O-6.1 BIOLOGICAL REVIEW

Comment Letter O-6.1

EXHIBIT 1

HAMILTON BIOLOGICAL

April 15, 2018

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8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

**SUBJECT: REVIEW OF BIOLOGICAL RESOURCE ISSUES
DRAFT EIR FOR OTAY VILLAGE RANCH 14 AND
PLANNING AREAS 16/19, COUNTY OF SAN DIEGO**

Dear Mr. Silver,

On behalf of the Endangered Habitats League, Hamilton Biological, Inc., has reviewed a DEIR prepared by the County of San Diego (hereafter the "County") for the Otay Village Ranch 14 and Planning Areas 16/19 project (hereafter the "proposed project" or "project"). The site of the proposed project encompasses approximately 1,369 acres, including approximately 723.7 acres within Otay Ranch Village 14 and 559.9 acres within Planning Areas 16/19; in addition, 85.4 acres of off-site lands owned by the City of San Diego, City of Chula Vista, California Department of Fish and Wildlife (CDFW), County of San Diego, and private landowners would be impacted. The project site includes 426.7 acres of the Otay Ranch RMP Preserve, and the DEIR proposes 11.8 acres of permanent impacts and 10.1 acres of temporary impacts for road improvements within this designated Preserve. O-6.1-1

The purpose of this review is to (a) identify any inadequacies in the field work or literature review conducted in support of the DEIR's analyses; (b) discuss any potential or apparent factual errors in the DEIR; (c) identify and discuss any biological impact analyses not consistent with CEQA, its guidelines, or relevant precedents; and (d) identify and discuss any remedies that might be appropriate to enable the EIR to satisfy the minimum requirements of CEQA. O-6.1-2 As part of my review, I visited the segment of Proctor Valley Road that passes through the project site on April 9, 2018. Accompanied by Dr. Robert Fisher of the US Geological Survey (USGS), I spent approximately two hours observing biological resources on the site. O-6.1-3

AUTHORIZATION OF TAKE IN PV1, PV2, AND PV3

The County seeks take authorization for PV1, PV2 and PV3 through the County MSCP Subarea Plan and the County's existing Section 10(a) permit. O-6.1-4

The Project Violates the Subarea Plan

The Subarea Plan incorporates into its requirements the Baldwin Agreement, which takes the form of a letter from The Baldwin Company dated November 10, 1995. The County, as a signatory to the MSCP, and as the co-Preserve Owner Manager (POM) of the Otay Ranch Preserve, has been integrally involved in implementing various aspects of the Subarea Plan for more than two decades. The County is aware that the Subarea Plan specifies that PV1, PV2, and PV3 are to be designated "as part of the MSCP Preserve" in exchange for allowing development in other areas that were originally intended for preserve. O-6.1-5

With approval of "take" granted by the USFWS and CDFW per the conditions of the Subarea Plan, the City of Chula Vista — co-POM, with the County, of the Otay Ranch Preserve — has already permitted development to expand into areas, which otherwise would have been preserved as part of the Otay Ranch Preserve without the Baldwin Agreement. As a result, the USFWS and CDFW have issued the "take" permits to both the County of San Diego and the City of Chula Vista for new development anticipated by the Subarea Plan and the Baldwin Agreement. O-6.1-6

Implications of Violating the Subarea Plan

Responding to the County's statement of intent to seek authorization of take in PV1, PV2, and PV3, the Wildlife and Habitat Coalition (of which the Endangered Habitats League is part) submitted the following NOP comment:

> As proposed, the development footprint does not comply with the hardline agreement or the Baldwin Agreement within the MSCP Sub Area Plan. The proposal is therefore not consistent with the requirements or intent of the MSCP and its goals to ensure that high quality conservation is maximized while less important habitat areas are set aside for development.

Rather than responding to this substantive comment, the DEIR is written as if the Subarea Plan simply does not preserve PV1, PV2, and PV3. The CEQA document treats PV1, PV2, and PV3 as if they were any other pieces of land, rather than parcels explicitly identified for preservation in a long-standing HCP. The implications of the County adopting such a stance extend far beyond this one project. Whereas the current applicant may wish to consider themselves unencumbered by conditions previously set by the Subarea Plan, the County cannot cast off the terms of the Plan without throwing the future of the MSCP itself into doubt. O-6.1-7

By failing to evaluate and discuss this fundamental planning issue as part of CEQA analysis of the proposed development of PV1, PV2, and PV3, the County deprives the public of a good-faith, reasoned analysis of this relevant issue, which the public asked to be considered in comments on the NOP. This is contrary to CEQA Section 15146, subdivision (b). O-6.1-8 Moving forward, a decision by the County to abandon the Baldwin exchange, without providing equivalent compensatory mitigation, may be seen as evidence that the County has stopped implementing the MSCP in partnership with the USFWS, CDFW, and other implementing agencies. This would mark the effective disso- O-6.1-9 lution of the MSCP as a coherent and reliable planning document, with far-reaching destructive implications for future land planning throughout San Diego County. O-6.1-9 Cont.

REVIEW OF BMO ANALYSIS AND FINDINGS REPORT FOR PV1, PV2, PV3

This section reviews Appendix A to the Biological Technical Report, prepared by Dudek, which is entitled, *Biological Mitigation Ordinance Findings for PV1, PV2, and PV3 Located in the Otay Ranch Village 14 and Planning Areas 16/19 Proposed Project*, hereafter the BMO Analysis and Findings Report. While the case is made in other comments that the BMO is not even applicable to the proposed project, this section evaluates the Appendix A analysis, which improperly assumes that the BMO does apply. As described in Appendix A: O-6.1-10

- PV1 is composed of approximately 18.9 acres and was originally designated for L2 development (i.e., low-density residential) under the Otay Ranch GDP/SRP and as Specific Plan Area in the County's General Plan.
- PV2 is composed of approximately 44.6 acres and was originally designated for L2 development under the GDP/SRP and as Specific Plan Area in the County's General Plan.
- PV3 is composed of approximately 134.5 acres and was originally designated for LM2 and LM3 development (i.e., low-medium density residential) under the GDP/SRP and as Specific Plan Area in the County's General Plan.

O-6.1-11

Page 12 of the BMO Analysis and Findings Report states:

> Section 3.3.3.7 of the MSCP County Subarea Plan, when discussing Otay Ranch, states the following: "The planned preserve area or Management Preserve plans to capture the highest value resource areas as preserved lands and concentrate development in disturbed habitat or agricultural areas" (County of San Diego 1997, p. 3-15). PV1, PV2 and PV3 were not designated preserve in the MSCP Plan.

This statement expresses the County's intent to ignore language in the Subarea Plan stating that PV1, PV2, and PV3 shall be incorporated "as part of the MSCP Preserve." Any development of these parcels would first require mitigation to compensate for the development actions already taken as part of the Baldwin Agreement, and then additional mitigation for the loss of PV1, PV2, and PV3 could be considered. The County must fully address this source of controversy in the project's CEQA documentation. O-6.1-12

Evaluation of BMO Criterion 1: Project development shall be sited in areas which minimize impact to habitat

The DEIR approaches this question by referring to small areas of coastal sage scrub that would be avoided on the edges of PV2 and PV3, seemingly to tick the box of "minimizing impacts to habitat" to enable a claim of technical compliance with Criterion 1. Evaluated in the context of the overall project, the purpose of developing PV1, PV2, and PV3 is to increase the feasibility of developing the Village 14 site in the middle of Proctor Valley, which would increase the project's impacts to habitat, not minimize them. O-6.1-13

For numerous reasons detailed in this letter, and several others prepared by noted conservation biologists with different specialties, establishing a large development in the middle of Proctor Valley is expected to be disastrous for such disturbance-sensitive species as the Quino Checkerspot Butterfly (*Euphydryas editha quino*), Golden Eagle, and Western Spadefoot. As emphasized in the attached letter from Jerre Stallcup of the Conservation Biology Institute to Ed Pert of CDFW, dated May 21, 2016: O-6.1-14

> As a metric for evaluating net benefit, preserve configuration and relationship to other conserved lands is more important than number of acres conserved, perimeter of the development boundary, or minor differences in habitat type.

As shown in Figure 4 of the BMO Analysis and Findings Report, PV1, PV2, and PV3 all support host plants for the Quino Checkerspot Butterfly, with PV1 and PV3 supporting substantial populations of these plants. O-6.1-15 Few of these important host-plant populations would be avoided. As discussed in separate analyses completed by butterfly experts Ken Osborne and Gregory Ballmer, the preserved host plants would remain close to the edge of the development area where they would be compromised by edge effects not mitigated by the project. O-6.1-16 Thus, viewed in the context of the overall project evaluated in the DEIR, adding PV1, PV2, and PV3 to the proposed development in Village 14 would substantially increase impacts to sensitive habitat areas, and the minor pull-backs along the edges of PV2 and PV3 should be seen as efforts to achieve some nominal claim to having satisfied Criterion 1 of the BMO. O-6.1-17

Evaluation of BMO Criterion 2: Clustering to the maximum extent permitted by County regulations shall be considered where necessary as a means of achieving avoidance

Adding PV1, PV2, and PV3 to the proposed project would introduce two additional bubbles of development connected by roads, thereby achieving the opposite of clustering. The BMO Analysis and Findings Report concludes on page 16 that, despite the impossibility of adding PV1, PV2, and PV3 into the mix without greatly increasing the development edge and creating an almost comically sprawling development footprint, the project would nevertheless be in conformance with Criterion 2 because "is not feasible to further cluster development and still meet the land use designations." Presumably, an important reason for adopting the Baldwin Agreement was to avoid such poorly sited development within an important Biological Resources Conservation Area. O-6.1-18

Evaluation of BMO Criterion 3: Notwithstanding the requirements of the Slope Encroachment Regulations contained within the Resource Protection Ordinance, effective October 10, 1991, projects shall be allowed to utilize design which may encroach into steep slopes to avoid impacts to habitat.

The BMO Analysis and Findings Report concludes on page 17 that "encroachment into steep slopes beyond the proposed Development Footprint would not avoid impacts" and that, for this reason, "the proposed development within PV1, PV2, and PV3 would be in conformance with this criterion." I concur with this conclusion. O-6.1-19

Evaluation of BMO Criterion 4: The County shall consider reduction in road standards to the maximum extent consistent with public safety considerations.

The BMO Analysis and Findings Report concludes on page 17 that the project design would satisfy this criterion "because (1) Proctor Valley Road has been reduced in width, and (2) further reductions in internal road standards are not feasible due to public safety issues." I concur with this conclusion. O-6.1-20

Evaluation of BMO Criterion 5: Projects shall be required to comply with applicable design criteria in the MSCP County Subarea Plan.

This lengthy section of the BMO Analysis and Findings Report continues the earlier charade of attempting to demonstrate that creating new bubbles of development connected by extensive roads within a largely undisturbed core habitat area somehow contributes to achieving applicable preserve design criteria. Consider, for example MSCP design criterion 4:

> Create significant blocks of habitat to reduce edge effects and maximize the ratio of surface area to the perimeter of conserved habitats using the criteria set out in Chapter 6, Section 6.2.3 of the MSCP [County Subarea] Plan. Potential impacts from new development on biological resources within the Preserve that should be considered in the design of any project include access, non-native predators, non-native species, illumination, drain water (point source), urban runoff (non-point source), and noise. O-6.1-21

Developing PV1, PV2, and PV3 would result in very extensive habitat fragmentation and edge effects, and would achieve the opposite of maximizing the ratio of surface area to the perimeter of conserved habitats. The BMO Analysis and Findings Report simply argues that their Preserve Edge Plan would take steps to minimize edge effects. As discussed subsequently in these comments, the Preserve Edge Plan is not a biological mitigation measure. The Preserve Edge Plan amounts to a series of landscaping and design guidelines, with no habitat restoration component or even a requirement to limit landscaping along preserve edges to locally native plant species. The Preserve Edge Plan simply is not geared toward avoiding, minimizing, or compensating for the project's effects on native plant and wildlife populations, and so reliance on this plan to achieve compliance with Criterion 5 of the BMO is farcical. O-6.1-22

The MSCP design criteria are specifically designed, first and foremost, to avoid the type of sprawling project design identified in the DEIR. No amount of dressing along the development edge can create an intact core habitat preserve capable of supporting viable populations of disturbance-sensitive species as the Quino Checkerspot Butterfly, Golden Eagle, and Western Spadefoot.

Would the Proposed Actions at PV1, PV2, and PV3 Conform to the BMO?

As discussed above, the proposed development actions within the three areas that the Subarea Plan preserves would not conform to multiple important requirements of the County's Biological Mitigation Ordinance (under the assumption that the Ordinance applies). As described above, the proposed actions would not: O-6.1-23

- Be sited in areas which minimize impact to habitat (Criterion 1). Addition of PV1, PV2, and PV3 to the hardlined Village 14 development area would increase the project's impacts to sensitive habitat areas for various special-status species.
- Achieve clustering to the maximum extent permitted by County regulations (Criterion 2). Maximum clustering would be achieved by the County following the Subarea Plan and avoiding development of PV1, PV2, and PV3.
- Comply with applicable MSCP design criteria (Criterion 5). The proposed actions would not minimize habitat fragmentation or edge effects and would not maximize the ratio of surface area to the perimeter of conserved habitats.

In order to claim that the proposed development of PV1, PV2, and PV3 would comply with the County's BMO, the project biologists have resorted to contorted and baseless interpretations of what should be straightforward analyses.

DEIR Fails to Analyze Edge and Fragmentation Effects

As discussed previously, the proposed project has a very high ratio of perimeter to development area, due to the unconsolidated/multiple development polygons and miles of road edges, with extensive areas that would be subject to fuel modification disturbances in perpetuity. A large body of peer-reviewed research exists describing the range of adverse effects to native plant and wildlife populations known to result from (a) the proximity of human settlements near natural open space areas, and (b) fragmentation of the natural landscape that occurs as human settlements push into new open space areas. The DEIR fails to adequately describe or analyze any of these effects within the context of relevant published research. O-6.1-24 The following discussions are provided to indicate the range of effects and their potential significance to the CEQA analysis of a large development project proposed to be established within the Jamul Mountains Biological Resources Conservation Area (BRCA) and the Sweetwater Reservoir/San Miguel Mountain/Sweetwater River BRCA. O-6.1-25

Some effects, such as the excessive habitat fragmentation and creation of new edge that accompany a sprawling project design, must be addressed by avoidance, because even the most ecologically sensitive edge treatments cannot be expected to work miracles. Other effects, such as fragmentation and loss of habitat, can be partially mitigated by plantings slopes adjacent to natural areas exclusively with appropriate, locally native plant species. The following discussions, including citations from the scientific literature, are provided to start the process of describing and acknowledging in this DEIR the nature and severity of the edge and fragmentation effects contemplated for this project. O-6.1-26

Edge and Fragmentation Effects

Urbanization typically includes residential, commercial, industrial, and road-related development (i.e., the "built" environment). At the perimeter of the built environment is an area known as the urban/wildland interface, or "development edge." In ecology, "edges" are places where natural communities interface, vegetation or ecological conditions within natural communities interact (Noss 1983), or patches with differing qualities abut one another (Ries and Sisk 2004). "Edge effects" are spillover effects from the adjacent human-modified matrix that cause physical gradients in light, moisture, noise, etc. (Camargo and Kapos 1995; Murcia 1995, Sisk et al. 1997) and/or changes in biotic factors such as predator communities, density of human-adapted species, and food availability (Soulé et al. 1988; Matlack 1994; Murcia 1995; Ries and Sisk 2004). Edge effects and habitat fragmentation are among the principal threats to persistence of biological diversity (Soulé 1991). Edge-related impacts may include:

- Introduction/expansion of invasive exotic vegetation carried in from vehicles, people, animals or spread from backyards or fuel modification zones adjacent to wildlands.
- Higher frequency and/or severity of fire as compared to natural fire cycles or intensities.
- Companion animals (pets) that often act as predators of, and/or competitors with, native wildlife.
- Creation and use of undesignated trails that often significantly degrade the reserve ecosystems through such changes as increases in vegetation damage and noise. O-6.1-27
- Introduction of or increased use by exotic animals which compete with or prey on native animals.
- Influence on earth systems and ecosystem processes, such as solar radiation, soil richness and erosion, wind damage, hydrologic cycle, and water pollution that can affect the natural environment.

Any of these impacts, individually or in combination, can result in the effective loss or degradation of habitats used for foraging, breeding or resting, with concomitant effects on population demographic rates of sensitive species.

Harrison and Bruna (1999) completed a review of a suite of studies dealing with fragmentation and edge effects and concluded that there is a general pattern of reduction of biological diversity in fragmented habitats compared with more intact ones, particularly with regard to habitat specialists. While physical effects associated with edges were predominant among species impacts, they found evidence for indirect effects including altered ecological interactions. Fletcher et al. (2007) found that distance from edge had a stronger effect on species than did habitat patch size, but they acknowledged the difficulty in separating those effects empirically. Many southern California plant and animal species are known to be sensitive to fragmentation and edge effects; that is, their abundance declines with fragment size and proximity to an edge (Wilcove 1985; Soulé et al.

1992; Bolger et al. 1997a,b; Suarez et al. 1998; Burke and Nol 2000). These considerations are of particular relevance for the proposed project, which proposes to introduce a large housing development into the middle of a Biological Resource Conservation Area.

Wildlife populations are typically changed in proximity to edges, either by changes in their demographic rates (survival and fecundity), or through behavioral avoidance of or attraction to the edge (Sisk et al. 1997; Ries and Sisk 2004). For example, coastal sage scrub areas within 250 meters of urban edges consistently contain significantly less bare ground and more coarse vegetative litter than do more "intermediate" or "interior" areas, presumably due increased human activity/disturbance of the vegetation structure near edges (Kristan et al. 2003). Increases in vegetative litter often facilitate growth of non-native plants (particularly grasses), resulting in a positive feedback loop likely to enhance plant invasion success (Wolkovich et al. 2009). In another coastal southern California example, the abundance of native bird species sensitive to disturbance is typically depressed within 200 to 500 meters (650 to 1640 feet) of an urban edge, and the abundance of disturbance-tolerant species is elevated up to 1000 meters (3280 feet) from an urban edge, depending on the species (Bolger et al. 1997a).

Habitat fragmentation is usually defined as a landscape scale process involving habitat loss and breaking apart of habitats (Fahrig 2003). Habitat fragmentation is among the most important of all threats to global biodiversity; edge effects (particularly the diverse physical and biotic alterations associated with the artificial boundaries of fragments) are dominant drivers of change in many fragmented landscapes (Laurance and Bierregaard 1997; Laurance et al. 2007). O-6.1-27 Cont.

Fragmentation decreases the connectivity of the landscape while increasing both edge and remnant habitats. Urban and agricultural development often fragments wildland ecosystems and creates sharp edges between the natural and human-altered habitats. Edge effects for many species indirectly reduce available habitat use or utility in surrounding remaining areas; these species experience fine-scale functional habitat losses (e.g., see Bolger et al. 2000; Kristan et al. 2003; Drolet et al. 2016). Losses of coastal sage scrub in southern California have resulted in the increased isolation of the remaining habitat fragments (O'Leary 1990). Fragmentation has a greater relative negative impact on specialist species (e.g., the Coastal Cactus Wren, *Campylorhynchus brunneicapillus*) that have strict vegetation structure and area habitat requirements (Soulé et al. 1992).

Specialist species have an increased risk of extirpation in isolated habitat remnants because the specialized vegetative structures and/or interspecific relationships on which they depend are more vulnerable to disruption in these areas (Vaughan 2010). In studies of the coastal sage scrub and chaparral systems of coastal southern California, fragment area and age (time since isolation) were the most important landscape predictors of the distribution and abundance of native plants (Soulé et al. 1993), scrub-breeding birds (Soulé et al. 1988; Crooks et al. 2001), native rodents (Bolger et al. 1997b), and invertebrates (Suarez et al. 1998; Bolger et al. 2000).

Edge effects that emanate from the human-dominated matrix can increase the extinction probability of isolated populations (Murcia 1995; Woodroffe and Ginsberg 1998). In studies of coastal sage scrub urban fragments, exotic cover and distance to the urban edge were the strongest local predictors of native and exotic carnivore distribution and abundance (Crooks 2002). These two variables were correlated, with more exotic cover and less native shrub cover closer to the urban edge (Crooks 2002).

The increased presence of human-tolerant "mesopredators" in southern California represents an edge effect of development; they occur within the developed matrix and are thus more abundant along the edges of habitat fragments, and they are effective predators on birds, bird nests, and other vertebrates in coastal sage scrub and chaparral systems and elsewhere (Crooks and Soulé 1999). The mammalian carnivores more typically detected in coastal southern California habitat fragments are resource generalists that likely benefit from the supplemental food resources (e.g., garden fruits and vegetables, garbage, direct feeding by humans) associated with residential developments. As a result, the overall mesopredator abundance, of such species as raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and domestic cats (*Felis catus*), increases at sites with more exotic plant cover and closer to the urban edge (Crooks 2002). Although some carnivores within coastal sage scrub fragments seem tolerant of disturbance, many fragments have (either actually or effectively) already lost an entire suite of predator species, including mountain lion, bobcats (*Lynx rufus*), spotted skunks (*Spilogale gracilis*), long-tailed weasels (*Mustela frenata*), and badgers (*Taxidea taxus*) (Crooks 2002). Most "interior" sites within such fragments are still relatively near (within 250 meters of) urban edges (Crooks 2002).

Fragmentation generally increases the amount of edge per unit land area, and species that are adversely affected by edges can experience reduced effective area of suitable habitat (Temple and Cary 1988), which can lead to increased probability of extirpation/extinction in fragmented landscapes (Woodroffe and Ginsberg 1998). For example, diversity of native bees (Hung et al. 2015) and native rodents (Bolger et al. 1997b) is lower, and decomposition and nutrient cycling are significantly reduced (Treseder and McGuire 2009), within fragmented coastal sage scrub ecosystems as compared to larger core reserves. Similarly, habitat fragmentation and alterations of sage scrub habitats likely have reduced both the genetic connectivity and diversity of coastal-slope populations of the Cactus Wren in southern California (Barr et al. 2015). Both Bell's Sparrows (*Artemisiospiza belli)* and California Thrashers (*Toxostoma redivivum*) show strong evidence of direct, negative behavioral responses to edges in coastal sage scrub; that is, they are edge-averse (Kristan et al. 2003), and California Thrashers and California Quail (*Callipepla californica)* were found to be more vulnerable to extirpation with smaller fragment size of the habitat patch (Bolger et al. 1991), demonstrating that both behavioral and demographic parameters can be involved. Other species in coastal sage scrub ecosystems, particularly the Cactus Wren and likely the California Gnatcatcher and San Diego Pocket Mouse (*Chaetodipus fallax*), are likely vulnerable to fragmentation, but for these species the mechanism is likely to be associated only with extirpation vulnerability from habitat degradation and isolation rather than aversion to the habitat edge (Kristan et al. 2003). Bolger (et al. 1997b) found that San Diego coastal sage scrub and chaparral canyon fragments under 60 acres that had been isolated for at least 30 years support very few populations of native rodents, and they suggested that fragments larger than 200 acres in size are needed to sustain native rodent species populations.

The penetration of exotic species into natural areas can reduce the effective size of a reserve in proportion to the distance they penetrate within the reserve: Argentine Ants serve as an in-depth example of edge effects and fragmentation. Spatial patterns of Argentine Ant abundance in scrub communities of southern California indicate that they are likely invading native habitats from adjacent developed areas, as most areas sampled greater than 200 to 250 meters from an urban edge contained relatively few or no Argentine Ants (Bolger 2007, Mitrovich et al. 2010). The extent of Argentine Ant invasions in natural environments is determined in part by inputs of urban and agricultural water run off (Holway and Suarez 2006). Native ant species were more abundant away from edges and in areas with predominately native vegetation. Post-fragmentation edge effects likely reduce the ability of fragments to retain native ant species; fragments had fewer native ant species than similar-sized plots within large unfragmented areas, and fragments with Argentine ant-free refugia had more native ant species than those without refugia (Suarez et al. 1998). They displace nearly all surface-foraging native ant species (Holway and Suarez 2006) and strongly affect all native ant communities within about 150 to 200 meters from fragment edges (Suarez et al. 1998; Holway 2005; Fisher et al. 2002; Bolger 2007; Mitrovich et al. 2010). Argentine Ants are widespread in fragmented coastal scrub habitats in southern California, and much of the remaining potential habitat for Blainville's Horned Lizards (*Phrynosoma blainvillii*) is effectively unsuitable due to the penetration of Argentine ants and the subsequent displacement of the native ant species that Coastal Horned Lizards need as prey (Fisher et al. 2002). Invasion of Argentine Ants into coastal sage scrub has also shown a strong negative effect on the abundance of the gray shrew (*Notiosorex crawfordi*) (Laakkonen et al. 2001). O-6.1-27 Cont.

Inadequate Impact Analysis for Edge/Fragmentation Effects

The DEIR's impact discussion fails to discuss and evaluate each type of biological effect resulting from development edges and habitat fragmentation, and then analyze whether each effect would or would not be potentially significant. Instead, the DEIR simply lists a number of effects on page 2.4-72, and asserts that the project's Preserve Edge Plan will ensure that each will be avoided or mitigated to below the level of significance: O-6.1-28

> Long-term indirect impacts to adjacent open space may include generation of fugitive dust, intrusions by humans and domestic pets, noise, lighting, invasion by exotic plant and wildlife species, effects of toxic chemicals (fertilizers, pesticides, herbicides, and other hazardous materials), urban runoff from developed areas, litter, fire, habitat fragmentation, and hydrologic changes. As required by the Otay Ranch RMP, the Proposed Project would include a 100-foot Preserve edge buffer, which is detailed in the Preserve Edge Plan. The Preserve edge is a 100-foot buffer between the Preserve and development and is not located within the Otay Ranch RMP Preserve. The 100-foot buffer is intended to lessen the edge effects of development on the Otay Ranch RMP Preserve. The Preserve Edge Plan details the uses allowed within the 100-foot-wide Pre-

> serve edge and provides a list of plant species that are appropriate adjacent to the Otay Ranch RMP Preserve. The Preserve Edge Plan addresses drainage, toxic substances, lighting, noise, fuel modification, fencing, and invasive species (RH Consulting Group et al. 2017).

Simply listing these effects does not actually disclose their nature or potential severity, and developing a Preserve Edge Plan does not necessarily cause potentially significant effects to become less than significant. The Preserve Edge Plan, which is not a CEQA mitigation measure, essentially amounts to a series of landscaping and design guidelines not geared specifically toward avoiding, minimizing, and compensating for the project's significant edge and fragmentation effects on native plant and wildlife populations in a Biological Resources Conservation Area. For example: O-6.1-28 Cont.

- Page 37 of the Preserve Edge Plan specifies that some fuel modification zones along the development edge would occupy the entire 100-foot-wide edge zone, with irrigation provided up to the edge of natural habitat. As discussed previously, irrigation is known to facilitate the spread of harmful Argentine Ants into nearby natural areas. No effort is made to develop alternative methods to provide the required fire protection without contributing to the project's already considerable edge effects. O-6.1-29
- Page 58 of the Preserve Edge Plan states that landscaping along edges would be "preferably native," which carries no weight as a form of native habitat mitigation. O-6.1-30
- The Approved Plant List for "RMP Preserve Interface/Transitional Areas" contains numerous non-native species that will not contribute to mitigation of the project's significant impacts to native plant communities. O-6.1-31
- The Approved Plant List includes *Rhus lentii*, a species native to Cedros Island in Mexico. *Rhus* species are known to hybridize freely (e.g., Burke and Hamrick 2002), meaning that introduction of R. lentii to the site could result in creation of hybrids with locally native species of *Rhus* in preserved areas. The intent of a document like the Preserve Edge Plan should be to incorporate locally native components into the preserve-edge treatments, rather than introducing novel biotic elements that can interact unpredictably with native species in adjacent natural areas, resulting in potential adverse effects on natural resources near the development edge. O-6.1-32

In summary, the project appears to be designed to *maximize* development edge, not to minimize it as required, and the EIR preparers have failed to discuss or utilize the extensive scientific research describing the range of adverse effects to sensitive natural resources that can be expected to accompany construction of a large residential development project in a core preserve area. These effects may extend as far as 250 meters (820 feet) into preserved habitat areas. In these ways, the DEIR fails to adequately describe or analyze significant adverse effects attendant to development edge and fragmentation of habitat. O-6.1-33 Rather than developing CEQA mitigation measures that provide a clear nexus to the project's edge and fragmentation effects — with defined actions and metrics that could be verified by the County, the Wildlife Agencies, and members of the public — the DEIR posits that a Preserve Edge Plan that contains no actual habitat restoration or even a strictly native landscaping component will address all of these potentially significant impacts. O-6.1-34

For these reasons, (a) the DEIR's characterization of the project's edge and fragmentation impacts is inadequate; (b) the DEIR provides no CEQA mitigation for the specific categories of edge and fragmentation impacts discussed in these comments; and (c) the DEIR provides no factual basis for its determination that no significant impacts would remain after mitigation. These are major flaws in the project's CEQA documentation. O-6.1-35

Plant Community Mapping Inadequate

The DEIR maps and characterizes plant communities according to the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008). I was not able to walk out onto the project site in order to carefully examine large areas, but could see from Proctor Valley Road several areas where the plant communities on the site differed from those mapped in the DEIR. This discrepancy was also noted in the attached letter from Jerre Stallcup of the Conservation Biology Institute to Ed Pert of CDFW, dated May 21, 2016:

> The current vegetation mapping classification that is required (Sawyer-Keeler-Wolf) would allow a more meaningful comparison of plant species composition in vegetation communities. Species composition is an important indicator of habitat quality, especially given that repeated fires have "type-converted" much of the native scrub communities to annual grasses. The DFW Proctor Valley property supports more intact, higher quality shrubland habitat than the GDCI Proctor Valley LP lands proposed for exchange. The GDCI Proctor Valley LP exchange lands primarily support non-native grassland and degraded coastal sage scrub that would require significant financial investment to restore to the quality found on the DFW Proctor Valley property. Thus, number of acres of "coastal sage scrub" alone is not an appropriate metric for the net benefit analysis; species composition should be considered.

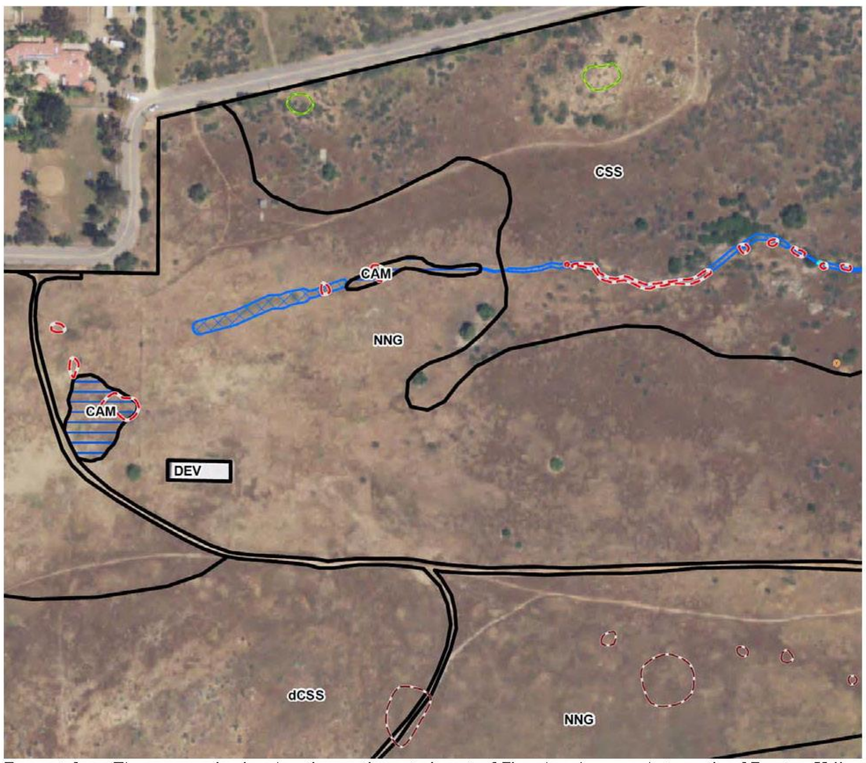
O-6.1-36

I agree with Ms. Stallcup that the DEIR would have provided more detailed and useful information were the communities to have been accurately classified and mapped using *A Manual of California Vegetation, second edition* (Sawyer et al. 2009).

Regardless of the system used, however, CEQA requires that the DEIR accurately describe the existing conditions. This is particularly important for this project, in which one of the alternatives involves swapping land in the northern part of the site for State-owned land near Village 14. Unlike most of the coastal sage scrub in Planning Areas 16 and 19, most of the chaparral and chaparral/scrub in and around Village 14 shows little evidence of substantial disturbance. Some scarring is visible due to off-road vehicle disturbance for a number of years — which has since ceased due to installation of rails along Proctor Valley Road — but in general those habitats do not support the dense thatch of non-native grasses and weeds evident in Planning Areas 16 and 19. The greater prevalence of open ground underneath the shrubs in the central portion of Proctor Valley provides habitat of relatively high quality for most special-status plants and wildlife, whereas the dense grasses and weeds in Planning Areas 16 and 19 undoubtedly choke out many native plants and provide inferior habitat for many native species, which tend to favor bare ground. Among the special-status wildlife species known to favor sparsely vegetated understory are the San Diegan Tiger Whiptail (*Aspidoscelis tigris stejnegeri*), Rosy Boa (*Lichanura trivirgata*), Blainville's Horned Lizard (*Phrynosoma* O-6.1-37 *blainvillii*), and Loggerhead Shrike (*Lanius ludovicianus*). Following are examples of some of the areas mapped incorrectly and/or inaccurately.

P.A. 19: Disturbed CSS and Grassland Mapped as Undisturbed CSS

Page 2.4-19 of the DEIR states, "Areas where native species were co-dominant with non-native grasses were mapped as disturbed Diegan coastal sage scrub." In Planning Area 19, large areas where non-native grasses are co-dominant, or even dominant, should be mapped as disturbed Diegan coastal sage scrub (dCSS), or even non-native grassland (NNG) but instead are mapped as Diegan coastal sage scrub (CSS), referring to scrub in an essentially undisturbed condition. See, for example, this excerpt from Figure 2.4-10b: O-6.1-38



Excerpt from Figure 2.4-10b, showing the north-central part of Planning Area 19, just south of Proctor Valley Road. Much of the area mapped as CSS should have been mapped as dCSS or even NNG.

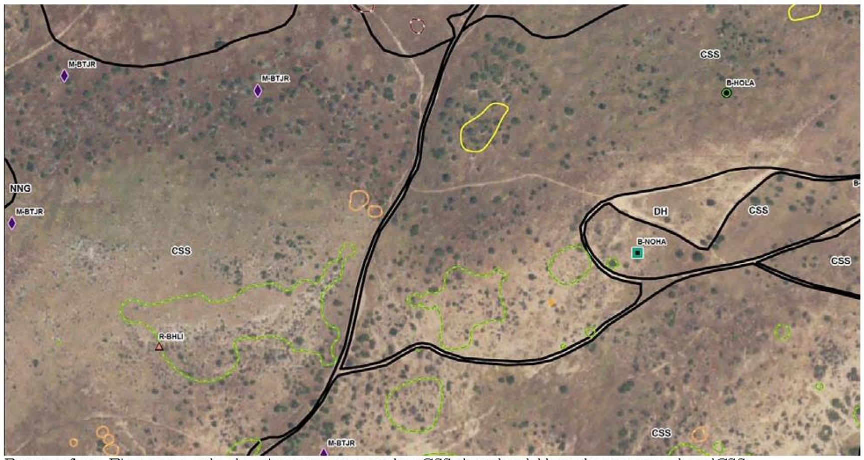
The following ground-level image shows part of Planning Area 19 near Proctor Valley Road (the same area mapped as undisturbed coastal sage scrub depicted on the previi-

ous page of this letter):

Image of Planning Area 19 taken from edge of Proctor Valley Road. Although this area is mapped as undisturbed coastal sage scrub, the community includes the large expanses of non-native grass shown here. *Source: Google Earth Pro.*

[INTENTIONALLY BLANK]

The following excerpt from Figure 2.4-10b shows the main northeast/southwest trending ridgeline that passes through Planning Area 19. Nearly all of the area shown below is mapped as undisturbed Diegan coastal sage scrub (CSS), but clearly this habitat should have been mapped as disturbed Diegan coastal sage scrub (dCSS).



Excerpt from Figure 2.4-10b, showing areas mapped as CSS that should have been mapped as dCSS.

The following photo shows the disturbed, grassy scrub in on the main ridgeline running through Planning Area 19 (i.e., the same area shown above).

Photo taken on April 9, 2018, from Proctor Valley Road facing southeast, showing the extensively grassy ridgeline mapped as undisturbed coastal sage scrub.

Photo: Robert A. Hamilton

The following excerpt from Figure 2.4-10b shows the northern part of Planning Area 16. Nearly all of the area shown below is mapped as undisturbed Diegan coastal sage scrub (CSS), but this is another part of the project site that should have been mapped as disturbed Diegan coastal sage scrub (dCSS) mixed with non-native grassland (NNG).

Excerpt from Figure 2.4-10b, showing areas mapped as CSS that should have been mapped as dCSS and NNG.

By mapping heavily disturbed and degraded habitat as undisturbed, the DEIR misrepresents the resource values present in Planning Areas 16 and 19. This is a serious deficiency of the DEIR that must be remedied in order to allow decision-makers and the public to evaluate the project and its alternatives using valid information.

Inadequate Treatment of Western Spadefoot Issues

The Western Spadefoot (*Spea hammondii*), a California Species of Special Concern, is not a "covered" species under the MSCP. Because this toad is not uniformly distributed among the MSCP covered habitats (grassland, coastal sage scrub, etc.) but instead is sporadically distributed in association with certain seasonal pools adjacent to suitable upland aestivation habitats, the MSCP does not provide mitigation via the habitat tier mitigation ratios. An adequate site-specific CEQA analysis, including contributions to cumulatively considerable effects, is required independent of the MSCP. The DEIR provides very little information on this species and its ecological requirements, and, as discussed below, the DEIR's CEQA analysis is misleading and manifestly inadequate. O-6.1-39

Life History and Ecological Requirements

In a recent report, the United States Geological Survey (USGS) — serving as the Independent Science Advisor (ISA) to the City of Santee — provided independent scientific information regarding the life history and ecological requirements of the Western O-6.1-40

Spadefoot in southern San Diego County (Rochester et al. 2017). The following discussions summarize relevant information from the USGS report.

Dispersal from Breeding Pools to Aestivation Sites

Western Spadefoots spend large parts of the year aestivating underground, often well away from their breeding ponds. As stated on page 5 of the USGS report:

> Western spadefoot require periodic wetlands for breeding purposes and upland, terrestrial habitats for foraging and aestivating during the hot, dry summers, one of these habitat elements without the other would not be sustainable in the long term. Although there are no direct estimates of a minimum patch requirement for western spadefoot, it is possible to make some estimates based on existing research. Baumberger's radio telemetry efforts (2013) documented that western spadefoot moved as far as 262 meters (860 feet) from the breeding pool site with an average distance from the pool of 40 meters (131 ft). The western spadefoot in her study had home ranges that ranged from 469 m² to 2,094 m² (Baumberger 2013).

Ignoring this critical fact, the DEIR and its impact analysis focuses entirely upon breeding pools rather than addressing all of the Western Spadefoot's habitat requirements, including aestivation sites. Failure to consider all of the spadefoot's life-history requirements leads to the DEIR's incomplete, inadequate, and misleading impact analysis for this species. O-6.1-40 Cont.

"Edge Effects" of Development Near Spadefoot Habitats

The presence of Western Spadefoots in a given area relates to the level of nearby urban development, which may be thought of as the accumulation of edge effects and other urban impacts. Pages 7-10 of the USGS report discuss several classes of potential adverse effects upon Western Spadefoots that can result from nearby developed areas, as summarized in the following paragraphs.

Aseasonal flows of water due to irrigation of landscaping can disrupt the natural pattern of filling and drying of ponds, permitting invasion by such non-native aquatic species as the American Bullfrog (*Lithobates catesbeianus*) and African Clawed Frog (*Xenopus laevis*) that can prey upon Western Spadefoots.

Altered watershed dynamics resulting from increased impermeable surfaces within the developed areas can result in a more rapid transfer of rain into the aquatic system within the conserved area rather than the gradual accumulation of water as it seeps into the ground and makes its way through the system naturally. Runoff may also contain a higher contaminant load from vehicles, pet waste, and landscape activities. Altered hydrology can lead to increased sediment transport into the aquatic system, covering egg masses with silt. Spadefoot breeding sites are not typically within flowing drainages, and may not be impacted directly, but contaminants can be carried through the food chain and increased flows can alter the available habitats. O-6.1-41

Introduced Argentine Ants (*Linepithema humile*) frequently extend from the urban edge into the first 200 m of undeveloped habitat, and where streams and creeks extend into the habitat, Argentine ants may also follow. Argentine Ants have been documented to alter both the native ant community and the overall invertebrate community, and Western Spadefoots feed mostly on insects. If Argentine Ants disrupt the local invertebrate community, this could impact availability of suitable prey for the Western Spadefoot. Additionally, small Western Spadefoot metamorphs could be vulnerable to attack by the omnivorous Argentine Ant.

Increased outdoor activity adjacent to new development typically involves hiking, cycling, and motorized off-road vehicle use, as well as increased presence of dogs, both on- and off-leash. Trash levels may also increase. These uses can prevent Western Spadefoots from using otherwise suitable breeding ponds, can increase sedimentation through disturbance of pools, and can decrease the longevity of seasonal pools bikes and animals cross through them. Off-road vehicles can result in direct mortality of Western Spadefoots in the form of road-kill of adults out foraging along roads at night, and tadpoles can be killed by vehicles driving through pools and pushing water and tadpoles out of the pool. O-6.1-41 Cont.

The DEIR fails to mention any of the development-related factors known to affect this species, both within and outside of breeding pools, and provides no spadefoot-focused mitigation measures designed to ensure the viability of the population in Proctor Valley post-project. This is another deficiency of the DEIR.

Western Spadefoot Habitat Requires Buffering from Development

In order to mitigate potential adverse effects associated with development edge upon Western Spadefoots, and to accommodate the movement of the toads between breeding ponds and upland aestivation sites, the USGS recommended that the City of Santee protect an **undeveloped buffer measuring 300 to 400 meters (980 to 1310 feet)** around Western Spadefoot breeding sites. By contrast, the DEIR asserts that preservation of eight known breeding pools, five of which actually lie within the Development Footprint and the other three of which appear to lie within several meters of the Development Footprint, would mitigate the project's significant impacts to this species. Given that spadefoot populations require extensive buffering from development edges, which has not been provided here, it is accurate to state that the DEIR provides no legitimate mitigation for the project's impacts to the Western Spadefoot. O-6.1-42

Spadefoot Survey Methods Invalid

Table 2.4-1 in the DEIR indicates that focused surveys for the Western Spadefoot were conducted between March 7 and March 28, 2017. USGS Biologist Robert Fisher conducted surveys for the Western Spadefoot on public land in Proctor Valley between December 2016 and March 2017. He notes that, by March 11, 2017, spadefoot metamorphs had already vacated 40% of pools where eggs or tadpoles had been present during his first two surveys (R. Fisher pers. comm.). Thus it appears likely that many pools had already lost their spadefoots by the time of Dudek's first survey on March 7, 2017. Since O-6.1-43 the project biologists have no way of knowing how many pools were occupied prior to the start of their surveys, their survey methods were inadequate and the results of these surveys cannot be relied upon to characterize the size or distribution of the spadefoot population on the project site. O-6.1-43 Cont.

Page 2.4-34 of the DEIR states that Western Spadefoot tadpoles were found both in a road rut and in pool B2 prior to start of the March 2017 focused surveys, but the DEIR does not indicate that spadefoots were found in either of those locations during the March surveys. The DEIR must disclose whether project biologists observe spadefoots in either of these locations during the focused surveys in March 2017. O-6.1-44

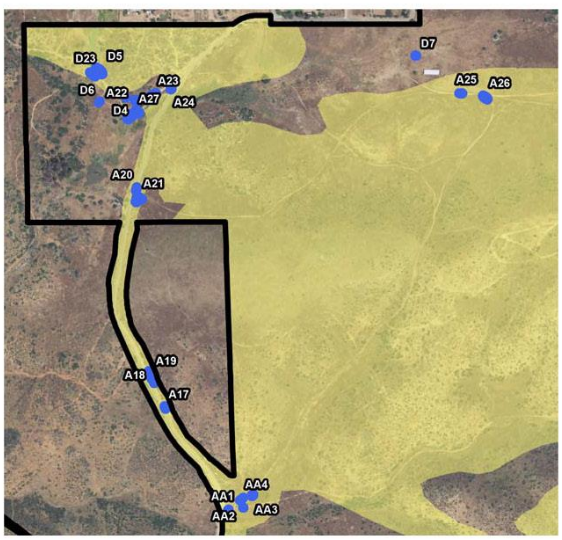
DEIR Misrepresents Project Impacts to Breeding Ponds

O-6.1-45

Page 2.4-34 of the DEIR states:

> Focused surveys resulted in the detection of 16 occupied features. Four occupied features are located within the Otay Ranch RMP Preserve (A21, A27, D6, and AA4). Eight occupied features are located within the Development Footprint (A19, AA1, AA3, B11, C4, C5, C7, and D19), and four occupied features are located within Conserved Open Space (A22, A23, D23, and D5).

Figure 2.4-9 on page 2.4-445 of the DEIR depicts the 16 pools relative to the proposed "Development Footprint," shown in yellow screen:



Referring to Figure 2.4-9, excerpted on the previous page:

- Five of the eight pools that the DEIR characterizes as being conserved — A21, A23, D5, D23, and AA4 — lie within the proposed Development Footprint.
- The remaining three pools that the DEIR characterizes as being conserved, A22, A27, and D6 — are located within 10-20 meters of the proposed Development Footprint. As discussed previously, the USGS recommends a buffer of **300-400 meters** between breeding ponds and the edge of urban development to avoid development impacts on the breeding pond (Rochester et al. 2017).

O-6.1-45 Cont.

Page 2.4-176 analyzes the project's potential effects on this species:

> Western spadefoot is not a Covered Species under the MSCP. However, the Proposed Project applicant's contribution of spadefoot habitat to the Otay Ranch RMP Preserve through the preservation of eight occupied features that support these species would mitigate impacts by providing suitable habitat in a configuration that preserves genetic exchange and species viability. Thus, direct impacts to this species would be reduced to less than significant.

Contrary to this impact analysis, 13 of the 16 known spadefoot breeding pools would lie within the Development Footprint, and an unknown number of additional breeding pools may also exist. Instead of being "preserved in a configuration that preserves genetic exchange and species viability," the three pools that lie just outside of the Development Footprint (not eight pools, as the DEIR states) would be subject to potentially significant edge effects. Thus, implementing the project would likely extirpate the Western Spadefoot from the project site, and possibly from surrounding areas in Proctor Valley. The DEIR identifies no mitigation for this significant impact.

Given that the Western Spadefoot is not a covered species under the MSCP, the project's significant impacts to this species would not occur within a regional framework designed to conserve populations of this species. The project's impacts would, therefore, be significant in a cumulative sense as well as at the project level. The DEIR identifies no mitigation for this significant impact.

For these reasons, (a) the DEIR's characterization of the project's impacts is misleading and inadequate, and (b) the DEIR provides no factual basis for its determination that no significant impacts would remain after mitigation. These are major flaws in the project's CEQA documentation.

O-6.1-46

Inadequate Treatment of Golden Eagle Issues

The project site occupies the eastern flank of San Miguel Mountain, known for decades as a nesting area for Golden Eagles until nesting activities there apparently ceased in 2007. As discussed herein, this disturbance-sensitive raptor does continue to consistently occupy San Miguel Mountain, albeit seemingly in a non-breeding role in recent years, and regularly forages on the project site, in Proctor Valley. The MSCP refers to this eagle territory as "Rancho San Diego," and Page 3-76 of the Final MSCP Plan states that, after build-out, this "nesting territory <u>should remain viable</u>" [emphasis in the original].

O-6.1-47

The MSCP's prognosis in this instance conflicts with the current understanding of Golden Eagle habitat requirements. Much of our current understanding of eagle behavior and habitat requirements in San Diego County stems from an ambitious GSM GPS telemetry study involving 29 Golden Eagles, undertaken by the US Geological Survey (USGS; Tracey et al. 2016, 2017). Most recently, the USGS has developed from these data a detailed model, anticipated for publication on April 16, 2018, to predict habitat usage patterns of Golden Eagles in San Diego County. In broad terms, it is my understanding that the model shows that Golden Eagles (a) strongly avoid urban development including areas near urban development, (b) moderately avoid exurban development, (c) weakly select in favor of rugged terrain, and (d) moderately select in favor of areas higher than those surrounding it (R. Fisher pers. comm.).

Dr. Peter Bloom and Dr. Michael Kuehn of Bloom Biological Consulting, Inc. are experts on the Golden Eagle (Bloom is a co-author of the USGS telemetry studies; Tracey et al. 2016, 2017). Bloom and Kuehn have prepared the attached letter to Dan Silver of the Endangered Habitats League dated January 19, 2018 (hereafter the Bloom Biological Letter), analyzing the likely effects of the proposed project upon the Golden Eagle. Page 12 of their letter states: O-6.1-47 Cont.

> Irrespective of future scenarios, the *current* status of Proctor Valley as important foraging habitat in a region that has elsewhere suffered significant habitat depletion must not be overlooked. If Proctor Valley is developed, eagle use in the directly impacted areas will be eliminated. Given the strong propensity of Golden Eagles to avoid human disturbance, it is all but certain that the surrounding lands will be avoided out to a certain distance, and this behavioral avoidance may fragment the habitat available to eagles to a greater extent than can be appreciated by looking at development footprints alone. Indeed, development in the valley floor may effectively eliminate use of the areas west of Proctor Valley altogether. Whether this occurs or not, the direct loss of habitat known to be regularly used by adult and subadult Golden Eagles, including the territorial Cedar Canyon pair, would have a direct and negative impact on regional eagle populations.

This conclusion contrasts markedly with the MSCP's assumption that the Rancho San Diego territory "should remain viable" after build-out in Proctor Valley, so long as development remains more than 4,000 feet away from active nests. The USGS model, scheduled to be released in the time to be employed during consideration of comments on the DEIR, will analyze large volumes of telemetry data, and thus can be expected to shed important light upon the situation, to help determine the likely outcomes of various development/preservation scenarios in Proctor Valley. Especially considering that the proposed project involves impacts outside of "take authorized" areas, the County should be making determinations of CEQA significance — and planning of backcountry development — based upon the best available information rather than blind adherence to assumptions of the MSCP that may prove to be invalid once extensive data are collected and analyzed using modern scientific methods. O-6.1-48

Eagles More Prevalent in Project Area than DEIR Acknowledges

Page 2.4-13 of the DEIR states:

> To evaluate the Proposed Project's potential to affect active golden eagle nests, avian experts at H.T. Harvey & Associates surveyed the Project Area and a 4,000-plus-foot buffer around the Project Area boundary to identify and locate any active golden eagle nests and to observe any golden eagle courtship or nesting activity. As explained in Section 2.4.1.6, Special-Status Wildlife Species, H.T. Harvey & Associates did not locate any active golden eagle nests or observe any golden eagle courtship or nesting behavior. Additionally, H.T. Harvey & Associates conducted periodic 2-day surveys during the 2016 and 2017 golden eagle breeding seasons to document activity at San Miguel Mountain, the Jamul Mountains, and the Proctor Valley areas (see Appendix C of the BTR (Appendix 2.4-1 to this EIR)).

San Miguel Mountain lies within the San Diego National Wildlife Refuge (SDNWR), a closed and gated area, and only researchers with a federal Special Use Permit (SUP) can legally access the refuge. In an email dated April 5, 2018, Refuge Manager Jill Terp of the USFWS wrote, "A look through our Special Use Permit list back to 2012 has not given me any indication Harvey and Associates has a SUP from SDNWR for eagles or anything else." Page 6 of a Technical Memorandum dated May 23, 2017, included as an appendix to the DEIR, prepared by H. T. Harvey and Associates, Inc., (hereafter the Harvey Technical Memo) states:

> Although we were unable to hike through this area of San Diego National Wildlife Refuge to accomplish an intensive search for potential remnant nest structures, our effort was sufficient to confirm that no eagles were actively nesting on the east flank of San Miguel Mountain.

Had the project biologists obtained a Special Use Permit from the USFWS, they could have conducted a more complete search for potential eagle nesting sites on San Miguel Mountain. Why did they not take this step?

In contrast to the surveys by H.T. Harvey and Associates, which yielded only sporadic observations of single Golden Eagles in and around Proctor Valley, USGS biologists captured and placed transmitters on **three** Golden Eagles on public land in Proctor Valley during December 2015 (Tracey et al. 2016). Dr. Fisher (pers. comm.) reports that San Miguel Mountain is a location where one or more Golden Eagles (individuals not part of the tracking study) can typically be found throughout the year. In his experience, the birds at this location are most reliably observed during the period from approximately 11:00 a.m. to 2:00 p.m. and are generally far less detectable earlier or later in the day (R. Fisher unpublished data). At around noon on April 9, 2018 — during the nesting season — Dr. Fisher and I observed an adult Golden Eagle soaring just above the peak of San Miguel Mountain. O-6.1-50

Page 10 of the Bloom Biological Letter states: O-6.1-51

> The telemetry data show that at least 10 Golden Eagles used the habitat in the vicinity of the Rancho San Diego territory for foraging, including adult and subadult birds. This included occasional use by the adjacent Cedar Canyon pair, to the southeast and near Otay Mountain. The Cedar Canyon male and female adults are marked with GIS transmitters and display typical territorial behavior over the area, though a nest site has yet to be documented for the pair. In addition to the encroachment from the Cedar Canyon pair, one male (GOEA-SD-M011) and one female (GOEA-SD-

F009) spent significant amounts of time in the vicinity of the Rancho San Diego territory from late 2014 into the spring 2015. Both were in their fourth year (FY) in 2015, meaning they would have become breeding age in 2016 and potential territory holders. O-6.1-51 Cont.

Review of DEIR's Golden Eagle Habitat Assessment

The DEIR includes as a technical appendix a memorandum prepared by H. T. Harvey and Associates, dated April 16, 2017, entitled "Otay Ranch Village 14 Land Exchange Golden Eagle Foraging Habitat Assessment" (hereafter the Harvey Habitat Assessment Memo). The memo evaluates the proposed Land Exchange Alternative, which would swap development rights to Planning Areas 16 and 19 for land adjacent to Village 14 that is owned by the State of California. As stated on Page 3 of the Harvey Habitat Assessment Memo:

1) The land exchange would transfer 278 acres from the Project applicant to the State, comprising 222.4 acres of coastal sage scrub, 34.1 acres of nonnative annual grassland, 13.3 acres of southern mixed chaparral, and 8.2 acres of miscellaneous land in Planning Areas 16 and 19.

2) The land exchange would transfer 278 acres from the State to the Project applicant, comprising 225.0 acres of chamise chaparral, 31.4 acres of coastal sage scrub, 7.6 acres of nonnative annual grassland, and 14 acres of miscellaneous land, all located in Village 14 except for a stretch of existing roadway running north through Planning Areas 16/19. O-6.1-52

As demonstrated previously, the DEIR provides a grossly inaccurate characterization of coastal sage scrub in Planning Areas 16 and 19. Whereas most of the scrub habitat in these two planning areas is clearly disturbed — i.e., with non-native grasses being co-dominant across large areas — Dudek mapped nearly all of the coastal sage scrub as undisturbed. Substantial areas mapped as scrub appear to be straight non-native grasslands. That the biologists of H. T. Harvey and Associates accepted Dudek's characterization of 222.4 acres of grassy habitat with widely spaced shrubs as undisturbed coastal sage scrub indicates that their habitat assessment warrants close scrutiny.

Figure 2 on page 5 of the Harvey Habitat Assessment Memo shows areas "where the extent of dense shrub vegetation appeared incompatible with eagle foraging." Unfortunately, Figure 2 (reproduced on the following page of this letter) places too many screens on the image for readers to evaluate whether the areas depicted as "incompatible with eagle foraging" are truly too dense to provide foraging opportunities for eagles. I have provided an aerial image on page 25 of these comments that shows Village 14 and surroundings without screens obscuring the information being depicted. O-6.1-53

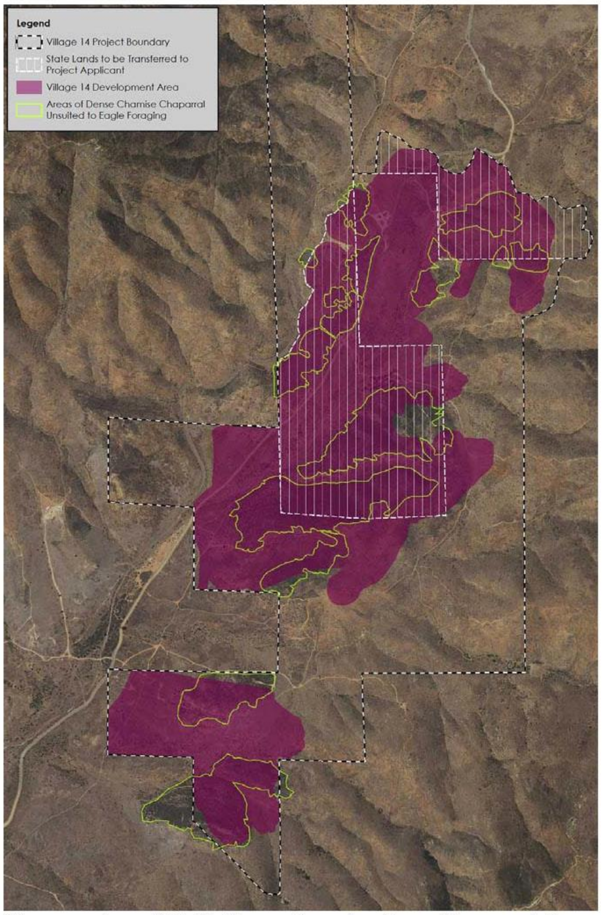
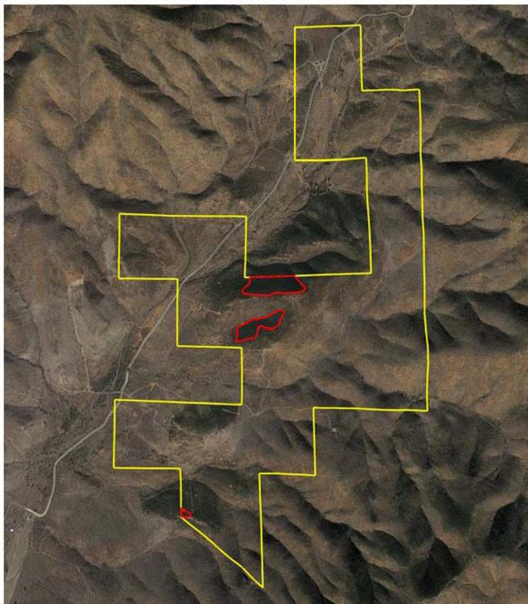


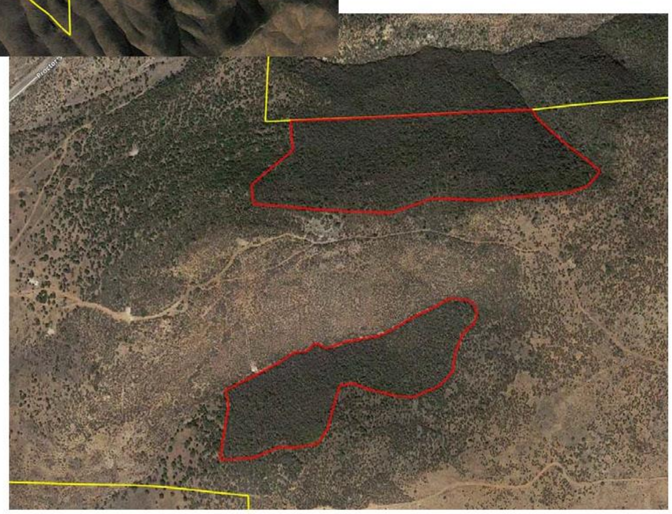
Figure 2 in the Harvey Habitat Assessment Memo, showing in light green the habitat areas that project biologists regard as too dense to provide suitable foraging habitat for Golden Eagles. Areas proposed for impacts under the Land Swap Alternative are shown in white cross-hatching, and all proposed development areas (under the Land Exchange Alternative) are shown in purple screen.

Raptor authority Peter Bloom reviewed H. T. Harvey's evaluation of "areas of dense chamise chaparral unsuited to Golden Eagle foraging." Dr. Bloom noted that Golden Eagles utilize a wide variety of habitats across the species' global range, and that many long-standing eagle territories in southern California are vegetated mainly with chaparral (P. Bloom pers. comm.). As can be seen on the aerial image above, and more clearly on the images on the following pages, most of Proctor Valley is characterized by rather open chaparral/coastal scrub habitat, with limited areas of dense vegetative cover. Those areas of dense chaparral may well serve as important refuges for various reptiles and mammal, other than rabbits and squirrels, that are prey for eagles.

O-6.1-54



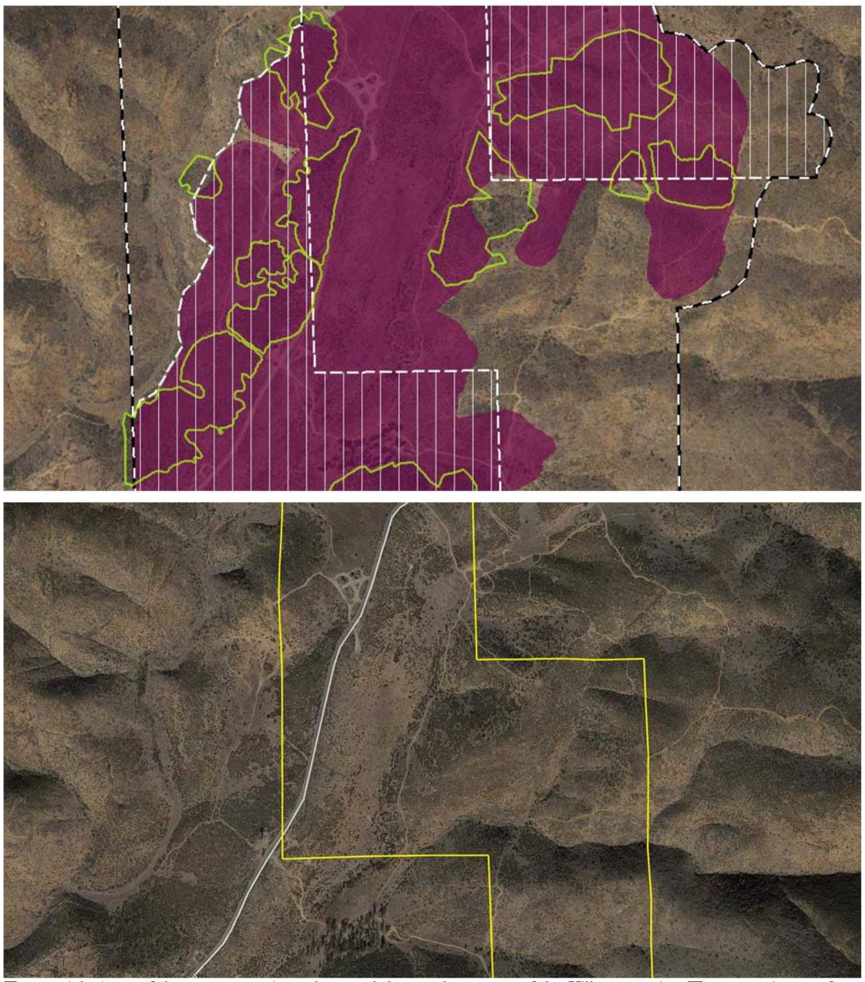
Aerial exhibit of Village 14 showing in red the three patches of closed-canopy chaparral, covering approximately 2% of the site, that do not provide suitable foraging habitat for Golden Eagles. The refuge these areas provide, however, may be important to the species that eagles prey upon when animal inevitably venture outside of the closed-canopy chaparral. Dr. Bloom (pers. comm.) and I consider the remainder of the chaparral and scrub habitats on the Village 14 site to be accessible by Golden Eagles. *Source: Google Earth Pro.*



Detailed view of the two largest areas of closed-canopy chaparral within Village 14. *Source: Google Earth Pro.*

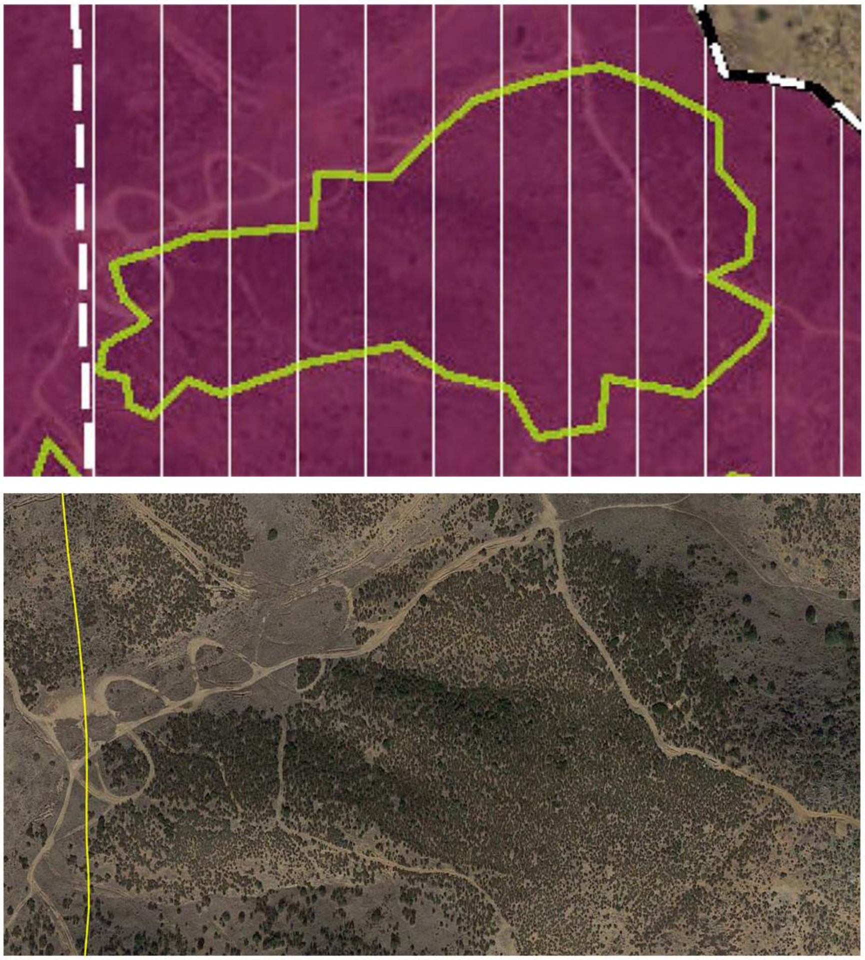
O-6.1-54
Cont.

The following side-by-side comparison shows some of the resources obscured beneath the purple screen in Figure 2 of the Harvey Habitat Assessment Memo.



Two aerial views of the same area, in and around the northern part of the Village 14 site. The upper image, from Figure 2 in the Harvey Habitat Assessment Memo, shows in light green several areas that the project biologists consider "areas of dense chamise chaparral unsuited to eagle foraging." The bottom image shows that the chaparral/scrub habitat in this area is rather open, without a closed canopy. See the following page, which zooms in on the northeastern patch of "dense" chaparral shown above. *Source: Google Earth Pro.*

O-6.1-54
Cont.



As can be seen in this direct comparison of a single patch of habitat (the northeastern patch of habitat shown in the comparison on page 26 of this letter), the chaparral/scrub in this polygon is actually quite open, with substantial gaps between adjacent shrubs or small groups of shrubs. The DEIR provides no evidence that this habitat is too dense for eagles to utilize. *Source: Google Earth Pro.*

The following page provides two photos of chaparral in Proctor Valley that I took during my field visit, again showing that the habitat is not as dense as the DEIR makes it out to be.

O-6.1-54 Cont.

Photo taken on April 9, 2018, from Proctor Valley Road facing northeast, showing the typical condition of chamise chaparral on the project site. As shown, most of this habitat type on the site has an open canopy with ample bare ground visible. This type of habitat is used by various prey species for the Golden Eagle, including the Black-tailed Jackrabbit, and appears to be accessible to foraging Golden Eagles.

Photo: Robert A. Hamilton

O-6.1-54 Cont.

Photo taken on April 9, 2018, from Proctor Valley Road facing northwest, showing the typical condition of chaparral/scrub on the project site. This type of habitat is used by various eagle prey species, and could certainly be accessed by foraging Golden Eagles.

Photo: Robert A. Hamilton

Page 4 of the Harvey Habitat Assessment Memo states:

> The vegetation density and stature may be too great to support eagle foraging within stands of dense chaparral, but it is important to recognize that such stands provide shelter and breeding sites for lagomorphs that periodically forage in and disperse across adjacent open areas where they are accessible to foraging golden eagles. Landscapes that support a patchy mosaic of smaller stands of dense shrubs intermixed with sufficient open grass/forb areas can provide good foraging habitat for eagles. In areas where large patches of dense chaparral predominate, however, the potential for eagle foraging is reduced to limited areas of transitional edge habitat.

This is quite true, but the DEIR provides no direct observations, or evidence from other eagle foraging studies, in support of its assertions that large expanses of habitat in Village 14 are too dense to allow eagles to forage there. As shown on page 25 of this letter, approximately 2% of the habitat on the Village 14 site truly possesses a closed canopy. The rest of the habitat has a moderately open to very open canopy. The question of whether eagles in Proctor Valley actually do dive into moderately dense chaparral, versus taking prey from the surrounding expanses of very open habitat, would have to be determined through observation (which is now possible with transmitters that send po- O-6.1-55 sition information every few seconds; P. Bloom pers. comm.). Whatever the case, the fact that eagles have successfully occupied Proctor Valley for many decades, and probably for much longer than that, indicates that they are capable of utilizing the chamise chaparral that dominates this area. O-6.1-55 Cont.

Page 6 of the Harvey Habitat Assessment Memo adds the following caveat:

> We do note, however, that the relative density and stature of shrub cover in the various polygons identified in Figure 2 varies, and that especially some of the smaller, less-dense patches in the northern portion of the development area could support occasional eagle foraging attempts.

O-6.1-56

This reads like an effort to play both sides, although the bulk of the memo is written so as to justify the land exchange desired by the County and the applicant. Consider also the following statements on the third paragraph on page 6:

> During the field surveys, we observed relatively more prey sign in shrub habitats, including patches of southern mixed chaparral, than in nonnative annual grassland. This impression was probably misleading, however, because it was much more difficult to detect scat in the lush growth of tall, thick grasses that resulted from the preceding, unusually wet winter.

O-6.1-57

To reiterate, eagles have been foraging in Proctor Valley for many years. This means that they are able to successfully find and access prey, presumably throughout those parts of the valley that they do not avoid due to human presence (as may well be the case with Planning Area 19, which abuts existing residences). The bottom line is that the project biologists did not conduct a study to determine where eagles actually forage in Proctor Valley. They presented a series of questionable assumptions about eagle foraging habits in the local area, and used those assumptions to characterize the land exchange alternative as representing a benefit to eagles. The DEIR should develop its analyses of likely outcomes for the eagle, under different development and preservation scenarios, using the best available information, which means using the USGS model scheduled to be released on April 16, 2018. O-6.1-58

Questionable Responses to County Queries

The DEIR provides as an appendix another memorandum prepared by H. T. Harvey and Associates, dated March 13, 2017, in which the biologists address 18 questions/requests for clarification from the County concerning H. T. Harvey's eagle surveys. Request for Clarification No. 16, in what is hereafter referred to as the Harvey Q/A Memo, states the following: O-6.1-59

> **16.** Provide an opinion as to whether the MSCP preserve, as augmented by the acreage conveyed by the proposed Project, provides adequate forage to sustain the golden eagles that currently include the Project site within their home range.

H. T. Harvey and Associates responded as follows:

> Based on the available and accessible evidence, it is not clear that any individual eagles currently rely on the Project area as foraging habitat consistently or perennially. Although the initial USGS tracking data suggested that the overall home range of the former Cedar Canyon breeding pair included Proctor Valley and the Jamul Mountains, that female died and our recent observations revealed a non-telemetered adult in the area. Access to more recent USGS tracking data may help clarify the current situation; however, those data are not publically [stet] available. Regardless, given that Proctor Valley does not currently overlap any pair's core breeding territory and the closest known recently active nests are more than 5 miles away, if a pair nesting in the San Ysidro Mountains routinely forages in Proctor Valley, the loss of even a few thousand acres of foraging habitat (the Project development footprint is approximately 810 acres and, by the MSCP definition, 97% of this area constitutes golden eagle foraging habitat) in a peripheral portion of that pair's overall home range would not exceed the 20% threshold of foraging area loss identified as significant in the MSCP. Moreover, such a pair would continue to have ready access to large acreages of suitable foraging habitat within the MSCP Preserve in the Jamul Mountains, the foothills of Proctor Valley, possibly around San Miguel Mountain, and in the large expanse of Preserve habitat located between the Jamul Mountains and San Ysidro Mountains. Therefore, developing the Project would not significantly compromise the ability of any current breeding pairs to sustain themselves.

O-6.1-59 Cont.

Regarding the assertion that recent USGS tracking data is not available to the public, in 2017, at the County's request, the USGS transferred to the County the shapefiles from the 2016 and 2017 reports (Tracey et al. 2016, 2017); H. T. Harvey never requested the data from USGS (R. Fisher pers. comm.). In order to base their analyses upon the best available information, the project biologists should have requested the latest tracking data from the County or from USGS. Moving forward, as discussed in these comments, the project biologists should be utilizing the new USGS model as an important part of their analyses.

Furthermore, although no eagles have been found nesting on San Miguel Mountain since 2007, it bears noting that the eagles regularly observed in this closed area are not fitted with transmitters and have not been closely monitored by any biologists. I observed an adult eagle soaring over San Miguel Mountain, on April 9, 2018 (i.e., during the nesting season), and thus, as of spring 2018, I consider it possible that eagles do currently nest at an unknown site on San Miguel Mountain. Also, as discussed subsequently, it is premature to assume that nesting Golden Eagles have been permanently extirpated from San Miguel Mountain, especially since current USGS studies show that this area and the undeveloped center of Proctor Valley remain viable habitat areas for the Golden Eagle (Tracey et al. 2016, 2017).

O-6.1-60

For the reasons discussed at length in this letter, the proper response to the County's request for an opinion about the level of "forage" sufficient "to sustain the golden eagles that currently include the Project site within their home range" would be to restate the question in a way that would allow for an evidence-based response. We should be asking, "What configuration of development in the project vicinity would allow for the historical San Miguel Mountain nesting site to provide viable nesting opportunities for Golden Eagles into the future (as assumed on Page 3-76 of the Final MSCP Plan)?" When the new USGS habitat selection model becomes available, it should be utilized to

O-6.1-61

evaluate whether establishing a new urban/suburban village in the middle of Proctor Valley would preclude Golden Eagles from making any regular use of San Miguel Mountain in the future. If so, the County should be considering alternatives that would maintain adequate undisturbed land in the middle of Proctor Valley and prioritize development of lands that have little or no value for eagles. O-6.1-61 Cont.

One such concept for moving development out of an important natural area and into a previously disturbed area could involve taking development out of Village 14 and shifting it to the recently closed Salt Creek Golf Club, which is 1.6 miles west of the project site and owned by the Otay Water District. The golf course, which covers approximately 250 acres, could accommodate many of the homes planned for the Village 14 project site, and building in that previously developed site would have greatly reduced impacts on sensitive natural areas. O-6.1-62

Request for Clarification No. 17 in the Harvey Q/A Memo states the following:

> **17.** Confirm your earlier opinion that the USGS data, while interesting for purposes of studying golden eagle behavior over the long-term, is incomplete and includes no analytical component, making it of marginal use in a project-specific impact assessment.

H. T. Harvey and Associates responded as follows:

> A robust assessment of eagle usage patterns and the importance of the Project site to tagged eagles would require a much more detailed evaluation of the gathered data than is possible based solely on the coarse-scale summary maps—with no interpretation—presented in the initial 2016 USGS report. Most importantly, discerning whether usage of the Project area by tagged adults that appear to be year-round residents is consistent throughout the year or seasonally variable, and using available analytical techniques to effectively portray the relative density of usage in different areas, are critical missing ingredients that would be required to use the data for assessing the relative importance of the Project area to resident breeders. O-6.1-63

The state-of-the-art model scheduled for release on April 16, 2018, is precisely the type of "critical missing ingredient" lacking previously. Before any final land-use decisions are reached, biologists should make use of the new model to guide the direction of this project using the best available science.

Request for Clarification No. 18 in the Harvey Q/A Memo states the following:

> **18.** Confirm your earlier opinion that that [stet] the project site's golden eagle habitat is sub-optimal due to density of chaparral and loamy/cobbly soils.

H. T. Harvey and Associates responded as follows:

> This statement applies ONLY to the Otay Ranch Village 14 portion of the proposed Project development area in the central portion of Proctor Valley. Planning Areas 16 and 19 contain greater proportions and extents of high-quality coastal sage scrub and annual grassland habitat. There is definitely foraging habitat for golden eagles in the Village 14 area of central Proctor Valley, which in some areas is relatively high quality. However, a substantial portion of the habitat in the vicinity of the Village 14 development area is not golden eagle foraging habitat because the chaparral is too dense. In addition, because of the soil characteristics, most of the bottomland portions of central Proctor Valley where much of the development will occur is not well suited to ground squirrels compared to other neighboring foothill areas (as well as the grazed grassland and coastal scrub habitats located primarily in Planning Area 16). This does not mean that there O-6.1-64

> are no foraging opportunities for eagles in these areas, but it limits the potential diversity of prey compared to other foothill areas that will be preserved.

As discussed from pages 23 to 29 of this letter, the DEIR presents no observations or other compelling evidence in support of its conclusion that Planning Areas 16/19 present superior foraging opportunities for Golden Eagles relative to Village 14. O-6.1-64 Cont.

DEIR's Impact Analysis Based on Outdated Concepts, Bad Assumptions

The DEIR's analysis of the proposed project's potential impacts to the eagle focuses entirely upon certain language contained in the MSCP, especially the requirement that "development be restricted within 4,000 feet of 'active' golden eagle nests." The DEIR's analysis fails to mention that the MSCP also specifies that the nesting pair of Golden Eagles at San Miguel Mountain/Rancho San Diego "should remain viable" (but would not if the project is built as proposed). By maintaining a laser focus on demonstrating lack of recent nesting, by faithfully evaluating the project against what we know to be an outdated and irrelevant metric of 4,000 feet of separation between nest sites and development, and by downplaying the importance of eagles continuing to make substantial use of both the project site and adjacent public lands regardless of their recent nesting status in the area, the DEIR carefully works its way to a poorly substantiated finding that project implementation would not result in any significant impacts to Golden Eagles. For reasons discussed in the Bloom Biological Letter, placing a large development in the middle of Proctor Valley would be very likely to cause Golden Eagles to permanently vacate the San Miguel Mountain/Rancho San Diego territory, an adverse outcome inconsistent with the assumptions of the MSCP when it identified the Golden Eagle as a covered species. This would be a significant impact. O-6.1-65

Why Save Eagle Habitat if There's No Active Nest?

As part of evaluating the DEIR's impact analysis, we should pay close attention to a lengthy footnote at the bottom of page 1 of the Harvey Technical Memo, which parses the meaning of "active" with reference to Golden Eagles nests:

> The term "active" is not defined in either referenced document and variable, often conflicting definitions have been applied to this term in describing and managing impacts to raptor nests, depending on the regulatory/management and temporal context (e.g., see Steenhof and Newton 2007; U.S. Fish and Wildlife Service 2009, 2013, 2016). Steenhof and Newton (2007) discourage continued use of the term because of this confusing history. Historically and most commonly, the term "active" has been used to describe nests that contain eggs or young (Postupalsky 1974). However, established golden eagle breeding pairs show high fidelity to their breeding territory, may occupy a territory for 20 years or more, typically maintain and variably use multiple alternative nests (which may be separated by substantial distances, depending on the density of breeding pairs, availability of nest substrates, and overall home range size), and often do not lay eggs every year (Kochert et al. 2002, Watson 2010). Therefore, where previously used nests are known to exist, the absence of eggs or young during a given breeding season does not confirm an unoccupied breeding territory nor the absence of an "active" breeding pair, only that no breeding attempt occurred that year (U.S. Fish and Wildlife Service 2009, 2013). For these reasons and for the purpose of maintaining no-development buffers to protect nesting eagles, the classification of golden eagle nests as "active" or "inactive" should reflect a multi-year assessment that accounts for the possibility of intermittent nesting, use of multiple alternative nests across years, and potential reuse intervals of 10 years or more for individual nests that persevere within occu- O-6.1-66

> pied territories (Kochert and Steenhof 2012). In addition, breeding territories typically should not be considered abandoned unless rigorous annual monitoring confirms the absence of a breeding pair for at least several years (U.S. Fish and Wildlife Service et al. 2012).

O-6.1-66 Cont.

The surveys conducted by H. T. Harvey during 2016 and 2017 occurred near the end of a decade-long period of especially difficult times for Golden Eagles at San Miguel Mountain. The birds have subjected to numerous forms of disturbance and climatic stress that have undoubtedly contributed to the likely/apparent failure of eagles to nest on San Miguel Mountain during the past decade:

- The Harris Fire burned the project site and surroundings, and apparently caused the eagles' historically occupied nesting ledge to collapse, in late 2007.
- Illegal immigrants and border patrol agents were found to have likely disturbed potentially suitable nesting sites in 2008, and such disturbances have continued to periodically occur in this area.
- In the southern part of Proctor Valley, the Rolling Hills and Bella Lago housing developments were constructed between 2005 and 2012.
- Off-road vehicle use of Proctor Valley was widespread and damaging enough in during the 2000s and early 2010s that in 2013 the California Natural Resources Agency, San Diego Association of Governments, and The Nature Conservancy teamed up to install a $350,000 system of protective rails along 2.5 miles of Proctor Valley Road. This system appears to be working well to help the natural habitats of the valley to recover, which should benefit jackrabbit and other small mammal populations and hence Golden Eagles. O-6.1-67
- The nesting platform established on San Miguel Mountain in 2013 — intended to replace the natural nesting site damaged in 2007 — may be oriented in a manner that the eagles consider unacceptable, or could require some other type of modification before eagles would use it.
- San Diego County experienced ten years of extreme, nearly uninterrupted drought from 2007/2008 to 2016/2017 (including one wet year in 2011/2012). Wiens et al. (2018) studied the effects of three years of severe drought (2014-2016) upon 100 pairs of Golden Eagles in the northern Diablo Range, east of San Francisco and San Jose, California. During those three years, the annual percentages of monitored pairs that *attempted* nesting were 20% (2014), 24% (2015), and 27% (2016). The statewide drought peaked in 2015/2016 and broke, at least temporarily, in 2016/2017. It may take multiple years of normal-to-wet winters, combined with habitat protection, for prey numbers to rebound to levels adequate to support a nesting pair of eagles at San Miguel Mountain.

Given that multiple adverse factors have affected San Miguel Mountain's suitability as an eagle nesting site during the past 10+ years, it is not surprising to me that eagles have not been found nesting there since 2007. The Bloom Biological Letter also addresses this issue, citing relevant information from an important and relevant long-term study of Golden Eagles in Idaho, which were documented reoccupying nesting territories after **decades** of non-use:

> Results from a 41-year study of Golden Eagle nest use in southern Idaho by Kochert and Steen-

> hof (2012) reveal that the use of alternate nests within territories is largely intermittent with "Two nests being unused for 21 and 27 years after 1971 before being used every 1 to 3 years thereafter." The same study also found that eagles "reoccupied a territory that had been vacant for 16 consecutive yr, and reused one of the old nests after 22 yr of nonuse", and that "Occasionally eagles built new nests on or near sites of nests that had been destroyed or had fallen off the cliff. Eagles built a nest on the exact spot of a nest that burned 2 yr previous, and eagles built three more nests 4, 10, and 26 m, respectively, from sites where nests had fallen 22, 28, and 31 yr earlier. Eagles built a new nest in 2010 on the same ledge that contained a dilapidated Golden Eagle nest 40 yr earlier.

Given the serious challenges that have faced Golden Eagles at San Miguel Mountain since 2007, and the continuing regular use of this area by adult eagles at all times of the year, it would be premature to declare the species extirpated as a breeder in this area.

O-6.1-67 Cont.

In conclusion, the Bloom Biological Letter states:

> . . . the bottom line is this: while there are many possible outcomes if the remaining habitat in the Rancho San Diego territory is left undisturbed – including re-occupancy and successful breeding by Golden Eagles – a certainty is that, if development is allowed to continue in prime foraging areas such as Proctor Valley, then this well-documented, traditional Golden Eagle nesting territory will become permanently extirpated. Furthermore, any loss of habitat now used for foraging or as fly-over space to access adjacent habitat, will lessen the viability of currently extant breeding territories.

O-6.1-68 Cont.

Under CEQA, these adverse and avoidable outcomes for Golden Eagles that the MSCP assumed would remain viable in the project area must be identified as a significant adverse effect of the project. Rather than focusing strictly on the apparent lack of recent nesting, and using this as the rationale upon which to claim a finding of no significant impact, the project biologists should evaluate all of the relevant information indicating that Golden Eagles make substantial and consistent use of the project site — a level of use that would be virtually guaranteed to greatly diminish or cease altogether with project implementation, as established using the best available science — and should acknowledge the potential for eagles to once again nest on San Miguel Mountain if and when habitat conditions improve. Consultation with the new USGS model, following its imminent publication, should provide important insight into the outstanding questions that remain at this time. The County, project applicant, and other stakeholders in and around Proctor Valley should be working toward finding creative solutions that maintain the ecological integrity of core natural open spaces near the advancing edge of urban sprawl. Instead, the DEIR seeks to lock us into flawed and inadequate planning decisions made decades ago, when we lacked the data to know better.

O-6.1-69 Cont.

SUMMARY AND CONCLUSION

The DEIR's analyses of several critically important biological resource issues, and its assertions of consistency with the County's Biological Mitigation Ordinance for parcels PV1, PV2, and PV3, lack the substantial evidence mandated under Section 15064(f)(5) of the CEQA Guidelines.

As discussed in these comments, project implementation would result in significant im-

O-6.1-70

pacts to preserved natural communities resulting from habitat loss, habitat fragmentation, and a wide range of edge effects. The DEIR fails to characterize, analyze, or mitigate for any of the project's significant edge effects.

The DEIR's mapping of plant communities is grossly inaccurate, with highly disturbed scrub and grassland areas depicted as undisturbed scrub. The effect of the mapping errors is to create the appearance that Planning Areas 16 and 19 possess greater ecological integrity and value as wildlife habitat than they actually do. Before any further consideration is given to exchanging these heavily disturbed communities for the relatively intact habitat owned by the State of California near Village 14 (i.e., the Land Exchange Alternative), the mapping errors must be corrected and a revised analysis presented that accurately reflects the biological resources present in Planning Areas 16 and 19.

The DEIR understates the project's impacts to the Western Spadefoot, and its analysis is based upon focused surveys that started too late in the season to identify all of the occupied breeding ponds. The DEIR also overstates the number of known breeding ponds that would be preserved, and fails to provide the extensive buffers around breeding ponds that USGS specialists consider necessary to provide adequate upland aestivation sites, and to buffer ponds from various edge effects of development. Thus, project implementation would result in significant, unmitigated impacts to the Western Spadefoot not acknowledged in the DEIR. O-6.1-70 Cont.

The DEIR bases its impact analysis for the Golden Eagle based entirely upon metrics contained in the Final MSCP Plan, downplaying or ignoring information from more recent telemetry studies indicating that development in the middle of Proctor Valley (i.e., within Village 14) would almost certainly result in loss of the San Miguel Mountain/Rancho San Diego eagle territory. The DEIR's eagle habitat assessment boils down to a series of questionable assumptions about eagle foraging habits in the local area, upon which the Land Exchange Alternative is being sold as representing a clear benefit to the local eagle population. See also the attached analysis by Bloom Biological Consulting. The DEIR's treatment of eagle issues should be revisited in light of comments on the DEIR as well as the Golden Eagle habitat preference model that the USGS is scheduled to release on April 16, 2018.

As explained in the attached letter from butterfly experts Ken Osborne and Gregory Ballmer, the DEIR uses the results of surveys conducted under drought conditions, and a poor understanding of the Quino Checkerspot Butterfly's population ecology and habitat needs, to understate the project's significant impacts to this endangered species, erroneously portraying the Proctor Valley as an area of marginally suitable habitat rather than high-quality core habitat from which QCB might expand into other areas during years of high reproductive success.

For all of these reasons, the DEIR is profoundly deficient as a CEQA document. The document's deficiencies are of such a magnitude that they cannot be addressed in the Final EIR. Rather, a new DEIR will need to be prepared and circulated for review.

I appreciate the opportunity to provide these comments on the DEIR and I look forward to the County's responses. If you have questions, please call me at (562) 477-2181 or send e-mail to robb@hamiltonbiological.com.

O-6.1-70 Cont.

Sincerely,

Robert A Hamilton

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President, Hamilton Biological, Inc.

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Attached:

- Literature Cited
- Curriculum Vitae

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Appendix A

Robert A. Hamilton

President, Hamilton Biological, Inc.

Expertise

Endangered Species Surveys
General Biological Surveys
CEQA Analysis
Population Monitoring
Vegetation Mapping
Construction Monitoring
Noise Monitoring
Open Space Planning
Natural Lands Management

Education

1988. Bachelor of Science degree in Biological Sciences, University of California, Irvine

Professional Experience

1994 to Present. Independent Biological Consultant, Hamilton Biological, Inc.

1988 to 1994. Biologist, LSA Associates, Inc.

Permits

Federal Permit No. TE-799557 to survey for the Coastal California Gnatcatcher and Southwestern Willow Flycatcher

MOUs with the California Dept. of Fish and Game to survey for Coastal California Gnatcatcher and Southwestern Willow Flycatcher

California Scientific Collecting Permit No. SC-001107

Robert A. Hamilton has been providing biological consulting services in southern California since 1988. He spent the formative years of his career at the firm of LSA Associates in Irvine, where he was a staff biologist and project manager. He has worked as an independent and on-call consultant since 1994, incorporating his business as Hamilton Biological, Inc., in 2009. The consultancy specializes in the practical application of environmental policies and regulations to land management and land use decisions in southern California.

A recognized authority on the status, distribution, and identification of birds in California, Mr. Hamilton is the lead author of two standard references describing aspects of the state's avifauna: *The Birds of Orange County: Status & Distribution* and *Rare Birds of California*. Mr. Hamilton has also conducted extensive studies in Baja California, and for seven years edited the Baja California Peninsula regional reports for the journal *North American Birds*. He served ten years on the editorial board of *Western Birds* and regularly publishes in peer-reviewed journals. He is a founding member of the Coastal Cactus Wren Working Group and in 2011 updated the Cactus Wren species account for *The Birds of North America Online*. Mr. Hamilton's expertise includes vegetation mapping. From 2007 to 2010 he worked as an on-call biological analyst for the County of Los Angeles Department of Regional Planning. From 2010 to present he has conducted construction monitoring and focused surveys for special-status bird species on the Tehachapi Renewable Transmission Project (TRTP). He is a former member of the Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC).

Mr. Hamilton conducts general and focused biological surveys of small and large properties as necessary to obtain various local, state, and federal permits, agreements, and clearances. He also conducts landscape-level surveys needed by land managers to monitor songbird populations. Mr. Hamilton holds the federal and state permits and MOUs listed to the left, and he is recognized by federal and state resource agencies as being highly qualified to survey for the Least Bell's Vireo. He also provides nest-monitoring services in compliance with the federal Migratory Bird Treaty Act and California Fish & Game Code Sections 3503, 3503.5 and 3513.

Board Memberships, Advisory Positions, Etc.

Coastal Cactus Wren Working Group (2008–present)

Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC) (2010–2014)

American Birding Association: Baja Calif. Peninsula Regional Editor, North American Birds (2000–2006)

Western Field Ornithologists: Associate Editor of Western Birds (1999–2008)

California Bird Records Committee (1998–2001)

Nature Reserve of Orange County: Technical Advisory Committee (1996–2001)

California Native Plant Society, Orange County Chapter: Conservation Chair (1992–2003)

Professional Affiliations

American Ornithologists' Union

Cooper Ornithological Society

Institute for Bird Populations

California Native Plant Society

Southern California Academy of Sciences

Western Foundation of Vertebrate Zoology

Mr. Hamilton is an expert photographer, and typically provides photo-documentation and/or video documentation as part of his services.

Drawing upon a robust, multi-disciplinary understanding of the natural history and ecology of his home region, Mr. Hamilton works with private and public land owners, as well as governmental agencies and interested third parties, to apply the local, state, and federal land use policies and regulations applicable to each particular situation. Mr. Hamilton has amassed extensive experience in the preparation and critical review of CEQA documents, from relatively simple Negative Declarations to complex supplemental and recirculated Environmental Impact Reports. In addition to his knowledge of CEQA and its Guidelines, Mr. Hamilton understands how each Lead Agency brings its own interpretive variations to the CEQA review process.

Representative Project Experience

From 2008 to present, Mr. Hamilton has served as the main biological consultant for the Banning Ranch Conservancy, a local citizens' group opposed to a large proposed residential and commercial project on the 400-acre Banning Ranch property in Newport Beach. Mr. Hamilton reviewed, analyzed, and responded to numerous biological reports prepared by the project proponent, and testified at multiple public hearings of the California Coastal Commission. In September 2016, the Commission denied the application for a Coastal Development Permit for the project, citing, in part, Mr. Hamilton's analysis of biological issues. In March 2017, the California Supreme Court issued a unanimous opinion (*Banning Ranch Conservancy v. City of Newport Beach*) holding that the EIR prepared by the City of Newport Beach improperly failed to identify areas of the site that might qualify as "environmentally sensitive habitat areas" under the California Coastal Act. In nullifying the certification of the EIR, the Court found that the City "ignored its obligation to integrate CEQA review with the requirements of the Coastal Act."

In 2014/2015, on behalf of Audubon California, Mr. Hamilton collaborated with Dan Cooper on *A Conservation Vision for the Los Cerritos Wetlands, Los Angeles County/Orange County, California*. The goals of this

Insurance

$3,000,000 professional liability policy (Hanover Insurance Group)

$2,000,000 general liability policy (The Hartford)

$1,000,000 auto liability policy (State Farm)

Other Relevant Experience

Field Ornithologist, San Diego Natural History Museum Scientific Collecting Expedition to Central and Southern Baja California, October/November 1997 and November 2003.

Field Ornithologist, Island Conservation and Ecology Group Expedition to the Tres Marías Islands, Nayarit, Mexico, 23 January to 8 February 2002.

Field Ornithologist, Algalita Marine Research Foundation neustonic plastic research voyages in the Pacific Ocean, 15 August to 4 September 1999 and 14 to 28 July 2000.

Field Assistant, Bird Banding Study, Río Ñambí Reserve, Colombia, January to March 1997.

References

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comprehensive review of ongoing conceptual restoration planning by the Los Cerritos Wetlands Authority were (a) to review the conceptual planning and the restoration work that had been completed to date, and (b) to set forth additional conservation priorities for the more intensive phases of restoration that were being contemplated.

From 2012 to 2014, Mr. Hamilton collaborated with Dan Cooper on *A Conservation Analysis for the Santa Monica Mountains "Coastal Zone" in Los Angeles County*, and worked with Mr. Cooper and the County of Los Angeles to secure a certified Local Coastal Program (LCP) for 52,000 acres of unincorporated County lands in the Santa Monica Mountains coastal zone. The work involved synthesizing large volumes of existing baseline information on the biological resources of the study area, evaluating existing land use policies, and developing new policies and guidelines for future development within this large, ecologically sensitive area. A coalition of environmental organizations headed by the Surfrider Foundation selected this project as the "Best 2014 California Coastal Commission Vote" (http://www.surfrider.org/images/uploads/2014CCC_Vote_Chart_FINAL.pdf).

In 2010, under contract to CAA Planning, served as principal author of the *Conservation & Management Plan for Marina del Rey, Los Angeles County, California*. This comprehensive planning document has two overarching goals: (1) to promote the long-term conservation of all native species that exist in, or that may be expected to return to, Marina del Rey, and (2) to diminish the potential for conflicts between wildlife populations and both existing and planned human uses of Marina del Rey (to the benefit of humans and wildlife alike). After peer-review, the Plan was accepted by the Coastal Commission as an appropriate response to the varied challenges posed by colonial waterbirds and other biologically sensitive resources colonizing urban areas once thought to have little resource conservation value.

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Third Party Review of CEQA Documents

Under contract to cities, conservation groups, homeowners' associations, and other interested parties, Mr. Hamilton has reviewed EIRs and other project documentation for the following projects:

- Safari Highlands Ranch (residential, City of Escondido)
- Newland Sierra (residential, County of San Diego)
- Harmony Grove Village South (residential, County of San Diego)
- Vegetation Treatment Program (statewide fire management plan, California Department of Forestry and Fire Protection)
- Watermark Del Mar Specific Plan (residential, City of Del Mar)
- Newport Banning Ranch (residential/commercial, City of Newport Beach)
- Davidon/Scott Ranch (residential, City of Petaluma)
- Mission Trails Regional Park Master Plan Update (open space planning, City of San Diego)
- Esperanza Hills (residential, County of Orange)
- Warner Ranch (residential, County of San Diego)
- Dog Beach, Santa Ana River Mouth (open space planning, County of Orange)
- Gordon Mull subdivision (residential, City of Glendora)
- The Ranch at Laguna Beach (resort, City of Laguna Beach)
- Sunset Ridge Park (city park, City of Newport Beach)
- The Ranch Plan (residential/commercial, County of Orange)
- Southern Orange County Transportation Infrastructure Improvement Project (Foothill South Toll Road, County of Orange)
- Gregory Canyon Landfill Restoration Plan (proposed mitigation, County of San Diego)
- Montebello Hills Specific Plan EIR (residential, City of Montebello; 2009 and 2014 circulations)
- Cabrillo Mobile Home Park Violations (illegal wetland filling, City of Huntington Beach)
- Newport Hyatt Regency (timeshare conversion project, City of Newport Beach)
- Lower San Diego Creek "Emergency Repair Project" (flood control, County of Orange)
- Tonner Hills (residential, City of Brea)
- The Bridges at Santa Fe Units 6 and 7 (residential, County of San Diego)
- Villages of La Costa Master Plan (residential/commercial, City of Carlsbad)
- Whispering Hills (residential, City of San Juan Capistrano)
- Santiago Hills II (residential/commercial, City of Orange)
- Rancho Potrero Leadership Academy (youth detention facility/road, County of Orange)
- Saddle Creek/Saddle Crest (residential, County of Orange)
- Frank G. Bonelli Regional County Park Master Plan (County of Los Angeles)

Selected Presentations

Hamilton, R. A. Six Legs Good. 2012-2017. 90-minute multimedia presentation on the identification and photography of dragonflies, damselflies, butterflies, and other invertebrates, given at Audubon Society chapter meetings, Irvine Ranch Conservancy, etc.

Hamilton, R. A., and Cooper, D. S. 2016. Nesting Bird Policies: We Can Do Better. Twenty-minute multimedia presentation at The Wildlife Society Western Section Annual Meeting, February 23, 2016.

Hamilton, R. A. 2012. Identification of Focal Wildlife Species for Restoration, Coyote Creek Watershed Master Plan. Twenty-minute multimedia presentation given at the Southern California Academy of Sciences annual meeting at Occidental College, Eagle Rock, 4 May. Abstract published in the Bulletin of the Southern California Academy of Sciences No. 111(1):39.

Hamilton, R. A., and Cooper, D. S. 2009-2010. Conservation & Management Plan for Marina del Rey. Twenty-minute multimedia presentation given to different governmental agencies and interest groups.

Hamilton, R. A. 2008. Cactus Wren Conservation Issues, Nature Reserve of Orange County. One-hour multimedia presentation for Sea & Sage Audubon Society, Irvine, California, 25 November.

Hamilton, R. A., Miller, W. B., Mitrovich, M. J. 2008. Cactus Wren Study, Nature Reserve of Orange County. Twenty-minute multimedia presentation given at the Nature Reserve of Orange County's Cactus Wren Symposium, Irvine, California, 30 April 2008.

Hamilton, R. A. and K. Messer. 2006. 1999-2004 Results of Annual California Gnatcatcher and Cactus Wren Monitoring in the Nature Reserve of Orange County. Twenty-minute multimedia presentation given at the Partners In Flight meeting: Conservation and Management of Coastal Scrub and Chaparral Birds and Habitats, Starr Ranch Audubon Sanctuary, 21 August 2004; and at the Nature Reserve of Orange County 10th Anniversary Symposium, Irvine, California, 21 November.

Publications

Gómez de Silva, H., Villafaña, M. G. P., Nieto, J. C., Cruzado, J., Cortés, J. C., Hamilton, R. A., Vásquez, S. V., and Nieto, M. A. C. 2017. Review of the avifauna of The Tres Marías Islands, Mexico, including new and noteworthy records. *Western Birds* 47:2–25.

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Draft Final Western Spadefoot (*Spea hammondii*): Independent Scientific Advisor Report for the City of Santee Multiple Species Conservation Plan (MSCP) Subarea Plan

Prepared for:
City of Santee

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Draft Final Western Spadefoot (*Spea hammondii*): Independent Scientific Advisor Report for the City of Santee Multiple Species Conservation Plan (MSCP) Subarea Plan

By: Carlton J. Rochester[1], Katherine L. Baumberger[1], and Robert N. Fisher[1]

U.S. GEOLOGICAL SURVEY
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2017

U.S. DEPARTMENT OF THE INTERIOR
RYAN ZINKE, SECRETARY

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William Werkheiser, Acting Director

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Introduction

The City of Santee is preparing a Subarea Plan under the Multiple Species Conservation Plan (MSCP) Subregional Plan in southwestern San Diego County. The Santee MSCP Subarea Plan (Plan) is a Natural Communities Conservation Plan (NCCP) and a Habitat Conservation Plan (HCP) to support the issuance of incidental take permits from the California Department of Fish and Wildlife (CDFW) and the United States Fish and Wildlife Service (USFWS) under the State and Federal Endangered Species Acts (ESA), respectively. Input from independent scientists is required for the completion of a NCCP, and the Santee MSCP has had independent scientific input on all species covered by the plan except for the western spadefoot (*Spea hammondii*).

The United States Geological Survey (USGS) is serving as the Independent Science Advisor (ISA) to the City to provide independent scientific input on the western spadefoot. The role of the ISA is to establish science-based conservation and management standards that will inform the preparation of the Plan and assist the Wildlife Agencies in their permitting responsibilities. The ISA's role includes clarifying the current state of scientific knowledge relevant to the Plan Area, but not answering policy questions. Sound scientific advice is critical to creating a strong and durable Plan, and guidance from the ISA is expected to provide the scientific underpinnings of plan development. The USGS has conducted wildlife surveys within San Diego County and southern California over the past two decades, including reptiles, amphibians, small mammals, birds, ants, and large mammals. As such, the USGS has the background to help address some of the issues related to the western spadefoot.

The City of Santee requested that USGS:

- Review existing data on species/habitat relationships, presence/absence, landscape features, important ecological processes, natural disturbance regimes, and other ecological factors relevant to the Plan Area
- Assess ecological requirements, life history characteristics, population size and status, genetics, and other attributes of western spadefoot relevant to the Plan Area
- Review GIS factors used for modeling of potentially suitable habitat
- Identify important data gaps and additional research needs
- Propose principles that could guide the conservation and recovery of western spadefoot in the Plan Area
- Formulate potential strategies for reserve management
- Evaluate scientific uncertainty and levels of risks
- Suggest strategies and targets for monitoring and adaptive management

Study Area

For purposes of this report, the City of Santee, the Study Area and the MSCP Subarea Plan Area (Plan Area) are one in the same and include all properties within the City of Santee's jurisdiction. This description of the Plan Area was developed for the Santee MSCP Subarea Plan and was provided by ICF. The City of Santee is bordered on the southwest by the East Elliott Community Plan Area in the City of San Diego, on the northwest by Marine Corps Air Station (MCAS) Miramar, on the east and north by the

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County of San Diego, and on the south by the City of El Cajon and Gillespie Field. Almost all of the lands to the north and west on MCAS Miramar, the Mission Trails Regional Park, and the County's Sycamore Canyon Park are covered by natural vegetation; while large portions of the lands to the south and east include the urbanized portions of the City of El Cajon and community of Lakeside (Figure 1).

The regionally important biological resources include the coastal sage scrub and chaparral-covered hills on the north and south sides of the Plan Area and the riparian corridor along the San Diego River and Sycamore Creek. These biological resource areas are divided into five Subunits within the Plan Area (Figure 1). The San Diego River Subunit includes the undeveloped lands along the San Diego River; the Rattlesnake Mountain Subunit includes the undeveloped lands in the southeastern portion of the Plan Area east of State Route (SR) 67; the Mission Trails Subunit includes lands adjacent to the Cowles Mountain section of Mission Trails Regional Park; the Magnolia Subunit includes the undeveloped lands east and west of Summit and North Magnolia Avenues (not including the Fanita Ranch Subunit); and the Fanita Ranch Subunit includes the undeveloped lands in the far north and northwest portions of the Plan Area.

The native vegetation in the Plan Area occurs throughout the five subunits. The vast majority of coastal sage scrub occurs on the Fanita Ranch and Magnolia Subunits, with smaller amounts in the Mission Trails and Rattlesnake Mountain Subunits (Figure 2). All of the chaparral is on the Fanita Ranch Subunit or on the north slope of Cowles Mountain in the Mission Trails Subunit. Almost all of the general grassland mapped in the Plan Area occurs on the Fanita Ranch Subunit. The general grassland habitat type is typically non-native grassland, but includes some native grassland. The riparian habitat types occur primarily along the San Diego River, with the exception of southern sycamore-alder riparian woodland, which occurs in Sycamore Canyon on the west edge of the Fanita Ranch Subunit. Several small patches of oak woodland occur within the Fanita Ranch and Magnolia Subunits. Most of the areas mapped as disturbed habitat occur in the central portion of the Plan Area, but several sizable patches also occur in the Fanita Ranch Subunit, along the San Diego River, and near Mission Trails Park. The areas covered by each vegetation community in the Plan Area are shown in Table 1.

The San Diego River Subunit consists of open water and discontinuous riparian vegetation running from the western edge of the Plan Area, near Mission Trails Regional Park, to the eastern edge of the Plan Area, near SR 67 (Figure 1). There are areas of disturbed habitat adjacent to the primary riparian corridor that may have potential for future restoration and enhancement. Past sand mining operations along the San Diego River have left large ponds of permanent water. Forester Creek joins the San Diego River south of the Santee Lakes. Restoration and enhancement projects have been completed along much of the portion of Forester Creek within the Plan Area (via the Forester Creek Improvement Project). A patch of coastal sage scrub dominates a hilltop on the east end of the San Diego River Subunit near the eastern boundary of the Plan Area.

The Rattlesnake Mountain Subunit occurs in the southeast portion of the Plan Area. Native habitat within this subunit is composed of one medium sized patch of native habitat (south of Shadow Hill Road and East of Graves Avenue) and a small patch southeast of Woodside Avenue (Figure 1). Both are dominated by coastal sage scrub. Portions of the larger patch have been developed into housing, which

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is not reflected in the vegetation map (Figure 2). A substantial amount of disturbed habitat also occurs adjacent to the patch at Woodside Avenue. The preserved habitat within this subunit is managed by the Center for Natural Lands Management (CNLM). Neither of the two habitat patches in the Rattlesnake Mountain Subunit connects to any significant native habitat beyond the boundaries of the Plan Area.

The Mission Trails Subunit includes a large block of contiguous habitat in the southwestern corner of the Plan Area (Figure 1). This block is largely composed of chaparral and coastal sage scrub, with native and non-native grasslands occurring on a smaller portion of the subunit (Figure 2). There is a vernal pool complex embedded in the matrix of coastal sage scrub, but it has a history of disturbance from off-road vehicle activity. Outside of the Plan Area, the Mission Trails Subunit is contiguous with the Cowles Mountain region of Mission Trails Regional Park, connecting the subunit to a landscape larger than that in the Plan Area.

The Magnolia Subunit occurs in the north-central part of the Plan Area between the border with San Diego County to the east and the Fanita Ranch Subunit to the north and west (Figure 1). This area is almost entirely covered by coastal sage scrub, but also includes some unmapped residences and fields (Figure 2). Native habitat within the Magnolia Subunit connects to similar habitat within the Fanita Ranch Subunit and beyond, representing a large, contiguous landscape extending from Interstate 15 to SR 67. Outside of the Plan Area to the east, the Magnolia Subunit is continuous habitat with the Lakeside Downs managed by the Endangered Habitats Conservancy (EHC).

The Fanita Ranch Subunit occurs at the north end of the Plan Area and is the largest of the five subunits (Figure 1). It is dominated by chaparral and coastal sage scrub (Figure 2), with a mix of native and non-native grasslands on the western slopes leading into Sycamore Canyon. There are stretches of riparian forest along Sycamore Canyon at the western boundary of the Plan Area. The Fanita Ranch Subunit is contiguous with the Magnolia Subunit to the east and south and MCAS Miramar to the west. As the largest subunit, the Fanita Ranch Subunit is further divided into the Fanita Ranch-Upper and Fanita Ranch-Lower Subunits. The Fanita Ranch-Upper Subunit includes the portion of the subunit north of the Magnolia Subunit and the Fanita Ranch-Lower Subunit is the portion west and southwest of the Magnolia Subunit.

Species Biology

The western spadefoot is a small, semi-fossorial amphibian species native to California and northern Baja California. During the long, dry months of summer and fall, the adults seek shelter underground. Early in the rainy season, they emerge to forage and reproduce, making use of temporary pools to lay their eggs. Western spadefoot typically breed in standing water that collects in shallow depressions within the upland habitat rather than in flowing streams or creeks. In addition to using naturally forming pools within the landscape, western spadefoot will breed in the pools forming along dirt roads within their habitat. Western spadefoot tadpoles can develop quickly if the pools begin to dry, but they do have limits on the minimum length of time that the breeding pool must persist. Although the species was distributed widely across the landscape, their current populations are limited by development and loss of habitat. Within the Plan Area, western spadefoot are known to live and breed at multiple sites in the Fanita Ranch Subunit. In 2005, Dudek (2017) documented the presence of western spadefoot across the grassland and lower foothills of the Fanita Ranch Subunit and mapped out many additional potential breeding sites.

There is limited information on the population dynamics for western spadefoot across its range or from year to year. As such, there are no estimates on the minimum population size required to sustain the species as its habitat is disturbed and broken into smaller and smaller pieces. Within the Fanita Ranch Subunit, there is a breeding population with breeding documented in at least 2005 (Dudek, 2017) and 2017 (USGS). This is likely a self-sustaining population at this time with connectivity to the larger surrounding habitat patch / meta-population and into the Magnolia Subunit. For the other areas with potential western spadefoot habitat, the Mission Trails and Rattlesnake Mountain Subunits, there are no known western spadefoot records within the data provided by Dudek (2017), USGS surveys (2017), the California Natural Diversity Database (CNDDB), iNaturalist, or the Herpetological Education & Research Project database (HERP: B. Hinds pers. comm.). The genetics project described below is the best effort to determine the population connectivity within the Fanita Ranch Subunit for the western spadefoot.

Genetic work is underway to characterize the western spadefoot, with samples collected from the Fanita Ranch Subunit (K. Neal, PhD Candidate, UCLA Department of Ecology and Evolutionary Biology). The goal is to determine if the populations and ponds on the Fanita Ranch Subunit that were occupied by the western spadefoot were genetically connected or not, as this would inform management objectives and corridor design between populations. The data will be utilized to develop a rough effective population size estimate which will provide an approximate number of breeding adults in the population that was sampled. Unfortunately for some of the pools, all of the tadpoles had completed metamorphosis and dispersed prior to the genetic sampling; genetic samples were only collected from 10 pools during the visit on 13 March, 2017. The distribution for the pools that were sampled will be sufficient to start the genetics work. Next year a more targeted sampling of the missing pools would be beneficial to the analysis, if possible. Additionally, the results will be compared to the sampling done elsewhere in Southern California in 2017 to see how these genetic metrics compare across the landscape.

Threats and Limiting Factors

Roads and trails

Western spadefoot have a complicated relationship with roads and trails, benefiting from these features in some cases and being negatively impacted by them at other times. Pools forming along dirt roads often provide breeding habitat but can also result in off-road vehicle related mortality directly or through a faster drying period. Many of the sites in the Fanita Ranch Subunit where western spadefoot have successfully bred in both 2005 and 2017 were road ruts. The soil compaction and depressions created along the dirt roads often results in pools suitable for reproduction. However, continued vehicle traffic through the pools while egg masses, tadpoles, and metamorphs are present results in direct mortality or may lead to increased siltation of the egg masses and faster drying. There are few data on the impacts of paved roads directly related to western spadefoot, but looking at other reptile and

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amphibian studies, paved roads act as barriers and result in direct mortality. Amphibian mortality rates on roads are highest on wet nights (Ervin et al. 2001) based on work done elsewhere in Southern California. Dodd et al. (2004) looked at the use of raised roadbeds, with a barrier wall and culverts, to connect two sides of a preserve in Florida. The eastern spadefoot was documented only rarely on the road surface or in the culverts under the road. In the post-construction data, only 1 eastern spadefoot was documented to have used one of the eight culverts under the road (culvert size = 1.8 m x 1.8 m). Seven eastern spadefoot were reported as roadkill going around the end of the protective barrier wall. The barrier wall and culvert system did greatly reduce the number of roadkill through the habitat of interest for reptiles and amphibians on the whole. Overall in the Florida study, the culverts were very small for the total length (44 m): 2 culverts were 1.8 m X 1.8 m, 2 were 2.7 m X 2.7 m, and 4 were 0.9 m in diameter. In a study specifically designed to look at amphibian use and selection of culverts based on dimensional cross-section and length, Woltz et al. (2008) showed that different reptile and amphibian species have a range of tolerances to culvert diameter and length, and some species show a preference to the type of substrate through the structure. The study species also had different abilities to climb over barrier fences. This might be a worthwhile study to repeat for western spadefoot since there doesn't seem to be much on the topic for this species. One potential shortcoming of their design was that they didn't allow for the subjects to not choose one of the test pipe diameters or lengths. The study design forced the animal to pick a culvert with no option to not go through one. Given an option, animals may choose to remain on one side of the culvert and not cross the barrier. Other impacts of roads may include increased contaminants associated with vehicles, avoidance of artificial light, and habitat fragmentation.

Patch size

The minimum area of habitat or patch size required by the western spadefoot to maintain a long term, viable population is unknown but likely is dependent on having both upland and aquatic / vernal pool habitats. Western spadefoot require periodic wetlands for breeding purposes and upland, terrestrial habitats for foraging and aestivating during the hot, dry summers, one of these habitat elements without the other would not be sustainable in the long term. Although there are no direct estimates of a minimum patch requirement for western spadefoot, it is possible to make some estimates based on existing research. Baumberger's radio telemetry efforts (2013) documented that western spadefoot moved as far as 262 meter (860 feet) from the breeding pool site with an average distance from the pool of 40 meters (131 ft). The western spadefoot in her study had home ranges that ranged from 469 m^2 to 2,094 m^2 (Baumberger, 2013).

From the long term reptile and amphibian surveys conducted by the USGS, the patterns of western spadefoot captures in pitfall traps can be compared to the size of the patch in which each is found. In an effort to standardize the evaluation of patch size, a parameter was developed for each of the pitfall arrays based on what the habitat patch would have been in 1995 because of the extensive development throughout southern California over the last two decades. Although the USGS trapping efforts were not specifically designed to address western spadefoot toad response to patch size and sustainability, it may be useful baseline data for consideration in conservation planning for the species. Using the pitfall captures for western spadefoot from San Diego, Orange, and Riverside Counties, the patch size for 351

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western spadefoot records from 106 study plots can be evaluated. The smallest patch where western spadefoot were found was Carmel Mountain Preserve at 217 hectares (ha), followed by Spring Canyon at 892 ha, near the international border with Mexico and SR-905. The USGS pitfall records for western spadefoot are summarized in Figures 3 and 4. Figure 3 shows the distribution of the sample plots within each of the patch size categories along with the number of western spadefoot detected within patches of the given size. The sample plots were not systematically distributed across the range of patch sizes. More arrays were sampled in the largest patches with only a very few arrays in the smallest patch size ranges. Larger patches can accommodate more study plots, but more western spadefoot records are also found within the larger patches.

Figure 4, the graph of the western spadefoot detections in the pitfall sample plots, shows that not only were more western spadefoot found in the larger patches, but that they were found at more individual plots. No western spadefoot were found in the three smallest patch categories. Seven out of 89 study plots (7.8 %) in patches between 100 and 1,000 ha had western spadefoot. In the next largest patch bin, 33 out of 171 (19.2 %) had western spadefoot. For study plots in patches between 10,000 and 100,000 ha, western spadefoot were found at 21.9 % of the plots. Larger patches tended to have western spadefoot in more of the sampled habitat than smaller patches.

A common conservation technique is to design the conservation area based on a buffer around a known resource. In the case of the western spadefoot, the sensitive resource would be the known breeding sites. Based on Baumberger's research (2013), 200 m, 300 m, and 400 m buffers around the 2005 western spadefoot breeding sites reported by Dudek (2017; Figures 5 and 6) were considered.

A 200 meter buffer around the known western spadefoot records would result in four discrete patches. If development completely surrounded all four patches, all would be smaller than any of those suggested by the preceding pitfall results. Only the patch around the western spadefoot sites at the north end of the Fanita Ranch Subunit would potentially connect to the habitat outside of the Plan Area. Without connectivity and potential management actions, the smaller sites are likely insufficient to support western spadefoot population in the long term. The four patches are described here and can be seen in the following maps. The 200 m buffers are shown as the blue bubbles in Figures 5 and 6.

- 200-A: 74.2 ha. This would be the only habitat patch that would connect out to the larger patch represented by MCAS Miramar. As such, the actual patch size would be larger than given here and would depend on the future development within MCAS Miramar.
- 200-B: 30.8 ha.
- 200-C: 12.6 ha.
- 200-D: <12.6 ha. A portion of a 200 m buffer around this location would be excluded from the patch due to urban development on the west side.

With a 300 meter conservation buffer around the known breeding sites at the north end of the Fanita Ranch Subunit, the habitat would be divided into three patches. Again, if these patches were all that remained, they would likely be too small to support western spadefoot population in the long term without additional, perpetual management actions. The 300 m buffers are shown as the green bubbles in the following maps. The following labels match those in Figure 5 and 6.

- 300-A: 120.0 ha. This would provide breeding habitat and a connection to the larger patch represented by MCAS Miramar.
- 300-B: 81.1 ha.
- 300-C: <28.3 ha. A portion of a 300 m buffer would be excluded from the patch size estimate due to development on the west and southeast edges.

Research on other species of spadefoot have shown that they tend to stay within 400 m of the breeding sites (Pearson, 1957; U.S. Fish and Wildlife Service, 2005; Garner et al., 2012) A 400 m buffer around the known breeding sites on the Fanita Ranch Subunit would result in two patches. The buffer would unite all of the pools in the Fanita Ranch-Upper Subunit.

- 400-A: 286.4 ha. Even without connectivity out to Miramar, conserving a patch of this size begins to approach patch sizes consistent with long term populations observed in two decades of USGS pitfall trapping.
- 400-B: <50.2 ha. This may not be suitable for long term viability of western spadefoot without additional management. Large portions along the west and south of this buffer would include urban development.

Edge effects

Along the perimeters of conserved lands where they adjoin urban landscapes, the proximity of development can impact the function of the natural systems beyond just the immediate interface. These edge effects include aseasonal flow, altered watershed dynamics, introduced species, increased recreational use, and increased fire risk. The extent that each of these impacts reaches into the open habitat varies with the landscape and the degree to which they impact western spadefoot may not be fully understood.

Aseasonal flow occurs when water is added to areas upstream of a site, typically as landscape irrigation and runoff, and then makes its way into the natural environment either through natural ground seepage or through artificial drains. Aseasonal flow is also typically characterized as occurring at a time of year inconsistent with the natural weather patterns. The result is that streams and creeks which naturally have surface water for only a few weeks or months during the winter (the nature wet cycle in San Diego County) hold water year round. Many of the species native to the region, including western spadefoot, are adapted to this cyclical wet and dry pattern, breeding in the temporary pools in the winter and then moving into the dry uplands during the rest of the year. Aseasonal flow can result in permanent year round water that can support non-native aquatic species such as fish, crayfish, bullfrog, and African clawed frogs. Work within San Diego County has documented the ability of bullfrogs to consume large quantities of individuals of native species. On Camp Pendleton, bullfrogs are known to consume arroyo toads as the toads move to the streams to breed. The hypothesis is that the bullfrogs listen for the male toads to call from the breeding site and then track them down by the calls. Western spadefoot calling from their breeding ponds may be subject to similar predation. Although the western spadefoot

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breeding sites are usually temporary pools, the call of the western spadefoot carries for a long distance and may attract bullfrogs to sites otherwise unsuited to the bullfrog (Hayes, 1985). Aseasonal flow allows potential predators to survive in a landscape otherwise inhospitable to them.

In addition to aseasonal flow, there is the further potential for the watershed dynamics to be altered along the edge of urban development. Increased impermeable surfaces within the developed areas can result in a more rapid transfer of rain into the aquatic system within the conserved area rather than the gradual accumulation of water as it seeps into the ground and makes its way through the system naturally. Runoff may also contain a higher contaminant load from "upstream" vehicles, pet waste, and landscape activities. Altered hydrology has the potential to lead to increased sediment transport into the aquatic system covering egg masses with silt. Western spadefoot breeding sites are not typically within flowing drainages and may not be impacted directly, but contaminants can be carried through the food chain and increased flows can alter the available habitats.

The Argentine ant (*Linepithema humile)* is an introduced invertebrate that will often take advantage of increased moisture levels within and along the edge of the urban development. Research by Mitrovich et al. (2010) showed a high likelihood that Argentine ants will extend from the urban edge into the first 200 m of undeveloped habitat. Where streams and creeks extend into the habitat, Argentine ants may also follow. Argentine ants have been documented to alter both the native ant community and the overall invertebrate community when the invasive becomes established. Western spadefoot feed mostly on insects. Zack and Johnson (2008) showed that the closely related Great Basin spadefoot (*Spea intermontana*) fed on a wide variety of insects with a high concentration of ants and beetles. If Argentine ants disrupt the local invertebrate community, the western spadefoot may be impacted by changes to its food supplies. Additionally, as Argentine ants first invade a new area, they tend to be more carnivorous, feeding on animal based materials, until they deplete the resources and must switch to a diet higher in plant based materials (Tillberg et al., 2007). Western spadefoot metamorphs, small and recently out of the breeding pond, could be vulnerable to attack as Argentine ants search for food.

Open spaces adjacent to urban areas quickly draw the attention of outdoor enthusiasts and, intentional or not, this can impact the local native species, including western spadefoot. Outdoor recreation in the form of hiking, cycling, and motorized off-road activity often includes an increase in the presence of trash and dogs, both on and off-leash. Although most recreationalists are not intending to harm the environment, our presence can have unintended consequences such as disturbing wildlife, including scaring western spadefoot off of breeding sites, increased sedimentation as breeding pools are disturbed, and decreased pool longevity as bikes and animals cross through the pools. Off-road vehicles can result in direct mortality of western spadefoot in the form of road-kill of adults out foraging along roads at night and the death of tadpoles where vehicles drive through pools pushing tadpoles and water out of the pool.

Recent fire studies have shown that with the increased density of development comes an increase in ignition sources, potentially resulting in a shorter fire return interval. Syphard et al. (2007) showed that fire density increased along with an increase in population density up to about 40 people/km2, and then began to decrease, possibly related to the built up of infrastructure and reduced response time. It is unknown how western spadefoot will respond to more frequent fire. The western spadefoot was at too low of a detection rate within the USGS pitfall fire study to draw any conclusions (Rochester et al., 2010). Based on life history pattern of the species, they would be underground at the time of year that the majority of wildfires occur in San Diego. The insulating properties of soil should shield estivating animals underground as the fire passes overhead. The potential that the breeding pools will be altered is high; there may be chemical signal in the subsequent water as it fills the pool the following year; drying of the landscape with the removal of leaf litter/duff resulting in increased direct sunlight hitting the ground but also reduced evapotranspiration. The creeks at Elliott Chaparral Reserve at the west end of this larger patch did not hold water for almost 10 years after the 2003 Cedar Fire, but there was also a significant drought during that time. Vernal pool studies have shown a positive response of the native plant species following fires. The north end of the Fanita Ranch Subunit is within the perimeter of the 2003 Cedar Fire and was characterized as a low to moderate fire severity. Dudek detected western spadefoot at the vernal pools in this area in 2005 (Dudek, 2017); the western spadefoot did not seem to be too heavily impacted by the fire, if at all. The fire perimeter data for the Plan Area goes back to 1910, with the most recent, the Cedar Fire, in 2003. Most of what didn't burn in 2003 burned in 1994 in the Rocoso Fire. The majority of the north end of the Fanita Ranch Subunit has burned two or three times in the documented time span (Figure 7). Portions of the south end of the Fanita Ranch Subunit have burned four or five times in that period. The US Forest Service produced a GIS layer (Safford et al., 2011) to estimate how much fire is on the landscape compared to pre-European conditions, called the Fire Return Interval Departure (FRID). The estimate takes into account the vegetation type and fire history. Much of the Fanita Ranch Subunit where western spadefoot have been documented was not classified in this process; the non-native grasslands that currently exist were not part of the pre-European landscape and cannot be calculated (Figure 8). The central portions of the Fanita Ranch Subunit are estimated to have burned more frequently in recent history (light green and dark green) than in pre-European conditions. As mentioned above, western spadefoot response to fire is an unknown as would be their response to an increased fire frequency. Although the Cedar Fire was over 13 years ago, the area should still be considered as recently burned. When fire management plans are developed for the remaining open spaces, they could include instructions/guidelines for the fire suppression teams which provide simple instructions or maps on where staging areas and command operations could be set up to avoid impacting vernal pools and potential western spadefoot breeding sites. Biologically significant sites could be identified on resource maps provided to fire suppression crews the same as culturally significant resources are identified. Informing fire suppression crews of the locations of western spadefoot sites may help in the conservation of the species within the Plan Area when fire crews can safely consider such resources.

The presence of western spadefoot within a site has been tied to the level of urban development around the site, which could be thought of as the accumulation of edge effects and other urban impacts. Urban development has a negative association with western spadefoot presence. Davidson et al. (2002) found that sites with western spadefoot had an average of 4% urban development at a 5,000 m radius around the site compared to sites where western spadefoot were not detected. The sites where western spadefoot were not found had an average of 23% urban development in the surrounding 5,000 m radius. As an approximation of their analysis, the NLCD_2011 land cover dataset were used to estimate the level of development around four areas within the Plan Area where western spadefoot habitat was modeled: The Mission Trails Subunit (Figure 9), the Rattlesnake Mountain Subunit (Figure 10), the Fanita Ranch-Upper Subunit (Figure 11), and the Fanita Ranch-Lower Subunit (Figure 12). The two regions of the Fanita Ranch Subunit are known to have western spadefoot, but the species has not been confirmed at the other two. The same data were generated for the USGS pitfall sites within San Diego County (Table 2). In the attempt to repeat this characterization, "Developed, Low Intensity", "Developed, Medium Intensity", and "Developed, High Intensity" were grouped together for the developed category and all other land cover classifications were left separate. Both the Fanita Ranch-Lower Subunit(41%) and Fanita Ranch-Upper Subunit (14%), where western spadefoot are present, are already well above the average level of development that Davidson et al. (2002) found for sites with the species. There are however multiple USGS pitfall sites with higher levels of development where western spadefoot have been detected over the past two decades. Western spadefoot were not detected at the USGS pitfall sites with development levels comparable to the Mission Trails (60%) and Rattlesnake Mountain (73%) Subunits (Table 2).

Corridor width and habitat connectivity

Maintaining connectivity between the various pieces of modeled habitat within the Plan Area is complicated by the level of urban development that already exists. Maintaining connectivity within the Fanita Ranch Subunit could increase the likelihood that western spadefoot will persist here, and it could be one of the conservation goals for the species. There is little existing data on the connectivity and movement requirements for western spadefoot, but looking at research on other species may be helpful. Coster et al. (2013) looked at movements of radio tracked wood frogs (*Lithobates sylvaticus*) and spotted salamanders (*Ambystoma maculatum*) to estimate the corridor width needs for those species. They recommended a minimum width of 50 m with the note that corridors may need to be wider for longer linkages. Baumberger's radio tracking (2013) may have insufficient observations to do the same kind of analysis for western spadefoot. The eastern spadefoot (*Scaphiopus holbrookii*) in Florida (Dodd et al., 2004) did not frequently use long, narrow culverts and seemed to go around the barrier more than through. Of the eight eastern spadefoot observed during that study, seven were dead on the road and one was detected while using a culvert (1.8 m H X 1.8 m W X 44 m L, dry, earthen substrate). The seven dead animals had gone around the end of the barrier and culvert system to enter the roadway. If the same behaviors hold for the local spadefoot species, connectivity between the sites in the Fanita Ranch Subunit will require corridors a minimum of 50 m wide. Culverts under roads may be adequate, but they will need to be large enough not to exclude the western spadefoot. Further study may be needed to determine the minimum culvert dimensions necessary to maintain connectivity for the local spadefoot.

As for connectivity between the patches of modeled habitat within the Plan Area, it is unlikely that the dis-contiguous areas are connected to one another. The Fanita Ranch Subunit, the only area known to have western spadefoot, is not connected to the habitat at the Mission Trails Subunit or the Rattlesnake Mountain Subunit. The Fanita Ranch Subunit and the Magnolia Subunit have no barriers to western spadefoot movement. Although western spadefoot have not been detected in the Magnolia Subunit, they should be able to move into the area from the Fanita Ranch Subunit with few restrictions.

Urbanization, major roads and lack of suitable habitat isolates each of these areas from the Mission Trails and Rattlesnake Mountain Subunits. Western spadefoot in the Fanita Ranch Subunit should be connected to western spadefoot in Mission Trails Regional Park thanks to the two large bridges and open habitat that continues to exist between the two areas. However, the Mission Trails Subunit is separated from Mission Trails Regional Park by Mission Gorge Road. The breeding sites in the Fanita Ranch Subunit are currently part of a habitat patch that extends from Interstate 15 on the west to State Route 67 on the east, State Route 52 to the south and the City of Poway to the north (11,961 ha): a 400 m buffer around these sites would maintain connectivity to the larger patch. A 300 m conservation buffer would split these breeding sites into two units. If a conservation buffer less than 400 m is preserved around the known breeding pools in the Fanita Ranch Subunit, the cluster of pools to the southeast would become isolated from those in the northwest. Without a sufficient habitat linkage to the pools to the northwest, the southeast patch is likely insufficient in size to sustain a population of western spadefoot. Based on the current conditions, there is no means to improve the connectivity between the Fanita Ranch / Magnolia Subunits and any of the other patches of modeled habitat within the Plan Area.

The Mission Trails Subunit may have an isolated population of western spadefoot. Any western spadefoot population on this habitat patch is probably not connected to any population outside of the patch. There is potential breeding habitat at this site but no confirmed western spadefoot occurrences. The habitat patch, which extends outside of the Plan Area over to Cowles Mountain, was estimated at 775 ha. In the event of extirpation of western spadefoot, there will be no outside source population to recolonize. While there is little potential to improve the connectivity of this site, there may be potential to improve the habitat if it can be shown that there are still western spadefoot at the site or adjacent lands outside this Subunit.

The Rattlesnake Mountain Subunit is not connected to any other patch with no reasonable means to improve the connectivity. Based on our review of the available imagery, there are no water sources for breeding at this location. Any historical western spadefoot population has likely died out by now with the level of isolation and lack of potential breeding sites.

Current conditions along the San Diego River Subunit will not provide western spadefoot connectivity to any other patch. The dense vegetation through most of this area is not suitable for western spadefoot. The modeled habitat up the sides of the Santee Lakes is not suitable and would not connect the San Diego River Subunit to the Fanita Ranch Subunit population. Additionally, the modeled habitat along Forester Creek is not suitable due to dense vegetation and would not serve for any connectivity. There could be remnant western spadefoot in the habitat near Mast Park. This would depend on the availability of breeding pools, but this is likely too small to function as a self-sustaining patch; it is less than 15 ha. There could be remnant western spadefoot in the open habitat along the river between Cuyamaca Street and Magnolia Avenue, near the sports facilities. It may not be ideal, but there is some scrubland mixed in with the surrounding upland habitat. This looks reminiscent of El Monte Valley in Lakeside, also along the San Diego River. The limiting factor would be the availability of breeding pools. Any population in this patch would be subject to extirpation with no recolonization. Any habitat improvements would need to be thought of in the context of all of the surrounding roads and urban

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impacts associated with this level of development and the potential that the patch as a whole is still too small. At most, this habitat patch is only 50 ha. The San Diego River Subunit will not provide a movement linkage for the western spadefoot known to be in El Monte Valley and those in Mission Trail Regional Park. The dense vegetation and deep waters with a lack of upland habitats will block western spadefoot movement.

Species Distribution Model

In an effort to identify sites with habitat characteristics where western spadefoot might be found, a draft species distribution model (SDM) was developed for the Plan Area by ICF. A species distribution model attempts to identify habitat and landscape variables that are suitable for the given species. In a previous effort, USGS and Dr. J. Franklin (University of Arizona) used the pitfall capture records for western spadefoot to make a SDM for the species that covered all of coastal Southern California, as well as the Plan Area. These two models will be compared and considered for the suitability of the areas identified as potential western spadefoot habitat.

The draft model provided by ICF included basically two parameters: vegetation type and slope. For vegetation, the following categories were included: coastal sage scrub, mixed chaparral, grassland, riparian, oak woodland, chamise chaparral, freshwater marsh, and vernal pools. For the slope variable, flat and moderate were included. In general, the predicted western spadefoot habitat model is reasonably accurate: most of the areas modeled as suitable habitat do look like western spadefoot habitat, with a few exceptions. The San Diego River was identified as western spadefoot habitat and it is likely not serving this function. The dense riparian forest, deep open water, and thick shoreline vegetation are not typically occupied by western spadefoot. If the vegetation type that resulted in the inclusion of the San Diego River and Forester Creek can be isolated, it might be useful to remove it from the model. The provided SDM appears to exclude dirt roads through the Fanita Ranch Subunit. Many of the known breeding pools are along the dirt roads. These road rut pools may be important to the persistence of the western spadefoot within the occupied habitat. These roads should be included in the modeled habitat if possible. Baumberger (2013) also reported that western spadefoot preferred soils with less clay than what was typically found in the area surrounding her study area. She also noted that western spadefoot were never found on slopes greater than 30 degrees, but reported that there were no areas with slopes greater than this in the area around her study. These considerations may help to tighten the SDM to more representative habitats for the western spadefoot.

The SDM developed by Dr. J. Franklin (unpublished) was based on USGS pitfall capture results for western spadefoot across all of Southern California. She developed two models: one based on a General Additive Model (GAM) and a second based on the Random Forest technique (RF). Based on 102 locations where the species was found, the GAM identified that western spadefoot prefer sites with moderately high values of January minimum temperature, higher values of July maximum temperature, lower values of precipitation, on flatter slopes, at low soil available water, shallower minimum soil depth, and are associated with certain soil orders (Figure 13). The RF also included these same variables but also identified summer radiation as an important variable.

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The model provided by ICF and Franklin's GAM model agree on several of the predicted areas of suitable habitat. Both models predict habitat at the south side of the Plan Area in the Mission Trail Subunit, in the Fanita Ranch Subunit, and in the Rattlesnake Mountain Subunit. The Franklin model over-predicts habitat; it includes large areas that are currently developed. The models disagree on the suitability of the habitat along the San Diego River Subunit as it runs through the Plan Area. The Franklin model predicts the probability of presence for western spadefoot as 0-0.1 for the dense vegetation along the river and 0.1-0.17 for the adjacent floodplain (much of which is now developed and is unsuitable). The provided SDM predicts habitat along the San Diego River through areas of thick riparian vegetation and deep standing, bodies of water.

Data Gaps and Additional Research Needs

Based on the literature search for this species, there is an extensive lack of basic information for the western spadefoot. There is more available for the southern spadefoot (*Spea multiplicatus*) and Great Plains spadefoot (*Spea intermontanus*), but very little for the western spadefoot within its range in Southern California. Additional research is needed to fill in the knowledge gaps on the dispersal of metamorphs from the breeding pond, feeding behavior, breeding cycles and success, survivorship across all age classes, and the overall longevity of the species.

Although Baumberger (2013) looked at the movement of adult western spadefoot around two breeding sites, there is little known about how far metamorphs disperse from breeding pools and how much this contributes to connectivity for the species. Baumberger's thesis showed that the 15 adults that were tracked didn't move far from the breeding pond. Metamorph dispersal may represent more significant movement and dispersal to new pools but there are limited ways to track such small animals. Some metamorphs are known to simply burrow into their natal pool, remaining at a breeding site that has been successful at least once. Current radio telemetry equipment has limitations in this application: metamorphs are too small for transmitters with any significant power and battery life span. Other methods may be suitable to tracking metamorph movement and could be investigated.

Survivorship across all age classes is unknown. Although 1,000's of eggs may be laid and 100's of metamorphs make it out of the breeding pool, the number that actually make it to adulthood and contribute to subsequent generations is complicated. Survivorship is highly variable across years and sites for all age classes. Insufficient rains may result in a complete lack of breeding or the desiccation of tadpoles before they can leave the pool. Extended drought may result in the deaths of even adults buried deep underground. Understanding the dynamics of western spadefoot survivorship would require years of research in order to include good years, bad years, and average years, following multiple age classes and animals in different environmental settings. Knowing how much the species can withstand would provide information as to what represents a sustainable population and how to identify when a population might be at risk of extirpation.

The ability to survive between years is critical to the species in an environment where breeding may not succeed every year. The longevity of the adults and the ability to persist through the lean times has allowed western spadefoot to survive on this landscape. The typical lifespan of the western spadefoot is currently unknown. From the USGS pitfall trapping data, recapture records are rare but there is one potential animal with a 7.75 year recapture trapping history. The majority of western spadefoot are not seen after the first time they are trapped. Twenty-three recaptures were within the same 4 or 10 day sample period. Six were within the same year and six were between 1 and 3 years. If droughts become extended in the future, adult western spadefoot must live long enough to make it from one successful breeding opportunity to the next.

Species Conservation

Patch size and upland habitat buffers

Based on the results from the USGS pitfall trapping within San Diego County over the past two decades, there are several potential impacts to consider in the conservation of the western spadefoot in the Plan Area. Western spadefoot were not found in habitat patches less than 217 ha (Table 2). An 830 m buffer of habitat around a single breeding pool would be needed to begin to approach the minimum patch size required by western spadefoot based on the USGS capture records. A 400 m buffer around the known western spadefoot breeding sites in the Fanita Ranch-Upper Subunit merge together and begin to approach this size of area (286 ha). A 400 m buffer around the breeding pools in the Fanita Ranch-Upper Subunit would also provide connectivity to the potential habitat outside of the Plan Area. A 300 m buffer would split the breeding pools in the Fanita Ranch-Upper Subunit, resulting in the southern set of pools being in a patch that is likely too small (81 ha) to sustain the species if all surrounding lands outside the buffer are developed and there is no means of connectivity provided. A 400 m buffer would not result in a minimum patch size compatible with western spadefoot for the breeding pond in the Fanita Ranch-Lower Subunit. Development surrounding and isolating the western spadefoot breeding pools on the Fanita Ranch-Lower Subunit from the rest of the Fanita Ranch Subunit, even with a 400 m conservation buffer around the pool, would likely result in too small a habitat patch to sustain the species. The Magnolia Subunit represents a patch of habitat approximately 225 h in area but is connected to habitat in the Fanita Ranch Subunit all along the north and west, representing a much larger patch of habitat. The Mission Trails Subunit is in a 775 ha habitat patch extending out to Mission Gorge Road, beyond the boundaries of the Plan Area. A 400 m buffer around the potential pools in the Mission Trails Subunit likely would be insufficient to maintain a western spadefoot population if all surrounding habitat were lost. The habitat in the Rattlesnake Mountain Subunit was estimated at 160ha but would be divided into several smaller patches based on the roads and housing developments now present in the area. There are no known breeding pools within the Rattlesnake Mountain Subunit. Even if breeding pools did exist within the Rattlesnake Mountain Subunit, the habitat patch is already smaller than the minimum predicted for western spadefoot based on the USGS pitfall findings. If potential future development limits the available habitat to the minimum 400 m conservation buffer around the known localities, the Fanita Ranch-Upper, Magnolia, and Mission Trails Subunits would be at the lower limits of the size and connectivity compatible with western spadefoot persistence, any smaller and the habitat fragment may be insufficient to sustain the species.

Urbanization, connectivity, and edge effects

Based on the Davidson et al. (2002) findings, all of the subunits would be estimated to be too heavily developed to support western spadefoot, but with the inclusion of the USGS pitfall data, it can be seen that western spadefoot can persist in areas with levels of development consistent with that found in the Plan Area currently. The 5,000 m buffer around the Fanita Ranch-Upper, Fanita Ranch-Lower, and Magnolia Subunits are between 14 and 40% developed, with western spadefoot confirmed in the Fanita Ranch Subunit. Further urbanization and development within the 5,000 m buffer around these sites would push each further out of the suitable range for western spadefoot occupation. The Mission Trails and Rattlesnake Mountain Subunits have between 60 and 73% development within the 5,000 m buffer and may be unsuitable for western spadefoot based on Davidson et al. (2002) and the USGS pitfall results for San Diego (Table 2).

The potential edge effects and the degree to which each extends into the natural landscape are highly variable and their impacts on western spadefoot may not be fully understood. The potential for increased fire frequency with increased development and a departure from the natural fire regime exist but with increased development also comes increased fire suppression resources. One edge effect that has been measured is the spread of Argentine ants: 200 m into the habitat from the urban edge. A 200 m interior buffer within the Rattlesnake Mountain Subunit would include nearly the whole property; only minute portions of the subunit are more than 200 m from the urban edge. All of the known breeding pools in the Fanita Ranch Subunit are currently more than 200 m from the urban edge but since Argentine ants often follow water and stream courses, these breeding pools may be susceptible to invasion as well if a source for Argentine ants becomes established nearby. The Mission Trails and Magnolia Subunits also have urban edge, but would also contain some area outside of the 200 m range of the Argentine ant.

The exact level of connectivity and the specifics of those connections are unknown for western spadefoot, but it is safe to estimate that there is no connectivity between the Mission Trails Subunit and any other subunit. The same applies to the Rattlesnake Mountain Subunit. Currently, the Fanita Ranch-Upper, Fanita Ranch-Lower, and Magnolia Subunits are estimated to be fully connected to each other and to the larger western spadefoot population in the habitat areas beyond the Plan Area. Multiple routes past any potential future barriers could be included in planning to provide multiple options for western spadefoot and other wildlife movement. Providing wildlife with multiple options to find movement routes that work best for their specific needs could increase the likelihood for success. Eastern spadefoot have been documented moving through culverts previously but additional information may be needed to determine the optimal dimensions of such structures.

Management Considerations

If the objective is to maintain western spadefoot within the Plan Area, maintaining and protecting breeding sites and adjacent upland foraging habitat, minimizing direct mortality, and providing opportunities for movement into and out of the population could be beneficial to the long-term persistence of western spadefoot. To help increase the probability of western spadefoot success, the following actions are identified for consideration:

- Maintaining connectivity between the known breeding sites within the Fanita Ranch Subunit as informed by the results of the genetic analysis currently underway could increase the likelihood of western spadefoot persistence. Actions that could be taken include:
    - Providing access to upland habitats between the breeding pools.
    - Minimizing barriers to movement between breeding sites.
    - Allowing for redundant routes. Limiting movement to one route runs the risk of complete failure if that route becomes compromised or is somehow unsuitable.
    - Incorporating the widest corridors possible. The wider the corridor the better. 50 m has been recommended for other amphibian species.
- Suitable breeding sites could be created or enhanced as evidenced by the use of road rut pools.
    - Where pools are lost or disturbed during development, compensate where possible.
    - Limiting potential breeding sites to just a few or one pool could be detrimental to the species. Redundant pools provide options and a failsafe for the potential that some may fail while others succeed.
    - Surveys could be performed to determine locations with soil characteristics compatible with the formation of breeding pools and water retention if artificial pools are created. Soil types within the Plan Area are variable and not all may be suitable for breeding pools. Within the Plan Area, western spadefoot were found on five soil categories (Figure 14), but have been documented to use additional soil categories by the USGS pitfall efforts (Table 3). Combined, these soil categories cover large portions of the Fanita Ranch, Magnolia, and Mission Trails Subunits.
    - The Mission Trails Subunit is a potential restoration site. The soil types along the upper mesa are consistent with those in the Fanita Ranch-Upper Subunit where western spadefoot have successfully bred in recent years. If existing pools are enhanced or new pools are built, public access and disturbance will need to be directed away from sensitive areas. The high levels of development surrounding this site may preclude it from being suitable, an important consideration before any restoration at the site.
    - Within the Fanita Ranch-Lower Subunit, only one significant pool is known, but it is the nicest quality vernal pool habitat onsite. Other locations along the ridgelines and dirt roads could also potentially be modified to act as new breeding pools. The western spadefoot habitat model and soil types are consistent with western spadefoot presence across the Fanita Rancho-Lower Subunit.
    - No western spadefoot or western spadefoot breeding sites were mapped in the Magnolia Subunit although there is suitable habitat based on the SDM and soil types. Several western spadefoot occurrences within the Fanita Ranch Subunit are just outside of the Magnolia Subunit. Artificial pools built on the Magnolia Subunit have the potential to be colonized naturally from the surrounding population.
- Translocation efforts may help establish additional populations of western spadefoot within the Plan Area.
    - Investigating existing genetic structure within the area is important before translocation efforts begin. If any genetic divergence exists within the region, efforts could be taken to maintain the genetic distinctiveness of the populations. If animals are moved, efforts

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could be taken to ensure that they are not moved into areas of differing genetic signatures.

- In spring 2017, several small pools at the Mission Trails Subunit held small amounts of surface water. The duration of water in these pools and the presence of any resident western spadefoot should be evaluated before considering translocating any western spadefoot to the site. If the existing pools do not hold water continuously for six to eight weeks, western spadefoot may not be able to successfully reproduce. The level of development surrounding the Mission Trails Subunit and its isolation from any other suitable habitat may exclude the site as a potential translocation site.
- Translocations within the Fanita Ranch Subunit may be appropriate where known breeding pools will be disturbed. The high levels of breeding success may qualify these pools as donor sites from which tadpoles can be harvested and moved to other locations out of the way of development.
- The Rattlesnake Mountain Subunit could be insufficient to support western spadefoot and is not recommended for any translocation efforts. Although there are patches of modeled habitat estimated to be suitable for the species and there are soil types commonly used by the species, there is no connectivity to any larger habitat patches, limited sources of water, and development levels well above those suitable for the species.
- Monitoring any tadpoles translocated to either natural pools or artificial pools through metamorphosis or desiccation of the pool would provide evidence of success and / or possibly lessons learned for the future. Surveys are best done every two to three weeks to document the progress of the tadpoles and the condition of the pool. Pools that dry before the tadpoles are able to metamorphose may be lacking in some feature and are best reconsidered before future translocation efforts.

- Minimizing long term disturbance to breeding sites could be beneficial for western spadefoot. Actions that could be taken include:
  - Erecting barriers on public access trails near breeding sites to prevent direct access to pools while still allowing wildlife access to the resource, and closing trails during rain events and several days afterwards, if possible.
  - Avoiding light pollution near breeding sites. Street lamps, parking lots, and flood lights at sport fields can be disruptive to the nocturnal breeding behaviors and activities of western spadefoot.
  - Including western spadefoot breeding sites in the fire management plan developed for the open lands. Providing fire suppression crews with information on the biological values. Meeting with fire command personnel to review suitable staging areas for suppression efforts.
- Reducing direct mortality of adults from roads could help the long-term persistence of western spadefoot within the Plan Area. Actions that could be taken include:
  - Providing movement routes for western spadefoot that will keep them out of harm's way: culverts, bridges, and barriers along the edges of roadways.

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- Determining where western spadefoot are entering the road and considering whether the situation can be modified to reduce access to the road surface.
- During the time of year that metamorphs are dispersing from the breeding pools, consider ensuring that they also have the means to safely cross roads and move past barriers.

Monitoring Considerations

Monitoring the western spadefoot can ensure continued persistence and help with evaluation of whether goals are being met. It is not typically difficult to determine if western spadefoot are present. During the winter, western spadefoot tadpoles can be observed in the breeding pools for up to eight to ten weeks after breeding, but it can be as little as 40 days. Surveys for western spadefoot can begin within a week of the first significant winter rain, as early as October or November. Surveys for western spadefoot eggs and tadpoles can be done during the day and do not require nighttime surveys. If western spadefoot are not detected after the first rains, surveys should be repeated with the next rain event. Once breeding has been confirmed, surveys can be repeated at four to six week intervals to document the success or failure of the breeding effort. It is not uncommon for western spadefoot to fail to breed every year. Nighttime surveys for adult western spadefoot can be done at the onset of the rainy season if desired or if breeding pools do not fill. Listening for calling males is a fast way to determine whether the species is present or not. The presence of eggs and tadpoles is also a positive sign that adults are present.

Summary

Western spadefoot are only known to occur in the Fanita Ranch Subunit of the Plan Area. Based on observations in 2005 by Dudek (2017) and USGS in 2017, the Fanita Ranch-Upper Subunit has a self-sustaining population with 100's of metamorphic western spadefoot making it out of the breeding pools in 2017. The pitfall trapping efforts over the past two decades across Southern California indicate that western spadefoot do better in larger patches, with more captures and a higher distribution within those patches. Drawing from the current knowledge of western spadefoot movement, a buffer of 300 to 400 m around the breeding sites will also protect the upland habitat needs for the species. Western spadefoot tend to be found in areas with low levels of urban development within a 5,000 m radius, but results within Southern California indicate that they can persist at intermediate levels as well. Existing development levels around the western spadefoot sites within the Fanita Ranch Subunit are within those observed at other locations with western spadefoot in San Diego County, but the Rattlesnake Mountain and Mission Trails Subunits may already have too much development within the adjacent landscape. Edge effects may include a-seasonal flow, other alterations to the watershed dynamics, increased risk of fire and departure from the traditional fire pattern, and direct mortality due to roads. There is currently little connectivity between the widely dispersed habitat patches as predicted in the species distribution model: only the Fanita Ranch and Magnolia Subunits appear to be connected at any larger landscape level to surrounding western spadefoot habitat or populations.

The greatest risk to western spadefoot survival is twofold, lack of reproduction and adult mortality. The absence of breeding success in any single year at a given pool may be negligible to the long term survival of the species. Western spadefoot are adapted to an arid environment with intermittent and variable rainfall. As long as the adults survive across multiple years, they will have the opportunity to breed in a subsequent year. How long a population of western spadefoot can go without successful breeding is unknown. As long as there are pools to breed in and there are enough adults, the western spadefoot will try again. Without breeding pools, the presence of adults is irrelevant, and without adult western spadefoot, the presence of breeding pools is irrelevant. Between environmental hardship, predators, and foraging, an adult western spadefoot represents a very small proportion of those that started out. Exact survivorship is unknown but explosive breeders like western spadefoot, where 1,000's of offspring are produced at once, typically have a low survivorship. Only a few individuals make it to adulthood to contribute to the next generation. Losing 10, 20, 30, or 100 tadpoles in a year to unnatural causes, as tragic as that might be, would not compare to needlessly losing 10 or 20 breeding adults in a population in a year. Without sufficient breeding sites, a population cannot survive. Without the breeding adults, a population cannot survive.

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Tables

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Table 1. Vegetation types in the Plan Area.

Vegetation Type	Area, ha	Percent
Urban, Disturbed Habitat, Agriculture, Eucalyptus Woodlands	2321.974	54.225%
Coastal Sage Scrub	1118.388	26.118%
Chaparral	335.620	7.838%
Grassland	310.097	7.242%
Water	80.625	1.883%
Riparian Scrub	74.568	1.741%
Riparian Forest	32.058	0.749%
Marsh	6.343	0.148%
Other Woodlands	2.326	0.054%
Riparian Woodland	0.129	0.003%

Table 2. The four shaded sites below are areas within the Plan Area that were modeled as potential western spadefoot habitat. The level of developed and undeveloped habitat within a 5,000 m radius of each site, along with that of USGS pitfall sites in San Diego County, shows that, while development levels are high, western spadefoot do manage to persist.

Site	Undeveloped	Developed	Captures[c]
Chula Vista 1	19.24%	80.76%	0
Rattlesnake Mountain Subunit	27.46%	72.54%	
Torrey Pines 2[a]	39.36%	60.64%	0
Torrey Pines 1[a]	39.93%	60.07%	0
Mission Trail Subunit	40.29%	59.71%	
Torrey Pines 3[a]	41.23%	58.77%	0
Cabrillo National Monumenta	42.65%	57.35%	0
Chula Vista 2	44.49%	55.51%	1
Tijuana Estruary[ab]	45.32%	54.68%	4
Del Mar Mesa	49.01%	50.99%	4
Carmel Mountain	49.34%	50.66%	9
Cowles Mountain	50.17%	49.83%	0
Spring Canyon[b]	54.62%	45.38%	8
Fanita Ranch-Lower Subunit	59.11%	40.89%	
Elliott	63.23%	36.77%	11
San Diego National Wildlife Refuge	69.57%	30.43%	32
Crestridge Ecologial Reserve	81.54%	18.46%	0
Fanita Ranch-Upper Subunit	85.90%	14.10%	
Camp Pendleton-3[a]	90.64%	9.36%	3
Camp Pendleton-1	96.48%	3.52%	19
Wild Animal Park	96.76%	3.24%	44
Camp Pendleton-2	98.29%	1.71%	11
Rancho Jamul ER	98.95%	1.05%	44
Little Cedar Ridge	99.74%	0.26%	0
Marron Valley	99.81%	0.19%	51
Japatul Valley	99.90%	0.10%	0
Santa Ysabel OSP	99.93%	0.07%	2

a - excludes open ocean
b - excludes undescribed land in Mexico
c - raw number of spadefoot captures without any correction for the number of pitfall arrays or sample days

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Table 3. Western spadefoot occurrences within the Plan Area occur on five different soil categories. From the USGS pitfall surveys, western spadefoot have been found on several additional soil categories within San Diego County, many of which are also found in the Plan Area. Western spadefoot occurrence records in the Plan Area are from Dudek (2017).

	USGS Pitfall Site													
Soil Category	Carmel Mountain	Camp Pendleton	Chula Vista 2	Del Mar Mesa	Elliott	Marron Valley	Rancho Jamul ER	Spring Canyon	San Diego National Wildlife Refuge	Santa Ysabel OSP	Tijuana Estruary	Wild Animal Park	Santee Plan Area Spadefoot Occurences	Soil Categories within the Santee Plan Area
Carlsbad gravelly loamy sand	X													
Cieneba coarse sandy loam							X							X
Cieneba rocky coarse sandy loam		X											X	X
Cieneba very rocky coarse sandy loam		X							X					X
Cieneba-Fallbrook rocky sandy loams												X		X
Crouch rocky coarse sandy loam										X				
Diablo clay		X												X
Escondido very fine sandy loam							X							
Fallbrook sandy loam		X							X			X		X
Friant rocky fine sandy loam						X	X		X					X
Hambright gravelly clay loam		X												
Holland stony fine sandy loam										X				
Las Flores loamy fine sand		X												X
Las Posas fine sandy loam							X							
Las Posas stony fine sandy loam							X							X
Linne clay loam								X					x	X
Loamy alluvial land-Huerhuero complex	X													
Olivenhain cobbly loam								X						
Redding cobbly loam					X									X
Redding cobbly loam dissected					X								X	X
Redding gravelly loam	X			X	X								X	X
San Miguel-Exchequer rocky silt loams			X											
Sckpen gravelly clay loam								X						
Terrace escarpments				X							X			X
Tidal flats											X			
Visalia sandy loam							X							X
Vista coarse sandy loam									X			X		X
Wyman loam													X	X

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Figures

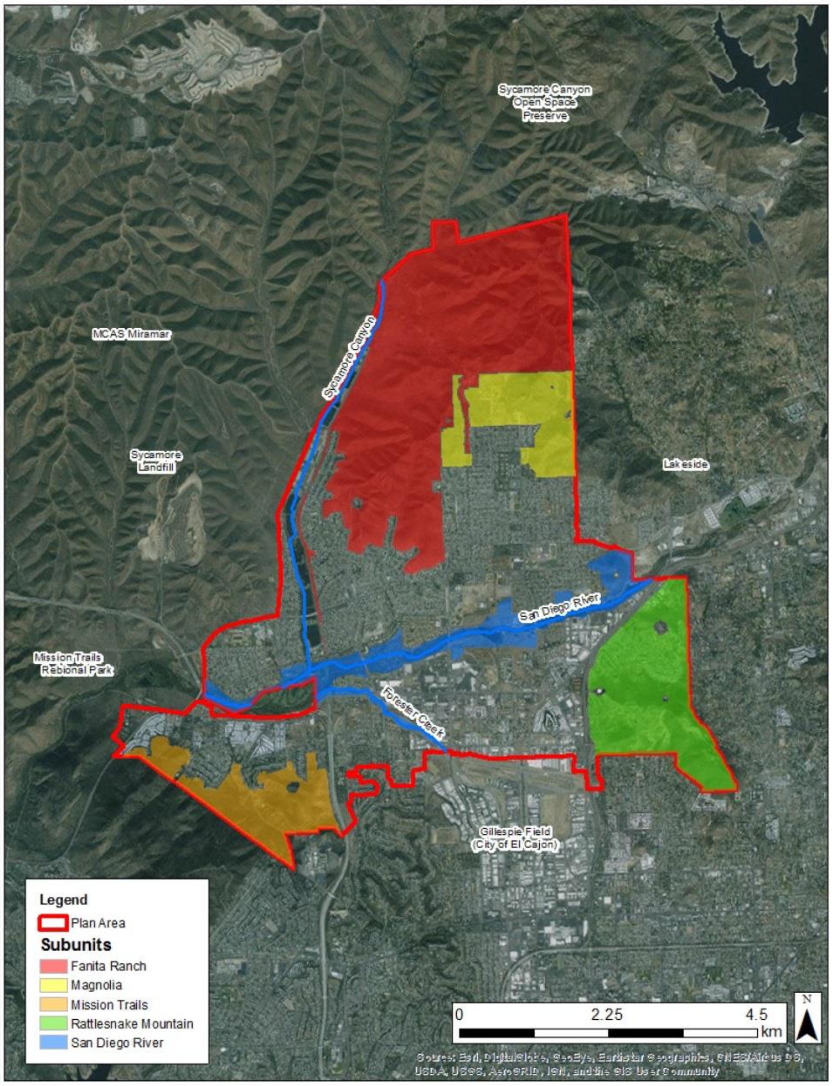

Figure 1. The five subunits within the Plan Area.

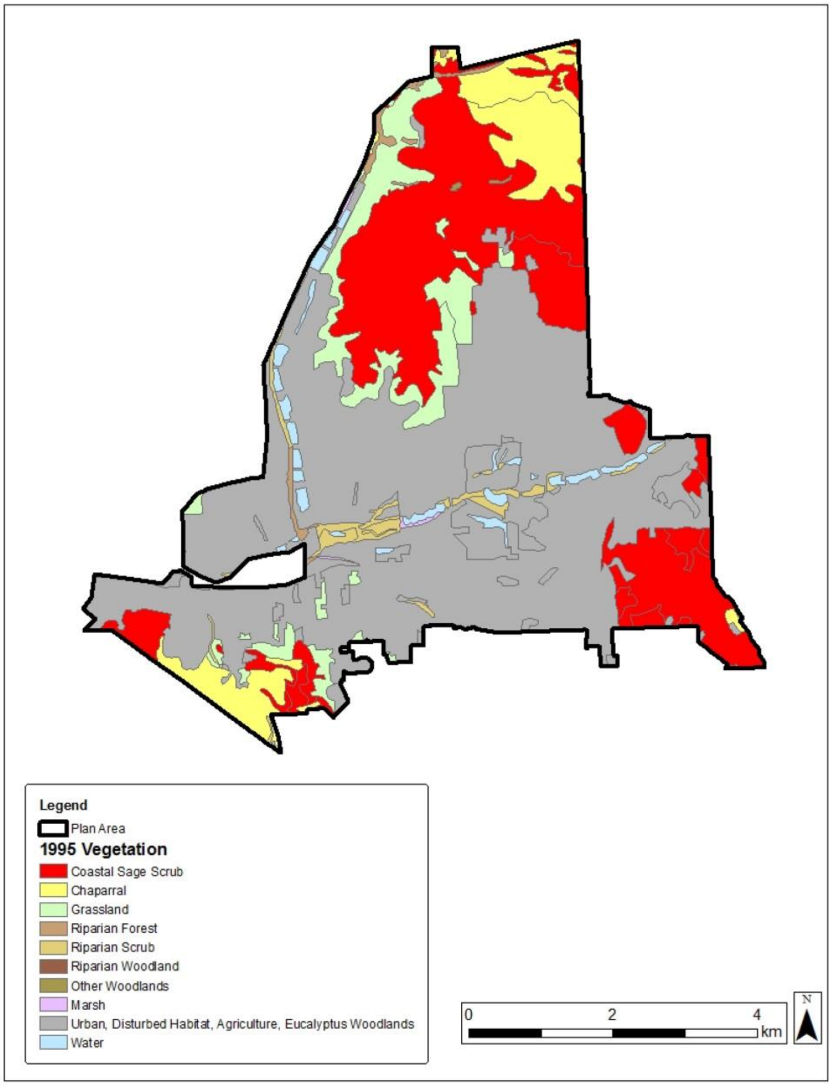

Figure 2. Vegetation within the Plan Area based on 1995 data. The Rattlesnake Mountain Subunit has been developed since this time and is now a mix of urban and coastal sage scrub.

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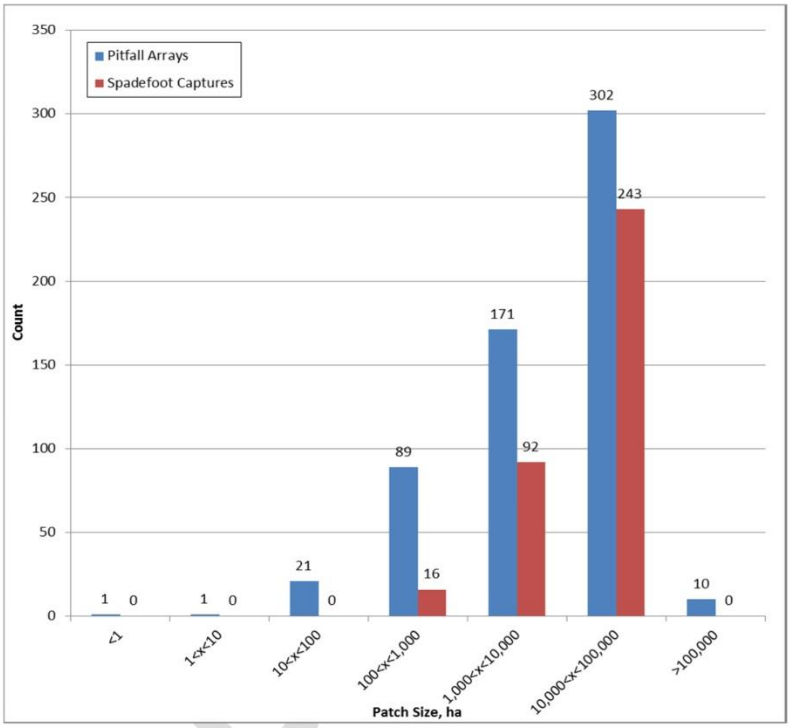

Figure 3. Western spadefoot captures within habitat patches of different sizes and the number of pitfall arrays within each patch size.

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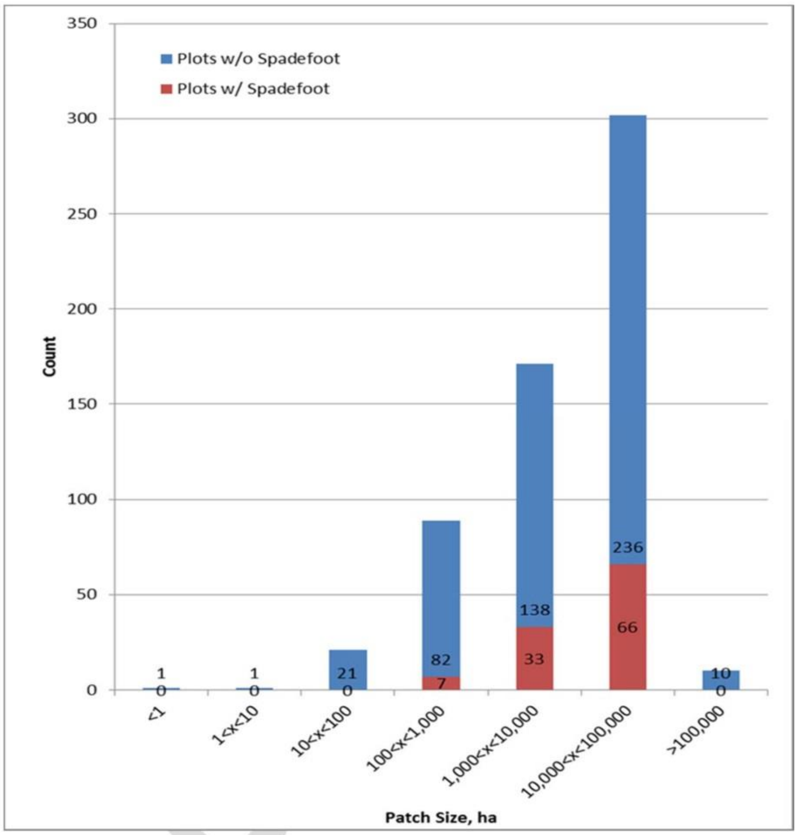

Figure 4. The number of pitfall arrays with and without western spadefoot captures based on patch size.

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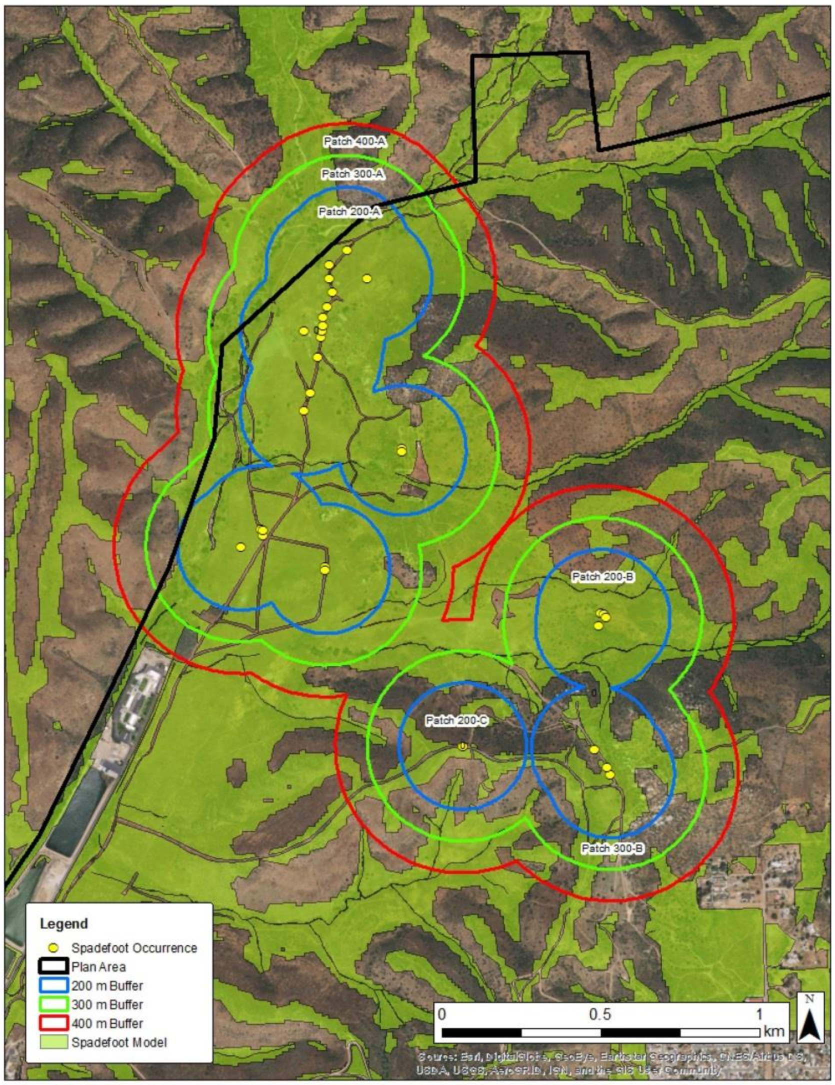

Figure 5. Western spadefoot localities within the Fanita Ranch-Upper Subunit with three levels of buffers: 200 m, 300 m, and 400 m. Western spadefoot occurrence records are from Dudek (2017).

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Figure 6. Western spadefoot locality within the Fanita Ranch-Lower Subunit with three levels of buffers: 200 m, 300 m, and 400 m. Western spadefoot occurrence records are from Dudek (2017).

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