

El Segundo Blue Butterfly
(*Euphilotes battoides allyni*)

5-Year Review:
Summary and Evaluation



Photo by Travis Longcore

U. S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California

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5-YEAR REVIEW
El Segundo Blue Butterfly
(*Euphilotes battoides allyni*)

1. GENERAL INFORMATION

1.1. Reviewers

Lead Region: Diane Elam and Jenness McBride, Region 8, California and Nevada,
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1.2. Methodology used to complete the review:

This review was compiled by Andrew Thompson of the CFWO, U.S. Fish and Wildlife Service (Service or USFWS) and considered available literature, office files, and conversations with several people that have expertise in a variety of subjects relating to conservation of the El Segundo blue butterfly.

1.3. Background:

1.3.1. FR Notice citation announcing initiation of this review:

The notice announcing the initiation of this and other 5-year reviews and opening of the public response period for 60 days was published on February 14, 2007 (72 FR 7064). We did not receive any information from the public specific to the El Segundo blue butterfly, but we did receive one general comment letter supporting continued protection under the Endangered Species Act of all species noticed in this announcement.

1.3.2. Listing history

Original Listing

FR notice: Federal Register 41 FR 22041

Date listed: June 1, 1976

Entity listed: subspecies; El Segundo blue butterfly
(*Euphilotes* (= *Shijimiaeoides*) *battoides allyni*)

Classification: Endangered

1.3.3. Associated rulemakings

No associated rulemaking has occurred for this subspecies.

1.3.4. Review History

No comprehensive status reviews have been conducted for this subspecies.

1.3.5. Species' Recovery Priority Number at start of 5-year review

The species' Recovery Priority Number was reported as a value of "9" in the 2007 Recovery Data Call for the CFWO. This number indicates a moderate degree of threat and a high potential for recovery for a listed subspecies (48 FR 43104).

1.3.6. Recovery Plan or Outline

Name of plan: Recovery Plan for the El Segundo blue butterfly (*Euphilotes battoides allyni*)

Date issued: September 28, 1998

Dates of previous revisions: None

2. REVIEW ANALYSIS

2.1. Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1. Is the species under review a vertebrate?

No. The Endangered Species Act defines species as including any subspecies of fish or wildlife or plants and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as DPSs only to vertebrate species of fish and wildlife. Because the El Segundo blue butterfly is an insect (an invertebrate) and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

2.2. Recovery Criteria

2.2.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes, the final, approved recovery plan lists four factors that need to be accomplished to consider downlisting the El Segundo blue butterfly to threatened status.

2.2.2. Adequacy of recovery criteria.

2.2.2.1. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes. There have been no substantial additions to our understanding of El Segundo blue butterfly biology since the recovery plan was published in 1998.

2.2.2.2. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

Yes. Listing factors A (present or threatened destruction, modification, or curtailment of its habitat or range), B (overutilization for commercial, recreational, scientific, or educational purposes), C (disease or predation), D (inadequacy of existing regulatory mechanisms) and E (other natural or manmade factors affecting its continued existence) are addressed by the recovery plan.

2.2.3. List the recovery criteria as they appear in the recovery plan and discuss how each criterion has or has not been met:

The recovery plan did not establish delisting criteria; however, four criteria were established to determine when the El Segundo blue butterfly can be considered for reclassification to threatened status.

Downlisting Criterion 1

At least one secure population in each of the four Recovery Units (RUs) – Ballona, Airport Dunes, El Segundo, and Torrance – are permanently protected and managed. The population that inhabits the Airport dunes (Napoleon Street and Waterview Street to the north, Vista del mar to the west, Pershing Drive to the east, and Imperial Highway to the south) contains the largest population of the butterfly and is the most likely one to survive disease, predators, parasites and other perturbations. Accordingly, the Airport Dunes must be one of the protected populations.

Downlisting criterion 1 primarily addresses listing factor A (destruction, modification, or curtailment of habitat or range) and D (inadequacy of existing regulatory mechanisms) by identifying permanent protection and management of occupied or potential El Segundo blue butterfly habitat as a conservation priority. As discussed below (see Downlisting criterion 2 and Section 2.3.2.1), there are two main factors that contribute to the destruction and modification of El Segundo blue butterfly habitat. First, urbanization and other anthropogenic development projects can lead to the direct destruction of habitat. Second, competition with plants which are not native to the coastal dunes ecosystem can have a detrimental impact on the El Segundo blue butterfly host plant, *Eriogonum parvifolium* or coast buckwheat.

Criterion 1 has not been met. Recovery units are defined as areas known to be inhabited by the El Segundo blue butterfly or areas that contain restorable habitat for the butterfly (USFWS 1998). The recovery plan identified four recovery units based on geographic proximity, similarity of habitat, and potential genetic exchange: the Ballona recovery unit, the Airport Dunes recovery unit, the El Segundo recovery unit, and the Torrance recovery unit. Protecting and managing at least one El Segundo blue butterfly population in each of the four recovery units is essential to recovery of the butterfly (USFWS 1998).

Potential habitat for the El Segundo blue butterfly in the Ballona recovery unit (Figures 1 and 2) has been permanently protected, but this site is not occupied. The goal of achieving a secure population in this recovery unit may depend on introduction of the El Segundo blue butterfly. Within the Torrance recovery unit (Figures 1 and 5), most of the El Segundo blue butterflies and their habitat are on private property. Although a Safe Harbor Agreement has been initiated that could potentially cover most of these landowners and provide increased protection and management for the El Segundo blue butterfly within the Torrance recovery unit, only one landowner has signed onto the agreement (see Section 2.3.2.4). This owner has allowed the planting and maintenance of native vegetation, including coast buckwheat, on the property. Although protection and management activities of variable intensity have taken place over the past decade within the Airport Dunes and El Segundo recovery units (Figures 1 and 3), there is no binding assurance of permanent protection at either location.

Downlisting Criterion 2

Each of the four populations are managed to maintain coastal dune habitat dominated by local native species including coast buckwheat.

Downlisting criterion 2 addresses listing factor A (present or threatened destruction, modification or curtailment of habitat or range) because active management of El Segundo blue butterfly habitat is required to prevent habitat modification and degradation that leads to loss of host plants critical to El Segundo blue butterfly survival (Mattoni 1990). Downlisting criterion 2 also addresses listing factor C (disease or predation) because nonnative plants have been shown to support insects that directly consume and compete with the El Segundo blue butterfly (Pratt 1987).

The primary focus of El Segundo blue butterfly management is to maintain and enhance populations of coast buckwheat. Management strategies have involved direct outplanting of juvenile coast buckwheat and weeding of vegetation that is not native to the coastal dunes ecosystem (Mattoni 1990; R. Arnold and K. Rose pers. comm. 2007). While downlisting criterion 2 has not been fully met, management activities of varying degrees of intensity have occurred within each of the recovery units as described in Section 2.3.1 of this review.

Downlisting Criterion 3

As determined by a scientifically credible management plan, each of the four populations must exhibit a statistically significant upward trend (based on transect counts) for at least 10 years (approximately 10 butterfly generations). Population management in each Recovery Unit must ensure that discrete population growth rates (λ) are maintained at or above 1.0 (i.e. population sizes increase between subsequent years).

Downlisting criterion 3 addresses listing factor E (other natural or manmade factors affecting its continued existence, including extinction vulnerability due to small population size) by assessing whether conserved populations are of sufficient size to be maintained through time. This criterion has not been achieved as formal,

quantitative surveys using consistent methods have been conducted only at the Airport Preserve within the Airport Dunes recovery unit and at the Chevron Preserve within the El Segundo recovery unit, and only for a maximum duration of 8 years. Within the Ballona and Torrance recovery units only presence/absence surveys have been conducted. Upward trends have been documented at the Chevron Preserve, but not for 10 years.

Downlisting Criterion 4

A program is initiated to inform the public about the El Segundo blue butterfly and its habitat. This program should target each of the following groups: 1) elementary and middle school-age children, 2) high school through adults, 3) land owners and local governments, and 4) insect collectors.

Downlisting criterion 4 addresses listing factor A (present or threatened destruction, modification, or curtailment of habitat or range) by educating the public about the value of natural resources in general and El Segundo blue butterfly habitat in particular. In addition, it deals with factor B (overutilization for commercial, recreational, scientific, or educational purposes) by informing the public about the sensitive nature of the El Segundo blue butterfly.

Downlisting criterion 4 has been partially addressed as a public outreach program has been implemented by the conservation group, The Urban Wildlands Group. This group maintains an informative website (www.urbanwildlands.org/esb.html) that details El Segundo blue butterfly conservation issues and has conducted multiple habitat restoration projects (e.g., Longcore *et al.* 2004). In addition, the conservation group, Rhapsody in Green, opportunistically interacts with elementary schools to educate children about conservation issues including the El Segundo blue butterfly (J. Earle pers. comm. 2007). Overall, however, we are unaware of a systematic effort by any entity to inform each of the targeted groups about El Segundo blue butterfly conservation.

2.3. Updated Information and Current Species Status

2.3.1. Biology and Habitat

There has been no published information about the general species biology or life history requirements of the El Segundo blue butterfly subsequent to 1998 when the recovery plan was issued; however, we provide background information on these topics to provide context for this 5-year review. Updated information on the spatial distribution/taxonomy and abundance/habitat conditions of the El Segundo blue butterfly is also provided.

The El Segundo blue butterfly, in the family Lycaenidae, is part of the insect community of the El Segundo sand dunes ecosystem (Emmel and Emmel 1973). The life cycle of the El Segundo blue butterfly is tied intimately to coast buckwheat (*Eriogonum parviflorum*) as survival of each of its four life stages (egg, larva, pupa, and adult) depend on this plant. The adult stage typically ranges from 4 days to 2

weeks and normally commences in mid June and lasts until early September. Adults consume coast buckwheat pollen and nectar, and mate and lay eggs on coast buckwheat flowers. Eggs hatch within 3 to 5 days, and larvae undergo four instars prior to pupation. During the larval (“caterpillar”) stage, individuals remain concealed within flower heads and feed primarily on coast buckwheat seeds. Upon pupation (change from larval to pupal stage), individuals fall to the ground and remain buried either underground or in the leaf litter at the base of the coast buckwheat until they emerge as adult butterflies. The pupal (“cocoon”) stage lasts for one or more years.

It is important to note that the precise habitat requirements of the El Segundo blue butterfly are not fully understood. Although it is known that the El Segundo blue butterfly depends on coast buckwheat, the range of coast buckwheat is greater than the range of the El Segundo blue butterfly. For example, while coast buckwheat is found throughout the city of Malibu in northwest Los Angeles County, presence of the El Segundo blue butterfly has not been confirmed north of the Ballona recovery unit (Mattoni 1990) (but see *Spatial Distribution/Taxonomy* below). Thus, it is unclear whether the range of the El Segundo blue butterfly is restricted by habitats with high loose sand content within the El Segundo dunes (Mattoni 1990) or if the El Segundo blue butterfly could survive in alternate locations that contain coast buckwheat but do not contain loose sand.

Taxonomy/Spatial Distribution

The final rule listing the El Segundo blue butterfly identified the butterfly as a member of the genus *Shijimiaeoides* (41 FR 22041). Later systematic studies determined this genus to be restricted to northern Asia (Mattoni 1977) and the El Segundo blue butterfly to be one of the five subspecies of *Euphilotes battoides* inhabiting southern California, southern Nevada, Arizona, and northern Mexico (Shields 1975, 1977).

At the time of its listing in 1976, the El Segundo blue butterfly was only known from the Airport Dunes and one small site near El Segundo now known as the Chevron Preserve. By 1998 when the recovery plan was issued, the El Segundo blue butterfly was known to occur in four disjunct locations: the Ballona Wetlands, Airport Dunes, Chevron Preserve, and Malaga Cove (USFWS 1998). The Ballona Wetlands site is no longer occupied.

Dispersal of El Segundo blue butterfly individuals to recently restored bluffs along Torrance and Redondo Beaches north of Malaga Cove (Figure 4) increased the number of known occupied sites in this general area to four sites (Schoch 2007; T. Longcore, pers. comm. 2007). However, due to the proximity of these sites to Malaga Cove, we still consider all four occupied sites as one general location. Similarly, a beach bluff site west of the Airport Preserve at Dockweiler Beach was recently restored and confirmed as occupied in 2007 (Figure 3) (T. Longcore, pers. comm. 2007). Because of the proximity of this site to the Airport Preserve, we are almost certain El Segundo blue butterflies dispersed naturally from the Airport

Preserve to this site. Thus, this Dockweiler Beach site is considered a second occupied site within the general Airport Dunes location. In summary, the El Segundo blue butterfly is extant at seven sites within three disjunct locations: two sites at the Airport Dunes location; the Chevron Preserve, and four sites near or north of Malaga Cove.

The El Segundo blue butterfly was recently reported to occur at two locations recognized neither in the 1976 listing rule nor the 1998 recovery plan: a southern location on the Palos Verdes Peninsula near Point Vicente, Los Angeles County (RBF Consulting 2001; Pratt 2006), and a northern location at Vandenberg Air Force Base in Santa Barbara County (N. Huber pers. comm. 2007; G. Pratt pers. comm. 2007). It is not completely clear in both cases, however, if these individuals are actually the El Segundo blue butterfly or morphologically similar species.

Butterflies that strongly resemble the El Segundo blue butterfly were found at Vandenberg Air Force Base in 2005 by Gordon Pratt and again in 2007 by Gordon Pratt and Dick Arnold (N. Hubert pers. comm. 2007). Based on wing morphology, genital morphology, flight period, and host plant association, these individuals were deemed more similar to the El Segundo blue butterfly than to any other known butterfly taxon (G. Ballmer, J. Emmel, and G. Pratt, pers. comm. 2007). Given the geographic separation between Vandenberg and the El Segundo Dunes [about 124 mi (200 km)] and the relatively limited dispersal capability of the El Segundo blue butterfly [movement of more than 656 feet (ft) (200 meters (m)) is rare; Mattoni 1990], it is possible that the Vandenberg individuals are not actually the El Segundo blue butterfly but rather an undescribed species (J. Emmel pers. comm. 2007). Alternatively, it is possible that this is, in fact, a remnant El Segundo blue butterfly population that was historically connected to a much larger El Segundo blue butterfly population to the south at the El Segundo dunes.

The El Segundo blue butterfly was also reported to occur on hard-packed, sandy cliff faces on the Palos Verdes Peninsula by RBF Consulting (2001) and Pratt (2006). These findings are significant because they potentially represent the first known occurrence of the El Segundo blue butterfly in a habitat lacking loose sand; Mattoni (1990) previously stated that the El Segundo blue butterfly appeared to be limited to coastal sand dune habitats.

There is some question, however, as to the true identity of these butterflies from the Palos Verdes Peninsula because another butterfly subspecies, *Euphilotes bernardino bernardino*, resides in this general area (Mattoni 1990; T. Longcore pers. comm. 2007). The Palos Verdes population of *E. bernardino bernardino* closely resembles the El Segundo blue butterfly (Mattoni 1988), such that it is not possible to distinguish these subspecies in the field (Pratt 2006). Furthermore, these subspecies have an overlapping flight period (Pratt 2006) and use the same host plant, although *E. bernardino bernardino* also associates with two other species of buckwheat, *Eriogonum cinereum* (ashy-leaf buckwheat) and *E. fasciculatum* (common buckwheat).

Despite these characteristics, Pratt stated that he felt certain that these individuals were not *Euphilotes bernardino bernardino* because a nearby stand of ashy-leaf buckwheat did not contain any butterflies (G. Pratt pers. comm. 2007). He postulated that the El Segundo blue butterfly would use coast buckwheat but avoid ashy-leaf buckwheat, whereas *E. bernardino bernardino* would use both species of buckwheat (G. Pratt pers. comm. 2007). RBF Consulting (2001) used similar logic in stating that although ashy-leaf buckwheat was present in proximity to coast buckwheat, the fact that the butterflies were found only on coast buckwheat indicated that they were the El Segundo blue butterfly. Given the significant differences in habitat underlying coast buckwheat in the El Segundo Dunes (loose sand) and the Palos Verdes Peninsula (cliff faces comprised of hard-packed sand), it is possible that the Palos Verdes population is neither the El Segundo blue butterfly nor *E. bernardino bernardino*, but rather an undescribed taxon (G. Pratt pers. comm. 2007). The uncertain taxonomic status of the recently discovered populations both at the Palos Verdes Peninsula and the Vandenberg Air Force Base makes it impossible to assess whether the current distribution of the El Segundo blue butterfly is different from the range stated in the recovery plan.

Clarifying the taxonomic status of these populations will take a determined effort as *Euphilotes* is a diverse genus with known cryptic speciation (*i.e.*, some species are very similar morphologically) (Mattoni 1988). Furthermore, morphological characteristics are often plastic (capable of adapting to conditions during growth or development) within a species of *Euphilotes*, and features such as the markings on wings can overlap among *Euphilotes* species (Pratt and Emmel 1998). In addition, although the use of different species of buckwheats as a host plant is sometimes used to characterize species, some *Euphilotes* species are known to use multiple host plants (Mattoni 1988; Pratt and Emmel 1998). Finally, it is also known that butterflies in the genus *Euphilotes* can be very similar morphologically yet significantly different genetically (Mattoni 1988; Pratt 1994; G. Pratt pers. comm. 2007). As such, future taxonomic research will likely need to combine morphological, ecological, and genetic analyses. In particular, it will be necessary to compare genetic signatures among the potential El Segundo blue butterflies from Vandenberg Air Force Base and the Palos Verdes Peninsula with known El Segundo blue butterflies from the El Segundo dunes. A study has been initiated to compare genetic signatures between butterflies from Vandenberg Air Force Base and the El Segundo dunes (N. Hubert pers. comm. 2007).

Abundance/Habitat Conditions

The range of the El Segundo blue butterfly has increased since the time of listing (*i.e.*, the butterfly is known from seven sites at three locations rather than just two sites), but survey efforts at the known occupied sites have not been consistently applied. Only presence/absence surveys are available at the sites discovered since listing. At the two sites known since listing, the small, Chevron Preserve and the larger Airport Preserve, quantitative methods have been used to estimate population densities. However, these methods are either not comparable or their accuracy is unclear (See Airport Dunes Recovery Unit below). Thus, there are insufficient data to determine

overall population trends for the El Segundo blue butterfly since the subspecies was listed in 1976. Despite this, there is an apparent increasing trend in El Segundo blue butterfly numbers at the Chevron Preserve (See El Segundo Recovery Unit below).

As indicated above, it is not clear whether the range of the El Segundo blue butterfly is restricted by habitats with high loose sand content within the El Segundo dunes (Mattoni 1990) or if the El Segundo blue butterfly can survive in other locations containing coast buckwheat without loose sand. However, there is recognition that overall habitat conditions for the El Segundo blue butterfly are greatly affected by the density of nonnative vegetation at occupied and restorable sites. Relatively fast-growing introduced plants such as acacia (*Acacia* spp.), iceplant (*Carprobrotus* spp.), and nonnative grasses compete with the El Segundo blue butterfly's host plant, coast buckwheat, by curtailing the sprouting of seedlings and maturation of juveniles (Mattoni 1990; K. Rose pers. comm. 2007; R. Arnold pers. comm. 2007). To address this issue, some level of management has occurred at the two continuously occupied sites known since the El Segundo blue butterfly was listed, the Airport Dunes and the Chevron Preserve. In addition, restoration actions have improved habitat conditions in the general area between Malaga Cove and Redondo Beach (Figure 4) and along beach bluffs in Dockweiler Beach directly west of the Airport Preserve (Figure 3). The El Segundo blue butterfly dispersed to and occupied these restored sites in 2007.

In the 1998 recovery plan, the four known locations of the El Segundo blue butterfly at that time and areas containing restorable habitat for the El Segundo blue butterfly were grouped into four recovery units based on proximity, similarity of habitat, and potential genetic exchange (USFWS 1998). However, textual description of some boundaries shown in the final recovery plan conflicted with the delineations illustrated in the figures (*e.g.*, Airport Dunes recovery unit), and other identified boundaries separated contiguous parcels of potential habitat for no apparent reason (*e.g.*, the boundary between the Airport Dunes and Ballona recovery units). As such, we have clarified the recovery unit boundaries in this 5-year review to make them consistent with the stated intent of the recovery plan to group the units based on proximity of occupied sites and restorable habitat, similarity of habitat, and potential genetic exchange. Updated information on management actions, habitat conditions, and survey efforts and general abundance trends for the El Segundo blue butterfly at specific sites within each of these clearly defined recovery units is provided below.

Ballona Recovery Unit

The Ballona recovery unit is constrained by Washington Boulevard to the north, Pacific Coast Highway to the east, Manchester Avenue to the south and the Pacific Ocean to the west. This recovery unit includes restored El Segundo blue butterfly habitat at the Ballona Wetlands and additional restorable habitat at the Ballona Lagoon and Toes Beach (Figure 2). In 1985 an individual El Segundo blue butterfly was seen in the Ballona Wetland (Mattoni 1990), and over the past 10 years approximately 200 juvenile coast buckwheat plants have been planted on a 6-acre (ac) (2.4-hectare (ha)) dune at its western edge (Ballona Wetland Dune in Figure 2) (K. Rose pers. comm. 2007; Phillip Williams & Associates 2006). We are not aware of

any El Segundo blue butterfly-related management activities or surveys conducted during the past decade within the Ballona Lagoon (T. Longcore pers. comm. 2007) or along Toes Beach.

It is estimated that approximately 70 percent of the outplanted juvenile coast buckwheat at the Ballona Wetland Dune survived to maturation and that their lives spanned 5-7 years (K. Rose pers. comm. 2007). Despite the presence of coast buckwheat, surveys in 2000 indicated that the El Segundo blue butterfly is not found in the Ballona Wetlands (Psomas 2001; Psomas and Lockhart 2001). Moreover, since the subspecies has not been found in the Ballona recovery unit at any point subsequent to the 1985 observation (Mattoni 1990; Psomas 2001; T. Longcore pers. comm. 2007; R. Arnold pers. comm. 2007), it is now considered extirpated from this recovery unit.

Airport Dunes Recovery Unit

The Airport Dunes recovery unit is bound by Manchester Avenue to the north, a straight line between the intersection of Manchester Avenue and Stanmoor Drive south to the intersection of Main Street and Imperial Highway to the east, Imperial Highway to the south, and the Pacific Ocean to the west. This region includes the entire Airport Dunes area (bound by Waterview and Napoleon Avenues to the north, Vista del Mar to the west, Pershing Drive to the east, and Imperial Highway to the south) and beach bluffs along Dockweiler Beach (Figure 3).

Significant restoration work was conducted within the Airport Dunes Recovery Unit at the Airport Preserve between 1986 and 1994 under the direction of Rudi Mattoni (Mattoni *et al.* 2000). This effort included removal of vegetation that is not native to the coastal dunes ecosystem and planting of native vegetation including coast buckwheat. We are unaware of any El Segundo blue butterfly-related management activities or surveys conducted during the past decade at the Airport Dunes outside of the Airport Preserve.

Standardized El Segundo blue butterfly surveys were conducted annually within the Airport Preserve between 1984 and 1994 by Mattoni *et al.* (2001) and subsequent to 1999 by Arnold (2000a, 2001a, 2002a, 2003a, 2004a, 2005; R. Arnold pers. comm. 2007). Analyses within each period show that butterfly populations fluctuated annually, and estimated population sizes increased in 4 of 9 sequential years between 1984 and 1994 (Mattoni *et al.* 2001) and 5 of 7 years between 1999 and 2006 (Figure 4A; Arnold 2005; R. Arnold pers. comm. 2007).

Moreover, because different methods were used to estimate El Segundo blue butterfly population size within these two periods, it is not possible to compare abundances between periods or to use this information to assess trends in El Segundo blue butterfly population numbers. Although both methods extrapolate total population size from transect counts, survey frequency, and transect location and use an extrapolation formula, each of these measures vary between the two techniques (Mattoni *et al.* 2001).

There is concern that the post-1999 method (*e.g.*, Arnold 2000a) that is currently used to estimate densities in both the Airport and Chevron preserves overestimates population sizes by approximately an order of magnitude (T. Longcore pers. comm. 2007). Given that major restoration efforts on the Airport Preserve ceased in 1994 (Mattoni *et al.* 2000) and that habitat has apparently degraded in recent years (Arnold 2005), we believe the greater population estimates in recent years likely do not depict a significant increase in population numbers but rather reflect methodological differences between the two estimation techniques. The earlier method used between 1984 and 1999 relies on well-established techniques that have been evaluated in peer-reviewed, scientific journals (Mattoni *et al.* 2001). However, until the efficacy of the newer method used between 1999 and 2006 is evaluated, it will be necessary to cautiously interpret estimates of El Segundo blue butterfly densities generated with this technique.

Outside of the Airport Dunes within this recovery unit, a 0.7-ac (0.28-ha) bluff along Dockweiler Beach west of the Airport Preserve was recently restored with native vegetation, including coast buckwheat. A presence-absence survey in 2007 documented that the El Segundo blue butterfly was present at this site (T. Longcore pers. comm. 2007) (Figure 3).

El Segundo Recovery Unit

The El Segundo recovery unit is bound by Imperial Highway to the north, Pacific Coast Highway to the east, Herondo Street to the south, and the Pacific Ocean to the west (Figure 3). The El Segundo recovery unit includes 1) occupied habitat at a 1.6-ac (0.65-ha) remnant sand dune (Chevron Preserve) owned by the Chevron Corporation at its refinery location in the City of El Segundo (USFWS 1998); 2) an approximately 30-ac (12-ha) area of restorable El Segundo blue butterfly habitat known as the “Scattergood Dune,” which is owned by the Los Angeles Department of Water and Power (LADWP) and abuts the southeast portion of the Airport Preserve and extends southward to within approximately 1,312 ft (400 m) of the Chevron Preserve; and 3) restorable beach bluff habitat along portions of Dockweiler and Manhattan Beaches (Figure 3).

The Chevron Preserve is the only currently known occupied site within this recovery unit, and although there is no formal management strategy for this site, Chevron is implementing management actions for the El Segundo blue butterfly (R. Arnold pers. comm. 2007). Recent management activities include extensive planting of coast buckwheat. Specifically, 500 coast buckwheat plants were outplanted annually between 2000-2003, and 1,000 plants were outplanted each year between 2004-2006 (Arnold 2000b, 2001b, 2002b, 2003b, 2004b; R. Arnold pers. comm. 2007). In addition, these management efforts included regular removal of vegetation that is not native to the coastal dunes ecosystem (R. Arnold pers. comm. 2007).

The Chevron Preserve was surveyed using consistent, quantifiable methods by Arnold annually between 1998 and 2006 (Arnold 1998, 2000b, 2001b, 2002b, 2003b,

2004b; R. Arnold pers. comm. 2007). El Segundo blue butterfly abundance fluctuated annually, and estimated population sizes increased in 4 of 7 years indicating an apparent increasing trend in El Segundo blue butterfly numbers. The management actions implemented by Chevron have likely contributed to this apparent increase in El Segundo blue butterfly abundance at this site over this 8-year period.

We know of only one other management action in this recovery unit that has occurred since issuance of the recovery plan. In 2002, an approximately 0.1-ac (0.04-ha) portion of a bluff located between the western terminus of 26th Street and 27th Street in the City of Manhattan Beach was planted with native vegetation including coast buckwheat, but this site does not support the El Segundo blue butterfly (T. Longcore pers. comm. 2007) (Figure 3). Because the site is separated from the nearest known El Segundo blue butterfly population at the Chevron Preserve by 1.6 mi (2.6 km) of dense urban development, the El Segundo blue butterfly is unlikely to naturally colonize this location (T. Longcore pers. comm. 2007).

Finally, the 1998 recovery plan noted that a single El Segundo blue butterfly was observed in the 1980's at what is now known as the Scattergood Dune (USFWS 1998; Mattoni 1990). The recovery plan also discussed the extensive planting of nonnative vegetation at this site in 1995. We are not aware of any additional confirmed sightings of El Segundo blue butterflies at the Scattergood Dune, and since the area is now landscaped, it is not likely that suitable host plants exist to support the El Segundo blue butterfly. Thus, the best available information indicates that this site is not currently occupied.

Torrance Recovery Unit

The Torrance recovery unit is bound by Herondo Street to the North, a straight line extending north from the intersection of Via del Monte and Granvia Altamira within the City of Palos Verdes Estates to the intersection of Pacific Coast Highway and Palos Verdes Boulevard then north along Pacific Coast Highway to the intersection of Pacific Coast Highway and Herondo Street to the east, a line extending directly west from the intersection of Via del Monte and Gravina Altamira to the Pacific Ocean to the south, and the Pacific Ocean to the east. The Torrance recovery unit includes publicly and privately owned parcels of unoccupied restorable and currently occupied habitat along the beach bluffs that run from Malaga Cove north through Redondo Beach (Figure 4). Four individual sites at this location are known to be occupied, but none of these sites are permanently protected, and existing surveys are not sufficient to evaluate El Segundo blue butterfly abundance trends.

Re-vegetation projects conducted in 2003 and 2004 by The Urban Wildlands Group, the non-profit organization that is administering a Safe Harbor Agreement (see Section 2.3.2.4), planted native vegetation including coast buckwheat on 0.7-ac (0.28-ha) and 3.25-ac (1.32-ha) bluffs within this recovery unit (Longcore *et al.* 2004; T. Longcore pers. comm. 2007) (Figure 4). The El Segundo blue butterfly was seen for the first time at these restored bluffs in 2007 (T. Longcore pers. comm. 2007).

Habitat between the recently colonized, previously occupied, and the Safe Harbor Agreement site consists largely of beach bluffs that are landscaped with ice plant.

2.3.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

At the time of listing in 1976, only habitat destruction (Factor A) and inadequacy of existing regulatory mechanisms (Factor D) were identified as threats to the El Segundo blue butterfly. The recovery plan, which was issued in 1998, identified additional threats to the subspecies from habitat modification (Factor A) and over-utilization for commercial purposes (Factor B). We now identify two new threats not discussed in the recovery plan: predation (Factor C) and extinction vulnerability due to small population sizes and isolation (Factor E). While not expressly identified at the time the recovery strategy for the El Segundo blue butterfly was developed, these two new threats are adequately addressed by the existing recovery criteria.

2.3.2.1. Factor A, Present or Threatened Destruction, Modification or Curtailment of Its Habitat or Range:

Habitat Loss

We estimate that the historical range of the El Segundo blue butterfly extended over much of the El Segundo sand dunes, which encompassed approximately 3,200 ac (1,295 ha) generally from the City of Westchester to the Palos Verdes Peninsula, Los Angeles County, California (Mattoni 1990; USFWS 1998). At the time of the El Segundo blue butterfly's listing in 1976, public and private development had significantly reduced potential El Segundo blue butterfly habitat, and only the Airport Dunes and the site now known as the Chevron Preserve were known to be occupied (41 FR 22041). These two sites included only about 320 ac (129 ha) of El Segundo blue butterfly habitat, which represented an estimated reduction in habitat of approximately 90 percent.

The range of the El Segundo blue butterfly is greater than was recognized in 1976, as this butterfly is now known to occur in the Torrance recovery unit, specifically on beach bluffs between Malaga Cove and Redondo Beach. Also, an individual El Segundo blue butterfly was identified in the Ballona Wetlands subsequent to listing; however, assuming an El Segundo blue butterfly population existed there at one time, it is now apparently extinct.

There has not been a substantial amount of additional development of El Segundo blue butterfly habitat since 1976, so the amount of El Segundo blue butterfly habitat (occupied plus restorable) is most likely similar at present to the amount in 1976. Using updated Geographic Information System (GIS) methods, we now estimate the remaining El Segundo blue butterfly habitat at approximately 451 ac (182 ha), which represents a slight, though still significant, reduction from what was known at the time of listing (*i.e.*, 86 percent of historical habitat lost as opposed to about 90 percent).

Restorable (*i.e.*, dune or bluff habitat requiring outplanting of host plant) and occupied habitat has been identified within each of the four recovery units (Figure 1). The threat of future habitat loss and to what degree this threat has been addressed by conservation actions is discussed below by recovery unit.

Ballona Recovery Unit

The potential for habitat loss within this unit has been partially addressed as the Ballona Wetlands were acquired by the State of California in 2004 and designated as a State Ecology Reserve (J. Liebster pers. comm. 2007; Phillip Williamson and Associates, Ltd. 2006). The State is currently preparing a management plan for the Ballona Wetlands that will address the El Segundo blue butterfly and other species native to this ecosystem (California Coastal Conservancy on-line report; J. Liebster pers. comm. 2007). Though this site is not occupied by the El Segundo blue butterfly, management by the conservation group Friends of Ballona Wetlands has produced an increase in coast buckwheat on the Ballona Wetlands Dune over the past decade (K. Rose pers. comm. 2007).

The Ballona Lagoon, and its associated restorable habitat for the El Segundo blue butterfly, is owned by the City of Los Angeles. Although we know of no current development threat to this area, it is not subject to any specific protection or management relating to the El Segundo blue butterfly (T. Longcore pers. comm. 2007).

Toes Beach, which contains potentially restorable El Segundo blue butterfly habitat (Figure 2), is threatened by a proposed development project. Much of this habitat was purchased by a developer in August 2004 and slated for mixed commercial and residential development (Echavaria 2004a, b). This proposal was met with opposition by local residents and environmental groups, and the developer has agreed to prepare an Environmental Impact Report to fully analyze impacts of this project to the local environment (Save Our Dunes on-line report).

Airport Dunes Recovery Unit

Within this recovery unit, Los Angeles World Airports manages the 202.8-ac (82.1-ha) Airport Preserve under a 1992 City of Los Angeles Ordinance (No. 167,940). This same ordinance proposed that the approximately 104.3-ac (42.2-ha) area north of the Airport Preserve be converted into a golf course. The golf course portion of the proposal was amended in a subsequent 1994 Los Angeles City Ordinance (No. 169,767) that stated, in part, that no development is to take place in the Airport Preserve and that only a nature preserve and accessory structures are allowed to be constructed in the northern 104.3-ac (42.2-ha) area of the Airport Dunes region. Despite this amendment, Los Angeles World Airports proposed to convert this northern area of the Airport Dunes into a golf course in 2001 (Rich 2003).

In response to the 2001 proposal, the California Coastal Commission designated the northern area of the Airport Dunes an “Environmentally Sensitive Habitat Area” under Chapter 3, Article 5, Section 30240 of the California Coastal Act and determined that construction of a golf course would be inconsistent with this designation. At present, this area still remains largely undeveloped, but no El Segundo blue butterfly-related management activities take place in this northern area, which is outside of the Airport Preserve proper.

The City of Los Angeles Ordinances (Nos. 167,940 and 169,767) prohibit development within the Airport Preserve, and Los Angeles World Airports conducts limited weeding of nonnative vegetation and El Segundo blue butterfly surveys; however, there is neither a formal guarantee that this area will be conserved into perpetuity nor is there binding assurance that management will continue in the future (A. Huang pers. comm. 2007).

We are aware of two projects that negatively impacted restorable El Segundo blue butterfly habitat in this recovery unit since issuance of the recovery plan in 1998. In 1999, Los Angeles World Airports planted 90 nonnative palm trees on the northern perimeter of the Airport Dunes. This action was challenged by the Urban Wildlands Group, and the California Coastal Commission judged in 2002 that Los Angeles World Airports had to remove the trees and replant the area with native vegetation. Los Angeles World Airports removed the palm trees between 2005 and 2006 but did not include coast buckwheat in the native re-vegetation project (T. Longcore pers. comm. 2007).

At present, Los Angeles World Airports, the management entity of the Airport Preserve, does not adhere to a specific management plan. Los Angeles World Airports does, however, conduct limited weeding of vegetation that is not native to the coastal dunes ecosystem within the Airport Preserve and sponsors population monitoring at this location (A. Huang pers. comm. 2007; R. Arnold pers. comm. 2007).

Beach bluffs located west of the Airport Preserve are primarily landscaped with nonnative vegetation, with the exception of the small area of bluff that was recently revegetated with coast buckwheat and other native vegetation (Figure 3). The El Segundo blue butterfly was observed in this restored area in 2007 (T. Longcore pers. comm. 2007). Again, while no immediate development threat to these areas has been identified, there is no guarantee for long-term management or any conservation status for these lands.

El Segundo Recovery Unit

As a measure of their commitment to land stewardship, the Chevron Corporation has exhibited a serious commitment to El Segundo blue butterfly conservation at the Chevron Preserve over the past decade. The site is fenced to prevent public access, and there are clearly-posted signs explaining the sensitive nature of this habitat. Chevron also funds annual El Segundo blue butterfly surveys,

outplanting of coast buckwheat, and weeding of vegetation that is not native to the coastal dunes ecosystem. As such, there is currently no apparent threat of development, and the El Segundo blue butterfly population has grown between 1998 and 2005 at this site. This location, however, is not protected through a conservation easement or other strategy that would preclude potential future development, and there are no assurances for perpetual management of the site (R. Arnold pers. comm. 2007).

The only El Segundo blue butterfly-relevant action relating to the Scattergood Dune that took place during the past decade is that the California Coastal Commission recently amended the California Coastal Act to exclude the Scattergood Dune from its jurisdiction (Section 30166 of the 2007 California Coastal Act). While there is no immediate identified threat of development, there is also no assurance of long-term habitat protection for this area. If this area were to be restored, it would provide significant additional habitat for the El Segundo blue butterfly and could provide an important habitat connection between the small Chevron Preserve to the south and the larger Airport Preserve to the north. It is likely that the El Segundo blue butterfly would recolonize a restored Scattergood Dune by moving into this site from both the Airport and Chevron Preserves. Scattergood Dune is separated from the Airport Preserve only by Imperial Highway and from the Chevron Preserve by partially undeveloped land (Figure 3). Recolonization of restored sites in the Airport and Torrance recovery units in 2007 (see section 2.3.1 above) demonstrates that the El Segundo blue butterfly is capable of moving across a street similar in width to Imperial Highway (Vista del Mar, which separates the Airport Preserve from the restored bluff on Dockweiler Beach; Figure 3) and can traverse a distance of at least 1,000 ft (305 m) across partially undeveloped land to reach restored habitat.

Because of their location in the coastal zone, it is not likely that the potentially restorable beach bluffs along Dockweiler and Manhattan Beaches will be developed (Figure 3).

Torrance Recovery Unit

Because the occupied and potentially restorable sites within the Torrance recovery unit occur mostly on the base of steep bluffs, the threat of development is likely minimal. Erosion, by contrast, may threaten El Segundo blue butterfly habitat. The recovery plan states that erosion control activities in 1994 and 1995 resulted in the loss of coast buckwheat from this area (USFWS 1998).

The owners of a private residence in this recovery unit signed a Safe Harbor Agreement with the Service on February 5, 2007, that allows for the planting and maintenance of native vegetation including coast buckwheat on 0.167 ac (0.07 ha) of their property (Figure 4). A condition of the Safe Harbor Agreement is that the owner must maintain restored El Segundo blue butterfly habitat for at least 13 years after it becomes suitable for El Segundo blue butterfly occupancy. Currently, neither coast buckwheat nor the El Segundo blue butterfly is present on

this property (T. Longcore pers. comm. 2007). Both coast buckwheat and the El Segundo blue butterfly, however, were found within 98 ft (30 m) of the Safe Harbor Agreement site in 2001 (T. Longcore pers. comm. 2006). Hence, there is a high probability that the El Segundo blue butterfly will naturally colonize the Safe Harbor Agreement site subsequent to the establishment of coast buckwheat.

Habitat Modification

While the listing rule did not address habitat modification as apart from habitat destruction, the recovery plan identifies this factor as a major threat to the El Segundo blue butterfly. The primary habitat-altering activity identified in the recovery plan is the presence of plants that are not native to the coastal dunes ecosystem that compete with the host plant of the El Segundo blue butterfly, coast buckwheat. Plants that are not native to the coastal dunes ecosystem that threaten coastal buckwheat are, in part, common buckwheat (*Eriogonum fasciculatum*), pampas grass (*Cortaderia selloana*), Myoporum (*Myoporum* sp.), two *Acacia* species, and two species of iceplant.

Vegetation that is nonnative to the coastal dunes ecosystem threatens the El Segundo blue butterfly through multiple mechanisms. First, these exotic plants impede coast buckwheat recruitment by competing for space and nutrients (Arnold 2005). Second, nonnative vegetation, such as the common buckwheat that was introduced to the Airport Dunes through a landscaping project in 1975, harbor insects that are detrimental to the El Segundo blue butterfly (Pratt 1987; Longcore *et al.* 1997). These insects have the potential to increase parasite loads in the El Segundo blue butterfly, compete with the El Segundo blue butterfly for resources, and directly consume larval El Segundo blue butterflies (Pratt 1987).

There is concern that existing management efforts are not sufficient to ensure long-term coast buckwheat persistence within the Airport Preserve (Arnold 2005; R. Arnold pers. comm. 2007). A large proportion of the coast buckwheat within the Airport Preserve is currently becoming senescent, and recruitment is hindered by encroaching vegetation that is not native to the coastal dunes ecosystem (Arnold 2005; R. Arnold pers. comm. 2007). For example, at the Airport Preserve the number of mature coast buckwheat counted on a transect fell from 518 in 2002 to 434 in 2005, and the number of senescent individuals increased from 138 to 184 during this time (Arnold 2005). Arnold (2005) stated that this reduction in numbers of mature plants was caused by the inability of recruits (seedlings) to replace senescent plants due to competition for space with nonnative vegetation. By contrast, at the Chevron Preserve the number of mature coast buckwheat increased and the number of senescent individuals decreased between 2002 and 2004, where management was more intense relative to the Airport Preserve (R. Arnold pers. comm. 2007).

Currently, Los Angeles World Airports has no plans to actively plant coast buckwheat (A. Huang pers. comm. 2007). In addition, because the Airport Preserve is directly beneath the flight path of airplanes taking off from the airport,

Los Angeles World Airports managers have expressed reservation about maintaining vegetation in the preserve. Specifically, they are concerned that plants such as coast buckwheat attract birds that present a safety hazard by colliding with airplanes (A. Huang pers. comm. 2007). Thus, modification of occupied habitat due to lack of management to sustain suitable host plant represents a primary threat to the El Segundo blue butterfly.

In addition to the impact of nonnative vegetation, the recovery plan also identifies off-road vehicle trespass and foot traffic as factors that may degrade and modify El Segundo blue butterfly habitat (USFWS 1998). The recovery plan states that, at the Airport Dunes, off-road vehicles in the late 1980's and foot traffic in 1997 damaged El Segundo blue butterfly habitat. Although we have no information documenting the extent of these activities, heightened security at the Airport Preserve subsequent to September 2001 likely has alleviated the threat of trespass at this site (R. Arnold pers. comm. 2007). Illegal trash dumping, trespass, and off road vehicles all pose a potential threat to coast buckwheat at the Ballona Wetlands (Phillip Williamson and Associates, Ltd. 2006).

Summary of Factor A Analysis

Historically, approximately 3,200 ac (1,295 ha) of El Segundo blue butterfly habitat was found in Southern California. At present, we estimate that habitat available for El Segundo blue butterfly conservation and restoration is limited to about 451 ac (182 ha) or 14 percent of this historical habitat. Although no significant loss of El Segundo blue butterfly-occupied habitat has occurred since the subspecies was listed in 1976, El Segundo blue butterfly distribution is still severely restricted with the subspecies existing at only three disjunct locations. While these locations include 7 occupied sites, they total less than 220 ac (89 ha), with only one site, the Airport Preserve, supporting the majority of this acreage (*i.e.*, 202.8 ac (82.1 ha)).

None of the occupied sites are protected through permanent conservation easements or other perpetual conservation strategies. Likewise, while some management has been implemented, particularly at the Chevron Preserve, none of the occupied sites have long-term, binding commitments or funding for management. Because a major threat to the El Segundo blue butterfly is loss of its host plant due to competition with vegetation that is not native to the coastal dunes ecosystem, parcels not threatened directly by development are still likely to become degraded if not actively managed. Thus, while progress has been made at reducing the threat of habitat loss and modification, and the number of occupied sites has increased since listing, these factors still threaten El Segundo blue butterfly survival and recovery.

2.3.2.2. Factor B, Overutilization for Commercial, Recreational, Scientific, or Educational Purposes:

The final rule listing the El Segundo blue butterfly did not identify this factor as a threat to the subspecies. However, the recovery plan identified one felony charge in 1995 where three poachers pleaded guilty to collecting and trafficking of protected butterflies, including the El Segundo blue butterfly (USFWS 1998). We are unaware of any further impacts to the El Segundo blue butterfly from collectors. As a result of its 1976 listing, we control and monitor El Segundo blue butterfly research through the issuance of Endangered Species Act section 10(a)(1)(A) recovery permits, thereby minimizing potential detrimental impacts from scientific or educational endeavors. Finally, the impacts of recreation are likely minor as all of the known occupied sites are closed to the public. The sites harboring blue butterflies at Vandenberg Air Force Base and the Palos Verdes Peninsula that may be the El Segundo blue butterfly are also probably not impacted by recreation. Vandenberg Air Force Base is closed to the public, and the butterflies on the Palos Verdes Peninsula are mostly found on steep cliff faces (Pratt 2006). Thus, we no longer consider this factor a threat to the El Segundo blue butterfly.

2.3.2.3. Factor C, Disease or Predation

Neither the final listing rule nor the recovery plan identified disease or predation as a threat to the El Segundo blue butterfly. Disease is still not known to substantially impact the subspecies. However, predators, parasites, and insect competitors associated with vegetation that is not native to the coastal dunes ecosystem are believed to negatively impact the El Segundo blue butterfly at the Airport Preserve (Pratt 1987).

Specifically, some moth species (*e.g.*, *Lorita scarifica*, *Aroga* sp.) use common buckwheat as well as the El Segundo blue butterfly's host plant, coast buckwheat. Whereas coast buckwheat is native to the El Segundo dunes, common buckwheat was introduced by humans to the Airport Preserve in 1975 as part of a landscaping project (Mattoni 1990; Longcore *et al.* 1997). Because common buckwheat blooms earlier than coast buckwheat, moths associated with common buckwheat develop earlier than the El Segundo blue butterfly and may prey on El Segundo blue butterfly larvae (Pratt 1987). In addition to directly consuming larval El Segundo blue butterflies, Pratt (1987) hypothesized that these moths compete for resources with the El Segundo blue butterfly and enhance its parasite loads.

Pratt's (1987) study found that parasite loads on El Segundo blue butterfly larvae decreased after common buckwheat was removed from parts of the Airport Preserve. We are not aware of any other studies documenting the impact of other insects on El Segundo blue butterfly population dynamics. Since common buckwheat is still found within the Airport Preserve (R. Arnold pers. comm. 2007), the potential impact of insects associated with vegetation not native to the

coastal dunes ecosystem has not been fully alleviated at the Airport Preserve. Thus, predation, enhanced by the presence of nonnative vegetation, is now recognized as a new threat to the El Segundo blue butterfly not known at the time of listing or issuance of the recovery plan.

2.3.2.4. Factor D, Inadequacy of existing regulatory mechanisms:

City Ordinances

The City of Los Angeles has implemented at least two land-use ordinances that relate directly to conservation of the El Segundo blue butterfly. First, Ordinance No. 167,940, effective on June 28, 1992, designated various uses to the land within the 307.1-ac (124-ha) Airport Dune area (Figure 3). Among these assignments were that the southern 202.8 ac (82.1 ha) would become a “Dunes Habitat Preserve,” the northern 102.3 ac (41.4 ha) would become a golf course, and 2 ac (0.8 ha) on the western boundary of the preserve and golf course would become a park. This ordinance also stated that “the preserve...shall be restored as reasonably feasible to natural state for the express purpose of providing a permanent preserve for dune-dependent species” (Section 3, Part A). Another important portion of this ordinance stated that the safety of airport flight operations would supersede any of the activities detailed in the ordinance and that the Federal Aviation Administration (FAA) held final authority in determining which activities may compromise flight safety (Section 3, Part F). Finally, the ordinance stated that prior to its implementation the land-use plan must be approved by California Coastal Commission (Section 5).

Second, Ordinance No. 169,767, effective April 6, 1994, partially amended Ordinance No. 167,940. Specifically, Ordinance No. 169,767 stated that “no development shall be allowed in the Southern 200 acres” of the Airport Preserve and that “the remainder of this property shall be limited to a nature preserve and accessory uses only”. Thus, this ordinance apparently prohibited extensive development in the northern 104.3-ac (42.2-ha) portion of the Airport Dunes.

State Protections

The El Segundo blue butterfly is not listed under the California Endangered Species Act, which does not protect insects. State laws providing potential protection to the El Segundo blue butterfly are the California Environmental Quality Act (CEQA), the Natural Communities Conservation Planning (NCCP) Act, and the California Coastal Act (CCA).

California Environmental Quality Act (CEQA). The CEQA is the principal statute mandating environmental assessment of projects in California. The purpose of CEQA is to evaluate whether a proposed project may have an adverse effect on the environment and, if so, if that effect can be reduced or eliminated by pursuing an alternative course of action or through mitigation. CEQA applies to projects proposed to be undertaken or requiring approval by State and local public

agencies.

If significant effects are identified through the CEQA process, the lead agency has the option to require mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA Sec. 21002). Because coastal dune ecosystems are recognized in California as a declining resource supporting several endemic species, projects affecting dune habitat that are mandated to comply with CEQA may provide some consideration of impacts to the El Segundo blue butterfly and its habitat. However, any protection afforded rare or sensitive species or their habitats, through CEQA, are at the discretion of the lead agency involved.

Natural Community Conservation Planning (NCCP). The NCCP program is a cooperative effort involving the State of California and numerous private and public partners to protect habitats and species. The program began in 1991 under the State's NCCP Act (California Fish and Game Code 2800-2835). A NCCP identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land use. Regional NCCPs may provide protection to federally listed species, such as the El Segundo blue butterfly, by conserving native habitats upon which the species depend.

The City of Rancho Palos Verdes is currently developing an NCCP/HCP that will consider the El Segundo blue butterfly as a covered species. The butterflies identified in the plan area by RBF Consulting (2001) are assumed to be the El Segundo blue butterfly under this NCCP/HCP.

California Coastal Act (CCA). The State law most likely to provide protection to the El Segundo blue butterfly is the CCA. The CCA is the principal statute mandating environmental assessment of coastal California projects. Chapter 3, Article 5, Section 30240 of the CCA states that a) environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those area; and b) development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas. As such, development activities in the coastal zone typically require a coastal development permit and the California Coastal Commission determines whether an area qualifies as an Environmentally Sensitive Habitat Area.

The CCA has had a significant role in El Segundo blue butterfly conservation. For example, the 2001 draft Los Angeles International Airport master plan Environmental Impact Report/Environmental Impact Statement proposed to designate the northern 104.3-ac (42.2- ha) portion of the Airport Dunes as land that would be developed. This proposal, however, was deemed inconsistent with

the CCA policy concerning resource protection as the entire 307-ac (124-ha) Airport Dunes area was determined to be an Environmentally Sensitive Habitat Area. More recently, the Coastal Commission in 2002 judged that LAWA had to remove 90 palm trees that were not native to the coastal dunes ecosystem from the northern edge of the Airport Preserve and replant this area with native vegetation.

Federal Protections

The National Environmental Policy Act (NEPA). NEPA may provide some protection for the El Segundo blue butterfly for projects with a Federal nexus (undertaken, funded, or authorized by Federal agencies). NEPA requires that the planning process for Federal actions be documented to ensure that effects on the environment are considered. The NEPA process is intended to help public officials make better decisions based on an understanding of the environmental consequences of their actions and to take actions to protect, restore, and enhance the environment (40 CFR 1500.1). Carrying out the NEPA process ensures that agency decision makers have information about the environmental effects of Federal actions and information on a range of alternatives that will accomplish the project purpose and need.

For environmental impacts that are significant, the Federal agency must identify alternatives to mitigate these impacts (40 CFR 1502.16). For projects undertaken, funded, or authorized by Federal agencies, NEPA would at least require that any significant adverse impacts to the human environment, including impacts to the natural and physical environment (40 CFR 1508.14), be considered. In particular, NEPA is likely to provide some protection for the largest population of the El Segundo blue butterfly at the Airport Preserve because many of the projects proposed by LAWA in this area are airport-related and funded by the FAA.

The Endangered Species Act (Act). The Endangered Species Act of 1973, as amended; 16 USC 1531 *et seq.*) is the primary Federal law providing protection for the El Segundo blue butterfly. Beyond the actual listing of the subspecies, these protections are afforded particularly through sections 7, 9, and 10 of the Act. Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or adversely modify their critical habitat. Section 7 also encourages Federal agencies to use their authorities to carry out programs for the conservation of listed species. Section 9 of the Act includes prohibitions against possessing, selling, importing, exporting, and taking listed species. Section 10 of the Act provides a process whereby private landowners can gain an exemption to the section 9 take prohibitions through a section 10(a)(1)(B) permit and Habitat Conservation Plan (HCP), provided such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Subsequent to listing of the El Segundo blue butterfly, one development project triggered section 7 consultation. We issued a non-jeopardy biological opinion

(FWS-OR-1012.5) April 20, 2004 (FWS-OR-1012.5), regarding the construction of a lighting system within the Airport Preserve with funds provided by the FAA. This project permanently impacted 0.25 ac (0.10 ha) of El Segundo blue butterfly habitat within the Airport Preserve, and the impact was offset through the enhancement of 1.25 ac (0.51 ha) of habitat elsewhere within the Airport Preserve.

The City of Rancho Palos Verdes' NCCP is also being developed as a Habitat Conservation Plan (HCP) under section 10 of the Act. As stated above (State Protections, NCCP), this plan will delineate private lands within the City of Rancho Palos Verdes that will be conserved and developed. The proposed conservation land includes the areas near Long Point and Point Vicente where potential El Segundo blue butterflies were found in 2001 (RBF Consulting 2001) and 2006 (Pratt 2006), respectively.

A recent change to implementation of the Act that affects the El Segundo blue butterfly is the Safe Harbor policy (64 FR 32717). Under the Safe Harbor policy, the Service may provide private or non-Federal landowners with technical assistance to develop Safe Harbor Agreements for the purpose of managing habitat for listed species on their property. Landowners are given the assurance that "land, water and/or natural resource use restrictions will not be imposed as a result of their voluntary conservation actions," provided that they are implementing agreed-upon conservation actions that will result in a net conservation benefit for the species (64 FR 32717). In addition, landowners are provided with incidental take coverage that enables them to return their property to agreed-upon baseline conditions after an agreed-upon time period. A private landowner has enrolled a 0.167-ac (0.067-ha) portion of property within the Torrance recovery unit in a Safe Harbor Agreement administered by The Urban Wildlands Group for the purpose of conserving the El Segundo blue butterfly. An important aspect of this particular Safe Harbor Agreement is that the landowner has agreed not to return the habitat to baseline conditions (*i.e.*, remove the habitat established under the agreement) until a minimum of 13 years has passed subsequent to the establishment of the El Segundo blue butterfly host plant, coast buckwheat. Prior to restoration, coast buckwheat was absent from this location.

Summary of Factor D Analysis

Listing of the El Segundo blue butterfly under the Act in 1976 increased awareness of the importance of protecting and managing coastal dune habitat for this subspecies on private and public lands in Los Angeles County. It is unlikely that existing regulatory mechanisms in place at the time of listing would have sufficiently addressed the threats faced by the El Segundo blue butterfly and achieved the same results. Although the California Coastal Act has contributed to the protection of El Segundo blue butterfly habitat with the designated coastal zone of California, the Endangered Species Act is still the primary regulatory mechanism mandating El Segundo blue butterfly conservation, and it is through the Act that we continue to work with private landowners and State and local

jurisdictions to implement actions to reduce ongoing threats and recover this subspecies.

2.3.2.5. Factor E, Other Natural or Manmade Factors Affecting Its Continued Existence:

Extinction vulnerability due to small population sizes and isolation

In addition to threats from urbanization and nonnative plants, the El Segundo blue butterfly is threatened by small population size and severe habitat fragmentation. Although population sizes were estimated to be relatively high in recent years at the Airport and Chevron preserves (Figure 4; Arnold 2005, 2004b), the effectiveness of the method used has not been evaluated. Even considering these higher estimates, El Segundo blue butterfly abundances are likely a fraction of historical sizes due to an estimated loss of 86 percent of its historical habitat.

Small populations have higher probabilities of extinction than larger populations because their low abundance renders them susceptible to inbreeding, loss of genetic variation, high variability in age and sex ratios, demographic stochasticity, and other random naturally occurring events such as droughts or disease epidemics (Soulé 1987). Owing to the probabilistic nature of extinction, some small populations will survive in the short term when faced with these demographic, environmental, and genetic stochastic risks, but they will eventually be extirpated. It is possible that stochastic events led to the local extinction of the El Segundo blue butterfly within the Ballona recovery unit. Mattoni (1992) reported that a lone individual was observed at the Ballona Wetlands Dune in 1985; none are currently present at this location.

Another factor that renders populations vulnerable to stochastic events is isolation, which often acts in concert with small population size to increase the probability of extinction. Urbanization and land conversion have fragmented the historical range of the El Segundo blue butterfly such that extant populations now operate as independent units rather than parts of a metapopulation or a single, cohesive, wide-ranging population. Over the long term, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because the likelihood of recolonization following such events decreases with isolation (Wilcox and Murphy 1985). Given the low dispersal potential of the El Segundo blue butterfly, it is unlikely that this subspecies will naturally recolonize a site such as the Ballona Wetlands Dune. This site is separated from the nearest extant population (Airport Preserve) by approximately 0.62 mi (1 km) of unsuitable habitat.

Habitat fragmentation also produces edge effects that facilitate the introduction of invasive, nonnative weeds that can out-compete and supplant the El Segundo blue butterfly's host plant, coast buckwheat. This problem is particularly relevant for small, isolated habitat blocks such as the Chevron Preserve. This site is bordered by parcels landscaped with nonnative vegetation. Only through intensive

management is it possible to maintain coast buckwheat in this environment (R. Arnold pers. comm. 2007). Given the size and surrounding landscape in other existing or potential sites, habitat fragmentation and isolation is likely to be an important concern in these areas as well.

At present, El Segundo blue butterfly populations exist in three isolated locations: the Airport Dunes, the Chevron Preserve, and the bluffs between Malaga Cove and Redondo Beach. Populations within the Airport and Chevron preserves could potentially be connected through migration if the Scattergood Dune was restored with native vegetation, including coast buckwheat. By contrast, even if the El Segundo blue butterfly were to be reintroduced to the restored Ballona Wetlands Dune, this site would still likely remain isolated from the nearest occupied site at the Airport Dunes due to large expanses of urban development. Similarly, even if most of the potential habitat from Malaga Cove in the Torrance recovery unit was restored to the northern extent of the beach bluffs in along Redondo Beach (Figure 4), these sites would remain isolated from the nearest northern occupied location at the Chevron Preserve. Thus, even comprehensive restoration would likely not lead to natural El Segundo blue butterfly dispersal between all potential and occupied locations, and habitat fragmentation would remain a threat to El Segundo blue butterfly recovery that can only be partially addressed through restoration actions. Nonetheless, restoration of all potential habitats likely would lead to an increase in abundance at each location, thus lowering the chance of extinction due to stochastic events.

2.3. Synthesis

When the El Segundo blue butterfly was listed as endangered in 1976, there were only two locations known to be occupied by the subspecies. About 86 percent of the subspecies' historical habitat has been lost to development. The remaining El Segundo blue butterfly habitat suitable for long-term conservation and restoration is limited to about 451 ac (182 ha). Only three disjunct locations (Airport Dunes, Chevron Preserve, and the beach bluffs between Malaga Cove and Redondo Beach) currently support occupied sites. Although none of the occupied sites are currently threatened by development, their long-term conservation is not assured. El Segundo blue butterfly habitat is easily degraded by competition with nonnative vegetation if not actively managed to sustain host plants. Thus, habitat degradation due to the lack of long-term conservation status and management is a major threat precluding the recovery of this subspecies.

The issue of insufficient management is particularly pressing at the Airport Dunes, which include the largest extent of occupied and restorable habitat for the El Segundo blue butterfly [about 307.1 ac (124.3 ha)]. Within this general location, the Airport Preserve harbors the largest El Segundo blue butterfly population, but there is evidence that current management practices are not sufficient to stem a decline in the El Segundo blue butterfly's host plant at this site. The much smaller, 1.6-ac (0.65-ha) Chevron Preserve, by contrast, has maintained a more active management plan over the past decade that has included annual planting of coast buckwheat and a regular weeding program. Likely as a

result of this management, the El Segundo blue butterfly population increased in the Chevron Preserve between 1998 and 2005.

The third location supporting the El Segundo blue butterfly (sites between Malaga Cove and Redondo Beach) is only managed in very limited areas. Ironically, Ballona Wetland, which is the one site with provisions for guaranteed management, currently lacks the El Segundo blue butterfly. Ensuring long-term management and re-introducing the El Segundo blue butterfly to the Ballona Wetlands Dune are two actions that would greatly benefit El Segundo blue butterfly conservation.

Predators, parasites, and insect competitors associated with nonnative vegetation are also believed to negatively impact El Segundo blue butterfly abundance, which is likely a fraction of its historical size due to loss of habitat. The remaining habitat for the El Segundo blue butterfly is fragmented such that the three extant locations are isolated from one another, thus making them more vulnerable to extirpation from stochastic events.

The fact that the El Segundo blue butterfly colonized restored bluffs along Torrance, Redondo, and Dockweiler beaches in 2007 demonstrates that this subspecies can respond positively to management. Furthermore, El Segundo blue butterfly management is relatively straightforward. If nonnative vegetation is replaced by native vegetation including coast buckwheat, and El Segundo blue butterflies are present in the general vicinity of the restored site, there is a high probability that the El Segundo blue butterfly will disperse naturally (migrate) to the restored location. As such, there is great potential to recover the El Segundo blue butterfly through habitat restoration and management.

If, theoretically, all potential habitat (Figures 1-3 and 5) was restored and the El Segundo blue butterfly was reintroduced to the Ballona recovery unit, populations of the El Segundo blue butterfly would still remain fragmented because the subspecies is not able to disperse across large expanses of dense urbanization that separates each site. The potential for long-term survival, however, would improve if these actions were to take place because each population would be considerably larger than it is at present, and hence would be less vulnerable to stochastic extinction.

An important, recent development relevant to El Segundo blue butterfly conservation is that this subspecies was reported to occur on the Palos Verdes Peninsula and on Vandenberg Air Force Base. These areas were not recognized to contain the El Segundo blue butterfly by either the original listing document or the recovery plan. The taxonomic status of these individuals, however, is not clear. Because many butterfly species in the genus *Euphilotes* are known to be morphologically similar yet genetically distinct (Pratt 1994), additional taxonomic research needs to be conducted to evaluate the status of these populations.

In consideration of its limited and fragmented distribution, overall small population size, and continued threats as described above, the El Segundo blue butterfly remains in danger of extinction throughout all or a significant portion of its range. Therefore, we recommend that the status of the El Segundo blue butterfly remain unchanged as

endangered. Because of the recent success of habitat restoration efforts, we believe the recovery potential for this subspecies has improved. Thus, we recommend a change in the recovery priority to 9, indicating a moderate level of threat but a high potential for recovery for a listed subspecies.

3. RESULTS

3.1. Recommended Classification: Endangered; no change is needed.

3.2. New Recovery Priority Number: 9. (No change)

4. RECOMMENDATIONS FOR FUTURE ACTIONS

Our recommendations are numbered relative to their order of priority (1 is highest).

1. Recommitment to management in the Airport Dunes and other sites

The Airport Dunes location was identified in the recovery plan as containing the most important El Segundo blue butterfly population. Despite the high conservation value of this area, current management policies within the Airport Preserve are apparently insufficient to maintain a healthy coast buckwheat population (Arnold 2005). Several El Segundo blue butterfly experts have expressed concern that poor management of the Airport Preserve will imperil the long-term survival of the El Segundo blue butterfly at this important location (*e.g.*, Gordon Pratt, Travis Longcore, and Richard Arnold, pers. comm. 2007). A commitment to management activities that include intensive removal of plants that are not native to the coastal dunes ecosystem and outplanting of native vegetation including coast buckwheat is necessary to ensure that the Airport Dunes continue to support a population of the El Segundo blue butterfly (Arnold 2005).

Other important sites in need of enhanced management are the Scattergood Dune in the El Segundo recovery unit and the beach bluffs in the Torrance and Airport Dunes recovery units. Continued management at the present level of intensity is likely to sustain the El Segundo blue butterfly population at the Chevron Preserve; however, there is no long-term assurance for continued management at this site. Further evaluation of the management efforts at the Ballona Wetlands need to be conducted to assess whether practices need to be amended at this site.

2. Reintroduce the El Segundo blue butterfly to the Ballona Wetlands Dune

The Ballona Wetlands were recently acquired by the State of California for the purpose of conservation. The State wants to incorporate El Segundo blue butterfly conservation into their overall management/restoration plan for this area (J. Liebster pers. comm.). Although surveys (Psomas 2001) indicated that the El Segundo blue butterfly is currently absent from the Ballona Wetlands, coast buckwheat has been planted and maintained along a 6-ac (2.4-ha) dune on the western edge of the Ballona recovery unit (Figure 2). Despite the presence of their host plant, it is unlikely that

the El Segundo blue butterfly will naturally recolonize this site due to limited dispersal potential (Mattoni 1990). Hence, to facilitate El Segundo blue butterfly recovery, it is important to initiate El Segundo blue butterfly reintroduction to the Ballona Wetlands Dune. Potential sources for colonists are the Airport and Chevron preserves.

3. Increase the amount of area that is protected and managed in each of the recovery units

Three sites identified in the recovery plan contain suitable habitat that is not currently protected or managed. First, although there are approximately 302 ac (122 ha) of potentially suitable habitat for the El Segundo blue butterfly in the Airport Dunes, the area that is managed (Airport Preserve) consists of only 202.8 ac (82 ha) (Figure 3). Conservation efforts would be significantly enhanced by protecting and managing the remaining 104.3 ac (42 ha). Second, another important area is the Scattergood Dune in the El Segundo recovery unit (Figure 3). Protection, restoration and management of this site would provide additional habitat for the El Segundo blue butterfly and a link between the Airport Dunes recovery unit and the Chevron Preserve. Third, there are several private properties containing the El Segundo blue butterfly and/or suitable habitat in the Torrance recovery unit. Enrollment of additional landowners into the existing El Segundo blue butterfly Safe Harbor Agreement would augment conservation of the subspecies.

In addition, beach bluffs that are currently landscaped with nonnative vegetation are found along Torrance, Redondo, Manhattan, Dockweiler and Toes beaches (Figures 1-3 and 5). Recent restoration efforts demonstrated that replacement of ice plant and other nonnative vegetation with native plants including coast buckwheat can lead to recolonization of beach bluffs by the El Segundo blue butterfly. Therefore, beach bluff restoration, management, and protection should be pursued to increase population sizes of the El Segundo blue butterfly.

- **4. Conduct standardized surveys within the Ballona and Torrance recovery units, Palos Verdes Peninsula, and Vandenberg Air Force Base**

Delisting Criterion 3 states, in part, that populations in each of the four recovery units must exhibit positive growth for 10 years as a condition for consideration of downlisting. At present, there has been no attempt to quantify population growth at sites within the Torrance recovery unit. Although the El Segundo blue butterfly is currently absent in the Ballona recovery unit, if reintroductions are conducted it will be important to systematically monitor the dynamics of this population. Finally, although the taxonomic status of the Palos Verdes Peninsula and Vandenberg populations is not clear, the population dynamics of these butterflies should be quantified. The same standardized survey techniques should be used at all sites because elucidation of population trends is a critical aspect of conservation management. Survey techniques should follow the procedure outlined by Mattoni *et al.* (2001)

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Personal Communications

We obtained valuable information about El Segundo blue butterfly-related issues through personal communication with the following people that have an expert knowledge about the El Segundo blue butterfly or its habitat:

Richard Arnold, Entomological Consulting Services Limited

Greg Ballmer, Department of Entomology, University of California, Riverside

John Earle, Rhapsody in Green

John Emmel, consulting entomologist

Andrew Huang, Environmental Management Division, Los Angeles World Airports

Nic Hubert, U. S. Fish and Wildlife Service, Ventura Office

Jack Liebster, California Coastal Commission

Travis Longcore, The Urban Wildlands Group

Gordon Pratt, Department of Entomology, University of California, Riverside

Kelly Rose, Friends of Ballona Wetlands

Figure 1. Overview of the four recovery units.

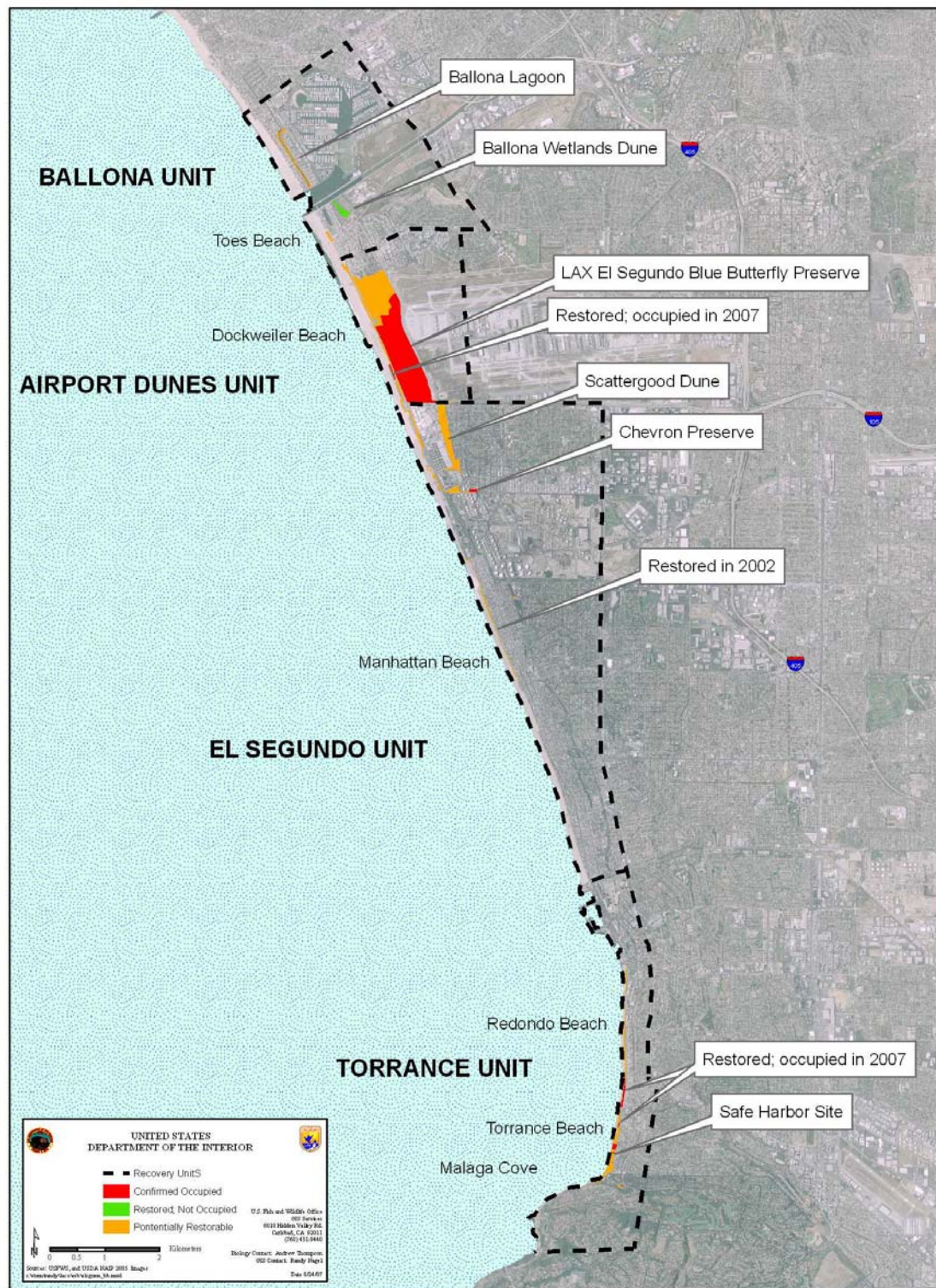


Figure 2. Close-up view of the Ballona recovery unit and the northern part of the Airport Dunes recovery unit. Note that Toes Beach is within the northern extent of Dockweiler Beach.

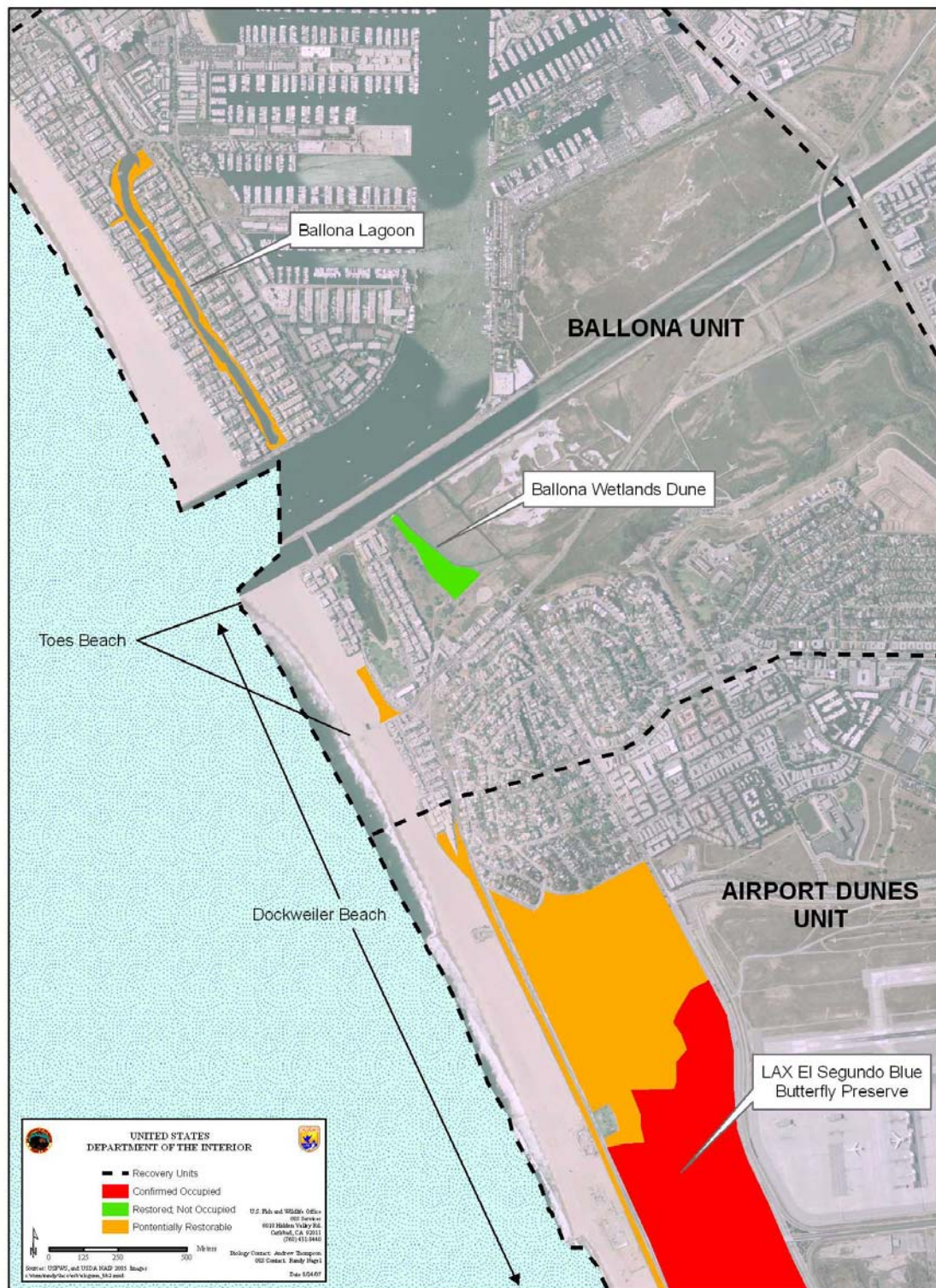


Figure 3. Close-up view of the Airport Dunes recovery unit and the northern part of the El Segundo recovery unit

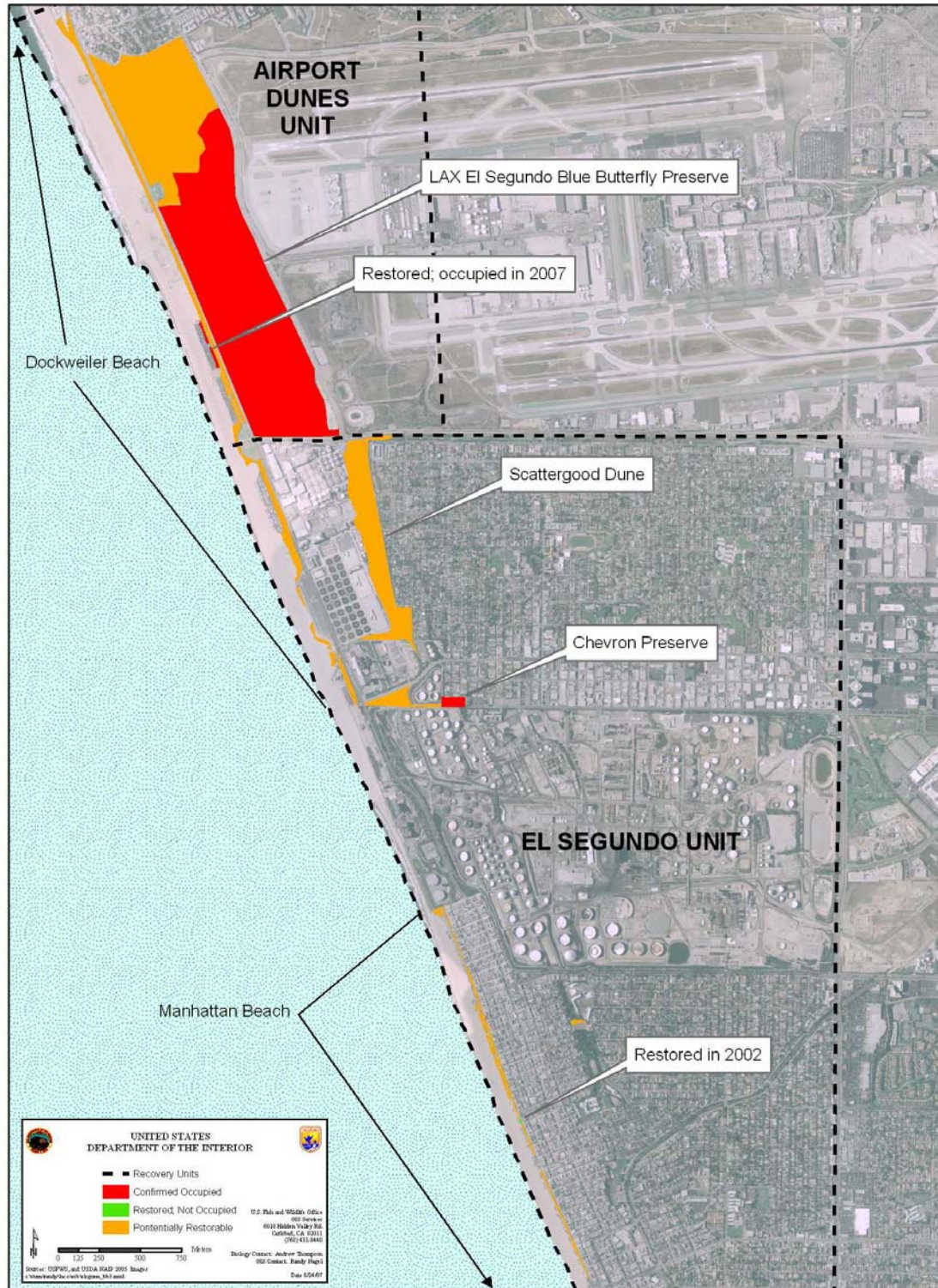
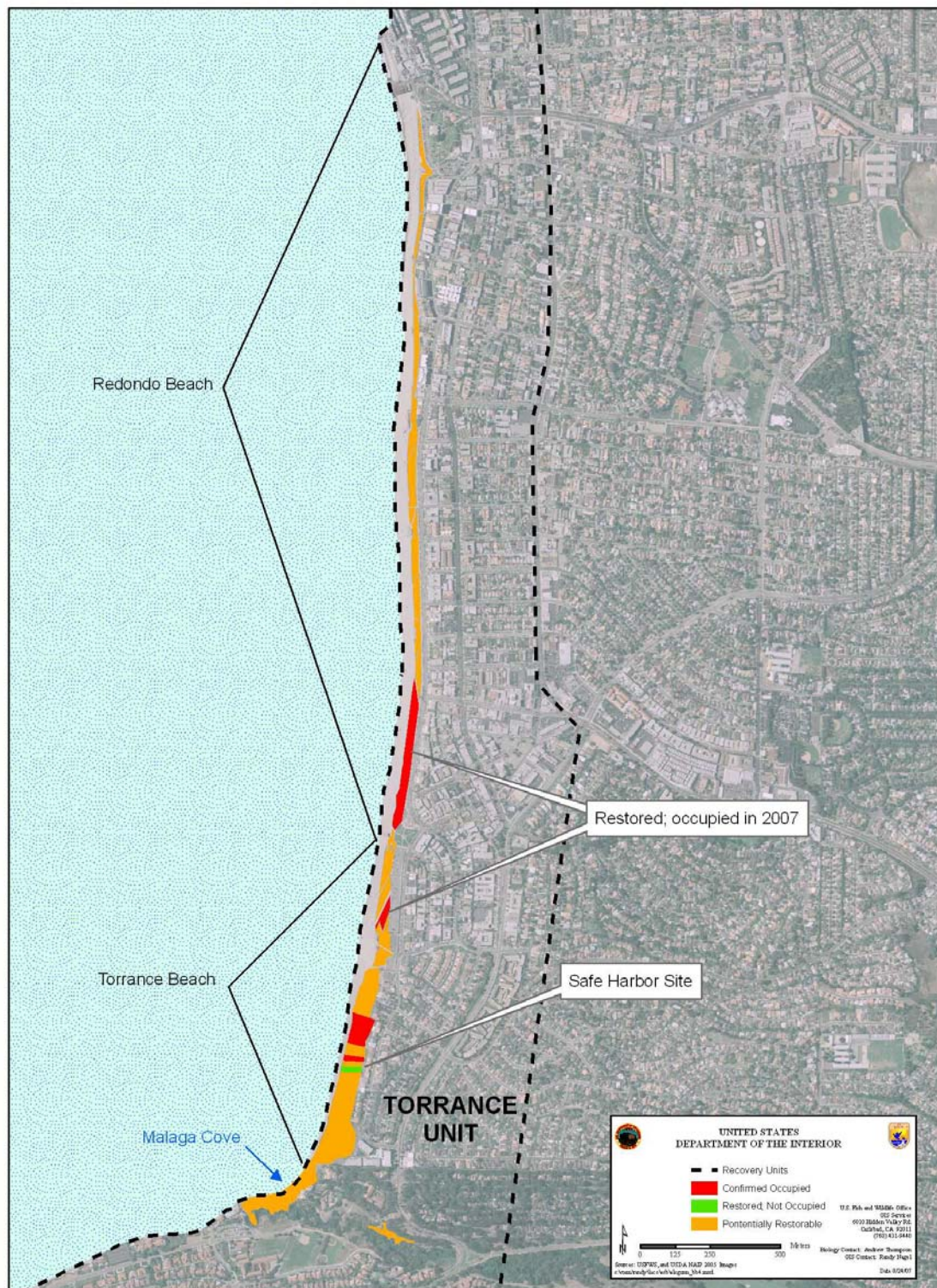


Figure Figure 4. Close-up view of the Torrance recovery unit and the southern portion of the El Segundo recovery unit.



**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW OF EL SEGUNDO BLUE BUTTERFLY**

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

_____ Downlist to Threatened

_____ Uplist to Endangered

_____ Delist

 X No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: 9

Review Conducted By: Karen A. Goebel, Andrew R. Thompson, and Eric Porter

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date _____

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve _____ Date _____

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FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 3-27-08

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve  Date 3/31/08