

Recovery Plan for the El Segundo Blue Butterfly

(Euphilotes battoides allyni)



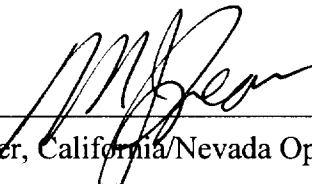
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EL SEGUNDO BLUE BUTTERFLY
(*Euphilotes battoides allyni*)

RECOVERY PLAN

Region 1
U.S. Fish and Wildlife Service
Portland, Oregon

Approved: _____


Manager, California/Nevada Operations Office, Region 1, U.S.
Fish and Wildlife Service

Date: _____

9/28/98

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ACKNOWLEDGMENTS

The recovery plan for the El Segundo blue butterfly was prepared by Rudi Mattoni, Travis Longcore, and Jeremiah George of the University of California at Los Angeles, Gordon Pratt of the University of California at Riverside, and Chris Nagano of the U.S. Fish and Wildlife Service. The drawings of the larva, pupae, and adult El Segundo blue butterflies were drawn by Rick Rogers. In addition, Rick assisted with field studies. The Recovery Unit Geographic Information System (GIS) maps were prepared by Stacey Love of the U.S. Fish and Wildlife Service. Arthur Bonner made significant contributions towards efforts to restore El Segundo blue butterfly habitat of the Airport Dunes.

EXECUTIVE SUMMARY

Current Status: This species is federally listed as endangered, and occurs at four disjunct locations in southwestern coastal Los Angeles County, California. The species is managed at two of the sites. The butterfly is not permanently protected at any of the four locations. The area of this species occurrence is highly urbanized and there are few remaining sites with *potential habitat*.

Habitat Requirements and Limiting Factors: The El Segundo blue butterfly is *endemic* to coastal sand dunes that contain suitable conditions for the early stages, larval *food plants*, adult nectar sources, and adult feeding, perching, and courtship areas. Soil and climatic conditions, as well as ecological and physical factors, contribute to the maintenance of suitable areas within the species range. Urban development and invasion by exotic species have resulted in a significant loss and modification of the species' habitat. Protection and management of existing and potential habitat, removal of exotic vegetation, and reduction of other threats to the species and/or its habitat is needed. Other threats include off-road vehicles and overcollecting.

Recovery Objective: Downlist to threatened status.

Recovery Criteria: The El Segundo blue butterfly can be considered for downlisting to threatened status when:

- 1) At least one secure *population* in each of the four Recovery Units (RUs) - Ballona, Airport, El Segundo, and Torrance - are permanently protected. 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) located in the Airport RU contains the largest population of the butterfly and is the most likely one that can survive disease, predators, *parasites*, and other *perturbations*. The Airport Dunes must be one of the protected populations.
- 2) Each of the four populations are managed to maintain coastal dune habitat dominated by local native species including coast buckwheat.

- 3) As determined by a scientifically credible monitoring 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 (*lambdas*) are maintained at or above 1.0, indicating a stable or increasing population.
- 4) A program is initiated to inform the public about the El Segundo blue butterfly and its habitat.

Actions Needed:

1. Protect, restore and manage existing habitat.
2. Determine species requirements.
3. Introduce animals to suitable locations.
4. Monitor populations.
5. Coordinate with the public.

Total estimated cost of recovery (in \$1,000's):

Year	Need 1	Need 2	Need 3	Need 4	Need 5	Total
1998	48	20	75	10	45	198
1999	178	30	70	10	45	333
2000	190	30	50	45	45	360
2001	192	28	80	45	45	390
2002	175	0	80	45	45	345
2003	185	0	45	45	45	320
2004	175	0	45	45	45	310
2005	175	0	45	45	45	310
2006	175	0	45	45	45	310
2007	175	0	45	45	45	310
2008	185	0	45	45	45	320
2009	175	0	45	45	45	310
2010	175	0	45	45	45	310
2011	175	0	45	45	45	310
Total	2,358	108	760	560	630	4,436

The estimated total cost of recovery is \$4,436,000. This excludes land acquisition costs and operational costs for management of lands. If land acquisition is used to secure habitat for the species, costs will need to be determined.

Date of Downlisting: Downlisting may occur when *management plans* for each of the four RUs are completed and implemented and management has shown its effectiveness by maintaining recovery criteria for at least 10 consecutive years.

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Part I. INTRODUCTION

Overview

The historic range of the El Segundo blue butterfly (*Euphilotes battoides allyni*) likely extended over much of the El Segundo sand dunes and the northwestern Palos Verdes peninsula in southwestern Los Angeles County, California. The El Segundo sand dunes formerly encompassed about 4.5² miles (11.6² kilometers) situated between Westchester and the Palos Verdes Peninsula (Mattoni 1990a, Mattoni 1990b). Suitable habitat on the Palos Verdes peninsula likely included about 20 acres (8.1 hectares). Today, urban development has greatly reduced the size of these areas. This species is imperiled by urban development, invasive exotic plants, and potentially off-road vehicles and overcollecting.

The El Segundo blue butterfly was listed as an endangered species in 1976 by the U.S. Fish and Wildlife Service (41 **Federal Register** 22041). Critical habitat for the species has not been designated. The Service currently considers this subspecies as having a high degree of threat, yet a high recovery potential, which is equivalent to a Recovery Priority of 3 (48 **Federal Register** 43098). This recovery plan recognizes the value of reducing the risk of global *extinction* of this species by recommending the protection of four Recovery Units (RUs) that include adequate habitat and area to prevent the extinction of this animal.

Because of the technical nature of much of this recovery plan, a glossary has been provided in the back of this plan. Any words written in “*bold italics*” have been defined in the glossary.

Taxonomy and Description

The El Segundo blue butterfly is one of five subspecies comprising the *polytypic* species, the square-spotted blue butterfly (*Euphilotes battoides*). *Euphilotes battoides* inhabits southern California, southern Nevada, Arizona,

and northern Mexico. The El Segundo blue butterfly is endemic to southwestern Los Angeles County in coastal southern California.

The El Segundo blue butterfly is a member of the blue butterfly subfamily, also known as the Polyomatinae in the family Lycaenidae. The adults have a wingspan of 0.75 to 1.25 inches (19 to 32 millimeters). The wings of the males are a brilliant blue color with an orange border on the rear of the upper *hindwings*. The females have dull brown colored wings with an orange border on the upper distal surface of the hindwings.

The El Segundo blue butterfly was formally described by Oakley Shields (1975) based on specimens that had been collected in El Segundo. Several experts had recognized the animal as a distinctive taxon prior to its formal description, including Martin (1970), and Emmel and Emmel (1973), and called attention to its potential extinction. Shields (1975) originally described the El Segundo blue butterfly as a member of the genus *Shijimiaeoides*. However, recent systematic studies have determined that this genus is restricted to northern Asia.

The status of the population of the Bernardino blue butterfly on the Palos Verdes peninsula remains unresolved. Adults are morphologically similar to subspecies *allyni*, but possess major differences, including different morphological characters in the *larvae*, different food plant species, and genetic differences in *allozymes*.

Geographic Distribution

Historically, the El Segundo blue butterfly likely inhabited much of the El Segundo sand dunes. There are known extant populations of the El Segundo blue butterfly at four locations: Ballona Wetlands, Airport Dunes, Chevron butterfly preserve, and Malaga Cove. The distribution of the El Segundo blue butterfly is dependent on its food plant, the coast buckwheat (*Eriogonum parvifolium*). The animal appears further limited to habitats with high sand content. Museum records reveal that the El Segundo blue butterfly was

widespread on the El Segundo sand dunes and specimens were collected at El Segundo, Redondo Beach, Manhattan Beach, and at several locations on the Palos Verdes peninsula (Donahue 1975) (Figure 1).

Ecosystem Description

The El Segundo blue butterfly is only known from the El Segundo sand dunes (Arnold 1983, 1986; Emmel and Emmel 1973; Oppewall 1975; Shields 1975). This habitat is a biologically sensitive and very unique environment, and is inhabited by a number of plant and animal species of special concern (Clarke 1947; Comstock 1947; Mattoni 1990a, Mattoni 1990b, Mattoni 1992; Pierce and Pool 1938, Pierce and Pool 1938-1940; Wells *et al.* 1983). The El Segundo sand dunes are the largest coastal sand dune system between the mouth of the Santa Maria River in Santa Barbara County and Ensenada in Mexico (Powell 1981; Cooper 1967). The vegetation has been defined as the Sand verbena-beach bursage series in Sawyer and Keeler-Wolf (1995). Native plants on the El Segundo sand dunes include coast buckwheat (*Eriogonum parvifolium*), dunes golden bush (*Haplopappus eriocoides*), dunes wall flower (*Erysimum suffrutescens*), dunes sun-cup (*Camissonia cheiranthifolia*), dunes burr-bush (*Ambrosia chamissonis*) and California croton (*Croton californica*).

The El Segundo sand dunes support a number of plants and animals that are endemic, rare, or of limited distribution, including the El Segundo spineflower (*Chorizanthe californica* var. *suksdorfii*), El Segundo dune flower (*Pholisma paniculatum*), Trask's snail (*Helminthoglypta traski*), El Segundo crab spider (*Ebo* new species), El Segundo sun spider (*Eremobates* new species), trapdoor spider (*Aptostichus simus*), Santa Monica dunes moth (*Copablepharon sanctamonicae*), River's dune moth (*Euxoa riversii*), El Segundo goat moth (*Comadia intrusa*), Ford's sand dune moth (*Psammobotys fordi*), El Segundo scythrid moth (*Scythris* new species), lesser dunes scythrid moth (*Scythris* new species), El Segundo Jerusalem cricket (*Stenopelmatus* new species), Belkin's dune fly (*Brennania belkini*), south coast dune beetle (*Psammodyus macclayi*), dune scarab beetle (*Aegilia convexa*), Dorothy's sand dune weevil (*Trigonoscuta dorothea*), Lange's dune weevil (*Onychobaris langei*), San



Figure 1

● General location of El Segundo Blue Butterfly in California

Diego horned lizard (*Phrynosoma coronatum blainvillei*), California legless lizard (*Anniella pulchra*), western spadefoot toad (*Scaphiophus hammondi*), and burrowing owl (*Spetyto cunicularia*) (Mattoni and Longcore 1997; Rogers and Mattoni 1993; Robert James and Chris Nagano, unpub. notes). One animal, the El Segundo flower-loving fly (*Rhaphiomidas terminatus terminatus*), likely is extinct. Suitable habitat exists for the endangered Pacific pocket mouse (*Perognathus longimembris pacificus*), endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*), endangered Riverside fairy shrimp (*Streptocephalus woottoni*), endangered San Diego button-celery (*Eryngium aristulatum* var. *parishii*), and the endangered California orcutt grass (*Orcuttia californica*) (Robert Hames and Chris Nagano, pers. Obs. 1997).

The El Segundo sand dunes formerly encompassed about 4.5² miles (11.6² kilometers) (3,200 acres or 1,295 hectares) situated from Westchester south to the base of the Palos Verdes peninsula and from the Pacific Ocean inland for approximately one-half mile (0.8 kilometer). An inaccurate figure of 36² miles (93² kilometers), sometimes miscalculated as 18,000 hectares, has been widely quoted for the dunes area based on a summary of California sand dunes by Cooper (1967). The misquoted value included pre-Flandrian sand deposits that contained older dunes that have more or less consolidated to form sandstone. Cooper (1967) described the situation in the body of his paper, but somehow the detail was overlooked and the original misinterpretation has been repeated by subsequent authors. This sandstone underlies the present sand dunes. The *edaphic* properties of sandstone do not provide the proper environmental conditions for the indicator sand obligate plants of the dunes community.

The biological community of sand dunes is adapted to continuously moving sand and extreme aridity. Once sand is permanently stabilized, the composition of the community changes. Sand obligate plant species decrease in frequency with the increased diversity, abundance, and cover of more widespread species, especially weeds. Animal community composition is affected in a similar manner.

The El Segundo sand dunes are the result of sand which was carried by the Los Angeles River to the Pacific Ocean and was then deposited by a combination of *littoral* drift and wind in its current position. The Los Angeles River discharged to the sea at Playa del Rey prior to 1830.

The El Segundo dunes and *lee deflation plain* were undisturbed until Rancho (Spanish land grants) development in the 1840's. Farming was then established on the coastal prairie to the east of the dunes, but generally started at least 0.5 mile (0.8 kilometer) farther inland, probably because of agricultural unsuitability of the poorly drained sandstone soil near the backdune. The dunes themselves were undisturbed until the late 1880's when the cities from Redondo Beach to Venice were established, however, urban development was limited. Prior to that time, virtually the entire El Segundo dunes were in a pristine condition.

The City of Redondo Beach separated the main dunes from south Redondo Beach and the Malaga Cove extensions, and development of Venice eliminated the dunes north of the mouth of Ballona Creek. Conversion of the central part of the dunes was slower. Construction of the Chevron oil refinery in 1911 separated the dunes into two fragments. The southern fragment was gradually converted to homes starting at the beginning of the twentieth century and rapidly accelerated in the late 1940's. The natural habitat values in these areas were totally destroyed by the 1970's. In the 1950's, Christopher Henne of the Los Angeles County Museum noted a dense El Segundo blue butterfly population and other rare insects in Hermosa Valley, an area soon after destroyed.

In 1928, the grid of streets on the Airport Dunes was constructed, but development was minimal following the 1929 stock market crash. Significant development did not take place until after World War II, with virtually the entire dunes built upon between 1946 and 1965. Nearly all of this area was privately owned. Construction of the Hyperion Sewage Treatment Plant and the Scattergood electrical plant in the 1940's, along with dense housing on the present Airport Dunes, reduced the northern fragment to about 80 acres (32

hectares) of coastal sand dune habitat by 1960. The 1.6-acre (.65-hectare) Chevron butterfly sanctuary site was isolated by residential development in the 1950's.

The most important events affecting the recent biological history of the Airport Dunes was the purchase and clearing of residences from nearly 200 acres (81 hectares) between 1966 and 1972, which had resulted in the major contraction of native plants and animals in this area. A major adverse impact resulted from construction of the VOR (very high frequency omni direction radio), and the excavation and re-contouring of about 70 percent of the backdune to re-align Pershing Drive in 1975. The newly recontoured dunes and irrigated dunes were stabilized by hydromulch with a non-native seed mix and irrigated with a sprinkler system by the Los Angeles Department of Airports. The common buckwheat (*Eriogonum fasciculatum*), a species not native to this habitat, was introduced by the Department of Airports to the Airport Dunes during this project. At the same time, the foredune to the south and west of the VOR was graded along with the last coastal prairie fragment between the backdune and Pershing Drive. The community at this site was a *Stipa* grassland, with a rich occurrence of herbaceous meadow plants and vernal pools. This coastal community is now extinct (Mattoni and Longcore 1997). Non-native plants continue to pose a threat to the Airport Dunes (Kowsky 1995).

The Los Angeles Department of Airports proposed converting about two-thirds of the Airport Dunes into a 27-hole golf course and setting aside about 92 acres (37 hectares) as a conservancy preserve for the El Segundo blue butterfly in 1982. The California Coastal Commission denied the plan on the grounds that it was inconsistent with California Coastal Act policies concerning resource protection, recreation, and public access. The Commission's decision was based in part on their conclusion that coastal sand dune ecosystems had almost disappeared in southern California, and any further loss of this habitat type could result in widespread extinctions. The Commission also suggested that the City of Los Angeles undertake a complete biological survey and assessment of the Airport Dunes. The Airport Dunes are also designated as a Significant Ecological Area in the Los Angeles County General Plan (England

and Nelson 1976).

The Los Angeles Department of Airports currently is proposing to expand the Los Angeles International Airport. One alternative of the LAX 2015 Expansion Master Plan involves a physical intrusion onto the Dunes of graded areas associated with the end of a runway. The alternative may be eliminated from the LAX 2015 Expansion Master Plan. Insufficient control of acacia (*Acacia* species) and iceplant (*Carprobrotus* species) is resulting in significant loss of El Segundo blue butterfly habitat at this Recovery Unit.

All of the known populations of the El Segundo blue butterfly are under threat from various sources. Iceplant and other invasive exotic plants have degraded the sand dune habitat at the west side of the Ballona Wetlands. Non-native plants continue to invade the Airport Dunes. The small size and relatively low diversity of native plants threatens the butterfly at the Chevron reserve in El Segundo. Habitat destruction and invasive exotic plants pose a significant threat to the population at Malaga Cove.

Life History

The El Segundo blue butterfly undergoes *complete metamorphosis* (egg, larva, *pupa*, and adult). The life span of this animal is about 1 year. Some pupae may remain in *diapause* for 2 or more years. The adults are active from mid-June to early September, the exact timing depending on the weather. The onset of flight is closely synchronized to the beginning of the flowering cycle of coast buckwheat, the food plant (Pratt and Ballmer 1993).

Upon emerging from their pupae, the female El Segundo blue butterflies fly to the flower heads of the food plant where they mate with males that constantly move from flowerhead to flowerhead. The females then immediately begin laying eggs. Laboratory data indicate females produce 15 to 20 eggs per day, but must continuously feed on nectar and pollen to maintain egg production (Mattoni and Pratt pers obs.; Mattoni 1992). Although field data indicate females at the Chevron site in El Segundo live an average of 4 days in nature

(Arnold 1983), in captivity, females live 2 weeks and produce up to 120 eggs (Mattoni 1992). Eggs hatch within 3 to 5 days.

The larvae of the El Segundo blue butterfly undergo four *instars* before they pupate, a process that takes 18 to 25 days (Figure 2). The larvae maintain a symbiotic relationship with ants (*myrmecophilous*). The larvae develop glands and *eversible* tubes that produce a sweet secretion by the third instar, and are thereafter tended by various species of ants (*Linepithema humile* or *Conomyrmex* species). The ants may protect the caterpillars from parasites and/or small predators. Mature larvae are highly *polymorphic*, varying in color from almost pure white or pure dull yellow to strikingly marked individuals with a dull red-to-maroon background broken by a series of yellow or white dashes or chevrons. Larvae remain concealed within the flowerhead when feeding, the color pattern adding to their *crypsis*. The preferred part of the flowerhead are young seeds, which are consumed preferentially to other flowerparts. The latter are closely webbed together by the caterpillars giving the illusion of an intact flowerhead. One larva requires two-to-three flowerheads (which equals 10 to 15 *involucre*s or 400 to 500 flowers or their seeds) to complete development. By late September, the flowerheads have generally *senesced* and the larvae have *pupated* underground or in the leaf litter at the base of the food plants.

The discrepancy between longevity of adults in the field, 2.3 to 7.3 days (Arnold 1983) and the laboratory, 16 day average (Mattoni 1992), is most likely due to predation by crab and lynx spiders. These spiders were found at a frequency of about 1 per 200 flowerheads in 1987 (Mattoni 1992). One capture of a male El Segundo blue butterfly was observed during 15 person-hours of direct observations of flowerheads.

The egg population of the El Segundo blue butterfly is chiefly regulated by a parasitic wasp (*Trichogramma* near *minutum*), which also attacks the eggs of the gray hairstreak butterfly (*Strymon melinus pudica*) and at least two species of micro-lepidopterous moths that also feed on buckwheat flowerheads. Pratt (1987) found 9 percent of 147 eggs of the gray hairstreak butterfly collected at

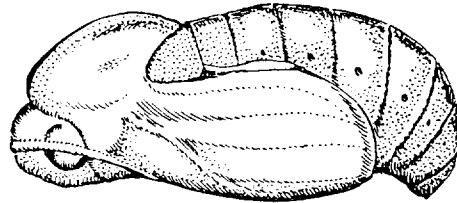
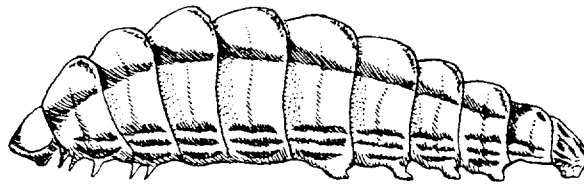


Figure 2. Upper Figure: Last instar larvae of the El Segundo blue butterfly. Length approximately 0.2 inch (5 millimeters).

Lower Figure: Pupa of the El Segundo blue butterfly. Length approximately 0.2 inch (5 millimeters).

the Airport Dunes in 1985 were parasitized by the wasp. It is difficult to accurately compare rates of parasitism in nature between the two butterflies because the more cryptic El Segundo blue butterfly eggs are more difficult to locate in the field.

In a sample of 30 mature El Segundo blue butterfly larvae that were collected on flowerheads in 1987, 6 (20 percent) were parasitized by a braconid wasp (*Apanteles thurberiae*). This same species of wasp also attacked the grey hairstreak butterfly, and two moths (*Lorita scarifica* and *Aroga* species); the latter two are common on the flowerheads. Arnold (1983) reported finding pupae of the El Segundo blue butterfly that were parasitized by two unidentified species of tachinid fly at the Chevron preserve. No quantitative data were given. The tachinid fly life cycle coincides with that of its El Segundo blue butterfly host so alternate hosts are not necessary for its persistence. A set of 28 pupae screened from sand at the Airport Dunes just prior to the 1988 flight season did not produce any parasites (Mattoni 1992).

Pratt (1987) found larvae of 2 moths (*Lorita scarifica* and *Aroga* species) predominant in *E. parvifolium* flowerheads, up to 50 per flowerhead, in 1985. He hypothesized that these two species severely reduced the food available to the El Segundo blue butterfly larvae, but also had an impact on the El Segundo blue butterfly by direct predation and indirect harboring of shared parasites. Mattoni (1988) found that a sample of flowerheads collected in 1987 produced 30 to 50 percent viable seed sets in spite of *herbivory* from all sources.

Adult El Segundo blue butterflies are sedentary animals that spend the bulk of their time perching and searching for mating opportunities (males) and ovipositing and feeding (females). From mark-release-recapture work, a few individuals moved distances equivalent to the farthest reaches of the habitat (Arnold 1986). Using a different approach, Mattoni and Pratt (pers. obs.) set out mature potted plants at sites up to 0.3 mile (0.5 kilometer) outside their normal distribution area with the objective of finding the offspring of dispersing females. The results were negative. All the flowerheads of two isolated plants in the disturbed foredune area were sampled with no El

Segundo blue butterfly early stages found on 184 flowerheads in 1987. These data, along with the observation of one adult male at Ballona Wetlands in 1987, indicate dispersal, and/or distant food plant locating ability across distances does occur, but is not a common event.

Threats and Listing Rationale

The El Segundo blue butterfly was listed as an endangered species on June 1, 1976, by the U.S. Fish and Wildlife Service (41 **Federal Register** 22044). Prior to the listing, Martin (1970) and Emmel and Emmel (1973) noted that the then undescribed El Segundo blue butterfly was in danger of extinction.

The Airport Dunes, the largest block of remaining natural habitat for the butterfly and other native species, was significantly reduced in quality and quantity between 1938 (Pierce 1939-1940) and the present day (Mattoni 1992; Nagano pers. obs.). However, the most substantive changes have taken place during the past 25 years (Mattoni 1990a, Mattoni 1990b). This has been as a result of the re-alignment of Pershing Drive, construction of Imperial Highway, moving sand to build the VOR hill, and fragmentation and scraping of the coastal prairie. The habitat degradation resulted in extinction or *extirpation* of many native species and the invasion of the site by exotic plants and animals.

Of the 20 species of native terrestrial mammals recorded by von Bloeker at the Airport Dunes (Pierce 1938-1940), most of which were present in 1975, only 3 are extant today (Maldonado undated). In their place are the introduced Norwegian rat (*Rattus norvegicus*), red fox (*Vulpes vulpes*), and opossum (*Didelphis virginiana*). Of 31 species of butterfly breeding on the site, 7 (or 23 percent) have been extirpated (Mattoni 1990a). Of 18 species of reptiles and amphibians (Von Bloeker 1941), 7 (or 39 percent) have been extirpated and all 5 scrub dependent birds have disappeared from the Airport Dunes (Mattoni 1990a).

The situation with native plants is even more serious because plants are the base of most food chains and ecosystems. A specialized herbivore restricted to

one plant species would be lost with extirpation of its food source, as in the case of two extirpated butterflies. Of the 73 native plant species recorded on the Airport Dunes by Pierce (1939-1940) 22 (or 30 percent), were not found during a 1989 survey (Mattoni 1990b), and 19 of the 51 extant species occur as fewer than 100 individuals and face imminent loss. In addition, several alien plants, including two acacia species (*Acacia* species) and common buckwheat (*Eriogonum fasciculatum*), had been introduced to the Airport Dunes within the past two decades with serious consequences. Other exotic species present in 1938 have since become significant competitors to the native plant community. These exotic plants include pampas grass (*Cortaderia selloana*), Myoporum (*Myoporum* species), and two species of iceplant (*Carprobrotus* species). Storksbill (*Erodium cicutarium*) and alien grasses are also eliminating habitat for native plants.

Ecosystem disturbance as a result of changes in the mammalian community has been profound as both rabbits and mice influence the differential reproductive efficiency of herbaceous plant species. The absence of mammalian foraging probably relaxed substantial pressure on seed banks, particularly European weeds. Loss of small mammals is linked to the introduction of the red fox, which themselves now have such limited food resources that they are driven to feeding on garbage, lizards, and even large insects.

In the late 1980's, off-road vehicles trespassed on the Airport Dunes, resulting in damage to El Segundo blue butterfly habitat and the native plant nursery (R. Mattoni pers. obs.). Areas containing sensitive cryptogamic crusts located on the backdunes near the VOR facility at the Airport Dunes were badly damaged by human foot traffic in 1997 (C. Nagano, pers. obs.). Cryptogamic crusts are formed in soils by blue green algae, lichens, mosses, fungi, and bacteria (Belnap 1993; Belnap and Gardner 1993; Harper and Pendleton 1993; Saint Clair and Johansen 1993). They increase the ability of the soil to hold moisture, decrease its susceptibility to erosion, and apparently have higher levels of native versus exotic plant species (Mattoni et. al. 1997).

Collecting of a number of butterfly species that exist in small colonies, or repeated handling and marking of even widespread species (particularly of females and in years of low abundance) can seriously damage populations through loss of individuals and genetic variability (Gall 1984; Murphy 1988; Singer and Wedlake 1981). Collection of females dispersing from a colony also can reduce the probability that new colonies will be founded. Although collecting or handling generally does not adversely affect healthy, well-dispersed populations of most butterfly species, a number of rare species, such as the El Segundo blue butterfly, are vulnerable to extirpation or extinction from these activities. In 1995, three poachers plead guilty to a felony charge of collecting and trafficking in protected butterflies, including the endangered El Segundo blue butterfly (Williams 1996).

Conservation and Management

Without an active restoration and management program, the long term persistence of the native dune ecosystem necessary to support the El Segundo blue butterfly is unlikely. The centerpiece of any effort must be the Airport Dunes, as this site contains not only the largest fragment, but the closest approximation to the prehistoric El Segundo Dune ecosystem. Substantial management and monitoring efforts for the El Segundo blue butterfly has been initiated by the City of Los Angeles at the Airport Dunes, and by the Chevron Corporation at their El Segundo blue butterfly preserve.

A comprehensive conservation plan needs further information not only on the biology of the El Segundo blue butterfly, but of other components of the ecosystem that impact the butterfly and other sensitive species found at the site.

The Service maintains responsibilities under the Act for listing, recovery, grants to the States, and consultation with Federal agencies. Section 7 of the Act requires Federal agencies to consult with the Service if their actions may affect listed species or adversely modify critical habitat. Critical habitat designation primarily affects Federal agency activities through section 7 of the

Act. In addition, the Service is involved with the issuance of incidental take permits pursuant to section 10 of the Act and the enforcement of prohibitions for take under section 9 of the Act.

The California Department of Fish and Game (CDFG) has indicated it does not have the authority to protect insects (Pete Bontadelli, CDFG, in litt. 1990). If the CDFG could protect insects, the Service could enter into a cooperative agreement with that agency which would allow the CDFG to develop conservation programs for the El Segundo blue butterfly and apply for Federal funds through section 6 of the Act. This would include research projects, surveys, and recovery actions.

Recovery Units

Areas known to be inhabited by the El Segundo blue butterfly or areas that contain restorable habitat for the animal have been grouped into four Recovery Units (RUs) based on geographic proximity, similarity of habitat, and potential genetic exchange. Each RU includes one or more existing populations of the El Segundo blue butterfly and/or restorable habitat for the management of at least one population. The occupied and restorable habitat in the RUs include only those areas that contain sandy soils. The distribution of historical records and soil types suggest that the butterfly occurred extensively through these four units. **Note that although general RU boundaries are noted in the text and identified in accompanying figures, the actual RUs do not include residential and commercial development, and areas that have otherwise been permanently altered by human actions.**

Ballona Recovery Unit. This Recovery Unit is bounded to the north by Washington Boulevard, to the south by Westchester Boulevard, to the east by a line extending from Lincoln Boulevard south to the Westchester Parkway, and to the west by the Pacific Ocean (Figure 3). There are two sites known to contain occupied or suitable habitat in this RU. The first is a 7-acre (2.8-hectare) terrestrial degraded coastal dune at Ballona Lagoon. A small 0.2-acre (.08-hectare) portion was revegetated in late 1990 with 41 species of sand dune

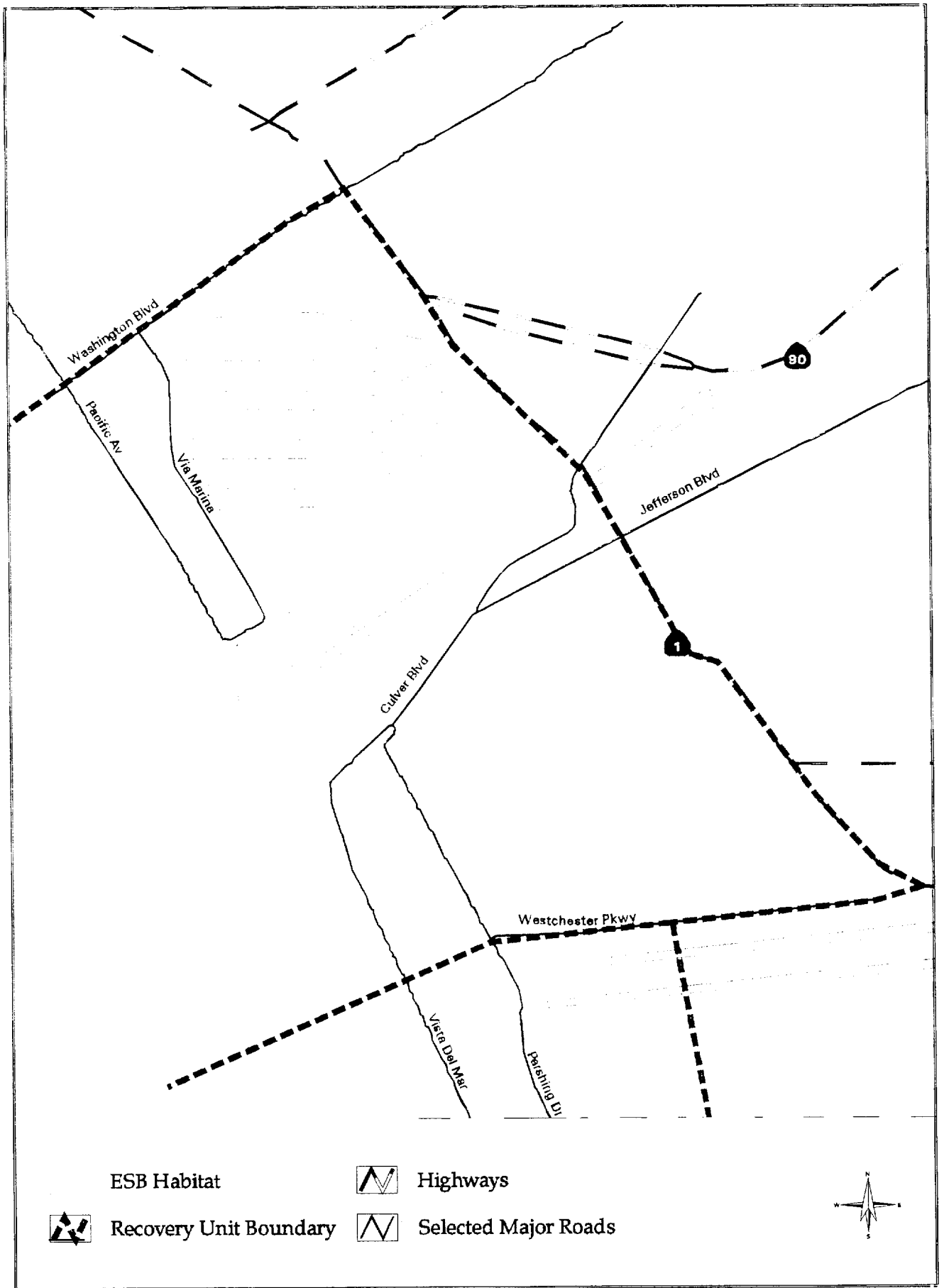


Figure 3. Ballona Recovery Unit

plants, including 70 coast buckwheat plants. However, the entire site was significantly altered by activities associated with a lagoon restoration project in 1997 (Goodwin *et al.* 1992; Nagano pers. obs. 1997). The other is a 6-acre (2.4-hectare) occupied sand dune located on the privately owned 950-acre (385-hectare) Ballona Wetlands. A single male was observed on the Ballona Wetlands dunes in 19875 (Mattoni 1992).

Airport Dunes Recovery Unit. The Airport Dunes Recovery Unit is bounded to the north by Culver Boulevard., to the south by Imperial Highway, to the east by Stanmoor Drive and Westchester Parkway south to Main Street and West Imperial Highway, and to the west by the Pacific Ocean (Figure 4). This RU contains the largest undeveloped coastal sand dune habitat remaining in southern California (Powell 1981). The natural resource value of the Airport Dunes is of international significance (Powell 1981, Wells *et al.* 1983). The *occupied* (and potential) *habitat* at the Airport Dunes is bounded by Waterview and Napoleon Avenues to the north, Vista del Mar to the west, Pershing Drive to the east, and West Imperial Highway to the south. In 1993, the Airport Dunes had an estimated population of about 3,300 El Segundo blue butterflies and an estimated 5,000 coast buckwheat plants (Mattoni *et al.* undated). After the initiation of the restoration program, in 1991 the estimated number of animals was 5,000 individuals and there were an estimated 3,358 plants (Mattoni 1992). Although inconsistent survey techniques make population estimates difficult, the Airport Dunes site appears to contain the largest population of the butterfly, and is likely the most resistant site to disease, predators, parasites, and other perturbations over the long term.

Several vernal pools and an ephemeral wetland are located on the Los Angeles International Airport between Pershing Drive and the runways. This area once contained significant numbers of vernal pools (Mattoni and Longcore 1997). The ephemeral wetland is inhabited by the only known population in Los Angeles County of the western spadefoot toad (*Scaphiopus hammondi*), a State of California Species of Special Concern. The vernal pools likely provide habitat for several rare plant and animal species.

El Segundo Recovery Unit. The El Segundo Recovery Unit is bounded by

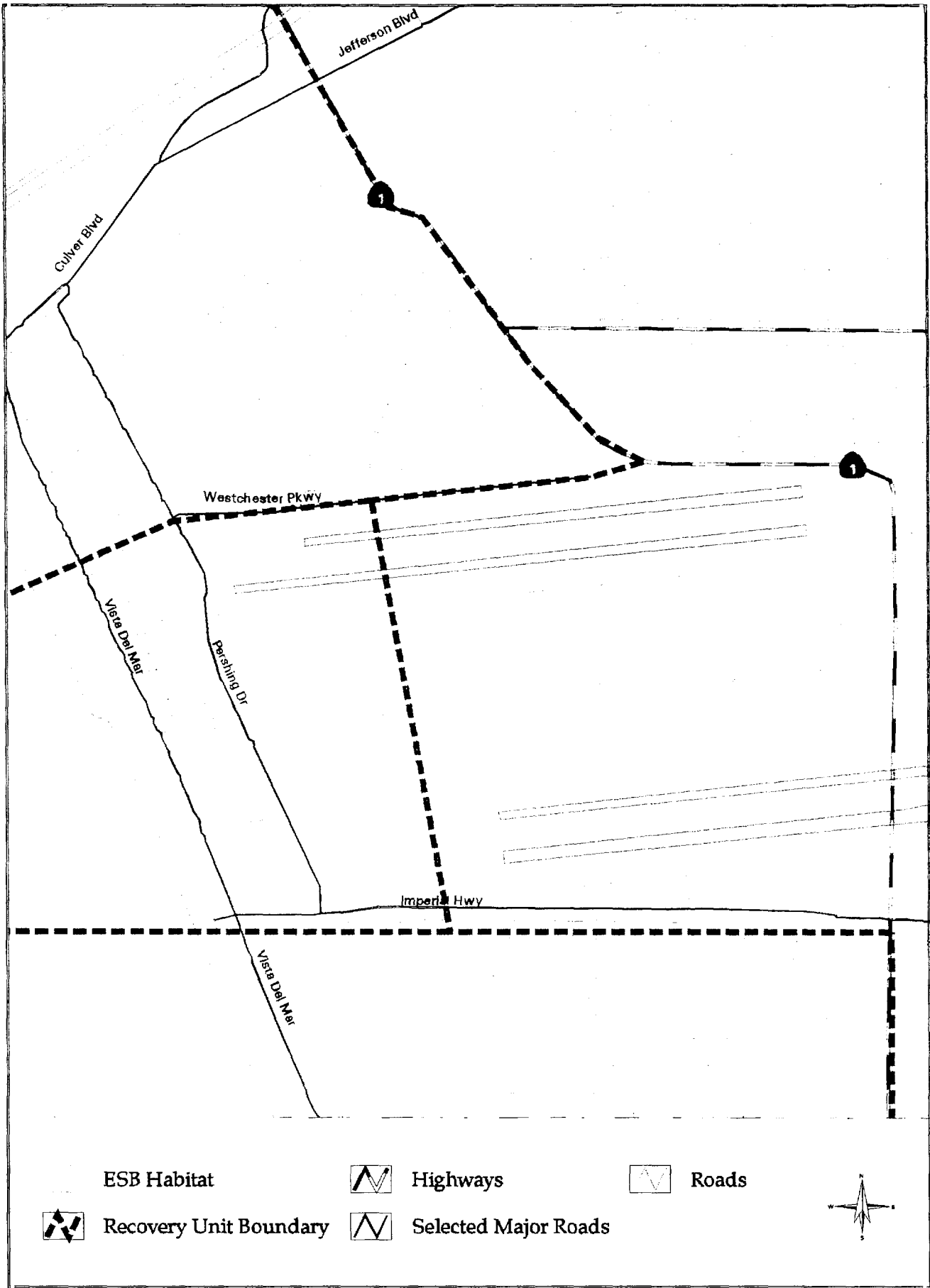


Figure 4. Airport Dunes Recovery Unit

West Imperial Highway to the north, to the south by Avenue H in the City of Torrance, to the east by Sepulveda Boulevard, and to the west by the Pacific Ocean (Figure 5). The known occupied habitat in the El Segundo RU is a 1.6-acre (.65-hectare) sand dune remnant owned and managed by the Chevron Corporation on its refinery located in the City of El Segundo. This site had a population of between 5,000 to 7,000 butterflies and approximately 1,200 coast buckwheat plants in 1996 (Arnold 1997). The native plant diversity of this site is relatively low. Removal of exotic plants, asphalt, planting of a increased diversity of native plants, and transplanting of appropriate native animals would significantly increase the natural value of this site.

A second site, which likely contains occupied habitat, is a 30-acre (12-hectare) sand dune slope located directly east of the Hyperion sewage treatment plant operated by the City of Los Angeles. A single El Segundo blue butterfly was observed in the late 1980's at the remnant sand dune located directly east of the Hyperion sewage treatment plant (Mattoni 1992). The area also is a potential movement corridor for the El Segundo blue butterfly and other wildlife between the Airport Dunes and the Chevron preserve. In 1995, it was extensively planted with non-native vegetation such as acacia (*Acacia redolens*), Torrey pine (*Pinus torreyana*), and myrtle (*Myrica californica*) by the Cities of Los Angeles and El Segundo. The inappropriate exotic landscaping program was the result of an agreement between the Cities of Los Angeles and El Segundo.

Other potential habitats include Dune Park in the City of Manhattan Beach with a 2-acre (.81-hectare) backdune about 1.2 miles (2 kilometers) south of Chevron. Although completely open to public use, areas could be protected and restored. Public school open space of about 1.5 acres (.61 hectare) each in Hermosa Beach and Manhattan Beach are potential restoration sites.

Torrance Recovery Unit. The Torrance Recovery Unit is bordered to the north by Avenue H and the Pacific Coast Highway in the City of Torrance, to the south by a line extending from the intersection of Granvia Altimira and Del Monte in the City of Palos Verdes Estates directly west to the Pacific Ocean, to the east by a line extending from the intersection of Granvia Altimira to the

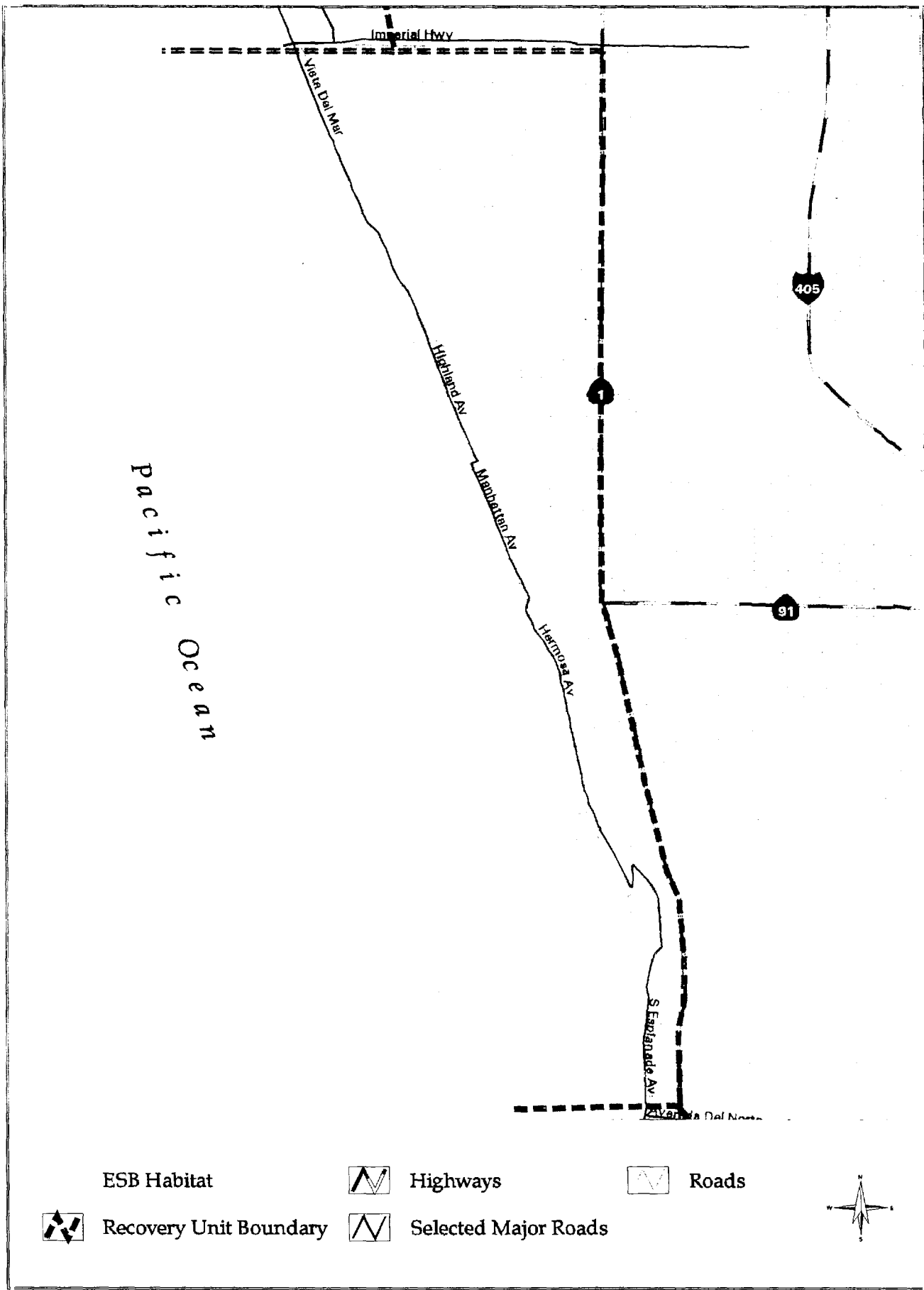


Figure 5. El Segundo Recovery Unit

intersection of Pacific Coast Highway and Palos Verdes Boulevard, and to the west by the Pacific Ocean (Figure 6). There are scattered coast buckwheat plants along the base of the sandstone bluffs between Torrance Beach in Torrance and Smugglers Cove in Palos Verdes Estates. The Malaga Cove population shares common alleles with the Airport Dunes population (Pratt pers. obs). The site containing the largest number of coast buckwheat food plants (Mattoni 1992) was damaged by erosion control measures during the winter of 1994/95 (Nagano pers. obs.). There are other private properties along the base of the bluffs that contain the El Segundo blue butterfly and its coast buckwheat food plant. There has been local interest expressed in protecting the animal and its habitat under conservation agreements.

A sand dune approximately one-half acre (.2 hectare) in size is located in Malaga Canyon about 500 feet (150 meters) northeast of the Palos Verdes Estates City Hall. This site contains potential habitat for the El Segundo blue butterfly, and is inhabited by sand dune obligate species, such as the San Diego horned lizard. An unknown party dumped sand and other waste material on this location in 1997, however, it is still considered potential habitat.

Approximately 5 acres (2 hectares) of potential habitat is located on the south side of the Palos Verdes Country Club Golf Course in the City of Palos Verdes Estates. Gum trees (*Eucalyptus* species) and other non-native plants cover much of this area, but the site could be restored for the El Segundo blue butterfly.

Recovery Strategy

Reducing the threat of extinction of the El Segundo blue butterfly will require 1) working with appropriate landowners and local governments to reserve and enhance the presently occupied habitat; 2) implementing a program to restore lands with the highest potential; and 3) initiating a captive breeding and release program.

Any proposed project that might reduce the size or area of habitat currently and potentially used by the species should be carefully evaluated. Compensation that fully protects and/or restores the El Segundo sand dunes should also be

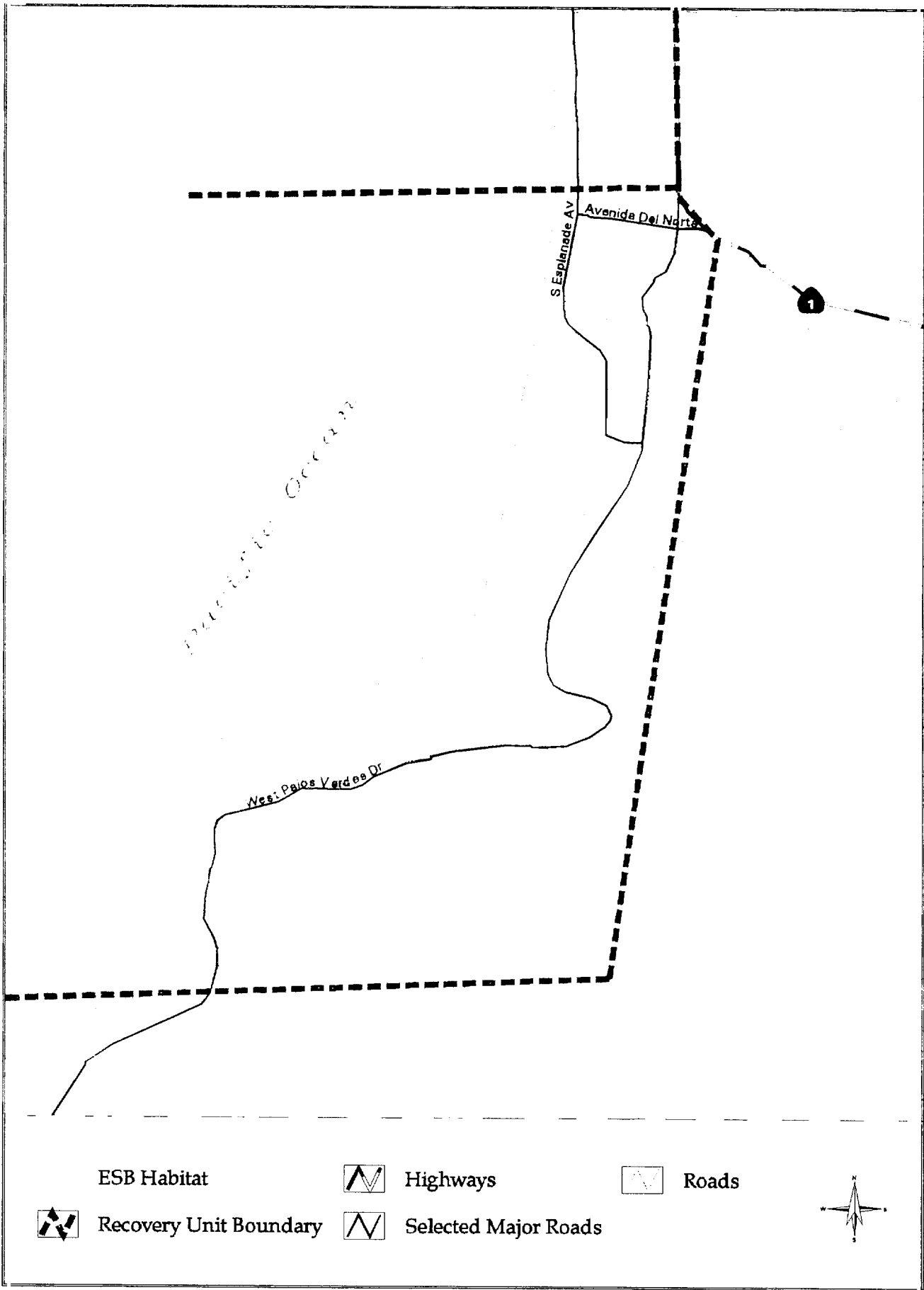


Figure 6. Torrance Recovery Unit

included in the project design. Project proponents should be encouraged to begin working with the Service in the early stages of project design to avoid and minimize project impacts and time delays.

The survival and recovery of the El Segundo blue butterfly is dependent on protection of occupied and potential habitat. Occupied habitat contains individuals of the species and associated habitat used for breeding, feeding, shelter, and/or as a dispersal corridor. Potential habitat consists of areas that contain El Segundo sand dune and are not currently occupied by the animal, but could be managed and restored for the species. Colonization of potential areas by the butterfly would result in increased numbers of individuals, ultimately expanding the number and size of populations until the species reaches the point where it can be downlisted.

Approaches to habitat restoration will vary from simple and predictably successful (in cases of enhancing partially occupied sites that are weed overgrown) to complex, costly and unpredictable (in cases of sites that have been significantly altered from their original state). Isolated sites may require re-introduction of the butterfly. A functional foodweb with many other invertebrate species should be restored around the approximately 50 native plant species that define the native vegetation.

The four Recovery Units (RUs) must be conserved to maintain the species' distribution and its genetic diversity throughout its present range. At least one population in each of the four RUs is needed to reduce the risk of extinction from random events that may affect any one local area. Line transect counts should be conducted at each site to measure the relative population abundance of the butterflies. This method, as described by Gall (1984), Pollard (1977), and Pollard et al. (1986) will provide an estimate of the relative number of adult animals at each site. Such transect counts can be standardized to occupied flowerhead number to estimate total standing populations and longevity can be used to estimate total populations across the seasons (Mattoni et al undated).

With habitat quality varying from one population and RU to another, acreage

needed to sustain *viable populations* also varies from site to site. However, the data needed to determine specific habitat acreage objectives for each RU are not available at this time. Additional data will be needed on reproduction and mortality rates, dispersal, and habitat variables before further refinement of RU boundaries, development of alternative RU designs, and analyses of population viability can be made. Until such data are obtained, the highest priority will be to protect existing populations of the El Segundo blue butterfly. Habitat may be protected through fee acquisitions, conservation easements, and voluntary management agreements.

The next highest need is for a program to augment existing populations and to establish new populations of the El Segundo blue butterfly.

As management plans are started, monitoring El Segundo blue butterfly populations will provide the ultimate test of management effectiveness. Census surveys should be coordinated to extend over the species range whenever possible. Monitoring methods should be applied consistently over a sufficient period, and they should be coupled with a long-term program for management of the species' habitat to evaluate its status. The collection of census data over a period of several years (possibly 8 to 10+ years) will be needed to include the variability of environmental conditions experienced by the species.

As existing populations are protected and managed, emphasis in conservation for the species will shift toward determining whether or not viable populations are being sustained. There will be a need to protect additional habitat if population data indicate that populations are not viable and at high risk for extirpation or extinction.

The El Segundo blue butterfly is sought by some insect collectors. The Service enforces Endangered Species Act prohibitions against take (including collection) and commerce of this species.

Part II. RECOVERY

Objectives and Criteria

The El Segundo blue butterfly can be considered for reclassification to threatened status when:

- 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 that can survive disease, predators, parasites, and other perturbations. Accordingly, the Airport Dunes must be one of the protected populations.
- 2) Each of the four populations are managed to maintain coastal dune habitat dominated by local native species including coast buckwheat.
- 3) As determined by a scientifically credible monitoring 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 s) are maintained at or above 1.0.
- 4) A program is initiated to inform the public about the El Segundo blue butterfly and its habitat.

Stepdown Narrative

1. Protect and restore occupied and suitable habitat in each of the four Recovery Units (Ballona, Airport Dunes, El Segundo, and Torrance).

The recovery of the El Segundo blue butterfly and the associated endemic and rare species inhabiting the El Segundo sand dunes requires a comprehensive program designed to reestablish natural community dynamics (see Part I, Ecosystem Description). The most important requirement for the survival of these species is preventing activities that reduce populations by destroying or damaging El Segundo dunes habitat. Control of invasive exotic pest plants is also of utmost importance.

The Airport Dunes, which comprise all of the known habitat in the Airport RU, are owned by the City of Los Angeles. The Airport Dunes must be permanently protected and managed in order for downlisting of the El Segundo blue butterfly to take place. Management of the Airport Dunes must include removal of exotic invasive plants, and removal of exotic animals, such as the red fox.

The recovery actions enumerated below may be carried out jointly, or individually within each RU, depending upon funding and local participation.

1.1 Map habitat areas.

Occupied and potential habitat in the RUs must be mapped through time to show trends in key parameters. Mapping and habitat analysis may be expedited by using a Geographic Information System (GIS). The data will also be provided to the Natural Diversity Data Base of the California Department of Fish and Game. Mapping of habitat suitable for this animal is for management, not regulatory, purposes.

1.2 Determine willingness of landowners to participate in recovery of the El Segundo blue butterfly.

Ownership information will be compiled for occupied and potential habitat areas. Landowners will be contacted by the Service and queried as to their interest in participating in the recovery of the El Segundo blue butterfly.

1.3 Protect habitats identified in 1.2.

To achieve downlisting, areas containing occupied and/or potential habitat need to be evaluated relative to the extent of distribution patterns necessary to support secure populations (see task 2). Sites to be protected should be selected based on habitat needs of adults and early stages, and willingness of landowners to participate in recovery efforts. Determination of the best possible sites for restoration and reintroduction may require intensive and long-term fieldwork.

Mechanisms for protecting a sufficient amount of habitat within the RUs must be selected individually for each parcel. The methods used will depend to a great extent upon the willingness of the landowners and management needs of the habitat. In general, habitat needed for breeding, feeding, and/or the development of early stages should be acquired in fee. Habitat protection must be permanent and may involve acquisition of fee title, conservation easements, and/or *habitat conservation plans* by Federal, State, or local governments, or appropriate non-profit conservation organizations. Dispersal corridors should be permanently protected through easements and voluntary management agreements. Voluntary management agreements should include a description of each entity's commitment and role in the recovery of the El Segundo blue butterfly.

1.4 Develop management plan for habitats protected in 1.3.

Each protected location needs a site-specific plan to address habitat management needs and threats to the habitat or population. Habitat restoration may figure prominently in management plans, particularly in areas where butterfly populations have been extirpated or reduced. Each plan should set site-specific management goals and specify how and when to achieve those goals, identifying funding sources. The management plan should be coupled with a monitoring plan (see task 3). Management plans should be reviewed periodically, or after significant changes in threats, management, research, or status of the species occur, and revised as appropriate.

1.5 Implement management plans developed in 1.4.

Although implementation will vary depending on the plan, the major components to be addressed in management are as follows:

1.5.1 Enhance occupied sites.

Habitat enhancement within occupied or partially occupied sites involves removal of non-native weeds—such as iceplant, acacia, tumbleweed, mustard, horehound, and grasses—that invade the dune habitat, crowding out nectar plants and native vegetation needed by the butterfly. Techniques used to remove the non-native species should be selected to avoid harming the butterfly and associated native ecosystem components. Following weed removal, revegetation with native species may be required (see below). Trampling of the substrate should be minimize during habitat enhancement activities. Enhancement should be prioritized and coordinated both within and among Recovery Units.

1.5.2 Restore sites with potential habitat.

Potential habitat across most of the RUs has a history of degradation from a variety of land uses. Restoration usually will take several years. For most of the unoccupied sites, state-of-the-art revegetation techniques should be implemented to establish appropriate, local ecotype native plants. Complete restoration may require re-introducing some minimum assemblage of invertebrates that cannot be expected to migrate naturally to these areas.

1.5.3 Determine effects of selected management methods on habitat needs of non-target species.

The remaining El Segundo sand dunes inhabited by the El Segundo blue butterfly harbor a unique assemblage of endemic and rare species, including the El Segundo spineflower, El Segundo goat moth, Ford's sand dune moth, El Segundo scythrid moth, El Segundo Jerusalem cricket, Belkin's dune fly, San Diego horned lizard, California legless lizard, and burrowing owl. Habitat requirements of these species, and the effects of management for the El Segundo blue butterfly, will be studied so that detrimental impacts can be avoided and minimized.

2. Determine ecological requirements, population constraints and management needs of the El Segundo blue butterfly.

To ensure survival and recovery of the El Segundo blue butterfly, the following studies and management actions should be undertaken:

2.1 Refine understanding of habitat requirements of the El Segundo blue butterfly for the purposes of conservation planning.

A better understanding of the animal's ecological requirements will facilitate development of recovery actions and site-specific plans.

2.1.1 Clarify the extent and condition of habitat areas necessary to provide for development of the early stages, breeding, nectaring, and shelter by the El Segundo blue butterfly.

Habitat areas that support the El Segundo blue butterfly need to be identified. The environmental correlates of butterfly distribution and abundance, considering soil type, vegetation composition and structure, and historical management need to be determined. The ecology, including distribution and habitat requirements of the egg, pupa, and especially the larva need to be determined.

2.1.2 Identify dispersal patterns (distances, direction, habitat needs) of the El Segundo blue butterfly.

Dispersal patterns of adults need to be analyzed, using direct observation to identify dispersal routes between habitat areas. The length, width, and structural characteristics of routes likely to be used by most dispersing individuals should be determined. Field observations and not mark-recapture should be utilized due to the extremely fragile nature of the animals (Murphy 1989; Singer and Wedlake 1981; Thomas 1983).

2.1.3 Clarify the ecological relationship between ants and the early stages of the El Segundo blue butterfly.

At least two species of ants have been observed to "tend" the larvae of the El Segundo blue butterfly. The ecological relationship between these animals, as well as

the biological requirements of the ants, need to be determined.

3. Determine methods of introducing butterflies to augment extant populations or into potential habitat.

Reintroduction and population augmentation are essential to the recovery of the El Segundo blue butterfly. Techniques must be developed to successfully introduce animals to augment extant populations or into sites with restorable habitat and willing landowners. Neither reintroduction nor augmentation is an appropriate means of mitigating habitat loss because the animal's prospects for recovery are already severely limited by lack of habitat.

3.1 Determine methods for captive breeding and rearing of the El Segundo blue butterfly.

Techniques for successful captive breeding and rearing of the El Segundo blue butterfly should be perfected. Both natural and artificial diets would be tested. Care should be taken to avoid artificial selection for traits that reduce the ability of captive bred animals to survive in the wild.

3.2 Determine methods for the release of propagated El Segundo blue butterflies into restored or unoccupied habitat.

Variables to be considered include optimal season, life stage, numbers, and placement methods for release. Handling and transportation techniques should be carefully designed to minimize mortality.

3.3 Identify specific locations for reintroductions.

Specific locations of suitable habitat within each RU should be

identified as possible reintroduction sites for El Segundo blue butterflies.

3.4 Implement captive propagation and release of El Segundo blue butterflies, as appropriate.

To meet recovery objectives, captive bred animals should be introduced to sites with suitable habitat owned by willing parties. Augmentation of existing populations may also be necessary.

3.4.1 Implement a captive propagation program.

Methods perfected in task 3.1 should be used to establish an ongoing captive propagation program. Ideally, this program would be conducted at a minimum of two facilities, to decrease the possibility of accidental loss of the entire captive population. Sizes of captive colonies and percent of various life stages to be maintained will be based on the results of task 3.1 and the demand for population augmentation or reintroduction. The presence of individuals in captivity does not substitute for their maintenance in the wild.

3.4.2 Implement reintroduction program, if appropriate.

Methods developed in task 3.2 will be used to reintroduce individuals to sites determined in task 3.3. Reintroductions should be conducted over at least a 3-year period at each site to increase the probability of population establishment.

4. Monitor the status of the El Segundo blue butterfly and its habitat.

The purpose of monitoring is to track the status (distribution and

abundance) of the species and progress toward recovery objectives. Because the El Segundo blue butterfly inhabits sand dune habitat that can change rapidly, the results of habitat management actions should also be tracked. Parameters need to be selected, methods and techniques determined, and a plan developed and implemented.

4.1 Develop monitoring guidelines and techniques for tracking population status and habitat trends.

Population monitoring should: 1) have an acceptable level of accuracy, 2) be repeatable over time and among observers, and 3) have a low impact on the butterfly and its habitat.

Monitoring guidelines should specify equipment, the frequency and timing of the monitoring activity, and skills and experience needed by observers collecting data.

Standard transects for monitoring adults should be established at each of the four RUs. The transects should be operated each flight season to determine long-term population trends in the El Segundo blue butterfly.

Standardized records must be maintained of all management actions, including a description of what was done, where, and when. This information will be important in helping to evaluate the effectiveness of management actions and in accurate implementation of management plans.

4.2 Develop a monitoring program for each population.

Monitoring programs for each known population will conform to the guidelines developed in task 4.1. Slight variations in techniques may be required at each site to accommodate local conditions, but above all, techniques will be consistent so that results among sites are comparable. Monitoring protocols

should be developed for each site within each of the recovery units that has a current population or any ongoing habitat restoration project. Although the development of monitoring programs is not considered a separate task for each RU, these programs may be developed individually, depending on priority and/or local interest.

The monitoring program will describe the specific methods for each site, how and when it will be implemented, where data will be stored, and what personnel will be involved. The programs should be reviewed and updated every 3 years or as new information and/or modifications are made to the program. Efforts must be made to coordinate monitoring between sites to maximize their usefulness.

4.3 Implement a monitoring program for each RU.

Data gathered will be used to evaluate the effectiveness of management activities and to track recovery and population trends of the El Segundo blue butterfly. The reports, original field notes, photographs, and all associated material should be provided to the Service. Copies of all reports should be provided to the California Department of Fish and Game Natural Diversity Data Base. Although the implementation of monitoring programs is not considered a separate task for each RU, monitoring may be implemented individually for each RU, depending on priority and/or local interest.

Data should be gathered according to the methods outlined in the monitoring program. Any deviation from the program should be noted. Data should be reviewed annually and summarized in the report. A summary of monitoring efforts should be compiled annually and provided to Federal and State agencies for further review and assessment of populations and habitat status. Any new threats to the species should be identified.

5. Coordinate with the public.

Coordination with the public is particularly important for recovery of the El Segundo blue butterfly. Coordination should be done in order to reduce take, provide information about the animal, and foster partnerships with landowners.

5.1 Conduct public outreach.

Public outreach efforts should focus on the unique and vanishing ecosystem that the El Segundo blue butterfly represents. Two programs, one targeting elementary and middle school-age children and the other targeting high school through adults, should be prepared and presented at schools and other local venues. Additionally, a publicity program to contact both landowners and local governments and inform them of the presence of the butterfly and the positive steps they can take to protect and preserve it should be developed. Finally, public outreach needs to include effective warnings to insect collectors who might be tempted to take specimens in violation of the Endangered Species Act, which provides both criminal and civil penalties.

The volunteer program Rhapsody in Green, which has been successful in protecting two Los Angeles area insects, has a record of promoting public participation and awareness in natural area enhancement. Such volunteer involvement is not only economical, but also establishes a positive public image for the participating organizations. Rhapsody in Green, highly experienced in generating favorable public relations, is willing to establish a grassroots effort for the El Segundo blue butterfly.

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Part III. IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows outlines actions and estimated costs for the El Segundo blue butterfly recovery program, as set forth in this recovery plan. It is a guide for meeting the objectives discussed in Part II of this Plan. This schedule indicates task priority, task numbers, task descriptions, duration of tasks, the agencies responsible for committing funds, and lastly, estimated costs. The organizations responsible for committing funds are not, necessarily, the entities that will carry out the tasks. When more than one agency is listed as the responsible party, an asterisk is used to identify the lead entity.

The actions identified in the implementation schedule, when accomplished, should protect habitat for the species, stabilize the existing populations, and increase the population size and numbers.

Priorities in Column 1 of the following implementation schedule are assigned as follows:

- Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.
- Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for full recovery of the species.

Key to acronyms used in the implementation schedule:

DFG	--	California Department of Fish and Game
FWS	--	U.S. Fish and Wildlife Service, Carlsbad Field Office
LA	--	City of Los Angeles
RIG	--	Rhapsody in Green
TBD	--	To be determined
cont.	--	continuous
intermit.--		Intermittent (once every 5 years)

**RECOVERY PLAN IMPLEMENTATION SCHEDULE
EL SEGUNDO BLUE BUTTERFLY**

Need 1: Protect, restore and manage habitat

Priority #	Task #	Task Description	Task Duration (Years)	Responsible Agencies	Total Estimated Cost (\$1,000's)	Cost (\$1,000's)				
						FY 98	FY 99	FY 00	FY 01	FY 02
1	1.1	Map habitat areas in the four RUs	intermit.	FWS	45	25				
1	1.2	Determine willing landowners	2	FWS	30		15	15		
1	1.3	Protect habitat areas identified in 1.2	cont.	FWS DFG LA TBD	1,047		10	20	67	95
1	1.4	Develop management plans for habitats protected in 1.3	TBD	FWS DFG TBD	145	10	45	45	45	
1	1.5	Implement management plans for all four RUs	2	FWS DFG	58		28	30		
1	1.5.1	Enhance occupied sites (vegetation removal, fencing, remove exotic species, etc)	cont.	FWS DFG LA TBD	523	3	40	40	40	40
1	1.5.2	Restore sites with potential habitat	cont.	TBD	390		30	30	30	30
1	1.5.3	Determine effects of management on habitat needs of non-target species	10	FWS	140	10	10	10	10	10
		Need 1: Subtotal of costs			2,378	48	178	190	192	175

Need 2: Determine species requirements

Priority #	Task #	Task Description	Task Duration (Years)	Responsible Agencies	Total Estimated Cost (\$1,000's)	Cost (\$1,000's)				
						FY 98	FY 99	FY 00	FY 01	FY 02
1	2.1.1	Determine ecological requirements for the El Segundo blue butterfly	4	FWS	70	10	20	20	20	
1	2.1.2	Determine dispersal patterns and movement corridors for the El Segundo blue butterfly	4	FWS	38	10	10	10	8	
		Need 2: Subtotal of costs			108	20	30	30	28	0

**RECOVERY PLAN IMPLEMENTATION SCHEDULE
EL SEGUNDO BLUE BUTTERFLY**

Need 3: Captive propagation and introduction of animals to suitable locations

Priority #	Task #	Task Description	Task Duration (Years)	Responsible Agencies	Total Estimated Cost (\$1,000's)	Cost (\$1,000's)				
						FY 98	FY 99	FY 00	FY 01	FY 02
1	3.1	Develop captive rearing techniques	2	FWS	45	25	20			
1	3.2	Determine methods for the release of captive propagated animals	3	FWS	40			10	15	15
1	3.3	Identify specific locations for reintroductions	5	FWS TBD	160	50	50	20	20	20
1	3.4.1	Implement captive rearing program	cont.	FWS	240			20	20	20
1	3.4.2	Implement release program	cont.	FWS	275				25	25
		Need 3: Subtotal of costs			760	75	70	50	80	80

Need 4: Monitor Populations

Priority #	Task #	Task Description	Task Duration (Years)	Responsible Agencies	Total Estimated Cost (\$1,000's)	Cost (\$1,000's)				
						FY 98	FY 99	FY 00	FY 01	FY 02
2	4.1	Develop population and habitat monitoring guidelines	1	FWS DFG	5	5				
2	4.2	Develop individual monitoring programs for each population	2	FWS DFG	15	5	10			
2	4.3	Implement monitoring programs for each RU	cont.	FWS DFG	540			45	45	45
		Need 4: Subtotal of costs			560	10	10	45	45	45

**RECOVERY PLAN IMPLEMENTATION SCHEDULE
EL SEGUNDO BLUE BUTTERFLY**

Need 5: Coordinate with Public

Priority #	Task #	Task Description	Task Duration (Years)	Responsible Agencies	Total Estimated Cost (\$1,000's)	Cost (\$1,000's)				
						FY 98	FY 99	FY 00	FY 01	FY 02
2	5.1	Conduct public outreach	cont.	FWS DFG RIG	630	45	45	45	45	45
		Need 5: Subtotal of costs			630	45	45	45	45	45
		TOTAL COST			4,436	198	333	360	390	345

APPENDIX A

Glossary

allozymes: A form of protein coded by a particular allele at a single gene locus.

complete metamorphosis: Undergoing a four stage metamorphosis (egg, larva, pupa, and adult) and exhibiting dramatic changes in body form and habits at each stage.

crypsis: Camouflaged.

diapause: A period of physiologically enforced dormancy, i.e., developmental arrest in an insect between periods of activity.

discal: An area in the center of each butterfly wing.

edaphic: Relating to soil conditions.

emergence: Exit of an adult insect from an immature stage. Compare with hatching.

endemic: Confined to a specific geographic area and found nowhere else.

eversible: Capable of being turned outward or inside out.

extinction: The complete disappearance or death of species from its total range. Compare with extirpation.

extirpation: The disappearance of a species from a particular area but not the total range. Compare with extinction.

food plants: The plant(s) fed upon by the larvae stage of a butterfly or moth (can also apply to early stage and adults of other non-lepidopterous insects).

Habitat Conservation Plan (HCP): A plan developed for the management of lands specific to meeting Federal requirements for obtaining an incidental take permit pursuant to section 10(a) of the Endangered Species Act of 1973, as amended.

hatching: Exit of an immature insect from the egg stage. Compare with emergence.

herbivory: Relating to an animal that feeds on living plant material.

hindwing: The rear wing of a butterfly.

imago: An insect in its sexually mature adult-and usually winged-stage.

instar: The immature insect between molts during development.

involucres: The bracts (leaf-like structures) at the base of a flower.

lambda: A means of expressing the growth or decline in a population. A value greater than 1.0 indicates an increasing population.

larva (plural=larvae): The immature and wingless form that hatches from the egg of a holometabolous insect and that will eventually transform into a pupa, prior to reaching adulthood.

lee deflation plain: The area located immediately behind the dunes.

littoral: Pertaining to the shore of a lake, sea, or ocean.

management plan: A plan developed for the conservation and management of a species or ecosystem. Conservation measures specified in a management plan generally include but are not limited to habitat protection, habitat management, and land use practices, but may include additional measures or methods of conservation, such as artificial propagation.

mandibles: The first of the paired mouth appendages in insects and other arthropods; usually jaw-like (in chewing forms) or needle-like (in sucking forms).

metamorphosis: A series of marked and more or less abrupt changes in the form of a developing insect.

myrmecophilous: An organism that is closely associated or dependant upon ants for some or all aspects of its ecology or biology.

occupied habitat: Areas that contain the early stages and/or adults of the El Segundo blue butterfly and/or movement corridors for the species.

oviposition: Egg laying

ovipositor: An organ used by insects for depositing eggs in a place suitable for their development.

parasite: An organism that lives on or in another organism obtaining food, but not killing its host. Compare with parasitoid.

parasitoid: A parasite that eventually kills its host.

perturbations: Changes in the state of a situation or organism.

polymorphic: Existence of varied body forms among individuals of a given species.

polytypic: A species with several subspecies.

population: A group of individuals at a given locality which interbreed when mature.

potential habitat: Areas containing coastal dunes with habitat components that are not currently occupied by the El Segundo blue butterfly and/or areas

that could be feasibly managed for the El Segundo blue butterfly.

proboscis: Elongate, often extensible, mouthparts of insects that take liquid food.

pupa (plural=pupae): An intermediate, usually quiescent, stage in the life cycle of a holometabolous insect in which the insect is usually enclosed in a hardened cuticle (chrysalis or puparium) or in a cocoon and from which the adult will eventually emerge.

pupated: Relating to an insect that has formed its pupae.

(minimum) viable population: A threshold level at which the population has a reasonable chance of survival or sustainability over time.

senesced: Grown old, usually no longer capable of reproduction.

APPENDIX B

Historical photographs of the Airport Dunes area

All historical photographs are courtesy of Rudy Mattoni
from the Los Angeles International Airport Archives



Figure 7. Airport Dunes looking south from the mouth of Ballona Creek/Playa del Rey to the large open area behind the dunes which is now Westchester and Los Angeles International Airport. The El Segundo sand dunes formerly extended west to the high tide mark. Photograph taken circa 1930's.



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Figure 8. Airport Dunes looking from the City of El Segundo north to the Santa Monica Mountains. The El Segundo sand dunes are located in the left side of the picture. Substantial sand dunes are visible in the lower left corner of the photograph. This is currently a heavily developed residential neighborhood in the City of Manhattan Beach. The coastal prairie, an extinct community, extended from just east of the El Segundo sand dunes inland to the Inglewood area. Vernal pools and the extinct El Segundo flower-loving fly were found on the coastal prairie. Photograph taken circa 1930's.



Figure 9. Airport Dunes looking south from Westchester south to the City of El Segundo. Residential development has occurred on most of the El Segundo sand dunes. Development of the coastal prairie east of the dunes is underway. Photograph taken circa 1950's.



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Figure 10. Airport Dunes looking north from the Hyperion treatment plant north to the Santa Monica Mountains. The homes on the Airport Dunes have been removed, Pershing Drive has been extended through the coastal prairie, and the Los Angeles Airport was in the process of expanding the Los Angeles International Airport. Today, nearly all of the habitat located east of Pershing Drive has been eliminated by development. Photograph taken circa 1975 by the Los Angeles Department of Airports.



Figure 11. Back dunes of the Airport Dunes taken from the corner of Imperial Boulevard and Pershing Drive. Photograph taken in 1939.



Figure 12. Back dunes of the Airport Dunes taken from the corner of Imperial Boulevard and Pershing Drive. The construction of Pershing Drive and the Los Angeles International Airport has eliminated the coastal prairie, a habitat that is now extinct. Photograph taken in 1989.

APPENDIX C

Summary of Comments

On September 30, 1997, the Service released the Draft Recovery Plan for the El Segundo blue butterfly for a 90-day comment period that ended on December 29, 1997, for Federal agencies, State and local governments, and members of the public (62 FR 51124). The Service sent letters to 98 experts on the El Segundo blue butterfly, lycaenid butterflies, insect conservation, and/or coastal sand dunes requesting comments on the Draft Recovery Plan. Responses were received from seven of these experts, who provided comments and recommendations on several subjects, including the need to determine the ecological relationship between ants and the early stages of the butterfly, the proposed captive breeding program, and the need for public education.

Comments were also received from 1 Federal agency, 2 State agencies, 2 local agencies, 10 environmental organizations, 2 businesses, 1 elected State official, and 55 private parties. Most of the commenters expressed support for the long term protection of the Airport Dunes, but did not offer specific comments. A number of commenters offered additional information on the threats to the El Segundo blue butterfly, or suggested particular comments or strategies to help recover the species. These comments, where appropriate, have been incorporated into the text of the recovery plan. The Service feels that some comments require fuller response and explanation. To this end we offer the following specific responses to comments.

Issue 1: One commenter suggested the Malga Canyon dune at ½ acre may be too small to support a viable population.

Service Response: Although the Malga Canyon dune is indeed smaller than other areas presently supporting the El Segundo Dune butterfly, we believe all potential habitats should be considered.

Issue 2: The same commenter recommended purchasing land between the Malga

Cove and Airport Dunes to enhance the genetic exchange between the populations.

Service Response: We will explore all opportunities to conserve and enhance the El Segundo Blue butterfly. Future action may include purchasing suitable areas from willing sellers and assisting and advising landowners on techniques to preserve and recover the butterfly on non-Federal property.

Issue 3: One commenter recommended further investigations into the ecological needs of local ants. These ants are closely tied to the recovery of the El Segundo Blue butterfly because they enhance to production and propagation of butterfly larvae.

Service Response: This suggestion has been added to the narrative.

Issue 4: Several commenters suggested captive breeding programs, although useful tools, must be carefully considered and designed. Poorly conceived captive breeding efforts may be detrimental to the recovery of the butterfly by decreasing the genetic variability of the wild population.

Service Response: We concur that poorly designed captive breeding programs have the potential to harm recovery efforts. As a result, the narrative has been changed to recognize this possibility and that care should be taken to avoid artificial selection for traits that reduce the ability of captive bred animals to survive in the wild.

Issue 5: Several commenters suggested the figures were inadequate.

Service Response: Figures have been redrafted to enhance their clarity and usefulness.

Issue 6: One commenter noted that specific strategies to combat damage to the butterflies and their habitats from off-road vehicles and over collecting was not addressed in the plan.

Service Response: Although specific strategies are not discussed, we anticipated that public education and outreach will help alleviate these threats. Furthermore, some areas, (e.g., LAWA, Chevron properties), have been fenced which excludes off-road vehicles and over collecting. If outreach proves ineffective, other methods will be considered.

Issue 7: Several commenters questioned the basis in the draft recovery plan for requiring 10,000 individuals in each of four recovery units prior to delisting the species. Similarly other commenters offered suggestions regarding appropriate measures to determine population trends.

Service Response: We have reevaluated this recovery criteria and concluded that it is more appropriate to base the success of the recovery effort on statistically significant upward population trends rather than a specific number of individuals. This change is reflected in the text of the Final Recovery Plan.

Issue 8: Two commenters suggested revisions or clarification of the taxonomic description of the species in the plan.

Service Response: We use the best available scientific information to produce recovery plans. As with many technical areas, taxonomists and systematists often disagree and taxa often undergo periodic revisions. Some past taxonomic concepts have been incorporated in the text to give readers a history of these discussions. However, in our opinion, this Plan reflects our current knowledge of the taxonomic status of the El Segundo Blue butterfly. Should future taxonomic or genetic analyses produce new information which substantially revises our knowledge of the systematics of the species, we will reevaluate and revise the plan as appropriate.

Although additional genetic work may clarify the relationship among El Segundo Blue butterflies and other taxa of the genus *Euphilotes*, we do not believe such research will change the need to conserve and protect the taxon. Therefore, genetic research, although encouraged, is not a high priority in this plan.

Issue 9: One commenter recommended identifying ongoing activities in the stepdown narrative.

Service Response: The stepdown narrative is a comprehensive, broad-scale identification of activities we believe, when fully implemented and completed will lead to the recovery of the species. It may contain some activities, (e.g., mapping, noxious vegetation control, and outreach programs) which are ongoing. However, it is intended to be a brief summary of the necessary actions and not meant to detail ongoing activities.

Issue 10: One commenter recommended focusing recovery efforts on areas that have not received conservation and recovery efforts in the past, (e.g, areas other than Los Angeles International Airport (LAX) and the Chevron properties).

Service Response: We acknowledge extensive efforts by several groups, including Chevron and LAX in the past. However, all four recovery units must be considered and managed to fully recover the species. As some populations are stabilized and secured, efforts can be focused on other recovery units. The Plan does not apportion recovery effort among the recovery units.

Issue 11: One commenter recommended that a single population center not be the basis for the species preservation.

Service Response: We concur. As a result four separate Recovery Units have been identified.

Issue 12: One commenter requested verification of information and copies of documents for specific points throughout the Recovery Plan.

Service Response: We use the best available scientific information develop recovery plans. Whenever possible, peer reviewed scientific publications are the basis for our conclusions. In some instances when little or no peer reviewed information exists, we base our recommendations on the professional opinion of recognized experts pertinent to the issue at hand. We have included additional

citations where appropriate in the Final Recovery Plan. The complete administrative record used to develop the plan is available for inspection at the Carlsbad Fish and Wildlife Office.

Issue 13: One commenter suggested when all identified recovery objectives in the Plan are met, the species should be delisted rather than downlisted.

Service Response: The Recovery Objective is to downlist the species to threatened. When crafting the plan, we determined that insufficient information is available to establish delisting criteria. At the time the species is downlisted we hope more information will be available and that further analysis will allow us to determine requirements to delist the species.

Issue 14: One commenter suggested that extensive efforts by Los Angeles World Airports (LAWA) to control acacia and iceplant have ameliorated the loss of El Segundo Blue butterfly habitat in the area.

Service Response: We respectfully disagree. Although we acknowledge extensive efforts by LAWA to control non-native vegetation, El Segundo Blue butterfly habitat in the area remains degraded. Future efforts will be needed to secure the area as El Segundo Blue butterfly habitat.

Issue 15: One commenter suggested that the Ballona wetlands are not suitable habitat for El Segundo Blue butterflies.

Service Response: Although only a single individual was observed at the site in 1985, we believe the area has attributes that with proper management, may allow the establishment and viability of a population of El Segundo Blue butterflies.

Issue 16: One commenter suggested that red foxes predation will make successful translocation of butterflies unlikely.

Service Response: To our knowledge, fox predation upon El Segundo Blue butterfly is not an issue.

Issue 17: One commenter suggested that the need to obtain additional data on reproduction, mortality rates, dispersal, and other habitat variables conflicts with need to minimize handling of the butterflies as stated in the plan.

Service Response: The desire to gather information on rare species is often in conflict with the need to protect remaining individuals. We will review any application for a permit to assist in the recovery of the species and weigh the benefits and potential detriments to the species when deciding the desirability of issuing said permit.

Issue 18: One commenter suggested successful habitat restoration indicates additional studies on the life history and ecology of the El Segundo Blue butterfly are not needed.

Service Response: Though some successful restoration efforts may have helped in the recovery of the species, additional efforts are needed. As more information on the life history and ecological needs of the species is obtained these recovery efforts are more likely to be successful.

Issue 19: One commenter questioned the need to reintroduce some minimum assemblage of invertebrates.

Service Response: The El Segundo Blue butterfly is but one part of a complex natural ecological community. We believe if all components of the community are in place, recovery efforts will be more likely to succeed and require less human intervention.

Issue 20: One commenter objected to the singling out of a single volunteer program.

Service Response: We commend all volunteers and programs that are working toward the recovery of the El Segundo Blue butterfly. Nevertheless, one program has made a commitment to assist in public outreach efforts. As such, it is included in the Implementation schedule and thus identified in the Recovery Plan.

Issue 21: Several commenters recommended additional detail on specific items such as proposed regulations protecting habitat, techniques for estimating population growth rates, restoration methods, and outreach programs. Similarly, one commenter recommended the Implementation Schedule identify all responsible agencies along with estimated costs broken down to each of the identified agencies.

Service Response: Although we strive to provide detail, when possible and appropriate, as our limited knowledge of the species often preclude specific recommendations. As our knowledge of the El Segundo Blue butterfly grows, our recommendations may become more specific. As stated in the disclaimer, Recovery Plans do not obligate other parties to undertake specific tasks and may not represent the views nor the official positions or approval of any individuals or agencies involved in the plan formulation, other than ourselves. Furthermore, the Implementation Schedule is offered as a guide. At the time of plan development, we identify responsible agencies and estimate implementation costs to the best of our abilities. Costs indicated for task implementation and/or time of achievement of recovery are estimates and subject to change. We will evaluate the details of specific action items in cooperation with land owners, funding agencies, species experts, and other responsible parties as they are proposed.

Issue 22: Many commenters wrote in support of the plan but opposed a purported expansion the North Runway Complex at LAX due to the potential destruction of El Segundo Blue butterfly habitat.

Service Response: Although the Recovery Plan addresses threats to the continued existence of the El Segundo Blue butterfly, it is an advisory document only. As such it cannot mandate actions which will correct past or avoid future disturbances. Furthermore, in their comments on the Draft Recovery Plan, LAWA stated they

"... made a decision early in the Master Plan process not to extend the runway through the Dunes habitat. Of the four alternatives being considered, no alternative extends runways through ESB habitat. One

alternative involves a physical intrusion onto the Dunes of graded areas associated with the end of a runway. The alternative is under active review for elimination from LAX 2015 Expansion Master Plan."

Any public comments on the proposed alternatives are more appropriately addressed directly to LAWA than in this document.

Issue 23: One commenter recommended studies on the impacts of jet exhaust, noise, vibration, and electromagnetic fields on the El Segundo Blue butterfly.

Service Response: Recommended studies in the Recovery Plan addresses the most likely limiting factors to the species which the above are not believed to be. We welcome any data or information available indicating jet exhaust, noise, vibration, and electromagnetic fields as limiting El Segundo Blue butterflies.

Issue 24: One commenter recommended the goals of the public outreach program should be identified in the plan.

Service Response: Refer to section 5 of the step down narrative.

Issue 25: One commenter recommended the cost savings attributable to volunteer efforts be included in the Plan.

Service Response: We concur that volunteer participation can offer significant savings when implementing recovery actions. However, until all volunteer efforts are tabulated and completed, we find it difficult to accurately estimate their value. Nevertheless, we believe future outreach efforts should educate the public on the cost savings associated with volunteerism.

Issue 26: One commenter stated that the recovery costs were overestimated.

Service Response: Recovery cost estimates are based on our past experiences and expected future expenses. We welcome any reliable information that will allow use to produce more reliable cost estimates.

Issue 27: One commenter recommended that an estimate be made of the amount of land required for the long term survival of the butterfly will be useful to land planners.

Service Response: We concur that estimates of land necessary to ensure the long term viability of the butterfly are desirable. Unfortunately, due to our limited knowledge of the species, any such estimate would be premature. However when Section 2 of the step down narrative, *Determine ecological requirements, population constraints and management needs of the El Segundo Blue butterfly*, is completed, we may be better able to accurately estimate the needs of the species.

Issue 28: One commenter recommended the outreach program include a publicity program to contact both landowners and local governments and inform them of the presence of the butterfly and the positive steps they can take to protect and preserve it.

Service Response: We concur. We have amended section 5 of the step down narrative to reflect this consideration.

Issue 29: One commenter suggested the list of species that are endemic to, or of limited distribution within, the El Segundo sand dunes is misleading because several are widely distributed. The commenter further recommended all references to undescribed taxa be removed from the Plan.

Service Response: Although several species identified, (e.g., burrowing owl), are indeed widely distributed, they are nonetheless rare. In several instances we suspect that their populations are imperiled. Nevertheless, we concur that the wording may be confusing. Therefore, we have amended the sentence to include the phrase, "endemic, rare, or of limited distribution." We respectfully disagree that species not formally described in the scientific literature should be edited from the Plan. Often these new species are endemic and particularly vulnerable. When reasonable, we believe it is important to recognize their existence and distribution. As the scientific community reviews their status we will reevaluate the appropriateness of including them in revisions to the Plan.

Issue 30: One commenter disagreed with the Service's contention that habitat destruction and exotic plants pose a significant threat to the population at Malaga Cove.

Service Response: We respectfully disagree. Based on our knowledge of past practices in southern California as well as the area in particular we believe development is a threat to the location. Furthermore, non-native plants continue to pose a problem at Malaga Cove.

Issue 31: One commenter stated that contrary to the Draft Recovery Plan, vernal pools do not exist between Pershing Drive and the Los Angeles International Airport runways.

Service Response: We respectfully disagree. During site visits to the area, our biologists located vernal pools in the area. In fact, recent surveys by consultants to LAWA found fairy shrimp cysts in soil samples from the pools. Fairy shrimp are typically associated with vernal pools.

Issue 32: Two commenters suggested that the information provided for the Airport Dunes Recovery unit did not include some quantitative information documented for other Recovery Units.

Service Response: Although the Airport Dunes have been intensively studied over the years, it has not always been surveyed or studied by the same researchers or using similar methods. As a result, it is inappropriate to compare all elements of the data collected on the site through time. This precludes our estimation of some parameters addressed on other recovery units. Nevertheless, information on estimated butterfly population and number of host buckwheat plants are provided.

Issue 33: Two commenters noted that not all available information on El Segundo Blue butterflies was included in the Plan.

Service Response: When preparing recovery plans, we try to be as comprehensive as practicable. However, although we strive to gather all existing information for

the species in question, often similar information is available from more than one source. In these instances it may not be necessary to specifically cite all reports and information available on the species in our possession. We will however, provide citations for all sources specifically refer to in the plan.

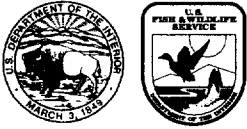
Issue 34: One commenter contended that Malaga Cove is a clayish chalk bluff and contains El Segundo Blue butterflies, thus the species is not restricted to areas of high sand content.

Service Response: We respectfully disagree. Although Malaga Cove may contain some clay layers, it includes significant areas of sand and sandstone. Therefore, we maintain that the statement is not erroneous.

Issue 35: One commenter questioned our statement that the El Segundo sand dunes are the largest coastal sand dune system between the mouth of the Santa Maria River in Santa Barbara County and Ensenada in Mexico.

Service Response: To our knowledge, this statement is correct. However, we welcome any information or documentation that will demonstrate that this statement is in error and help us correct any inaccuracies in the Plan.

**Region 1
U.S. Fish and Wildlife Service
Ecological Services
911 N.E. 11th Avenue
Portland, Oregon 97232-4181**



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