, MM, and OO.

and the Commission in past actions has applied the Coastal Act's wetland protection provisions to man-made wetlands (e.g., Hillside Village South 5-92-188-A4).

*• Though both features support wetland indicator plants, hyssop loosestrife (Lythrum hyssopifolia, OBL) and brass buttons (Cotula coronipifolia, OBL), both species are non-native invasive species on the CalIPC list of invasive species.*

For determining the presence and extent of a wetland area, the only relevant information about the plant species that are present is, 1) their wetland plant indicator status[13], and, 2) their percent cover, for applying the indicator tests for hydrophytic vegetation[14]. The designation of a plant species as "invasive," "native," or "non-native" has no bearing on its ability to grow in wetland habitat and is therefore not a relevant consideration.

One hundred percent of the species observed in each of Areas C and CC are obligate wetland species (species that occur in wetlands > 99% of the time) and the presence of aquatic invertebrates and observations of surface water following rainfall are field indicators of wetland hydrology. On our March 16, 2016 site visit, at wetland C there was evidence outside the delineated wetland boundaries of recent inundation or surface saturation in the form of soil cracks, and the vernal pool species wooly marbles was present. We requested that the area be resurveyed to determine whether there was a change in the wetland boundary. Based on an examination of sample points along several transects, it appears that the boundary has not changed (Bomkamp 2016c).

*• The features contain only non-listed versatile fairy shrimp, the presence of which actually poses a threat to the federally listed San Diego fairy shrimp as it has been shown to hybridize with the versatile fairy shrimp.*

The presence of aquatic invertebrates is a field indicator of wetland hydrology and, as such, is information that is used during the wetland delineation process. The potential ability of the species present to interbreed with other species of aquatic invertebrates is not relevant to the delineation of a wetland.

*• Feature C is largely underlain by a 2-inch layer of asphalt, which largely negates any habitat value of the feature.*

This point suggests that wetland C exists over asphalt – considered by most to be a hard, paved surface. However, this is not the case. None of the 13 soil sample locations at and around the wetland indicate the presence of that type of material. Instead, several of the sample points show dark soil staining similar to that indicated in this photograph (excerpted from Bomkamp 2016c):

[13] A plant is considered an indicator of a wetland, in the Arid West Region (which includes coastal southern California), if it has been assigned a status of OBL, FACW, or FAC by a panel of wetland experts overseen by the ACOE. The wetland plant list is a dynamic document maintained online by the ACOE. The current list was updated April 28, 2016. The regional lists can be downloaded at http://rsgisias.crrel.usace.army.mil/NWPL/.

[14] Dominance Test, Prevalence Test

GLENN LUKOS ASSOCIATES

Exhibit 2

Photograph 5: 2.5 inch thick layer of Asphaltic material in C Extended 3.

While laboratory analysis of this material carried out at four locations around the wetland indicates that it includes hydrocarbon contamination, as described in greater detail below, only one of these four samples (located outside or on the periphery of the wetland feature) had hydrocarbon contamination levels that exceed the clean-up thresholds approved for Banning Ranch by the Regional Water Quality Control Board. These threshold levels are intended to provide protection for both public and environmental health. The absence of soil exceeding these thresholds within the wetland feature suggests that either the suspected oil spill at this location occurred far enough in the past for natural processes to attenuate the contamination levels or that prior clean-up activities that may have been carried out at this site were adequate to bring contamination levels to within safe limits. In either case, there is no evidence to support the assertion that the habitat value of the wetland feature is negated, a point further indicated by the presence of wetland vegetation and aquatic invertebrates within the wetland feature. Furthermore, there is no "solid layer of asphalt" at C or CC; a "thin veneer" of sediment over a solid layer of asphalt is not the substrate conditions at these wetlands. In fact, the 2012 wetland survey data sheet for pool CC did not mention anything about contaminated soil, asphaltic layers or other impermeable surfaces and instead noted the following: "Myford soils are deep, moderately well drained soils, medium to rapid runoff, very slow permeability, formed on terraces." See specific discussion below comparing P to C and CC.

*• Feature CC consists of an excavated pit created to remove 3 pipelines, and contains a monoculture of a non-native, invasive plant species.*

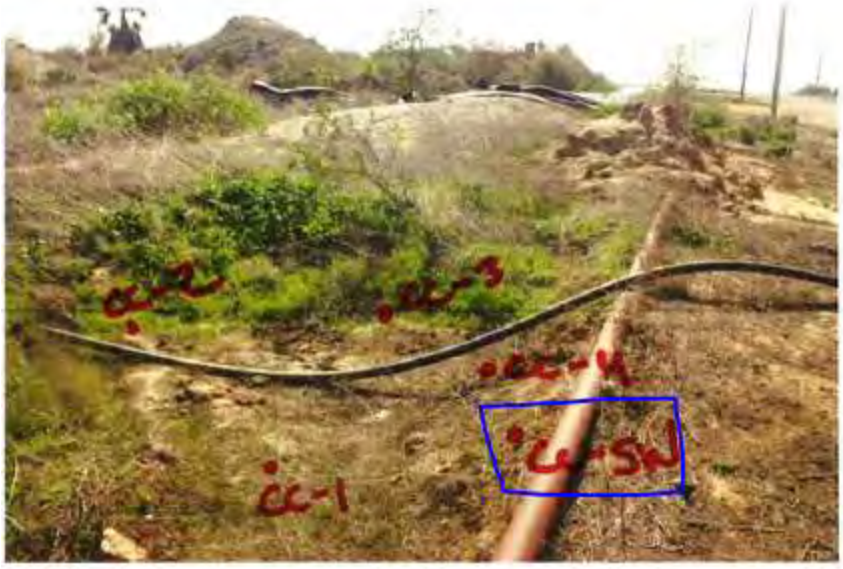
As previously noted above, the origin of the wetland feature and native or non-native status of wetland vegetation found within it are not relevant to its delineation as a wetland.

*• Both Feature C and CC contain hydrocarbon impacted soils that impact any habitat value and that must be remediated.*

Commission staff has evaluated the applicant's assertion that wetland features C and CC contain hydrocarbon impacted soils that affect habitat value and that must be remediated. This assertion appears to be based on anecdotal reports that remediation and clean-up activities associated with broken pipelines occurred at or around each feature as well as the results of soil sampling and laboratory analysis carried out in May of 2016. While Commission staff agrees with the applicant that hydrocarbon contaminated soils have been detected in the vicinity of each feature, we disagree that clean-up/remediation is required throughout each feature because:

- Clean-up and remediation activities appear to have been carried out at feature CC many years ago to remove clean-up targets such as abandoned pipelines and hydrocarbon contamination. In information provided to Commission staff, the applicant has indicated that these activities resulted in the successful removal of segments of three pipelines from within the wetland feature as well as several cubic yards of potentially contaminated soil. Wetland vegetation and other positive wetland indicators have persisted or returned to this feature since the completion of these clean-up activities and the wetland delineation carried out by the applicant's biological consultants confirms this feature is a functioning wetland because 100% of the species present during the survey were wetland species and indicators of wetland hydrology were present (including aquatic invertebrates and 8-10 inches of standing water).

- Soil sampling and analysis carried out at both C and CC indicates that one sample location of the five at CC and one sample location of the four at C exceed the clean-up threshold established in the Regional Water Quality Control Board approved Remedial Action Plan. These single samples from each feature greatly exceed all the other sample results and are from the periphery of each feature, indicating that the majority of each feature is free from contamination and would not require clean-up. Additionally, the sample site at feature CC is located in an upland area outside of the wetland feature, suggesting that clean-up of the contaminated soil may be accomplished carefully without disturbing or removing wetland habitat. Photos provided to Commission staff from the applicant showing the location of the sample sites and the corresponding laboratory results are provided below.


| Soil sample ID | TPH (C4-C12) by EPA Method 8015B(M) (mg/kg) | TPH (C13-C23) by EPA Method 8015B(M) (mg/kg) | TRPH by EPA Method 418.1M (mg/kg) |
|---|---|---|---|
| CC-1-6" | ND | <5 | <10 |
| CC-2-6" | ND | <5 | 14 |
| CC-3-8" | ND | <5 | <10 |
| CC-4-8" | ND | <5 | 42 |
| CC-SW-6" | ND | 197 | 260 |
| C-1-7" | ND | 13 | 70 |
| C-2-7" | ND | <5 | <10 |
| C-3-6" | ND | 212 | 530 |
| C-4-6" | ND | 10 | 46 |

The highlighted samples (CC-SW and C-3) exceed the clean-up threshold of 100 mg/kg for Total Petroleum Hydrocarbons (TPH) – center column – but are below the threshold of 1000 mg/kg for Total Recoverable Petroleum Hydrocarbons (TRPH) – right column - established in the Regional Water Quality Control Board approved Remedial Action Plan.

*• These features are not connected in any way to other seasonal features on the site. Feature C is located at the base of a large spoil pile, which blocks any connectivity to the watersheds of other seasonal features. Similarly, Feature CC is a deep depression (approximately 2.5 feet deep) that exhibits no potential for overflow as ponding depths generally reach only a few inches.*

The connectivity of wetlands C and CC is not relevant to their designation as wetlands. In many cases, wetland features are isolated and not connected to other wetlands. For example, vernal pools, seasonal ponds, and small marshes are not always connected to other similar features. However, this does not mean that they are not functional wetlands. Historical aerials show that entire upper mesa on Banning Ranch was characterized by scattered round mounds, sometimes called mima mounds, which are typically found in areas with impermeable hardpan or claypan layers (Figure 3b). Within California, vernal pools are commonly associated with mima mounds [15]. The soil at C and CC is identified as "myford soils" which are described as potentially hydric soils where appropriate topographic features exist (e.g. depressions), and have very slow permeability. Vernal pools in the nearby Fairview Park vernal pool complex are situated on myford soils. The presence of C and CC in this area could be a reflection of past history where shallow depressions that seasonally ponded dotted the landscape and may or may not have been connected

*• Feature C consists of an excavated depression approximately five feet by seven feet and about three to four inches in depth. The depression was created by excavating the soil to expose a broken pipe, which was ultimately abandoned in place and the pipe left within the excavated depression for future remediation. An approximately two-foot by four-foot area in the center of the feature is underlain by a one to two inch thick layer of asphalt-like material which is at a depth of three to four inches. This information along with site photographs were provided to Dr. John Dixon and Dr. Engel dated March 22, 2016 and is cited in Dr. Dixon's Memorandum referenced above.*

*In Dr. Dixon's Memorandum, he discusses Feature P, which has similar characteristics to C. Specifically, Dr. Dixon noted:*

> *"Pond P had strong wetland vegetation, including vernal pool species, and indicators of wetland hydrology. Both areas have been shown to be shallow depressions with a thin veneer (0-5") of sediment that has accumulated over a layer of asphalt that was installed as part of the oil field operations (Bomkamp 2015b). We recommend that these features not be considered wetlands under the meaning of the Coastal Act and Commission's Regulations, not because they are anthropogenic, but rather because they are based on an artificial substrate and are unable to support the normal processes that promote the formation of hydric soils. Although Pond P supports a predominance of wetland indicator species, we do not believe that "lands" in the wetland definition in Section 30121 of the Coastal Act was meant to include asphalt, concrete, and the like, even where sediments sufficient to support some plants have accumulated at the surface."*

[15] Reed S. E. and Amundson R. G. 2007. Sediment, Gophers, and Time: A Model for the Origin and Persistence of Mima Mound—Vernal Pool Topography in the Great Central Valley. *In* Vernal Pool Landscapes.(eds. R. A. Schlising and D. G. Alexander). California State University, Chico, CA. 15-27.

*It would seem reasonable that the same reasoning would apply given that Features C and CC were created through excavation to repair and ultimately abandoned a broken pipe that was the source of the underlying asphalt materials and hydrocarbon impacted soils. Attachment 6 includes comparison photographs of Features C, CC and P. Ecologically, the features are not substantially different and it would be reasonable and consistent for the Coastal Commission to make such a finding.*

Despite the assertions above, wetlands C and CC are substantially different from feature P. The primary and critical difference is that feature P exists over an extensive former industrial work area made of compacted, hardened asphalt while around wetlands C and CC, the soil in some locations is apparently stained with oil residue. This difference is shown in the photographs included below of each site (provided to Commission staff by Glen Lukos Associates in Bomkamp 2015b and Bomkamp 2016c). At feature P, the asphalt prevented excavation of soil test pits beyond several inches in depth (at which point the paved layer was encountered) without significant effort to break apart the asphalt into solid pieces whereas while at some places the soil at wetlands C and CC was stained a dark color, it was penetrated easily and not found to be comprised of a solid mass of hardened, compacted paving material like the soil at feature P.

Photograph 4: Ashpaltic material excavated from shallow pit

NEWPORT BANNING RANCH
Feature P

Photograph 5: 2.5 inch thick layer of Asphaltic material in C Extended 3.

GLENN LUKOS ASSOCIATES
Exhibit 2

*Additional Wetlands*

Pond M had wetland hydrology, as indicated by the presence of aquatic invertebrates, but in 2012 only one of the two dominant plant species was a wetland indicator. This did not meet the wetland vegetation criterion (>50% of dominants are wetland indicators). Since that time, hydric soil has been identified (Bomkamp 2016c) and another wetland indicator species (woolly marbles, FACW), which is also a diagnostic species for vernal pools, has become abundant (personal observations) and we therefore recommend that Pond M be designated a vernal pool wetland. At Pond E, a wetland indicator species provided 70 percent of the vegetative cover in 2012, but since it was one of only two dominant species, it did not meet the wetland vegetation criterion. In 2016, at least one area did have a predominance of wetland vegetation (Bomkamp 2016c). The wetland boundary was not based on vegetation, but rather on evidence of hydrology, which was more inclusive. Since Pond E supports the endangered San Diego fairy shrimp, it also meets the definition of an Environmentally Sensitive Habitat Area (ESHA) under the Coastal Act due to its important ecosystem function, regardless of its jurisdictional wetland status. Pond E is adjacent to abandoned well 58 and to a

suspected oil sump[16]. There does not appear to be evidence of significant soil contamination at the Well 58 location (Geosyntec 1996, Welsh 2015) but the sump may require remediation (Dudek 2013a, NBR 2015d, Footnote 14, above). Vernal pools VP1, E, and M support stands of mulefat, a wetland indicator species, that are adjacent to the polygons mapped as wetland by Dudek (2013a). Typically, based on the wetland definition in the Commission's Regulations, vegetation dominated by wetland indicator species that are adjacent to observed ponded areas delineate as part of the wetland, regardless of whether shallow soil saturation is observed. These three areas have recently been resurveyed, and areas that contain mulefat have been explicitly characterized as either upland or wetland based on location and associated vegetation (Bomkamp 2016c).

Wetlands outside the proposed development area are Ponds VP1, VP2, A, E, W, V, KK, MM, and OO. In addition to wetlands VP1 and VP2, San Diego fairy shrimp ESHA outside the proposed disturbance area include the periodically ponded areas VP3, G, H, I, and J (Figure 1).

We recommend that development be set back a minimum of 100 feet from the edge of wetlands or 10 feet from the edge of vernal pool watersheds, whichever is greater. In the case of wetlands C and CC, we recommend that the buffers be merged (Figure 2) to prevent wetland CC from being surrounded by development and to provide a sufficiently large protected area (c. 2 acres) to function as a vernal pool complex that could

[16] Two oil production features are located at Pool E – Well No. 58 and a suspected historic oil sump. Well No. 58 was abandoned and capped in 1994 under the oversight of the California Department of Oil, Gas, & Geothermal Resources, the Orange County Health Care Agency, the Orange County Building Department and the Santa Ana Regional Water Quality Control Board. As part of that work, the concrete well pad was removed, the well was filled and capped at six feet below the ground surface, and approximately 40 cubic yards of soil at the well head was excavated and removed. The excavation was backfilled with clean soil and soil testing was carried out. This testing was completed by Geosyntec and indicates that soil at the well site contains less than 5 ppm of hydrocarbon contamination (essentially non-existent). The location of well 58 was verified at: http://maps.conservation.ca.gov/doggr/Index.html?api=05921710#close . The suspected historic oil sump is located approximately 40 feet to the north of Well No. 58 within the depression known as Pool E and was investigated by Geosyntec in 2006 and 2007. Reports from these investigations are available from the Santa Ana Regional Water Quality Control Board at: http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0605921271. These investigations included removal of all surface vegetation, including several trees, from the area around the suspected sump as well as the excavation of three 2 foot wide by 8 foot deep trenches within and adjacent to Pool E. Visual observations, soil sampling, and laboratory analysis indicate the presence of low levels of hydrocarbons in shallow soils below Pool E. These hydrocarbons consist predominantly of heavy end, degraded and weathered materials. No free oil was found. When sampling was carried out nine years ago, detectable hydrocarbon concentrations were estimated to extend from near the surface to about 5 feet below the ground surface across an approximately 40 foot wide area. Heaviest concentrations were located in a 2 foot deep by 15 foot wide patch in the center of this area with a maximum concentration of 5,000 ppm. The allowable concentration established by the Regional Water Quality Control Board for this depth range on the project site is 1,000 ppm in areas of open space, parks, and streets and 100 ppm in residential areas. If additional soil sampling reveals that levels of hydrocarbons or other regulated pollutants at the site of the suspected historic sump have not degraded to below these allowable concentrations, clean-up work would be carried out and restoration of the remediated area should take place *in situ*.

accommodate significant vernal pool creation as part of the approved HMP. We also recommend that the vernal pool complex proposed by the applicant that includes vernal pool VP1 be expanded to include the vernal pools Pond E and Pond M, which would provide a greater opportunity for significant vernal pool restoration and creation. These measures incorporated into the approved HMP will enhance the chances for the survival and recovery of the endangered San Diego fairy shrimp.

Vernal Pools

"Vernal pool" is a term of art that refers to a particular type of seasonal wetland with habitat characteristics that present severe physiological constraints for both plants and animals, resulting in a unique biota (Zedler 1987, Holland & Jain 1988, Bauder et al. 1998, Keeley & Zedler 1998, Solomeshch et al. 2007). Vernal pools are patchily distributed from Oregon to Baja California and were once common on coastal terraces in southern California. These pools tend to occur in aggregations, often in a landscape of more-or-less uniformly arrayed low hummocks and swales. The hummocks, often termed mima mounds, vary from a few inches to a few feet in height and are vegetated with upland grasses and shrubs. The contrast in vegetation between the hummocks and swales makes them obvious in aerial photographs. These hummocks and swales are underlain by a shallow aquitard that prevents the soil from draining. In southern California this impermeable layer is generally comprised of dense clay. Hydrology is based on rainfall and the watershed for each pool is generally the surrounding area within a distance of only about five to ten pool diameters (Bauder et al. 2011). The areas supporting vernal pools have a Mediterranean climate with winter rainfall and dry, hot summers. The pools fill during the first significant rainfall, remain inundated for several weeks at a time during the winter, maintain moist soils into the spring, and completely dry out during the summer. The periods of inundation are too brief to support aquatic plants (e.g., cattails) and too long to allow the development of persistent upland vegetation. They may fill and dry several times during normal winters, but may remain dry throughout drought years. The plants and animals that have adapted to this unpredictable habitat generally have an annual habit with seeds or diapausing eggs or embryo-containing cysts that are resistant to desiccation. At any given time, most of the population of each species is dormant in the soil with only a portion developing into adults during a given year's rainy season.

The physical difference between vernal pools and other seasonal wetlands is subtle and apparently not well-understood. Perhaps the main differences of vernal pools are the extreme lack of permeability of vernal pool soils, hydrology based only on rainfall, and relatively small watersheds. The principal diagnostic characteristic of vernal pools is the presence of a number of species, mostly small vascular plants, that are seldom found in other habitats. The species that are found within or along the edges of vernal pools in southern California can be divided into three groups (Zedler 1987; the examples are species that have been observed at Banning Ranch[17]): 1. Plants that are largely restricted to vernal pools within the region, e.g., wooly marbles (*Psilocarphus brevissimus*), loosestrife (*Lythrum hyssopifolia*), water pigmy weed (*Crassula aquatica*),

[17] Dudek 2013a; Dudek and Glen Lukos, 2013; Bomkamp 2000.

waterfern (*Marsilea vestita*), and little mousetails (*Myosurus minimus*), 2. Plants that are found in vernal pools in the region, but are more common in other wetlands, e.g., brass buttons (*Cotula coronopifolia*), rabbit's foot grass (*Polypogon monspeliensis*), common spikerush (*Eleocharis palustris* (= *E. macrostachys*)), and curly dock (*Rumex crispis*), 3. Plants that are often in vernal pools but are also common in adjacent upland habitats, e.g., long-beaked storke's bill (*Erodium botrys*), rattail fescue (*Festuca* (=*Vulpia*) *myuros*), and sandspurry (*Spergularia marina* (= *S. salina*). Similarly, some aquatic invertebrates are largely restricted to vernal pools, e.g., San Diego fairy shrimp (*Brachinecta sandiegonensis*); whereas others are frequently found in vernal pools, but are more common in other wetlands, e.g., versatile fairy shrimp (*B. lindahli*). Plants and animals that are either endemic to vernal pools or most frequently found in that habitat are considered diagnostic species when evaluating the status of a wetland. Species that are commonly found in both vernal pools and other wetlands may be characteristically present in vernal pools, but are not diagnostic of that habitat.
Prior to widespread urban development, there were extensive fields of mima mounds in southern California and there were many thousands of vernal pools in San Diego County (Purer 1939) and probably also in Orange County (Riefner & Pryor 1996, Riefner et al. 2007). Mima mounds are obvious in historical aerial photographs of the Corona Del Mar area south of Newport Bay and of Banning Ranch to the north (Figure 3). In 1994, a vernal pool complex that supports vernal pool plants and both the versatile fairy shrimp and the endangered San Diego fairy shrimp was discovered just north of Banning Ranch at Costa Mesa's Fairview Park (Bomkamp, 1995). It is very likely that the coastal terraces of Banning Ranch supported vernal pool complexes within the mima mound landscape prior to ground disturbance from agriculture and oil field operations. Extensive vernal pool complexes are no longer evident. However, wetlands are still present and some have vernal pool characteristics. All have been disturbed to various degrees. Some may have been recently created by human activities, whereas others may be the result of ground disturbance to areas of previously existing pools. There is no way after-the-fact to distinguish the one type of wetland from the other.

Engel (2015) identified as vernal pools those putative wetlands delineated by the applicant's consultants (Dudek 2013a) that were inhabited by known vernal pool species, in particular, by the versatile fairy shrimp. However, when we examined in the field each area that had ponded during the 2010-2011 rain year, it was apparent that many did not meet the wetland definitions in the Coastal Act and the Commission's Regulations (see above). In a less disturbed and manipulated habitat, it could be appropriately conservative to identify vernal pools based on the presence of characteristic species. However, after examining each of the previously ponded areas, many of which occur in unpaved roadways, parking lots, and other industrial areas, we decided that at this location the designation "vernal pool" should only be applied to areas that support diagnostic species. However, it is possible for accidental or man-made habitats to provide some of the ecological functions of vernal pools. Bauder et al. (1998) addressed this issue from the point of view of the U. S. Fish and Wildlife Service as follows:

> "Road ruts, man-made ponds, minor impoundments on drainages, and abandoned borrow sites, are generally not considered vernal pools. However, these areas may function as vernal pool habitat by supporting vernal pools species, and may even be a consequence of previous land alterations to historical pool habitat. These areas remain subject to Endangered Species Act requirements if they support listed species, with a determination of their significance to recovery addressed individually."

Rare Terrestrial Vegetation Communities

The vegetation at Banning Ranch is discussed in detail by Engel (2015). The California Department of Fish and Wildlife[18] ranks species and natural communities by degree of imperilment (as measured by rarity, trends, and threats) and considers communities and species with state ranks of S1, S2, and S3 to be rare and "highly imperiled"[19]. In past actions, the Coastal Commission has consistently regarded natural communities and species with these rankings to be "rare" for purposes of the definition of Environmentally Sensitive Habitat Areas (ESHA) in Section 30107.5 of the Coastal Act. The determination of whether a particular area containing elements of such natural communities or individuals of such species meets the definition of ESHA requires a site-specific analysis that takes into consideration such matters as the size of the area, the degree of isolation, adjacent development and other disrupting activities (and the legality thereof), amount of existing degradation, and potential jeopardy to regional populations by loss of the area[20].

Here we address only those rare vegetation communities that potentially constrain development within the proposed disturbance area, in particular the *Encelia californica* Shrubland Alliance (California brittle bush scrub, S3), southern coastal bluff scrub (S1), maritime succulent scrub (S1), and *Nassella pulchra* Herbaceous Alliance (purple needle grass grassland, S3?[21]). Southern coastal bluff scrub and maritime succulent scrub are now considered "legacy classifications" and are being replaced by nomenclature developed by CDFW as part of their new standard classification system. These two systems do not map one to one and these two scrub habitats are now most closely approximated by the *Opuntia littoralis* Shrubland Alliance (coast prickly pear scrub, S3). There seems to be no disagreement as to the status and locations of southern coastal bluff scrub or maritime succulent scrub, so we will focus our analysis on purple needle grass grassland and brittle bush scrub.

[18] Rarity ranking may be found at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=24716&inline=1
[19] http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_background.asp
[20] The Commission has occasionally found that small, relatively isolated patches or scattered individuals of a rare species or habitat are not rare or ESHA (e.g., small isolated patches of southern tarplant at Hearthwide Homes 5-05-020); on the other hand, the Commission found that an area on a capped toxic waste site supporting a small population of Ventura marsh milk-vetch was ESHA because it was the only known remaining population of the species (City of Oxnard LCP No. Oxnmaj-1-00: North Shore at Mandalay Bay Annexation).
[21] The question mark (?) "denotes an inexact numeric rank due to insufficient samples over the full expected range of the type, but existing information points to this rank" (footnote 16, Op. Cit.).

Patches of these rare vegetation communities that occurred within the northern industrial area and were fragmented, isolated, and surrounded by unvegetated roads, parking and storage areas were not designated ESHA. Similarly, in all areas, small islands of habitat that were not contiguous or closely adjacent to large areas of rare habitat or to gnatcatcher use areas, and areas within containment berms or those surrounded by infrastructure were not designated ESHA[22]. All excluded areas large enough to show up on a map are shown in Figures 4 and 5.

*Encelia californica Shrubland Alliance (California brittle bush scrub)*

"Coastal sage scrub" is a generic vegetation type that is inclusive of variously classified subtypes (Kirkpatrick and Hutchinson 1977; Holland 1986; Sawyer et al. 2008). In general, coastal sage scrub is comprised of dominant species that are semi-woody and low-growing, with shallow, dense roots that enable them to respond quickly to rainfall. Under the moist conditions of winter and spring, they grow quickly, flower, and produce light, wind-dispersed seeds, making them good colonizers following disturbance. Coastal sage scrub communities perform extremely important roles in the Mediterranean ecosystem, including providing critical habitat for many rare and endangered species. However, this vegetation community has been drastically reduced in area as a result of habitat loss due to development. In the early 1980's it was estimated that 85 to 90 percent of the original extent of coastal sage scrub in California had already been destroyed (Westman 1981). Losses since that time have been large and particularly severe along the southern California coast.

At Banning Ranch, California brittle bush scrub is perhaps the most widely distributed of the three rare coastal sage shrub communities that occur in the areas proposed for development. The California Brittle Bush Scrub Alliance (S3) usually occurs close to the coast in the summer fog zone and is comprised of a number of vegetation Associations defined by particular species compositions[23], but in each case *Encelia californica* has at least 30% cover in the shrub canopy. *Encelia californica* is the principle or sole

[22] The rationale for excluding small, isolated patches of habitat or patches that occur within industrial development is that the rarity rankings apply to "natural communities" (footnote 16, Op. Cit.). This suggests an undefined but sufficiently large area where normal community processes, such as interspecific competition and predation, can take place without destroying the patch and where individual species have sufficient resources to successfully complete their various life stages, growing, reproducing, and replacing themselves within the patch or among a mosaic of such patches. It also suggests an area that is not so small or so constrained by development that the constituent species are prevented from functioning more-or-less normally and where regional processes, such as immigration, emigration, and colonization or use by wildlife, are not severely constrained. In addition, we suggest that whereas a vegetation community type may be rare, little insular patches of the constituent species that meet the inclusion criteria within a small area may be widely distributed and relatively common. Such patches are often prevented from expanding and functioning normally due to surrounding disruptive conditions, such as development, high cover of invasive species, or periodic ground disturbance.

[23] Within the hierarchical vegetation classification system used in California, the Alliance is defined by the dominant species. Within each Alliance, Associations are defined by secondary species. The rarity designation of Associations within an Alliance will be at least as rare at the Alliance itself. Some Associations within an Alliance may be of greater conservation concern than others. Alliances and Associations are relatively low level, local or regional classifications. A higher level, broader class is the Division, which includes, for example, grassland and Mediterranean California scrub.

dominant species in an Association that is common on Banning Ranch. The habitat was described as follows in the EIR: "This vegetation type is dominated by bush sunflower, and it occurs as a monoculture in many of the northern patches. Other species present in lower densities include bladderpod, wreath plant (*Stephanomeria virgata*), goldenbush (*Isocoma menziesii*), California buckwheat, coastal prickly pear, and coastal cholla." Brittle bush is a good colonizer of disturbed areas, sprouting and growing rapidly following winter rainfall. Such areas also tend to be rapidly colonized by non-native annual species, but under favorable conditions are shaded out by the brittle bush, which is a perennial species that lives 30 years or longer. Areas colonized by *Encelia californica*, especially after cessation of disturbances like periodic mowing, should be considered an early stage in the development of an important and rare vegetation community rather than denigrated as weedy and degraded. Dr. Todd Keeler-Wolf, Senior Vegetation Ecologist for the California Department of Fish and Wildlife, stated that despite the "weedy" habits of its eponymous dominant, the California Brittle Bush Scrub Association has become quite rare in coastal California.[24]

With the exception of small, isolated patches or patches surrounded by oil field development, we recommend that areas identified as having at least 30 percent cover by California brittle bush scrub on Banning Ranch be designated as ESHA and incorporated into the HMP because they are rare and also because they are especially valuable due to the role of this vegetation type in the ecosystem of providing important habitat for the federally threatened coastal California gnatcatcher, and because they are demonstrably easily disturbed and degraded by human activities and development. The location of *Encelia californica* ESHA is shown in Figure 4. We recommend that development be set back at least 50 feet from this ESHA to prevent significant disruption of habitat values and that this habitat buffer be restored to appropriate native vegetation as part of the approved HMP. No fuel modification activities for fire safety should take place within the ESHA or ESHA buffer.

*Nassella pulchra Herbaceous Alliance (purple needle grass grassland)*

Native grassland is one of the most endangered habitats in California. Once covering vast areas of the Central Valley and coastal terraces, native grasslands have been largely replaced by non-native annual species. More-or-less intact examples of these communities are now largely restricted to the coastal fog belt of central and northern California and in other areas to soils, such as serpentine, that present physiological challenges to the exotics. However, stands of native grasses, often dominated by purple needle grass, persist along the coast as islands of various sizes and densities within a sea of mostly annual, Mediterranean species. Significant stands of purple needle grass grassland are considered rare and imperiled, and of high conservation value by the California Department of Fish and Wildlife. For this reason the Commission has designated purple needlegrass grassland as ESHA in previous actions (e.g., 4-04-085 Comstock Homes, 5-03-013 Marblehead, DPT-MAJ-1-03 Dana Point Headlands). This vegetation community has been present in a mosaic of patches on the coastal terraces of Banning Ranch (Figure 5).

[24] Personal telephone communication between J. Dixon and T. Keeler-Wolf on December 6, 2015.

The applicant argues that the purple needle grass grassland on the site should not be considered ESHA because it is degraded, has low native species diversity and low cover of needle grass (c. 20%), the patches are small, and the grassland does not represent a unique wildlife habitat (NBR 2015a). In addition, the applicant's consultants have documented that several of the areas that support purple needle grass no longer meet the vegetative cover criterion (> 10% relative vegetative cover) established by the Manual of California Vegetation (Sawyer, et al. 2008) for classification as part of the rare Purple Needle Grass Grassland Alliance (Figure 6). This reduction in vegetative cover has probably occurred because the diagnostic plants have died back and been heavily grazed, apparently by rabbits, during the continuing drought that is now in its fourth year. However, the membership criterion is >10% vegetative cover relative to the total cover of vegetation present rather than absolute ground cover. Therefore, where all the vegetation has died back proportionally, the membership criterion may still be met, as was the case in many areas in 2015. In addition to the drought, native grassland has suffered from invasion by the non-native Russian thistle (*Salsola tragus*) in summer 2015, especially in the eastern-most area south of the east-west arroyo.. The first issue is whether significant occurrences of this habitat constituted ESHA when first mapped in 2012 and the average relative vegetative cover of purple needle grass was around 20 percent. To this, the clear answer is "Yes." The criterion for inclusion in this natural community Alliance was met (> 10% relative cover of purple needle grass) and low native diversity is now characteristic of most stands of native grassland as a result of human disturbance and the invasion by European annual grasses. Purple needle grass as a species is not rare, and we conclude that very small, isolated patches, or patches closely surrounded by industrial development do not function as a unique grassland habitat. However, we mapped patches in larger clusters that aggregate to several acres as ESHA due to the rarity of such grassland communities (Figure 5).

The second issue to consider is the current condition of the habitat. In earlier draft constraints maps that we shared with the applicant and the interested public for purposes of discussion and planning, we based the purple needlegrass grassland locations on the results of 2012 mapping rather than the 2015 surveys, because we did not think that the habitat should be assessed during a drought year, since most of the individual tussocks of native grass were still present, albeit smaller due to reduced growth and to increased grazing pressure from herbivores that are themselves stressed from a drought-related reduction in available forage. In fact, many patches of native grassland still met the membership criterion for this rare habitat type and we thought that the rest of the habitat would recover with normal rainfall. The presence of Russian thistle was a function of drought and likely to be ephemeral. Contrary to predictions, the 2015-2016 El Niño event did not result in sufficient rainfall to break the drought in southern California. With the continuing drought it was apparent during our March 16, 2016 site visit that the purple needlegrass had severely declined, many plants had died, and survivors were generally present only as tiny rosettes with little above-ground tissue, and very few have flowered. There is little likelihood that most of the remaining purple needlegrass plants can recover and flourish, and we now think that our

assessment must be based on existing conditions. The applicant again surveyed for purple needlegrass grassland in March and April 2016 and we have used the results of those studies in our constraints analysis. In most areas, relative vegetative cover varied from less than 1% to around 5%. However, in three areas significant patches of purple needlegrass grassland (>10% relative vegetative cover of needlegrass) persist[25] (Figure 6).

Purple needle grass grassland meets the definition of ESHA in the Coastal Act because it is rare and easily disturbed by human activities. We recommend that development be set back at least 50 feet from the edge of the mapped habitat areas to prevent significant disruption of habitat values and, as part of the approved HMP, that the habitat buffer be restored to appropriate native vegetation. No fuel modification activities for fire safety should take place within the ESHA or ESHA buffer.

Finally, one other factor contributed to the mapping of ESHA on the site and warrants a brief explanation. From mid-2012 to the beginning of 2015, Commission staff and the owners and operators of the site engaged in discussions regarding alleged unpermitted development at the site. At the beginning of 2015, they entered into a settlement agreement and jointly proposed consent enforcement orders to the Commission to implement the settlement. At that time, the owners and operators of the site agreed not to engage in the large-scale mowing activities in the upland areas previously undertaken by the oilfield operator that resulted in impacts to native habitats. The Commission issued those orders in March of 2015. Section 3.2.D of the consent orders states that, through issuance of those orders, the Commission was "resolving contested issues regarding whether and where [illegal] development has occurred." It goes on to explain that the Commission and the applicant agreed that the Commission would treat 24.6 acres of deed-restricted areas:

> *as if they were 1) vegetated with native plants consistent with surrounding plant communities, and 2) limited to open space and restoration (subject to [one] contingency),*[26] *for all purposes, including analysis of project impacts for CDP application No. 5-13-032* [later replaced by the present application].

[25] In each case, we averaged the cover from the sample transects to characterize the polygon. Area 1 (the farthest to the west in Figure 6) has average relative vegetative cover of 18.9%. Area 2 (the area to the northeast in Figure 6) has average relative cover of 22.9%. Area 3 adjacent to wetland "W" in Figure 6 was sampled by biologists from both Glen Lukos Associates and Dudek. Glen Lukos biologists sampled 5 transects and Dudek biologists sampled 2. Glen Lukos found that the polygon was not purple needlegrass grassland because the average relative cover of needlegrass on their transects was less than ten percent. Dudek mapped a small polygon as having greater than ten percent cover of needlegrass but recorded less than ten percent cover on their transects. However, their analysis was based on the absolute cover of needlegrass and not the relative vegetative cover. When the latter was calculated cover was greater than 20 percent on their transects. We averaged all the transect data (8.89%, 6.42%, 7.15%, 2.14%, 6.26, 20.62, 20.56). The average relative cover for the whole polygon is 10.3%, which meets the membership rule for purple needlegrass grassland.

[26] The one contingency referenced in section 3.2.D addresses alternative restoration requirements in the event that the Commission allows development in any of these protected areas

Pursuant to Section 3.1.I of the orders, the areas that were to receive such treatment were identified in an exhibit and include 18.45 acres proposed for restoration and an additional 6.15 acres of wetlands preserved as open space (i.e. deed restricted) for the purpose of resolving the Commission's claims for civil penalties, the majority of which are on the upper mesas (Figure 7). Were these areas vegetated as indicated, they, too, would become rare vegetation communities and constitute ESHAs. Thus, consistent with the guidance provided in the consent orders, we recommend that the areas to be restored within proposed restoration polygons also be considered ESHAs and incorporated into the approved HMP, and that development be set back 50 feet from rare vegetation or 100 feet from wetlands or gnatcatcher habitat to prevent significant disruption of habitat values and that the habitat buffer be restored to appropriate native vegetation. No fuel modification activities for fire safety should take place within the ESHA or ESHA buffer.

Rare Animal Species

*Coastal California Gnatcatcher (Polioptila californica californica)*

The coastal California gnatcatcher is an obligate and permanent, non-migratory resident of coastal sage scrub (CSS) in southern California and northern Baja California (Atwood 1993, USFWS 1993). It was listed as threatened under the Endangered Species Act in 1993 as a result of the extirpation or severe decline of populations throughout its original range due to habitat loss from agricultural and urban development (USFWS 1993). The gnatcatcher preys upon invertebrates, especially insects and other arthropods, by "gleaning" or plucking them from the foliage of native and non-native plants within or adjacent to their primary habitat. Although not dependent on any particular shrub species, their preferred habitat, especially during the breeding season is coastal sage scrub with at least 50 percent shrub cover about 1 m in height that is dominated by California sagebrush (*Artemisia californica*), California brittle bush (*Encelia californica*), California buckwheat (*Eriogonum fasciculatum*), or a combination of these species (Atwood 1993, Atwood and Bontrager 2001, Breyer and Wirtz 1997, Weaver 1998). Although territories are maintained throughout the year, they are most strongly defended during the breeding and nesting season from February through July (Atwood 1993, Preston et al. 1998). Extra-territorial wandering is common outside the nesting season and foraging in non-CSS habitats, such as mulefat scrub and riparian scrub, is most frequent during that time (Campbell 1998, USFWS 2003). Dispersing juveniles generally settle less than half a mile from their natal territory (USFWS 2003, Gavin 1998).

In past actions, the Commission has designated relatively undisturbed coastal sage scrub that is appropriate habitat for California gnatcatchers as ESHA, regardless of whether gnatcatchers were documented on any particular parcel or area that was the subject of the Commission's action (e.g., LCPA 3-03B, Crescent Heights). Only through the protection of appropriate habitat can the rare species that periodically depend upon it be protected. In such cases, the ESHA is coincident with the extent of the appropriate habitat and is easily mapped.

Determining the boundaries of gnatcatcher ESHA is more difficult where the habitat is highly degraded and fragmented. This was the case in San Clemente at the site proposed for the Marblehead development. The mesa top was routinely disked and adjacent slopes and canyons that supported remnant stands of coastal sage scrub had been invaded by non-native species such as black mustard. Most of the coastal sage scrub was so degraded that it did not rise to the level of ESHA itself and could not be assumed to be used by the gnatcatchers. However, one to three pairs of nesting gnatcatchers were periodically present and their locations were mapped during the winter or spring of seven years between 1990 and 2001. On two occasions actual use areas were estimated. Although the field methods differed from year to year, the Commission found that the estimated use areas during the nesting season based on the cumulative locations of gnatcatcher sightings, which included both remnant scrub habitats and ruderal vegetation[27], were ESHA. At Marblehead, 100-foot development setbacks planted with appropriate native vegetation were required, except in a few special circumstances where a 50-foot setback was allowed in view of the extensive habitat restoration that was proposed for all the slopes and canyons (CDP 5-03-013 Marblehead).

The situation at Banning Ranch is intermediate between the two previous examples. The coastal sage scrub, although degraded in many areas, in all cases considered meets both the membership rules for the California Brittle Bush Scrub Alliance or other rare scrub type, and the definition of ESHA under the Coastal Act. However, the habitat is fragmented by roads and other oil field development and not all areas of sage scrub have documented use by gnatcatchers. Nevertheless, from 1992 through 2015, the vegetation on the site has supported an estimated 7 to 29 breeding pairs of gnatcatchers, with an average of 17 pairs (Engel 2015). Although the actual number of breeding pairs may differ from the estimates for a variety of reasons (NBR 2015b), this is immaterial to our ESHA determination.

We have mapped gnatcatcher ESHA following a protocol intermediate between that used for large expanses of undisturbed gnatcatcher habitat in the San Diego area and that used by the Commission for the highly degraded area at Marblehead. Banning Ranch differs significantly from Marblehead in that the native vegetation communities that are present are in relatively good shape compared to the Marblehead habitats even though interspersed with areas degraded by oil field activities. In addition, areas where mowing previously took place are rapidly recovering and becoming dominated by California brittle bush scrub. As at Marblehead, we initially identified gnatcatcher habitat as the cumulative use areas during the nesting season mapped by the applicant (Engel 2015), which were based on documented gnatcatcher territories and sightings (Figure 9). The applicant has noted that the survey methods and intensity have varied over the years, as have the estimated locations of gnatcatcher use (NBR 2015b). This was also the case at Marblehead. The mapped use areas in both cases are the best estimates

[27] These degraded slopes and canyons at Marblehead have been restored to high quality coastal sage scrub as a condition of development and in 2015 supported 15 pairs of gnatcatchers that fledged 14 broods during the breeding season. A brood is generally made up of 3 to 4 chicks.

that fit the existing data. At Banning Ranch, as is typical, the actual areas used by gnatcatchers varied from year to year. We agree with the applicant that there are insufficient data to definitively ascribe the observed shifts in use to any particular cause, including habitat alterations from human activities. We do not agree that it is inappropriate to use all the available data simply because it includes multiple generations of gnatcatchers living under differing habitat conditions. In fact, we consider that the benefit of using all the data, and note that nearly all the observations are clustered within currently existing habitat. We recognize that the level of effort devoted to identifying gnatcatcher use areas has varied over the years and that it is difficult to determine the actual number of individuals present without intensive studies. However, for our purposes, the area of use is more important than the number of birds present. We feel strongly that all the available data should be used to identify that cumulative use area. We believe that restricting gnatcatcher ESHA to only those use areas mapped during recent drought years or years with optimal surveying effort would be a prescription for local extinctions of this species.

The polygons shown in Engel (2015) and in Figure 9 include open space, oil field infrastructure, and disturbed areas. In addition, the vegetation has shifted over the years, which could result in a shift of gnatcatcher use. Therefore, we clipped the gnatcatcher use areas to the coastal scrub habitats[28] within the use boundaries in order to exclude debris stockpiles, roads, other unvegetated areas, and discrete areas of non-native vegetation, such as iceplant[29] (Figures 10-12). Exceptions are unvegetated areas and areas of non-native habitat that are surrounded by native habitat. Finally, following a protocol similar to that which the Commission has applied in less disturbed areas, we identified as coastal California gnatcatcher ESHA as all appropriate native habitat within and contiguous to the cumulative use areas documented during breeding season surveys (Figures 13-15). This differs from the protocol applied in more pristine areas where all appropriate habitat is considered ESHA, regardless of whether gnatcatchers have been documented to be present in any particular location. Nearly all the historical gnatcatcher observations fall within the defined occupied habitat. Observations outside of the current occupied habitat are shown in Figures 13-15. The historical observations that now occur outside of appropriate gnatcatcher nesting and foraging habitat probably reflect a change in site-specific habitat conditions and have not been used to identify occupied gnatcatcher habitat except for one case in the most northern area. There the observation of a gnatcatcher individual was mapped as occurring outside but close to appropriate coastal sage scrub and that habitat was included as gnatcatcher ESHA.

Those areas of vegetation that are occupied by the coastal California gnatcatcher meet the definition of ESHA because they are especially valuable due to their role in the ecosystem of providing habitat that supports a rare species and they are easily

[28] In some areas, other native habitats, such as mulefat, are included within the boundaries of the coastal scrub.

[29] Engel (2015) explicitly excluded such areas from gnatcatcher habitat in her text, but they were included within the use areas shown on the maps to facilitate production. They have now been removed from the maps also, as recommended by the applicant (NBR 2015b).

disturbed or degraded by human activities and developments (Figures 13-15). In a few areas, ESHA takes the form of several linear patches because the habitat areas used by the gnatcatchers are divided by roads or other bare space. The small gaps created by these roads and bare spaces do not affect foraging by gnatcatchers and it is important that these linear patches of habitat be recognized as occupied gnatcatcher habitat and be protected.

Scattered areas of non-native species (e.g., black mustard) and common native species (e.g., quailbush or upland patches of mulefat) that are not recommended for protection are known to be used periodically for foraging, especially during the non-breeding season when territory defense is lax and adults commonly forage outside their usual territories. For example, gnatcatchers have been observed in quail bush (*Atriplex lentiformis*) along the Pacific Coast Highway on the adjacent property and no doubt forage in these habitats on Banning Ranch too (Hamilton 2015). Extra-territorial foraging is probably also more common during periods of drought-induced stress when prey are less common. Christine Medak of the U.S. Fish and Wildlife Service thinks that over time gnatcatchers utilize most of the upland areas of Banning Ranch and forage in most native and non-native shrubby vegetation (personal communication April 20, 2016). The most conservative approach would be to protect all the upland vegetation. However, in such a disturbed location, we believe that the only strong and defensible basis for identifying particular areas as important gnatcatcher habitat and ESHA is the testimony of the birds themselves over time. Given that the actual area used throughout the year by these rare birds is undoubtedly larger by some unknown amount, it is critical for the continued maintenance of a significant gnatcatcher population at Banning Ranch that the identified ESHA be conserved, restored where appropriate, and buffered from the impacts of development as part of the approved HMP. We recommend that the gnatcatcher ESHA be given 100-foot habitat buffers or development setbacks, and that these areas be restored to appropriate native vegetation. In addition, degraded scrub habitats outside the development footprint should be restored to high quality coastal sage scrub appropriate for gnatcatcher use as partial mitigation for the inevitable environmental impacts of development, such as predation by domestic cats. No fuel modification activities for fire safety should take place within ESHA or ESHA buffers.

*Western burrowing owls (Athene cunicularia hypugaea)*

Western burrowing owls (*Athene cunicularia hypugaea*), “burrowing owls”, are identified as a rare species[30] by CDFW’s California Natural Diversity Database (CNDDB) and are also listed as a California Species of Special Concern (CSSC) by CDFW, a bird of conservation concern by USFWS, and as a sensitive species by the Bureau of Land management (BLM).

Burrowing owls, once a widely distributed common grassland bird in California, have been in continuous decline since the 1940’s (Grinnell and Miller 1944, De Sante et al.

[30] S3: Vulnerable, at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

1996). While the most significant declines in California have occurred in central and southern coastal counties, where habitat loss due to rapid urbanization over the last several decades has resulted in drastic population decreases or extirpation (De Sante et al. 1997, 2004) burrowing owl numbers have declined throughout their range in the western United States (Gervais et al. 2008). Other significant factors contributing to the decline of burrowing owls is the loss of burrow habitat from disking and grading, ground squirrel eradication efforts that include the use of anti-coagulant poisons, increased predation by non-native or feral species, habitat fragmentation, and other human-caused mortality such as vehicle strikes, electrified fences, shooting, and vandalism of nesting sites (Gervais et al. 2008).

In his June 24, 2016 letter, Dr. Bloom wrote the following regarding the status of burrowing owls in Orange County:

> *Historically, the Burrowing Owl was an "abundant resident on the lowlands and mesas" of the Los Angeles Basin (Grinnell 1889). As of the 1970s, the species remained a "fairly common resident . . . throughout coastal plain and foothills" of Orange County (Sexton and Hunt 1979). Twenty years later, the breeding population had dwindled to one pair near UC Irvine and 4–5 pairs at the NWSSB* [Naval Weapons Station Seal Beach] *(Hamilton and Willick 1996). Review of eBird data (http://ebird.org), and inquiry with local birders, indicate that the species has been recorded nesting only at NWSSB during the past decade, most recently in 2013, when a single pair was observed with up to five fledglings. Nesting has not been recorded anywhere in Orange County during the past two years (Bloom unpubl. data).*
>
> *Small numbers of Burrowing Owls regularly occur in Orange County during fall and winter (Hamilton and Willick 1996, eBird data). Review of eBird data for the past decade indicates that wintering owls are observed most regularly at NWSSB, Upper Newport Bay, and Bolsa Chica, with numbers typically in the range of 1–3 birds per winter at each of these sites. Thus, the 1–3 Burrowing Owls typically found at Banning Ranch (which is off-limits to the public, and therefore seldom included in eBird reports) represent a substantial proportion of the species' wintering population in Orange County. Most importantly, no night surveys were conducted at Banning Ranch when burrowing owls and other owl species are most active, meaning the estimate of 1–3 birds represents a minimum number. This includes both migrant Burrowing Owls passing through and the minimum of 1–3 known, presumably, wintering owls.*

Burrowing owls are typically found in open, dry, native and non-native grassland and ruderal areas where tree or shrub canopies cover less than 30% of the habitat (Zarn1974, Green and Anthony 1989, Haug et al. 1993, DeSante et al. 1996). Burrowing owl essential habitat requirements are burrows for nesting and roosting adjacent to large foraging areas (Coulombe 1971, Voous 1988, Johnsgard 1998). The most common nest and roost burrows used by burrowing owls in California are dug by ground squirrels (*Spermophilus beecheyi*) (Trulio 1997, CDFW 2008, CDFW 2012).

Burrowing owl's exhibit strong fidelity to burrow sites regularly reusing both nesting and roosting burrows from one year to the next (Martin 1973, Trulio 1994, Feeney 1997).

Formal winter burrowing owl surveys have been conducted on the site in 2008, 2009, 2010, and 2014. In every case over-wintering burrowing owls and evidence of burrow occupancy were observed on several different dates during the survey period. Glenn Lucas Associates observed burrowing owls in three different locations on the upper mesa in 2008 (Figure 16); Bonterra observed one owl each in 2009 and 2010 near the vernal pool complex on the east side of the property (Figure 16), and Dudek reported one owl on the mesa on the south end of the property in 2014 (Figure 16). In all cases the burrowing owls were observed in areas with lots of ground squirrel burrows (Figure 17) and within or near vernal pools, native (purple needle grass, salt grass) and non-native (annual brome and wild oat) grassland, or ruderal/disturbed habitat.

In addition to the formal winter surveys, several members of the public documented burrowing owls on the property during winter in 2011, 2012, 2013, 2014, 2015, and 2016 (Figure 18):

- On February 16, 2011, Kevin Nelson photographed a burrowing owl and occupied burrow on the southern mesa of the Banning Ranch property.

- On 15 dates between December 27, 2012 and March 10, 2013, Cindy Black reported observing up to two burrowing owls on Banning Ranch. A December 28, 2012 photograph by Shyang Ray depicts one of the observed owls.

- On 27 dates between December 5, 2013 and March 11, 2014, Cindy Black reported observing at least one burrowing owl on Banning Ranch.

- On 3 dates between January 30 and February 11, 2015, Cindy Black reported observing two burrowing owls on Banning Ranch; one between 16$^{th}$ and 17$^{th}$ Street, and the other vocalizing from the southern mesa near Carden Hall School.

- On 4 dates between December 24, 2015 and March 12, 2016, Cindy Black reported observing a burrowing owl on Banning Ranch between 16$^{th}$ and 17$^{th}$ Street.

- On April 29 and May 4, 2016, Steve Ray observed a burrowing owl perched near a burrow on Banning Ranch a short distance west of Coastline College.

During a site visit on January 28, 2016, Dr. Engel and Amber Dobson (Coastal Program Analyst) observed a burrowing owl perched on a berm near the vernal pool complex on the east side of the property and a burrowing owl (potentially the same owl) soaring just above the ground in the same area (Figure 18). And Robb Hamilton of Hamilton Biological Inc., observed a burrowing owl on March 15, 2016, between 16$^{th}$ and 17$^{th}$ Street (Figure 18). The formal winter survey results, along with the public's and the

biologist's observations, show that every winter for 9 years (2008-2016) one or more burrowing owls have consistently over-wintered on NBR.

The diet of burrowing owls in California includes a broad assortment of insects (centipedes, spiders, beetles, crickets, and grasshoppers), amphibians, reptiles, birds, and small rodents typically found in open grassland areas (Thompson and Anderson 1988, Green et al. 1993, Plumpton and Lutz 1993, Gervais et al. 2000, York et al. 2002). While insects tend to dominate the diet numerically, vertebrates account for the majority of biomass in many regions (Green et al. 1993). Burrowing owls are primarily crepuscular (active at dusk and dawn) in their foraging, but hunting activity has been observed over 24 hours (Grant 1965, Coulombe 1971, Martin1974).

The CDFW's 2008 *Guidance for Burrowing Owl Conservation* emphasizes the importance of suitable foraging habitat to the survival and persistence of burrowing owls:

> *Foraging habitat is essential to burrowing owl persistence. Mitigation for impacts to burrowing owl foraging habitat within home ranges should be required based on site-specific evaluation of existing land use patterns, prey availability, and other ecological factors. Useful as a rough guide to evaluation project impacts and appropriate mitigation for burrowing owls, adult male burrowing owl home ranges have been documented (calculated by minimum convex polygon) to comprise anywhere from 280 acres in intensively irrigated agro-ecosystems in Imperial Valley (Rosenberg and Haley 2004) to 450 acres in mixed agricultural lands at Lemoore Naval Air Station, CA (Gervais et al. 2003), to 600 acres in pasture in Saskatchewan, Canada (Haug and Oliphant 1990). But owl home ranges may be much larger, perhaps by an order of magnitude in non-irrigated grasslands such as at Carrizo Plain California (Rosenberg, pers. comm.), based on telemetry studies and distribution of nests……In general, burrowing owls in many study areas have been documented to forage primarily within 600 m of their nests (within approximately 300 acres, based on a circle with a 600 m radius) during the breeding season (Gervais et al., 2003, Haug and Oliphant 1990, Rosenberg and Haley 2004).*

Regarding burrowing owl foraging habitat, Dr. Bloom states the following in his June 24, 2016 letter:

> *Importantly, no surveys have attempted to determine specific foraging areas used by wintering owls on Banning Ranch. The published literature and my own observations lead me to conclude that Burrowing Owls can be expected to utilize all of the available grassland/vernal pool and open grass/scrub habitats within the uplands of Banning Ranch. Any significant reduction, fragmentation, or degradation of potentially suitable Burrowing Owl foraging habitat would threaten the long term survival and existence of these individuals, as well as an unknown number of Burrowing Owls that can be expected to occur there during migration*

> *(migrants are seldom detected during the kinds of surveys that have been conducted at Banning Ranch).*

He goes on to say:

> *What is important for the persistence of Burrowing Owls is that the set-aside for owl foraging include, to the maximum extent possible, large and contiguous areas of vernal pools, native or non-native grasslands, and other open, sparsely vegetated habitats. Project planning to date falls far short of this standard.*

Burrowing owl foraging habitat is easily disturbed; adverse impacts include trampling and destruction from foot and vehicle traffic, mowing and disking, fragmentation into small blocks from roads and development, and total removal by grading and development. And the burrowing owls themselves are very susceptible to disturbance; large and contiguous areas of suitable foraging habitat are important for protecting burrowing owls from a myriad of threats associated with development. The most serious threats to burrowing owls are direct habitat loss, habitat fragmentation, and eradication of ground squirrels in areas undergoing rapid urbanization such as southern California. According to the 2008 CDFW burrowing owl conservation guidelines; "The importance of habitat loss is emphasized by the fact that most owl populations suffering either extirpation or drastic reduction have been in coastal counties that experienced tremendous urbanization in recent decades". Because they are ground dwelling, burrowing owls are extremely vulnerable to disturbance and predation by domestic and feral cats and dogs, as well as native predators, and to burrow disturbance and destruction by unleased dogs, human foot and vehicle traffic. Other threats to burrowing owls include pesticides such as the various anti-coagulants used to kill rodents and the noise and artificial lighting associated with development.

The first test of ESHA is whether a species or habitat is rare. Rarity can take several forms, each of which is important. Many rare species or habitats are globally rare, but locally abundant. Some other species or habitats are geographically widespread, but occur everywhere in low abundance. Burrowing owls, documented as rare in California by the CDFW, USFWS, and BLM as stated above, fall into the latter category; they are distributed from the Mississippi River to the Pacific Ocean but in all locations in very low numbers primarily because of loss of burrow and foraging habitat due to human development and disturbance.

A separate test for ESHA is whether a species or habitat is especially valuable. The definition explains that areas may be valuable because of their "special nature," or special "role in the ecosystem." Burrowing owl burrow and foraging areas play a special role in the ecosystem because they provide essential nesting, roosting, and foraging habitat for the rare owl.

Finally, for an area to qualify as an ESHA, the plant or animal life or habitat in the area must be one that could be easily disturbed or degraded by human activities and developments. Within Orange County, as in most areas of southern California, rapid

urbanization has resulted in direct loss or significant degradation of natural habitat including open grassland areas and ground squirrel habitat that are necessary for burrowing owls to survive and persist.

For these reasons burrowing owl burrow and foraging habitat meet the Coastal Act definition of ESHA as habitat that is "especially valuable because of [its] special . . . role in [the] ecosystem and which could be easily disturbed or degraded by human activities and development."

In considering burrowing owl's dependence on suitable foraging habitat, we recognize that Banning Ranch, in its current state as open space with active oil operations, with approximately 122 acres of open grassland and ruderal areas, does not support the estimated amount of foraging acreage (approx. 300 to over 400 acres) needed for adult male burrowing owls. However, as documented above, the site consistently supports one or more wintering burrowing owls. We identified suitable burrowing owl burrow and foraging habitat on Banning Ranch by applying the following area characteristics required for burrowing owl survival and persistence:

- habitat consisting of native and non-native grassland, grassland sparsely vegetated with low shrubs, and ruderal and disturbed areas.

- contiguous block of suitable habitat with ground squirrel burrows and consistent evidence of burrowing owl presence and use of burrows.

- large contiguous area where human disturbance has been limited and can be minimized to the greatest extent possible.

By employing these criteria, we identified a 64-acre area of burrowing owl burrow and foraging habitat ESHA (Figure 16).

*Raptor/Burrowing Owl Foraging Habitat*

As noted by the applicant (NBR 2015a) and the Banning Ranch Conservancy (Hamilton 2015a,b, 2016a,d,e,f), both native and non-native grasslands provide important foraging opportunities for raptors including burrowing owls. For many years, there was no attempt to protect non-native grasslands and ruderal areas in coastal California because of their exotic status. However, more recently wildlife biologists have realized that most of the remaining raptor foraging habitat along the southern California coast was largely comprised of non-native species and, being unprotected, was rapidly being developed. As a result, the CDFW began recommending in their CEQA analyses and Natural Community Conservation Planning that losses of such raptor foraging habitat be mitigated at a ratio of 0.5:1.0 (e.g., Tippet 2000).

The generic approach to grassland preservation established by the CDFW provides regional benefits, but was not intended to address the protection of particular species at particular locations. However, issues of resource protection that come before the

Coastal Commission are always site-specific. In past actions, the Commission has designated breeding, roosting, and wintering features (e.g., trees and burrows) as ESHA, but not foraging habitat, such as non-native grasslands. The disconnect in this approach was pointed out by Ronald Jurek (2000), a CDFW avian biologist, in the context of the Brightwater development on the Bolsa Chica Mesa where the Eucalyptus trees used for nesting and perching were designated raptor ESHA, but the adjacent grasslands were not. Mr. Jurek wrote that, "[t]he ESHA is a zone of trees with good perching and nesting conditions within raptor habitat. It is not the raptor habitat itself. In my professional opinion, for most of the raptor species known to use the ESHA, raptor use depends primarily on the availability of the food resources of the surrounding lands…."

There is certainly a rationale for identifying raptor foraging habitats as Environmentally Sensitive Habitat Areas because raptors will only occupy sections of the coast where such habitats are present and the amount of foraging habitat appears to be a limiting factor for both breeding success and the size and health of wintering populations. Therefore, foraging habitats are especially valuable due to their role in the ecosystem of supporting raptors, including sensitive species such as burrowing owls and white-tailed kites. However, Environmentally Sensitive Habitat refers to a particular "area," and technical staff has found it difficult to define such an area or provide an objective basis for choosing one subset of a large area over another because potential areas frequently include hundreds of contiguous acres of annual grasses and ruderal vegetation. Even when there are data indicating the presence of foraging raptors, there is generally not sufficient information to identify those particular areas of habitat that are especially important. Therefore, for past projects, in order to maintain critical foraging habitat for raptors staff has recommended and the Commission has implemented the policy adopted by CDFW (e.g., Hellman Properties 5-97-367-A1; Hearthside Homes Brightwater 5-05-020).

In the previous version of this memorandum, we also recommended applying the CDFW policy at Banning Ranch in order to protect a portion of the grassland and ruderal areas that provide appropriate foraging habitat for burrowing owls and other raptors. This recommendation has been criticized by Robb Hamilton (2015a,b, 2016a,d) and most recently by Mr Hamilton (2016e) and Dr. Peter Bloom (2016), both avian ecologists with extensive field experience in southern California. Dr. Bloom was one of the three independent peer reviewers concerning raptor issues associated with proposed development on the Bolsa Chica mesa, and his recommendations helped inform the staff recommendation for Commission action on a project-specific Local Coastal Program Amendment (1-95) and a later application for a Coastal Development Permit (5-05-020) for the Brightwater project.

Dr. Bloom suggests that in our biological assessment and recommendations we are applying a different standard at Banning Ranch than was applied at Bolsa Chica. This is not correct. We are, in fact, applying the same standard, although the implications for raptors are different because of other differences in the two projects. In both cases (Bolsa Chica and our October 2015 and April 2016 NBR ESHA determinations), the

only areas designated ESHA for burrowing owls are areas containing small mammal burrows that were repeatedly observed to be used by wintering owls, the same method was used to define the ESHA boundary, and the same buffer was recommended (50m/160ft). At Bolsa Chica the burrowing owl ESHA was 0.65 ac and at Banning Ranch the recommended burrowing owl ESHA was 1.5. In neither case was foraging habitat for raptors recommended by staff to be classified as ESHA, or in the case of Bolsa Chica, determined by the Commission to be ESHA. However, application of the CDFW recommendation to preserve 0.5 acres of foraging habitat for each 1.0 acre developed was recommended in both instances and was required by the Commission for the Brightwater development. Although not part of the Commission's action on the Coastal Development Permit, the 103-acre lower bench of the Bolsa Chic mesa was eventually placed in conservation and is appropriate raptor foraging habitat[31]. Following the CDFW recommendation, to mitigate for the loss to development of about 68 acres of foraging habitat on the upper bench, 34 acres were required to be preserved, a small portion of which was offsite. Therefore, although only a portion was required by the Commission, there are probably about 130 acres of foraging habitat available to an estimated one to three wintering burrowing owls on the Bolsa Chica mesa. This is very different from the situation at Banning Ranch where about the same number of wintering burrowing owls have probably been generally present.

At Banning Ranch, Bloom (2016) estimates that there are about 122 acres of foraging habitat, of which 55 acres could be developed based on the constraints analysis in the May 2016 staff report. Under this scenario approximately 67 acres of foraging habitat would remain. However, as shown in Figure 8, that would leave only 25 acres of the most appropriate grassland foraging habitat outside of the proposed commercial and development disturbance footprint. Furthermore, this area would be comprised of small strips and patches of grassland within close proximity to and fragmented by development and subject to development-related disturbance. This arrangement is in stark contrast to large contiguous areas of foraging habitat removed from human disturbance known to be critical for burrowing owls. In fact, Bloom (2016) believes that implementing development in the footprint suggested by staff in May 2016 "would almost certainly lead to extirpation of the Burrowing Owl as a winter species on Banning Ranch."

Determining the minimum size of foraging habitat necessary to support one to several burrowing owls is not a simple exercise. Bloom cites studies that estimate average home ranges from around 300 to over 400 ac for breeding males and suggest that wintering ranges are four times larger. In the studies he cites, there is tremendous variability among birds, with breeding home ranges from 20 to 1,213 acres in one study. The fact that one to several wintering birds have been present at Banning Ranch with approximately 122 acres of foraging habitat indicates that those large areas are not

[31] In its 2000 action on the LCP amendment the Commission required that the lower bench be designated "Conservation" due to the presence of wetlands and coastal sage scrub and southern tarplant ESHA. The amended LCP was not accepted by the County and the applicant did not include the lower bench in its application for a Coastal Development Permit. Subsequently, the lower bench was purchased with public funds and conserved.

required in all situations. However, we agree that reducing the area of available foraging habitat in such a way that the remaining habitat is fragmented and subject to increased disturbance will place the burrowing owl at increased risk of abandoning this site. We appreciate Robb Hamilton's and Dr. Bloom's criticisms and their effort to focus our attention on this issue. The loss of wintering burrowing owls would be a significant impact. Jurek (2000) wrote that, "The three raptor species that I feel are most in need of potential and actual habitat protection efforts in the Bolsa Chica area are the burrowing owl, northern harrier, and white-tailed kite." The need for protection is equally high three miles to the south at Banning Ranch.

Unlike the situation in many coastal areas (e.g. the Gaviota coast), the potential foraging habitat at Banning Ranch and the Newport Beach area in general is not extensive and all the appropriate habitat at Banning Ranch is probably used at one time or another by burrowing owls. We think that the areas that are especially important to these owls are areas that are adjacent or close to their burrowing habitat and that form relatively large, unbroken expanses of grassland that are not subject to high levels of disturbance from residential, commercial, or recreational development. Therefore, we recommend that the Commission designate the 64 ac. of grassland and ruderal habitats shown in Figure 16 as ESHA because of their important ecosystem function of providing burrow habitat and foraging opportunities for the burrowing owl, and because they could be easily disturbed or degraded by human activities and development. These areas should be incorporated into the Habitat Management Plan.

*San Diego Fairy Shrimp (Brachinecta sandiegonensis)*

The federally endangered San Diego fairy shrimp is a small aquatic crustacean in the order Anostraca that is restricted to vernal pools in coastal southern California and northwestern Baja California, Mexico (USFWS 1997). San Diego fairy shrimp are usually found in small, shallow vernal pools that range in depth from approximately 2 to 12 inches (Hathaway and Simovich 1996). Their lifecycle includes an embryonic egg stage in the form of cysts that have reduced metabolic activity and are resistant to harsh drying conditions. The embryonic cysts persist as a cyst bank consisting of different generations. The lifespan of adult San Diego fairy shrimp is approximately 30 days with adults reaching sexual maturity within 7 to 20 days (Ripley et al. 2004). Adult San Diego fairy shrimp are typically found from January to March; however, during years with extended rainfall they may occur earlier and later. While each generation of adults lives for approximately one month, San Diego fairy shrimp exhibit staggered hatching such that adults may be present throughout an entire wet season.

Complete US Fish and Wildlife Service vernal pool protocol level surveys for determining the presence or absence of San Diego fairy shrimp consist of either two full wet season surveys done within a five year period, or two consecutive seasons of one full wet season survey and one dry season survey in any order. The protocol level procedures for both wet and dry season surveys are biologically and technically rigorous as well as time-consuming. For instance, during the wet season, pools must be sampled once every two weeks, beginning no later than two weeks after initial

inundation and continuing until pools are no longer inundated or until 120 days of continuous inundation have elapsed. Detailed requirements for vernal pool protocol level surveys are provided in USFWS (2015).

San Diego Fairy Shrimp have been identified in 8 pools (VP1, VP2, VP3, E, G, H, I, J) on Newport Banning Ranch. The applicant has asserted that they have completed the requirements for vernal pool protocol level surveys (Dudek and Glenn Lukos Asssociates 2013). However, Christine Medak, US Fish and Wildlife Service biologist stated in an April 8, 2013 email response to that report that, "Based on our review of the information provided, we recommend one more protocol wet season survey (USFWS 1996) during a year of at least average rainfall year [sic] is conducted in all pools that pond sufficiently (i.e. 3 cm) to be sampled, with the exception of the pools occupied by *Branchinecta sandiegonenesis* (i.e. 1,2,3,E, G, H, I, J)". When we examined the record, it appeared that many ponds were not sampled through the entire wet season, data sheets for ponds determined to have no fairy shrimp were missing, and most data sheets for ponds that were sampled had missing data, making it impossible to verify that the surveys were conducted in accordance with survey protocol. Therefore, while eight ponds have been determined to support San Diego fairy shrimp, the presence or absence of San Diego fairy shrimp in the other ponds remains inconclusive and an additional wet season vernal pool protocol level survey may be required by the Service.

Should an additional survey or other actions be required by the U.S. Fish and Wildlife Service pursuant to the federal Endangered Species Act, we recommend that the Service's requirements be completed prior to issuance of a Coastal Development Permit and that additional restrictions, as necessary or appropriate to protect the San Diego fairy shrimp, be observed and incorporated into the approved HMP.

To maintain the viability of this endangered species, we recommend that vernal pools be created in several areas and be incorporated into the approved HMP to provide habitat for the San Diego fairy shrimp, and that destruction of vernal pools containing San Diego fairy shrimp due to remediation be mitigated at a 10:1 (area created or restored:area impacted) by restoring the vernal pools in place and creating vernal pools nearby or in other areas approved by the U.S. Fish and Wildlife Service.

*Habitat Management Plan*

Banning Ranch and the surrounding area is unique and ecologically valuable as one of the only reasonably intact wetland-bluff ecosystems, including river mouth and estuary habitat, lowlands with wetlands, uplands with coastal scrub and riparian habitat, and grasslands with vernal pools, remaining along the coast of southern California. There are no comparable areas to the south and only a few such areas to the north, including Bolsa Chica six miles up the coast. As detailed above, Banning Ranch supports a number of wetlands and rare habitats and species that rise to the level of ESHA. A Habitat Management Plan should be developed, in consultation with the USFWS and CDFW, to ensure that the existing wetlands and ESHA are protected, preserved, and enhanced and to restore and mitigate wetlands and ESHA impacted by the project

activities. The approved Habitat Management Plan will serve as the umbrella guidance document for the protection, enhancement, restoration, and mitigation of wetlands, ESHA, and open space outside the approved developable areas required by the Coastal Development Permit (CDP) and will be designed to complement the restoration required, independent of the CDP, pursuant to the settlement agreement between the applicant and the Commission (CCC-15-CD-01 & CCC-15-RO-01, dated May 12, 2015.

Fuel Modification

The fuel modification plan submitted by the applicant would be inconsistent with the recommendations in this memorandum for protection of biological resources. It would be inadequate to protect the various resources described above most significantly for the following reasons:

- It would provide only 20 feet of defensible space between development and habitat buffer, an unprecedently small distance and, based on prior experience, fire officials would most likely demand a larger area, which would then result in disturbance within the buffer.

- The size of the habitat buffers would themselves be greatly reduced from the minimum widths recommended herein and justified as explained above and,

- Fuel modification would be allowed to occur within the buffers; fuel modification is typically a type of use that involves vegetation management such as thinning, limbing, and clearing, all types of disturbance not allowed in buffers.
-

The technical staff initially recommended that no fuel modification occur within the recommended buffers. Technical staff has since reviewed Commission staff's recent, alternative fuel modification proposal, developed in response to arguments made by the applicant. That alternative proposal would require 60 feet of defensible space between development and the habitat buffer. Habitat buffers would remain as recommended by the technical staff: 100 feet for wetlands and vernal pools, 50 feet for ESHA vegetation, 100 feet for gnatcatcher habitat buffer, 164 feet for burrowing owl burrow habitat buffer, and 100 feet for burrowing owl foraging habitat buffer. Within the outermost 10 feet of the buffer, however, a trail would be allowed adjacent to and supplementing the 60 feet of defensible space. In addition, another 20 to 30 feet adjacent to the trail and extending into the buffer could be initially planted with fire resistant native shrubs (subset of shrubs found in California brittle bush scrub and maritime succulent scrub), where no maintenance will ever occur. Because this area would be planted with native shrubs that are consistent with the functioning of a buffer and would not be subject to ongoing management or other disturbance, and because of the limited size of the trail, provided there is some form of separation between the trail and the remainder of the buffer to minimize the likelihood that the buffer would be invaded by domestic pets or humans, Technical Staff can support this alternative approach.

Combined Biological Constraints Analysis

The results of our analysis and the location of areas identified as wetlands and environmentally sensitive habitats as defined in Sections 30121 and 30107.5 of the Coastal Act and Section 13577 of the Commission's regulations Act are shown in Figures 19, 20, and 21 for the northern, central, and southern portions of Banning Ranch, respectively. Only the area of ground disturbance associated with the proposed development was subjected to a site-specific analysis in the field, although habitat types and wetlands that occur outside the disturbance footprint are also depicted on the maps. ESHA boundaries outside the disturbance area that is associated with proposed residential and commercial development have not been checked and verified in the field. The recommended development setbacks of 50 feet for sensitive vegetation (including proposed restoration areas), 100 feet for wetlands and gnatcatcher habitat, 100 feet for burrowing owl foraging habitat, and 164 feet for burrowing owl burrow habitat are shown, but clipped and joined wherever two of the buffers meet in order to form a single continuous setback line. If fuel modification zones are required by the local fire authority, additional setbacks or other protective measures may be required to prevent intrusion into ESHA and ESHA buffers.

Figure 1. Wetlands, San Diego fairy shrimp ponds, and non-wetland periodically inundated areas.


Wetlands and Non-Wetland Periodically Ponded Areas at Banning Ranch

Figure 2. Wetlands C and CC with merged 100-foot buffers.

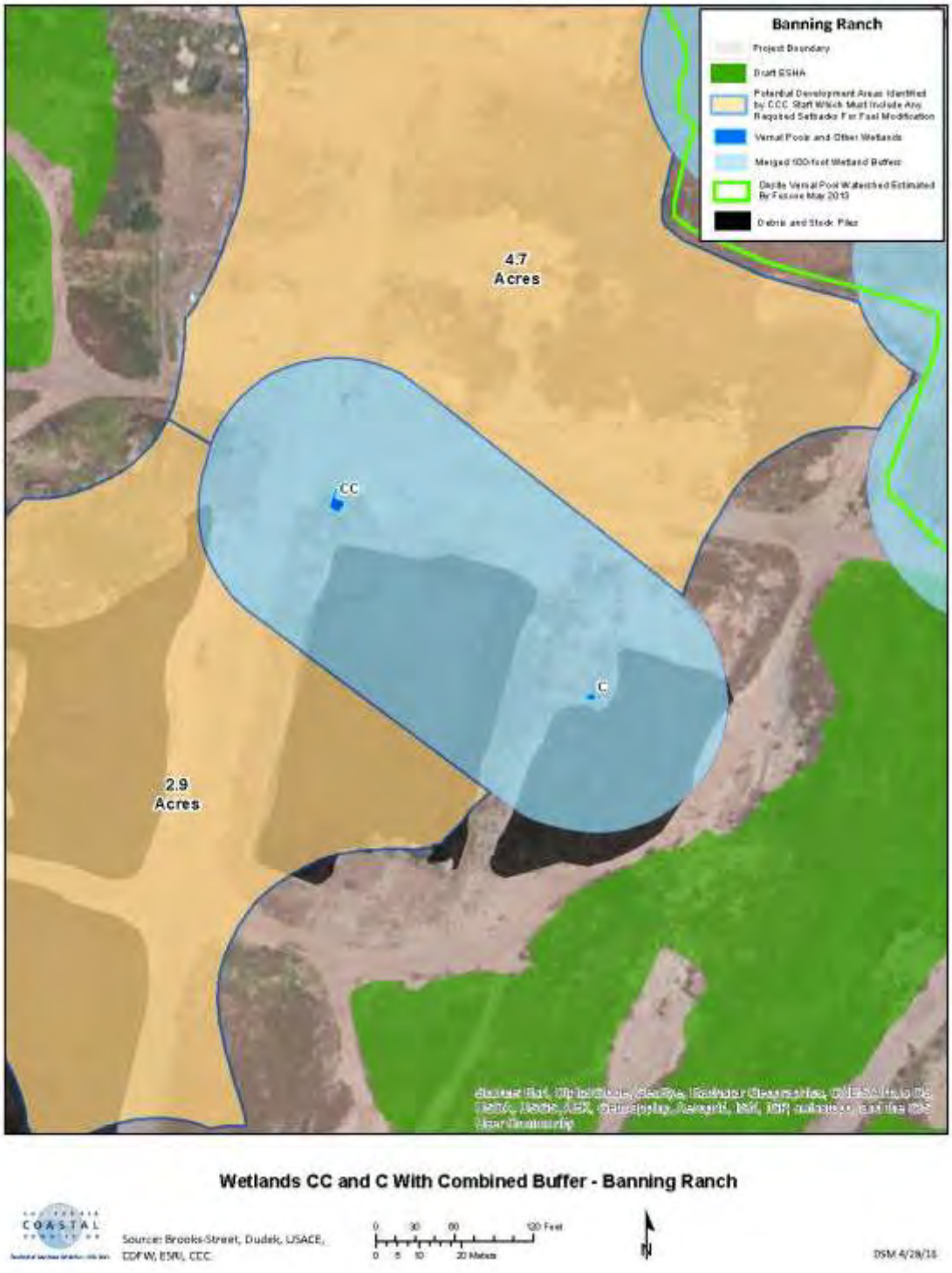


Figure 3. Mima mounds near Corona del Mar and at Banning Ranch apparent in aerial photographs taken prior to urban and industrial development.

A. Area near Corona del Mar in 1952 (from Riefner et al. 2007, Figure 1)

B. Banning Ranch in 1938

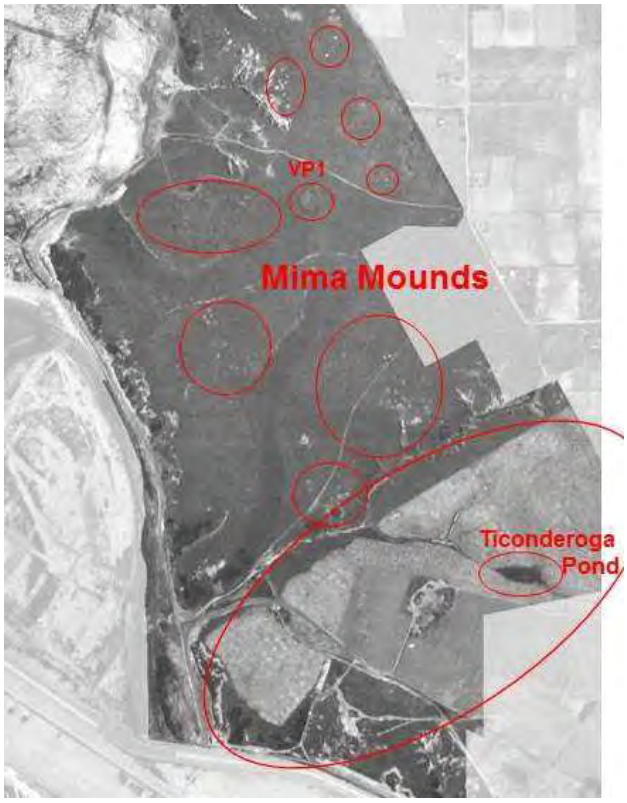


Figure 4. Brittle bush scrub recommended for designation as Environmentally Sensitive Habitat Areas.

Figure 5. Purple needle grass grassland present in 2012 and recommended for designation as Environmentally Sensitive Habitat Areas in 2015.

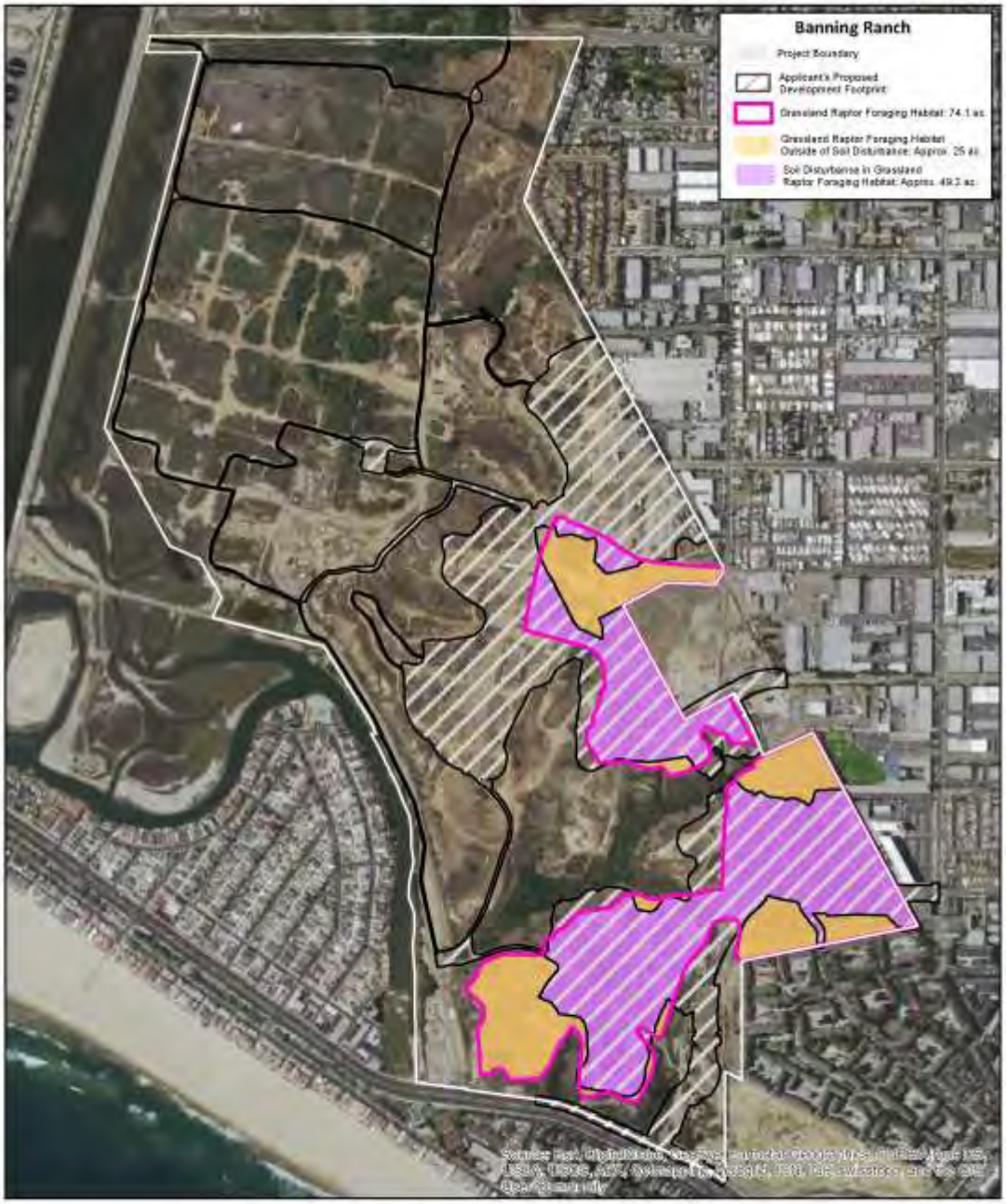
Figure 6. Patches of purple needlegrass grassland present in both 2012 and 2016, and patches that were present in 2012 but "absent" (≤ 10% relative vegetative cover) in 2016. A few patches outside the proposed development area shown as present in 2012 were not surveyed in 2016 and may still be present with greater than 10% relative vegetative cover but would not create a constraint on development because of their location.


Purple Needle Grass Grassland On Banning Ranch

For Illustrative Purposes Only. Source: Brooks-Street, Dudek, ESRI, CCC.

Figure 7. Candidate restoration areas (outlined in yellow) identified in the context of consent enforcement orders regarding alleged unpermitted development on Banning Ranch.

Figure 8. Approximate location of existing grassland raptor/burrowing owl foraging habitat at Banning Ranch relative to the proposed area of development.




Grassland Raptor Foraging Habitat On Banning Ranch

For Illustrative Purposes Only. Source: Brooks-Street, Dudek, ESRI, CCC.

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Figure 9. Unadjusted cumulative gnatcatcher use areas 1992-2015. Although never considered part of the gnatcatcher ESHA (Engel 2015), unvegetated areas, such as roads and other disturbed oil field areas, and areas dominated by invasive species, such as iceplant, are included within the mapped polygons.


Coastal California Gnatcatcher Cumulative Use Areas on Banning Ranch Based on Observed Breeding Territories from 1992 to 2015. In Some Areas Mapped Cumulative Use Areas Overlap Existing Oil Field Development Such As Roads and Well Pads.

For Illustrative Purposes Only. Source: LSA, PCR, BonTerra, Dudek, ESRI.

Figure 10. Gnatcatcher cumulative use areas in the northern portion of Banning Ranch clipped to currently existing native vegetation.

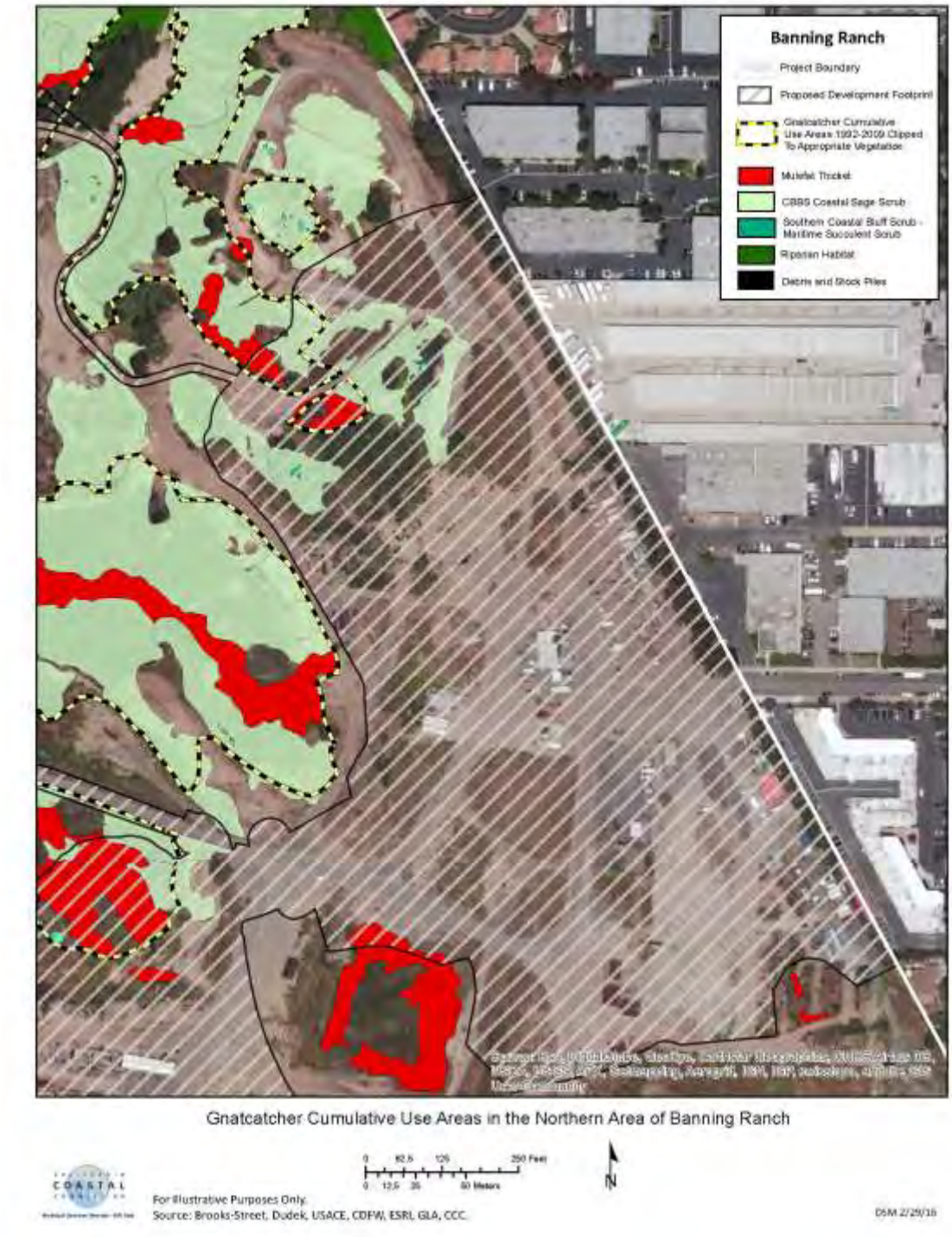


Figure 11. Gnatcatcher cumulative use areas in the central portion of Banning Ranch clipped to currently existing native vegetation.

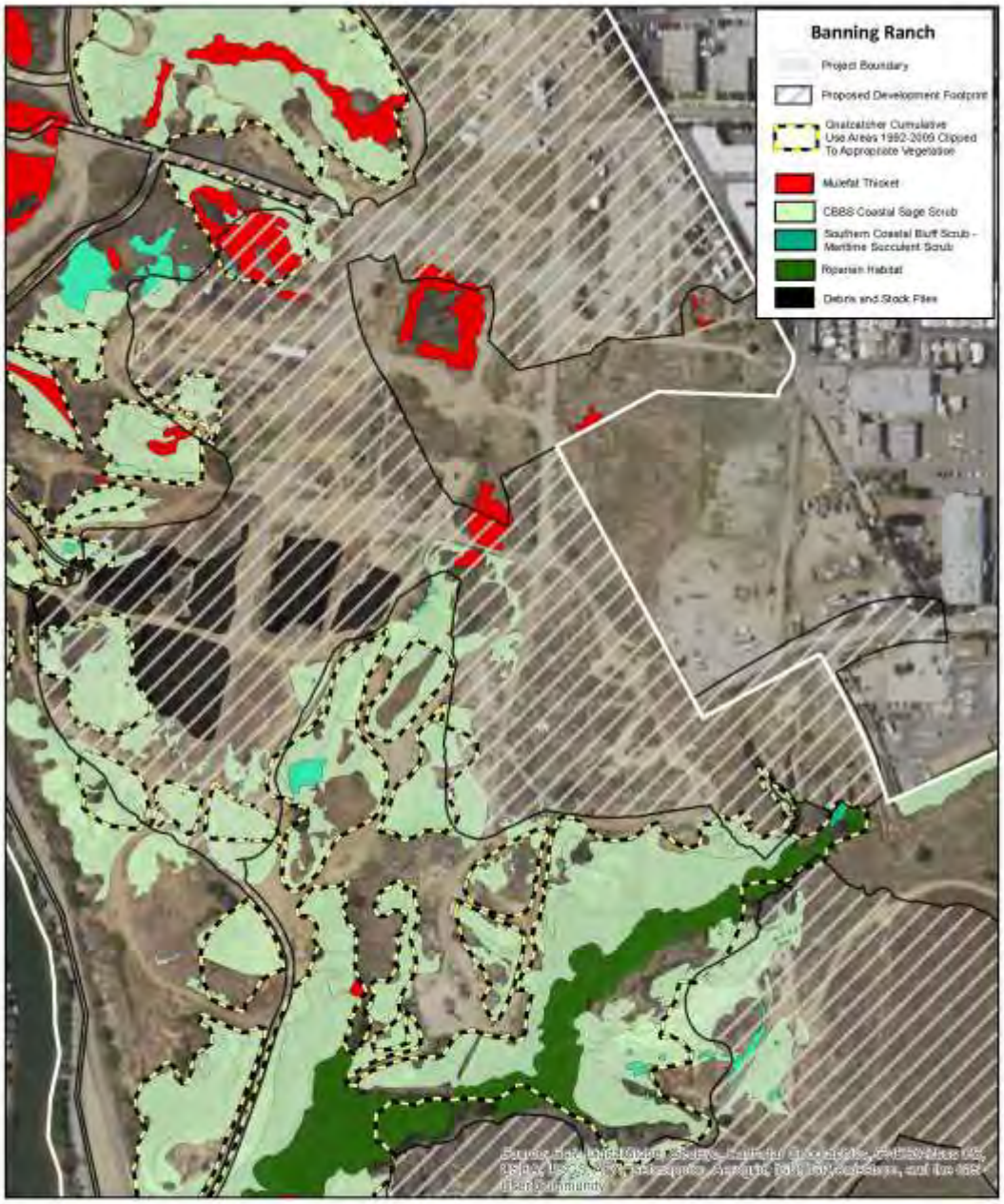


Figure 12. Gnatcatcher cumulative use areas in the southern portion of Banning Ranch clipped to currently existing native vegetation.

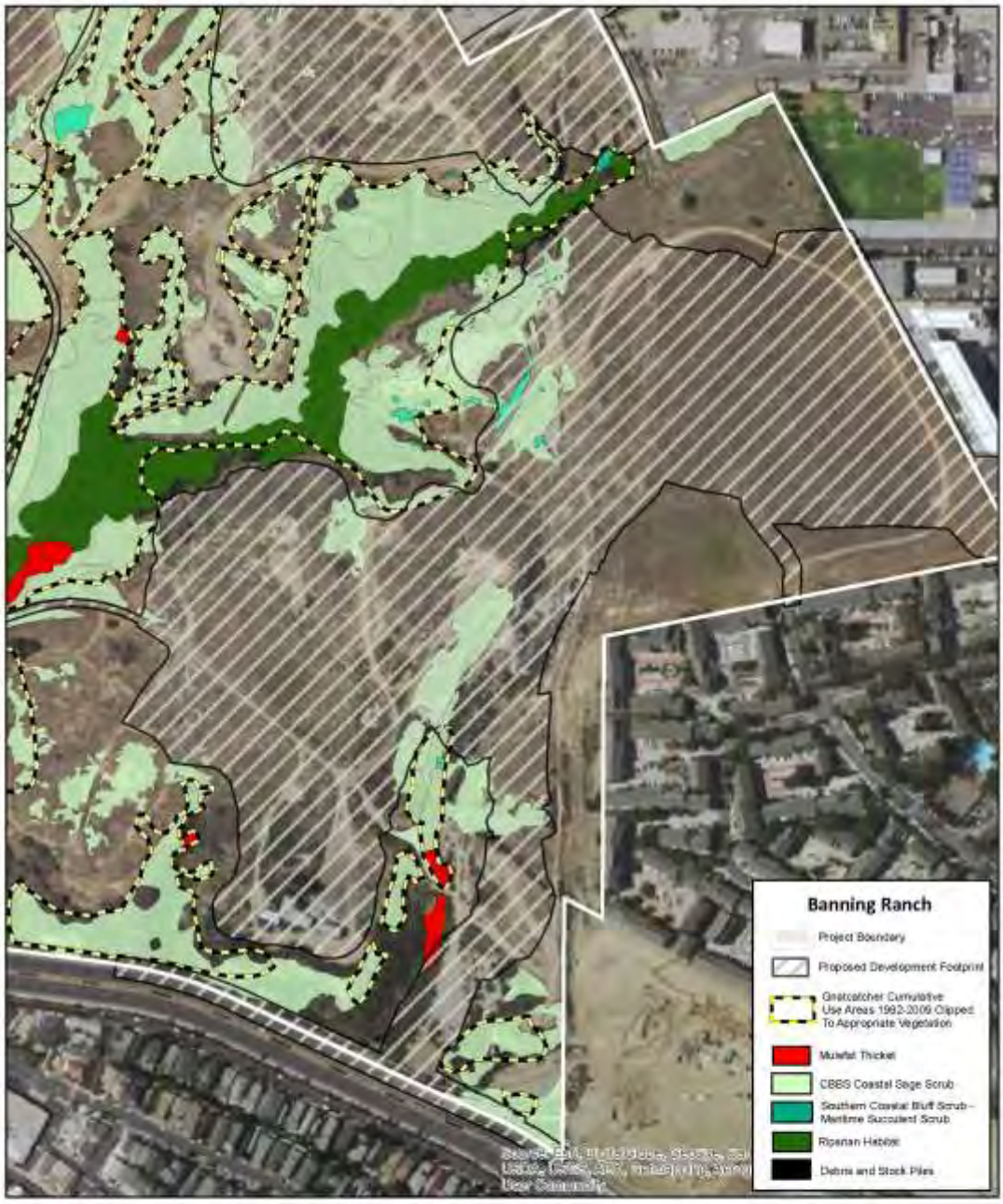


Figure 13. Coastal California gnatcatcher ESHA in the northern portion of Banning Ranch. The ESHA (orange polygons) includes appropriate native gnatcatcher habitat that is adjacent to documented cumulative use areas (dashed polygons). Historical gnatcatcher observations outside of the ESHA are also shown (see text).

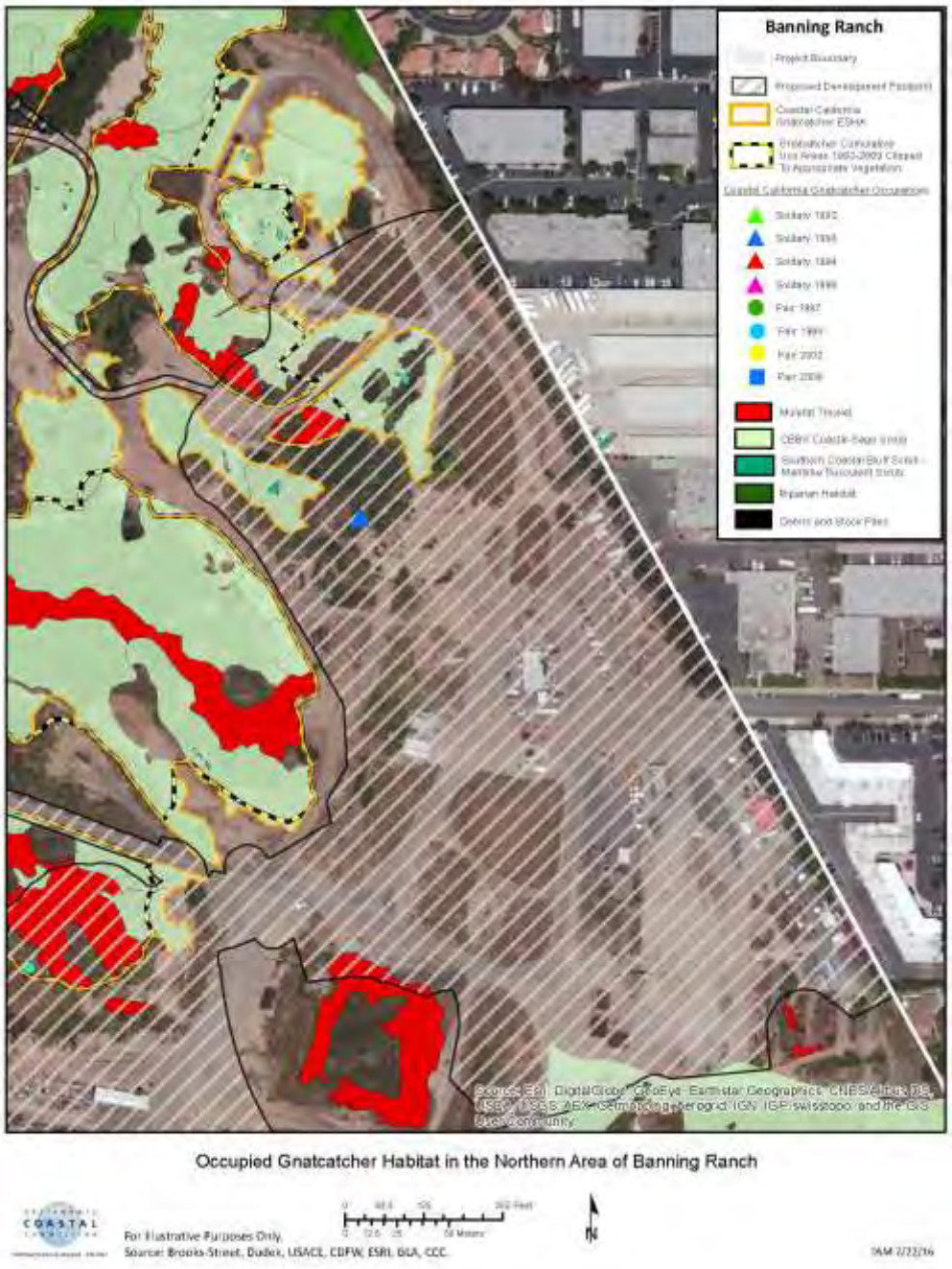


Figure 14. Coastal California gnatcatcher ESHA in the central portion of Banning Ranch. The ESHA (orange polygons) includes appropriate native gnatcatcher habitat that is adjacent to documented cumulative use areas (dashed polygons). Historical gnatcatcher observations outside of the ESHA are also shown (see text).

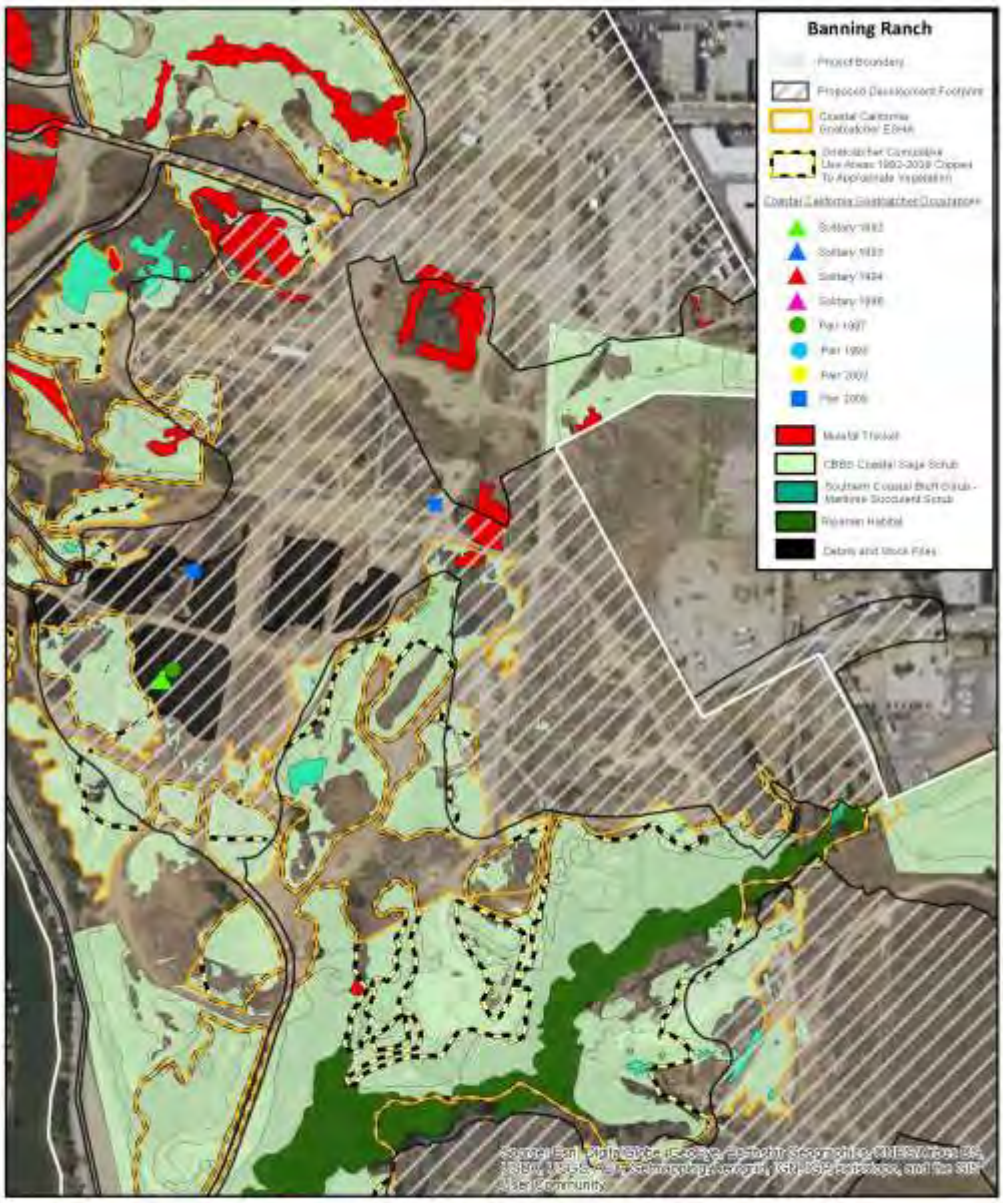


Figure 15. Coastal California gnatcatcher ESHA in the southern portion of Banning Ranch. The ESHA (orange polygons) includes appropriate native gnatcatcher habitat that is adjacent to documented cumulative use areas (dashed polygons). Historical gnatcatcher observations outside of the ESHA are also shown (see text).

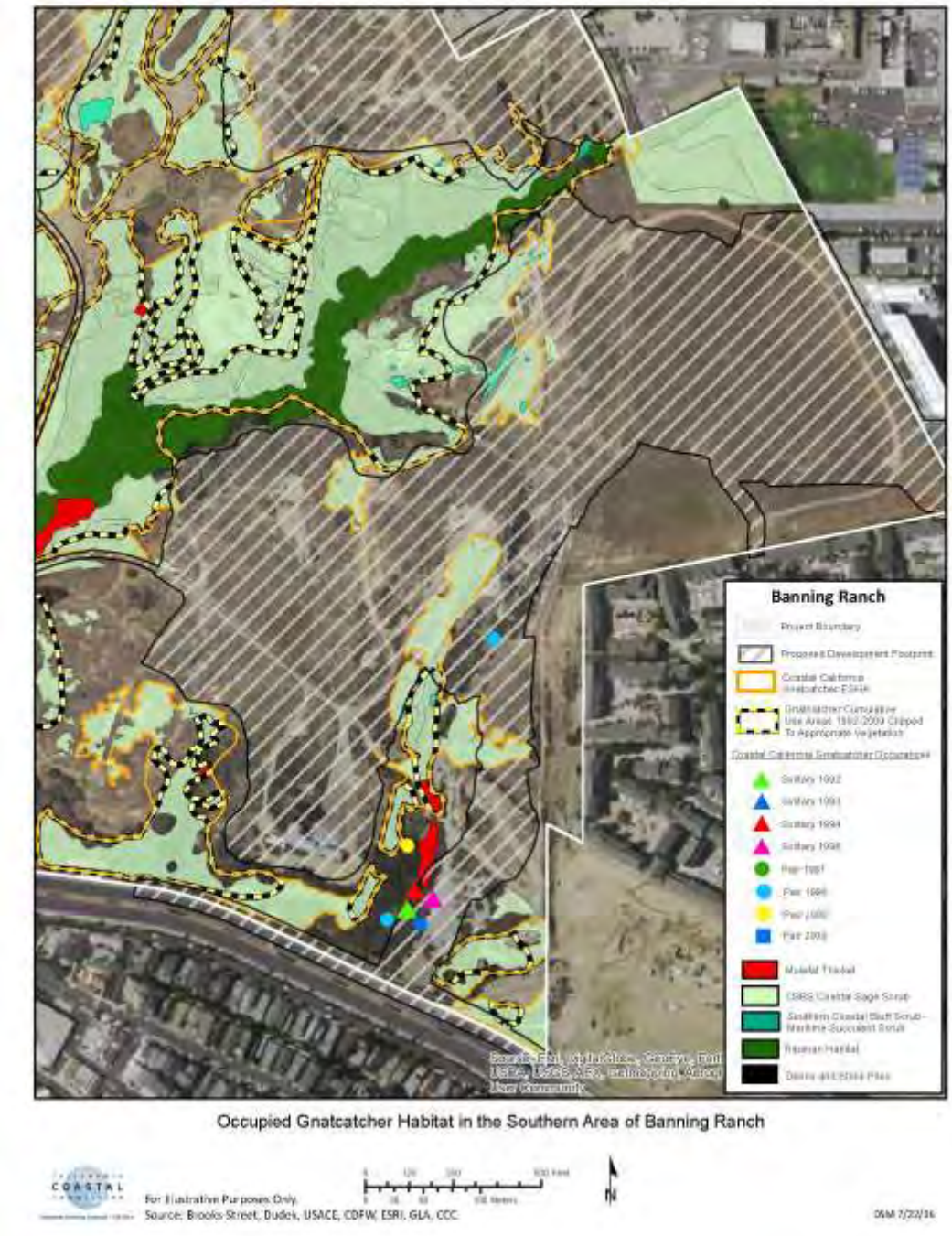


Figure 16. Banning Ranch's Biological Consultants (Glenn Lukos Associates, BonTerra, and Dudek) Burrowing Owl Winter Observations – Winter Surveys Conducted in 2008, 2009, 2010, and 2014. Burrowing Owl Burrow and Foraging Habitat ESHA Shown in Brown and Yellow, Respectively.

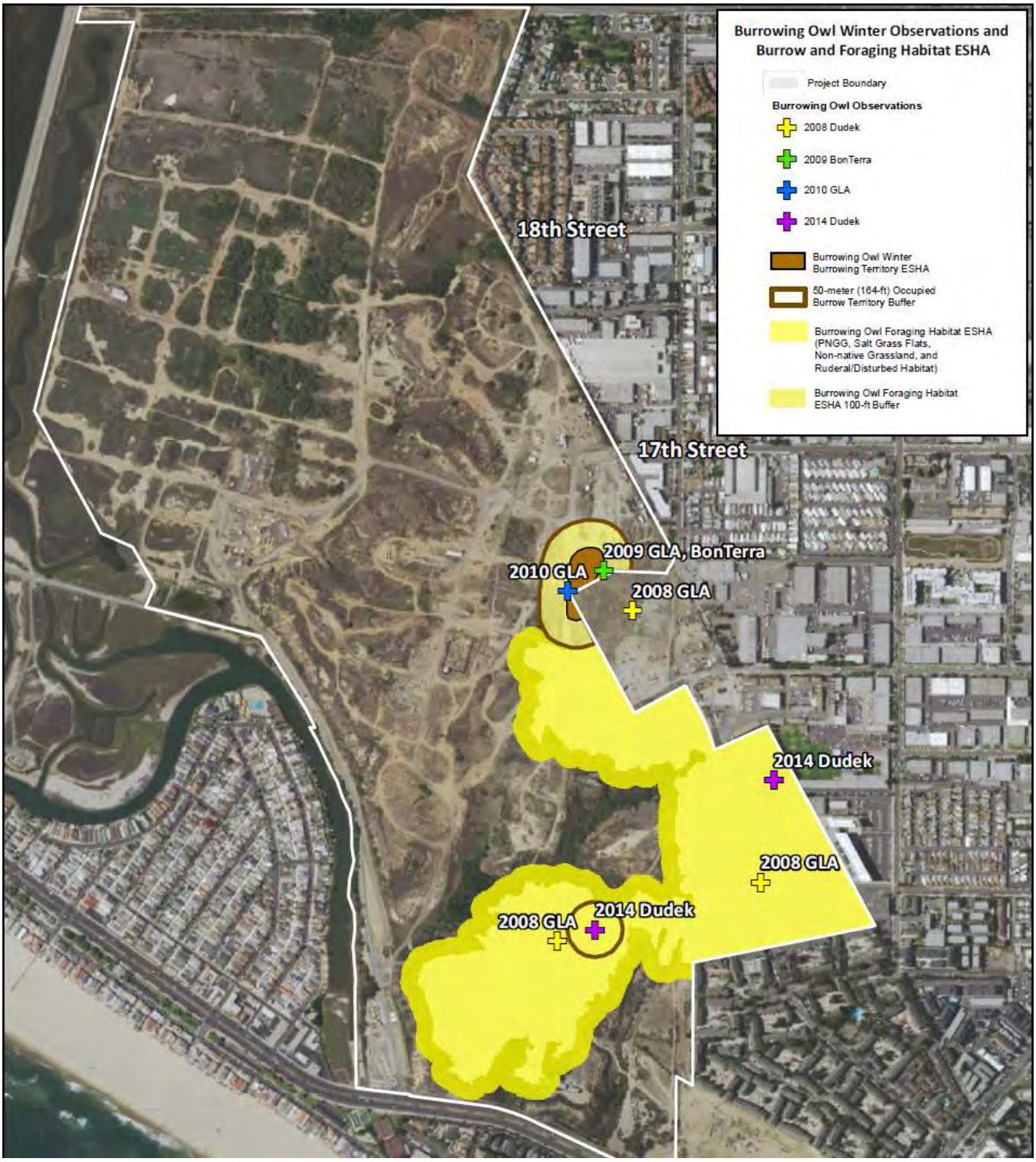


Figure 17. Suitable Burrowing Owl Burrows and Burrowing Habitat Identified by Dudek in 2014 (Ground Squirrel Burrows) Shown as Black Dots and Outlined in Red, Respectively.

Figure 18. General Public Burrowing Owl Winter Observations (many with associated date stamped photographs) from Outside the Banning Ranch Property Boundary Spanning 2011 to 2016. CCC 2015 Observation made by Jonna Engel and Amber Dobson on January 28, 2015. 2016 Hamilton* Observation was made by Robb Hamilton, biologist and principal of Hamilton Biological on March 16, 2016. Burrowing Owl Burrow and Foraging Habitat ESHA Shown in Brown and Yellow, Respectively.

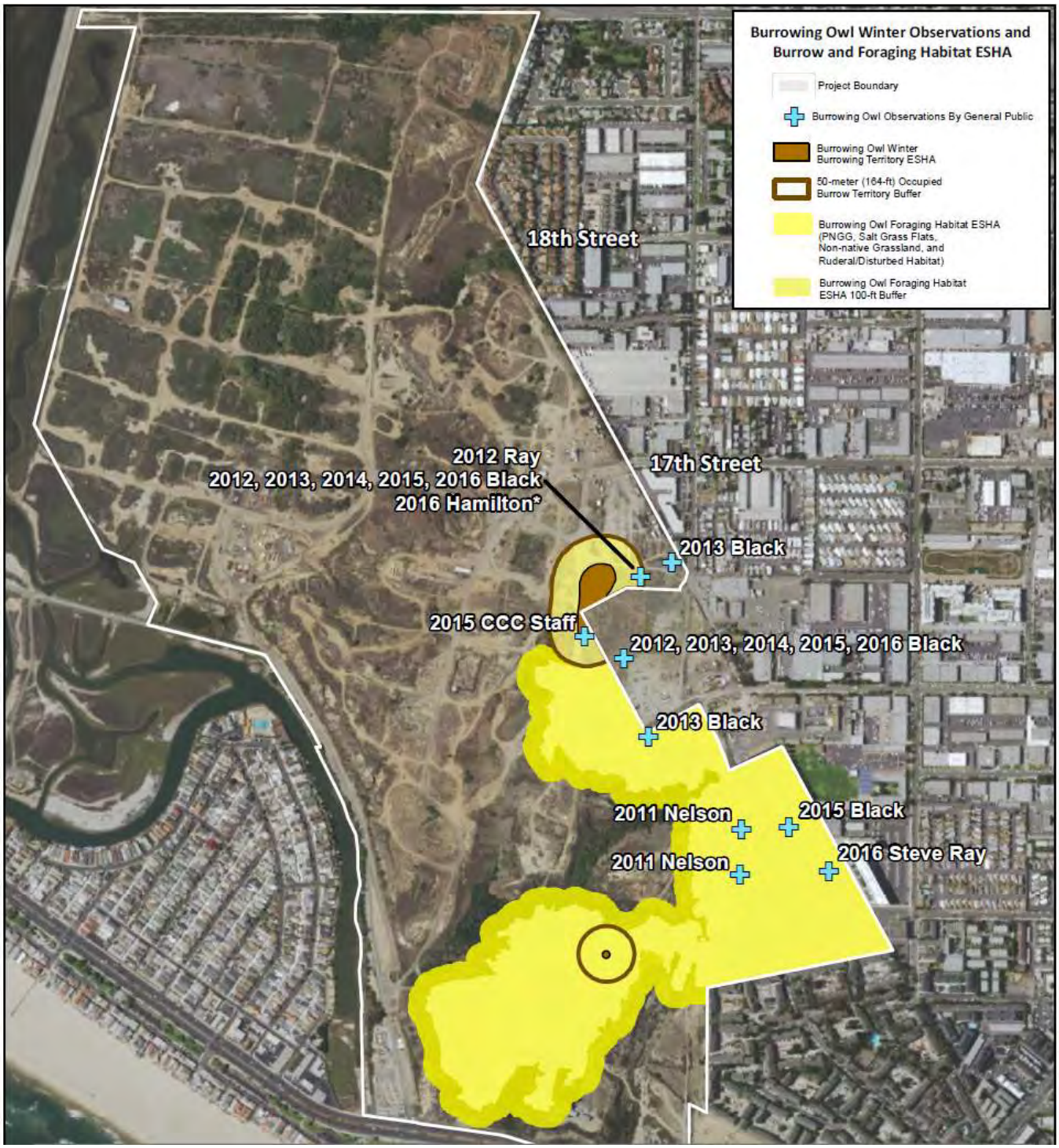


Figure 19. Cumulative constraints map for the northern portion of the proposed development area at Banning Ranch. Environmentally Sensitive Habitat Areas, wetlands and vernal pools, and development setbacks (habitat buffers) are shown.

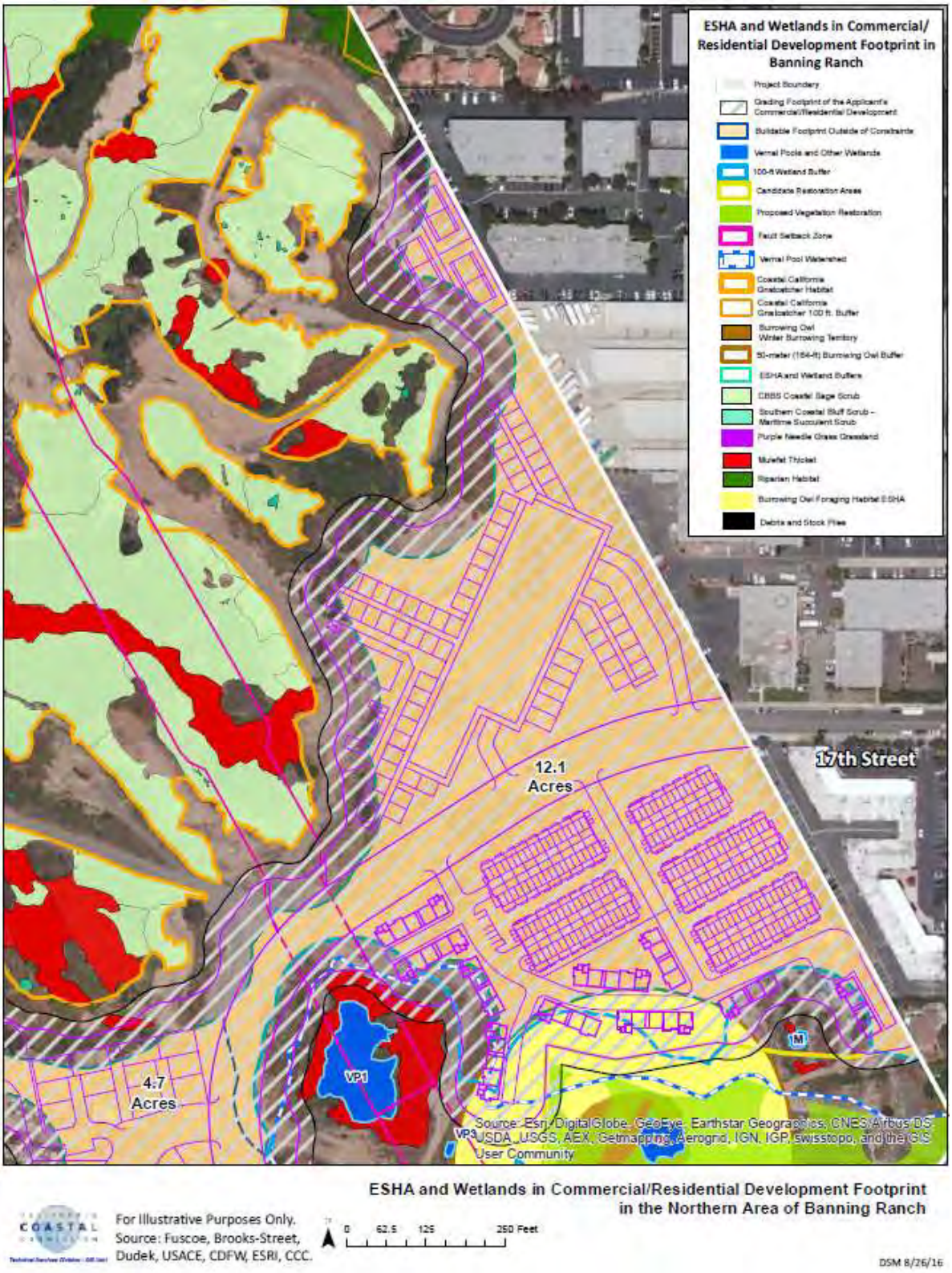


Figure 20. Cumulative constraints map for the central portion of the proposed development area at Banning Ranch. Environmentally Sensitive Habitat Areas, wetlands and vernal pools, and development setbacks (habitat buffers) are shown.

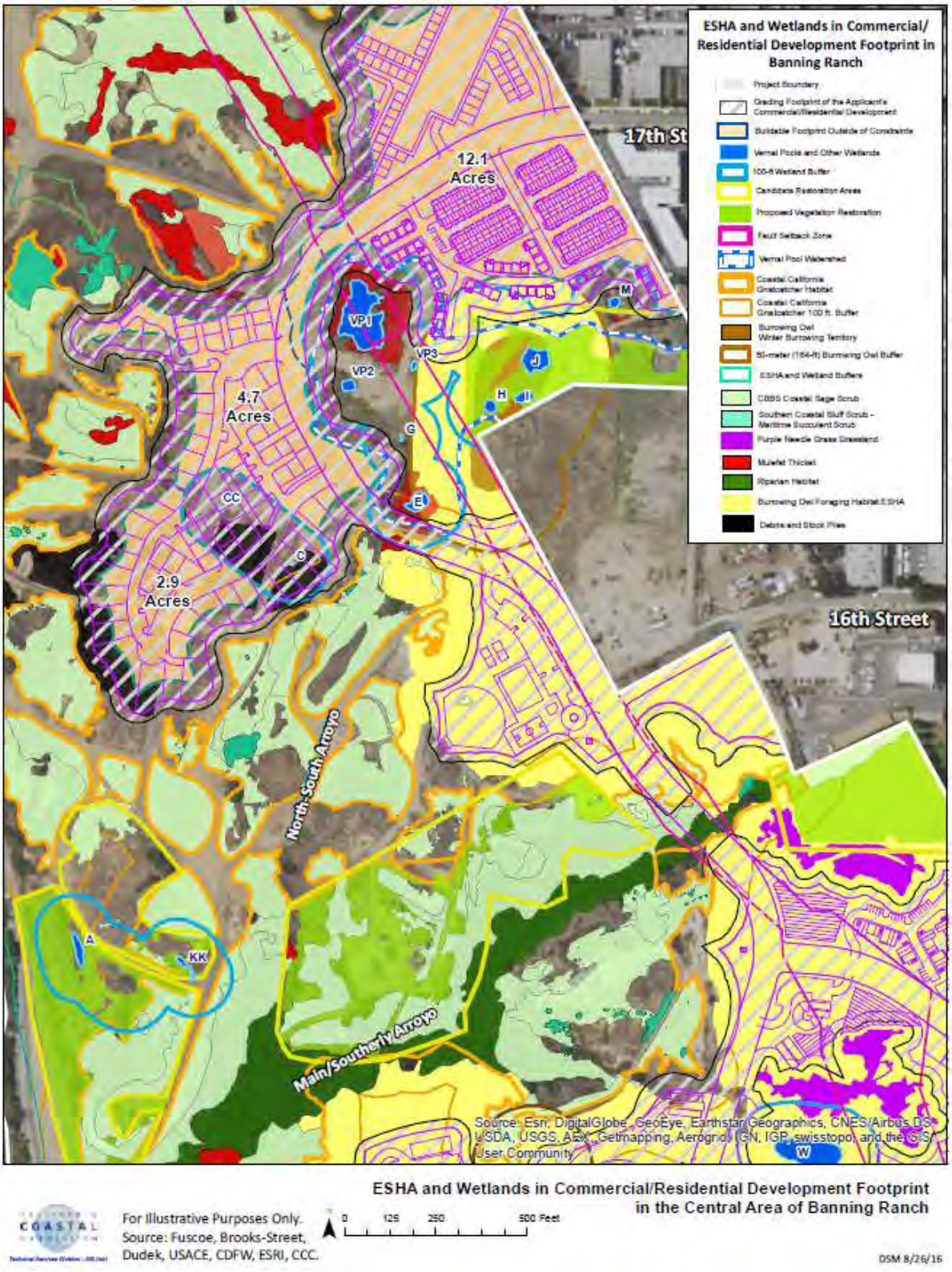
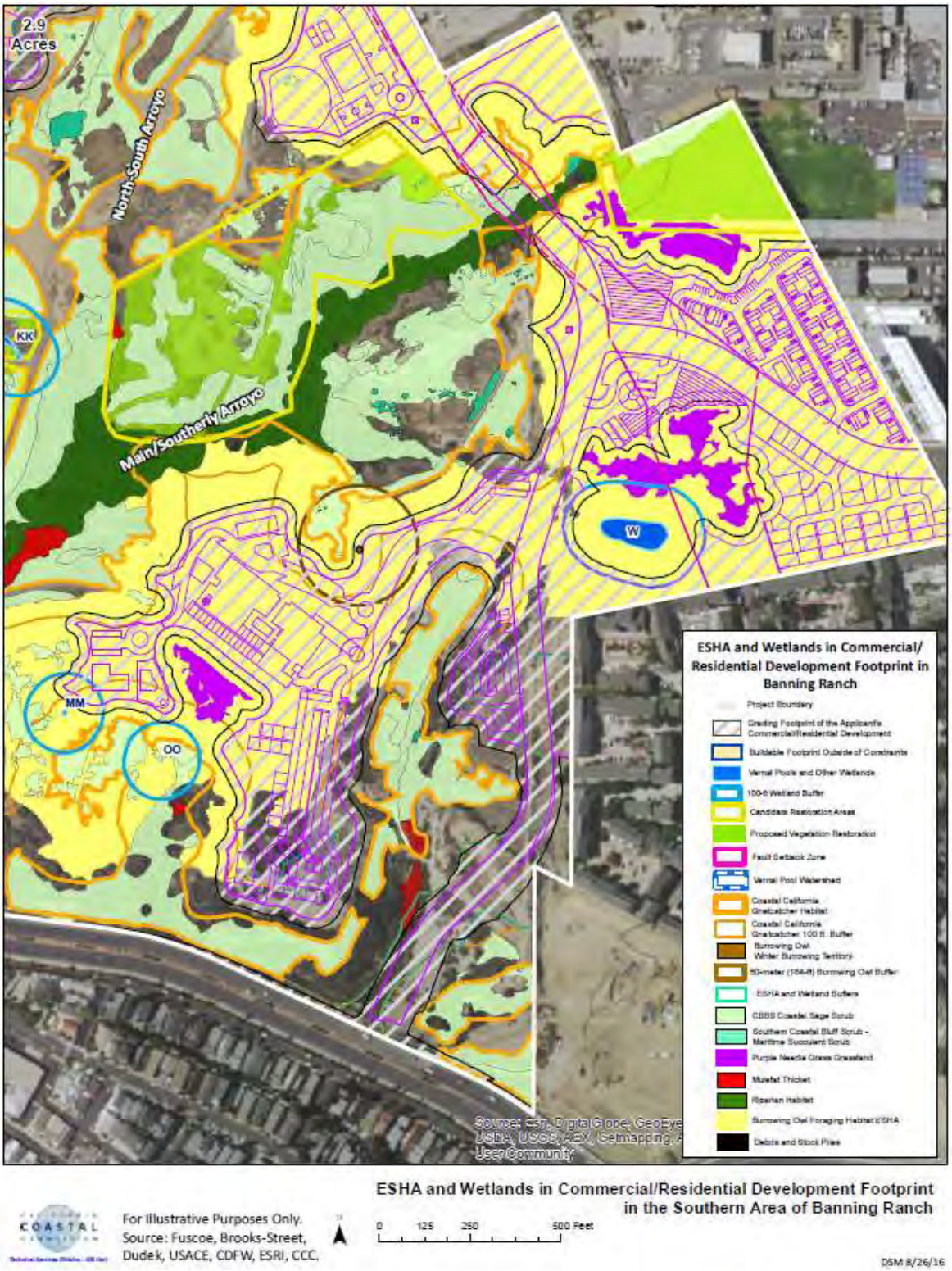


Figure 21. Cumulative constraints map for the southern portion of the proposed development area at Banning Ranch. Environmentally Sensitive Habitat Areas, wetlands and vernal pools, and development setbacks (habitat buffers) are shown.



Documents Reviewed/Literature Cited:

Atwood, J.L. 1993. California gnatcatchers and coastal sage scrub: The biological basis for endangered species listing. Pages 149-169 in Keeley, J.E. (ed.), Interface between ecology and land development in California. Southern California Academy of Sciences, Los Angeles.

Atwood, J.L. and D.R. Bontrager. 2001. California gnatcatcher (*Polioptila californica*). In A. Poole and F. Gill, eds., The Birds of North America, No. 574. The Birds of North America, Inc., Philadelphia, PA.

Atwood, J.L. 2015. Letter dated October 5, 2015 to J. Ainsworth (CCC) regarding coastal California gnatcatchers at Newport Banning Ranch.

Bauder, E. T., D. A. Kreager, and S. C. McMillan. 1998. Vernal pools of Southern California: Recovery plan. Fish and Wildlife Service, Region 1, U. S. Department of the Interior, Portland, OR.

Bauder, E.T., A.J. Bohonak, B. Hecht, M.A. Simovich, D. Shaw, D.G. Jenkins, and M. Rains. 2011. A draft Regional Guidebook for applying the Hydrogeomorphic Approach to assessing wetland functions of vernal pool depressional wetlands in southern California. San Diego State University, San Diego, CA. [Originally published December 2009, updated November 8, 2011]

Berchtold, K. (Santa Ana Regional Water Quality Control Board). 2015. Comments on revised remedial action plan - Newport Banning Ranch oil field abandonment, 1080 west 17th street, Costa Mesa, Orange County, California. Letter to M. Klancher (Aera Energy) dated December 15, 2015.

Bloom, P.H. (Research Biologist). 2000. Letter to S. Hansch (CCC) concerning independent review of the likely affects of three development alternatives on birds of prey.

Bloom, P.H. (Bloom Research on behalf of the Banning Ranch Conservancy). 2016. Letter dated June 24, 2016 to J. Dixon (CCC) regarding “Review of burrowing owl issues, Banning Ranch project, Newport Beach, CA.”

Bomkamp, T. 1995. Vernal Pools: Environmental Sensitivity of and Description of Vernal Pools and Associated Resources. Appendix C of the City of Costa Mesa Fairview Park Master Plan as revised and updated. 2008. Costa Mesa, CA

Bomkamp, T. 2000. Results of Wet Season Surveys for the Federally Listed Endangered San Diego Fairy Shrimp, Newport Banning Ranch, Orange County, California. Letter report to M. Schlesinger (Taylor Woodrow Homes) dated October 18, 2000.

Bomkamp, T. (Glenn Lukos Assoc.). 2015a. Memorandum to J. Dixon (CCC) regarding "Delineation Data for Seasonal Features at Newport Banning Ranch" dated November 24, 2015.

Bomkamp, T. (Glenn Lukos Assoc.). 2015b. Memorandum to J. Dixon (CCC) regarding "Substrate Underlying Feature P at Newport Banning Ranch" dated December 9, 2015.

Bomkamp, T. (Glenn Lukos Assoc.). 2015c. Memorandum to J. Dixon (CCC) regarding "Clarification Regarding Seasonal Features MM and PP at Newport Banning Ranch" dated December 10, 2015.

Bomkamp, T. (Glenn Lukos Assoc.). 2016a. Memorandum to A. Dobson (CCC) regarding "Wetland status for mulefat scrub beyond the limits of Vernal Pool 1, Feature E and Feature M at Newport Banning Ranch, Orange County, California" dated March 10, 2016.

Bomkamp, T. (Glenn Lukos Assoc.). 2016b. Memorandum to J. Engel and J. Dixon (CCC) regarding "Vegetation Mapping at Proposed Intersection of Bluff Road and Pacific Coast Highway, Newport Banning Ranch, Orange County, California" dated March 21, 2016.

Bomkamp, T. (Glenn Lukos Assoc.). 2016c. Memorandum to J. Engel and J. Dixon (CCC) regarding "Feature C and immediately surrounding areas and feature CC at Newport Banning Ranch" dated March 22, 2016.

Bomkamp, T. (Glenn Lukos Assoc.). 2016d. Memorandum to J. Engel and J. Dixon (CCC) regarding "Results of purple needlegrass grassland assessment in March of 2016, Newport Banning Ranch, Orange County" dated April 4, 2016.

California Department of Fish and Game. 2008. Guidance for burrowing owl conservation. A report dated April 14, 2008.

California Department of Fish and Game. 2012. Staff report on burrowing owl mitigation dated March 7, 2012.

Campbell, K.F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California gnatcatcher use of habitats other than coastal sage scrub: Conservation and management implications. Western Birds 29:421-433.

Collins, C.T. 1979. The ecology and conservation of burrowing owls. Pages 6-17 *in* Proceedings of the National Audubon Society symposium of owls of the west, their ecology and conservation, Scheaffer, P.P. and S.M. Ehlers (editors). National Audubon Society Western Education Center, Tiburon, CA.

Coulombe, H. N. 1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. Condor. Volume 73, Number 2, Summer 1971, pp. 162-176.

Davis, J. (Dudek). 2016. Spring 2016 purple needlegrass grassland assessment for Newport Banning Ranch. A letter report to M. Mohler (Newport Banning Ranch LLC) dated April 12, 2016.

DeSante, D. F., E. Ruhlen, and D. K. Rosenberg. 1996. The distribution and relative abundance of burrowing owls in California: evidence for a declining population. Institute for Bird Populations. Point Reyes Station, California.

DeSante, D. F., Ruhlen, E. D., Adamany, S. L., Burton, K. M., and Amin, S. 1997. A census of Burrowing Owls in central California in 1991. Raptor Res. Rep. 9:38–48.

DeSante, D. F., Ruhlen, E. D., and Rosenberg, D. K. 2004. Density and abundance of Burrowing Owls in the agricultural matrix of the Imperial Valley, California. Studies Avian Biol. 27:116–119.

Dudek. 2013a. Jurisdictional determination of seasonal features for the Newport Banning Ranch. A report prepared for Newport Banning Ranch LLC dated May 2013.

Dudek. 2013a. Revised Grassland Assessment and Vegetation Mapping Survey Report for the Newport Banning Ranch. A report prepared for Newport Banning Ranch LLC dated May 2013.

Dudek. 2013b. Habitat Conservation and Conceptual Mitigation Plan for the Newport Banning Ranch Property City of Newport Beach and Unincorporated Orange County, California. A report prepared for Newport Banning Ranch LLC dated October 2013.

Dudek and Glenn Lukos Associates. 2013. Summary of Protocol Surveys for Federally-Listed Vernal Pool Branchiopods Conducted on Newport Banning Ranch, City of Newport Beach and Unincorporated Orange County, California. Letter report to C. Medak (USFWS) dated January 29, 2013.

Engel, J. (CCC). September 25, 2015. Memorandum to Amber Dobson (CCC) regarding: “ESHA and wetland determination for Banning Ranch, Orange County, California (CDP 5-13-032).”

Evans, D. L. 1982. Status report on twelve raptors. U. S. Department of the Interior, Fish and Wildlife Service Scientific Report No. 238. pp. 13-17.

Feeney, L. R. 1997. Burrowing owl site tenacity associated with relocation efforts. Pages 132-137 *in* Lincer, J.L. and K. Steenhof (editors). 1997. The Burrowing Owl, Its Biology and Management; Including the Proceedings of the First International Burrowing Owl Symposium. Raptor Research Report Number 9.

Gavin, J.P. 1998. Breeding and dispersal biology of the California gnatcatcher in central Orange County. Western Birds 29:323-332.

Geosyntec. 1996. Phase 1 description Environmental Restoration Program Newport Banning Ranch West Newport Oil Company, Orange County, Ca. A report to West Newport Oil Company dated January 31, 1996.

Gervais, J.A., D.K. Rosenberg, and L. Comrack. 2008. Burrowing Owl (*Athene cunicularia*), In Shuford, W.D. and T. Gardali. California Bird Species of Special Concern: A ranked assessment ofspecies, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Green, G. A., and Anthony, R. G. 1989. Nesting success and habitat relationships of Burrowing Owls in the Columbia basin, Oregon. Condor 91:347–354.

Grishaver, M.A, P.J. Mock, and K.L. Preston. 198. Breeding behavior of the California gnatcatcher in southwestern San Diego County, California. Western Birds 29:299-322.

Grinnell, J., and Miller, A. H. 1944. The distribution of the birds of California. Pac. Coast Avifauna 27.

Hamilton, R.A. (Hamilton Biological). 2014. Letter to J. Ainsworth (CCC) regarding "Comments on Dudek's California gnatcatcher surveys, Newport Banning Ranch Property, Orange County, California" dated January 21, 2014.

Hamilton, R.A. (Hamilton Biological). 2015a. Letter to J. Engel (CCC) regarding "Delineation of ESHA at Newport Banning Ranch staff report w9b, Application No. 5-13-032" dated September 30, 2015.

Hamilton, R.A. (Hamilton Biological). 2015b. Letter Report to J.Engel (CCC). Subject: "Comments on NBR Response to Commission Staff Burrowing Owl Recommendations and Discussion of Russian Thistle in Grasslands, Banning Ranch Project, Orange County, California" dated December 16, 2015.

Hamilton, R.A. (Hamilton Biological). 2016a. Letter to J. Dixon (CCC) regarding "Biological Issues, Banning Ranch, Newport Beach, California" dated February 13, 2016.

Hamilton, R.A. (Hamilton Biological). 2016b. Letter to J. Snyder (USFWS) regarding "Request for USFWS to consult with CCC staff, Banning Ranch, Newport Beach, California" dated April 6, 2016.

Hamilton, R.A. (Hamilton Biological). 2016c. Email report to J. Dixon and J. Engel (CCC) regarding "Tony Bomkamp/GLA Remapping of Myoporum Scrub" dated April 8, 2016.

Hamilton, R.A. (Hamilton Biological). 2016d. Letter report to Jack Ainsworth (CCC) regarding "Review of Current Biological Issues, Proposed Banning Ranch Project Application No. 5-15-2097" dated July 29, 2016.

Hamilton, R.A. 2016e. Letter to J. Engel (CCC). Subject: "Information on Burrowing Owls, Newport Banning Ranch, Orange County, CA" dated August 16, 2016.

Hamilton, R.A. (Hamilton Biological). 2016f. Letter to J. Engel (CCC). Subject: "Compilation of Burrowing Owl Observation Data Newport Banning Ranch Application No. 5-13-032" dated August 22, 2016.

Hathaway, S.A. and M.A. Simovich. 1996. Factors affecting the distribution and co-occurrence of two southern Californian Anostracans (Branchiopoda), *Branchinecta sandiegonenesis* and *Streptocephalus woottoni*. Journal of Crustacean Biology 16:669-677.

Haug, E. A., Millsap, B. A., and Martell, M. S. 1993. Burrowing Owl (*Speotyto cunicularia*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 61. Acad. Nat. Sci., Philadelphia.

Holland, R. and S. Jain. 1988. Vernal Pools. Pages 515-553 in: M.G. Barbour and J. Major, eds. Terrestrial vegetation of California, 2nd ed., California Native Plant Society, Sacramento, CA.

Johnsgard, P. A. 1988. North American owls: biology and natural history. Smithsonian Institution Press, Washington, D. C.

Jurek, R. 2000. Letter dated October 16, 2000 to S. Hansch (CCC) concerning the effects on natural resources of three alternative development plans proposed for the Bolsa Chica Mesa in Huntington Beach, California.

Keeley, J.E. and P.H. Zedler. 1998. Characterization and global distribution of vernal pools. Pages 1-14 in: C.W. Witham, E.T. Bauder, W.R. Ferren, and R. Ornduff (eds.), Ecology, conservation, and management of vernal pool ecosystems – Proceedings from a 1996 conference. California Native Plant Society, Sacramento, CA.

Kirkpatrick, J.B. and C.F. Hutchinson. 1977. The community composition of Californian coastal sage scrub. Vegetatio 35:21-33

Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior. Condor 75: 446-456.

Newport Banning Ranch. 2015a. NBR response to Commission staff purple needle grass grassland ESHA recommendation. Comments dated December 1, 2015.

Newport Banning Ranch. 2015b. NBR response to Commission staff gnatcatcher/scrub pool ESHA recommendation. Comments dated December 1, 2015.

Newport Banning Ranch. 2015c. NBR response to Commission staff burrowing owl ESHA recommendation. Comments dated December 1, 2015.

Newport Banning Ranch. 2015d. NBR response to Commission staff Vernal Pool ESHA Recommendation. Comments dated December 1, 2015.

Purer, E.A. 1939. Ecological study of vernal pools, San Diego County, Califonria. Ecology 20:217-229.

Preston, K.L., P.J. Mock, M.A. Grishaver, E.A. Bailey, and D.F. King. 1998. California Gnatcatcher Territorial Behavior. Western Birds 29:242-257.

Riefner, R.E. and D.R. Pryor. 1996. New locations and interpretation of vernal pools in southern California. Phytologia 80:296-327.

Riefner, R.E., S. Boyd, and R.J. Shlemon. 2007. Notes on native vascular plants from mima mound-vernal pool terrain and the importance of preserving coastal terraces in Orange County, California. Aliso 24:19-28.

Ripley, B.J., J. Holtz, and M.A. Simovich. 2004. Cyst bank life-history model for a fairy shrimp from ephemeral ponds. Freshwater Biology 49:221-231.

Sawyer, J.O., T. Keeler-Wolf, and J. Evans. 2008. A manual of California vegetation, 2nd edition. California Native Plant Society, Sacramento, California.

Solomeshch, A.I., M.G. Barbour, and R.F. Holland. 2007. Vernal Pools. Pages 394-424 in: M.G. Barbour, T. Keeler-Wolf, and A.A. Schoenherr (eds.), Terrestrial vegetation of California. 3rd edition. University of California Press, Berkeley, CA

Tippet, W.E. (CDFW). 2000. Letter to D. Bartlett (Bartlett & Associates) regarding "Comments on the Hellman Ranch biological assessment (1/6/00), burrowing owl survey (2/23/00) and subsequent confirmation of the biological assessment (5/31/00)" dated June 19, 2000.

Trulio, L. A. 1994. The ecology of a population of burrowing owls at a naval air station in northern California. Dept. of the Navy. San Bruno, CA.

Trulio, L. A. 1997. Strategies for protecting western burrowing owls (*Speotyto cunicularia hypugaea*) from human activities. Pp. 461-465 *in* Duncan, J. R., D. H. Johnson, and T. H. Nicholls (editors). Biology and conservation of owls of the northern hemisphere. USDA Forest Service General Technical Report NC-190. St. Paul, Minnesota.

Voous, K. H. 1988. Owls of the northern hemisphere. M. I. T. Press, Cambridge, Massachusetts.

U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; Determination of threatened status for the coastal California gnatcatcher. Final Rule. Federal Register 58:16742-16757.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; Determination of Endangered status for the San Diego fairy shrimp. Final Rule. Federal Register 62:4925-4939.

U.S. Fish and Wildlife Service. 2015. Survey Guidelines for the Listed Large Branchiopods. A guidance document dated May 31, 2015. USFWS, Pacific Southwest Region, Sacramento, CA.

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population Segment for the California Gnatcatcher (*Polioptila californica*). Proposed Rule. Federal Register 68:20228-20312.

Weaver, K.L. 1998. Coastal sage scrub variation of San Diego County and their influence on the distribution of the California gnatcatcher. Western Birds 29:392-405.

Welsh, T. (Banning Ranch Conservancy). 2015. Vernal Pool E is relatively clean. A report submitted to the Coastal Commission dated November 17, 2015.

Zarn, M. 1974. Burrowing owl. U. S. Department of the Interior, Bureau of Land Management. Tech. NoteT-N-250, Denver, Colorado, 25pp.

Zedler, P.H. 1987. The ecology of southern California vernal pools: a community profile. U.S. Fish and Wildlife Service Biological Report 85(7.11).