Technical Report
LAX Master Plan EIS/EIR

7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys

January 2001

Prepared for:

Los Angeles World Airports
U.S. Department of Transportation
Federal Aviation Administration

Prepared by:

Sapphos Environmental Inc.

Sapphos Environmental Inc

environmental compliance

resource planning

June 5, 2000

MEMORANDUM FOR THE RECORD
JN 1049-002.M15

TO: Camp, Dresser & McKee
(Ms. Robin Ijams)

FROM: Sapphos Environmental, Inc.
(Dr. Brad Blood and Dr. Irena Mendez)

SUBJECT: Summary of Surveys Conducted in Support of the Los Angeles International Airport 2015 Master Plan EIS/EIR

ATTACHMENTS:

1. Memorandum for the Record (1067-007.M21). Subject: Results of Spring Surveys for Endangered, Threatened, and Sensitive Plant Species in the Master Plan Study Area. Dated May 8, 2000.
2. Memorandum for the Record (1043-010.M05). Subject: 1998-1999 Vegetation Monitoring Report and Schedule for On-Going Maintenance Activities, El Segundo Blue Butterfly Habitat Restoration Area at Los Angeles International Airport, Los Angeles, California. Dated February 28, 2000.
3. Arnold, Richard. Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July, August, and September 1999. Dated October 1999.
4. Memorandum for the Record (1043-010. M03). Subject: Winter Bird Count at El Segundo Dunes 1998/1999. Dated January 4, 1999.
5. Jones and Stokes Associates, Inc. Subject: Final Analysis and Culture of *Streptocephalus* Cysts from Los Angeles International Airport. Prepared for Sapphos Environmental, Inc., 133 Martin Alley, Pasadena, CA 91105. Dated January 1999.
6. Memorandum for the Record (1067-007.M15). Subject: Results of Directed Summer Surveys for Sensitive Amphibians, Reptiles, California Brown Pelican, California Least Tern, and the Endangered El Segundo Blue Butterfly at LAX/El Segundo Dunes. Dated December 21, 1998.

133 Martin Alley
Pasadena
California
91105

Mail
P.O. Box 50241
Pasadena
California
91115

Tel
626/683-3547
Fax
626/683-3548
Email
sapphos@pacbell.net

7. Memorandum for the Record (1043-010.M01). Subject: El Segundo Blue Monitoring Activities for the 1998 Flight Season at Los Angeles International Airport. Dated December 17, 1998.

8. Memoranda for the Record (1067-007.M17 and 1043-008.M08). Subject: Results of Spring Surveys for Gastropods and Arthropods at Los Angeles International Airport in Support of the Los Angeles International Airport 2015 Master Plan EIS/EIR. Dated October 23, 1998.
9. Memorandum for the Record (1067-007.M16). Subject: 1998 ESB Numbers at LAX El Segundo Dunes. Dated September 25, 1998.
10. Memorandum for the Record (1043-008.M06). Subject: Results of Directed Surveys for American Peregrine Falcon, California Least Tern, Southwest Willow Flycatcher, Least Bell's Vireo and Loggerhead Shrike at LAX/El Segundo Dunes. Dated September 8, 1998.
11. Memorandum for the Record (1043-008.M05). Subject: Results of Spring Directed Surveys for Western Spadefoot Toad at LAX/El Segundo Dunes in Support of the LAX 2015 Expansion Master Plan Project. Dated July 29, 1998.
12. Regional Environmental Consultants. Subject: Fairy Shrimp Surveys at Los Angeles International Airport. Prepared for Sapphos Environmental, Inc., 50 South Delacey, Suite 210, Pasadena, CA 91105. Dated July 1, 1998.
13. Memorandum for the Record (1067-006.M03). Subject: Preliminary Results of Dry and Wet Season Surveys for Vernal Pool Associated Endangered Species in Support of the Los Angeles International Airport Master Plan EIR/EIS (Fairy Shrimp). Dated June 30, 1998.
14. Memorandum for the Record (1043-008.M02). Subject: Results of Spring Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, April 17 - May 27, 1998. Dated June 15, 1998.
13. Memorandum for the Record (1067-007.M08). Subject: Results of Winter Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, February 5 to 25, 1998. Dated April 9, 1998 (Revised).
14. Memorandum for the Record (1067-007.M07). Subject: Western Spadefoot Toad at LAX. Dated February 23, 1998.
15. Memorandum for the Record (1067-007.M02). Subject: Aircraft Bird Strike Literature Review. Dated February 6, 1998.
16. Memorandum for the Record (1067-007.M01). Subject: Winter Bird Count at El Segundo Dunes. Dated January 29, 1998.
17. Memorandum for the Record (1067-004.M28). Subject: El Segundo Blue Butterfly Habitat Quality Evaluation at the Los Angeles/El Segundo Dunes. Dated January 19, 1998.

18. Memorandum for the Record (1067 005.M04). Subject: Final Report of Pacific Pocket Mouse Survey at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, September 1st to 26th, 1997. Dated January 13, 1998.
19. Arnold, R. A., 1997. "Preliminary Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July and August 1997." Prepared for Sapphos Environmental, Inc., 133 Martin Alley, Pasadena, CA 91105 and U.S. Fish and Wildlife Service, Carlsbad Field Office, 2730 Loker Ave. West, Carlsbad, CA 92008. Dated November 24, 1997.
20. Memorandum for the Record (1043-007.M02). Subject: Wildlife Survey of the Argo Ditch. Dated November 18, 1997.
21. Letter for the record. Subject: Recovery Permit Application 10(a) (1) (A) for On-Going Monitoring and Maintenance at the El Segundo Blue Habitat Restoration Area. Dated June 3, 1997.
22. Memorandum for the Record (1067-003.M14). Subject: Results of 1996 Field Surveys for the El Segundo Blue (ESB) Butterfly at the El Segundo Dunes. Dated December 11, 1996
23. Memorandum for the Record (1043-004.M01). Subject: 1996 ESB Numbers at LAX El Segundo Dunes. Dated October 25, 1996.
24. Memorandum for the Record (1067-001.M23). Subject: 1996 Herpetofauna Surveys at the Los Angeles International Airport. Dated May 23, 1996.
25. Memorandum for the Record (1067-001.M19). Subject: 1996 Breeding Birds of Prey Survey at the Los Angeles International Airport. Dated April 3, 1996.
26. Memorandum for the Record (1043-002.M04). Subject: 1995 Amphibian and Reptile Surveys at the Los Angeles International Airport El Segundo Dunes. Dated March 7, 1996.
27. Memorandum for the Record (1043-002.M07). Subject: 1995 Bird Surveys at the Los Angeles International Airport El Segundo Dunes. Dated March 7, 1996.
28. Memorandum for the Record (1043-002.M08). Subject: 1995 Surveys for the El Segundo Blue Butterfly at the Los Angeles International Airport El Segundo Dunes. Dated March 4, 1996.
29. Tabor, Steve. Baseline Inventory for Small Mammals and Carnivores at the Los Angeles International Airport El Segundo Dunes Restoration Project Site, Los Angeles County, CA. Prepared for Sapphos Environmental, Inc. Dated July 1995.
30. Memorandum for the Record (1043-001.M06). Subject: State of the Dunes and Recommendations for Management. Dated May 3, 1995.

This Memorandum for the Record (MFR) transmits to Los Angeles World Airports (LAWA) a summary of the biological resource surveys conducted in support of the Los Angeles International Airport 2015 Master Plan EIS/EIR, including the results of directed surveys for endangered and threatened species.

General and directed surveys were undertaken for all federally and/or state listed or other sensitive species that have the potential to occur within the Master Plan study boundaries and the Los Angeles/El Segundo Dunes. Memoranda for the Record providing detailed results of these surveys are included with this Memorandum for the Record as attachments, and are listed above.

Federal and State Listed Species

Directed surveys were performed for nine (9) wildlife species and seven (7) plant species with federal or state listing as endangered or threatened.

Directed dry and wet season surveys for the federally listed San Diego fairy shrimp (*Branchinecta sandiegoensis*) and the Riverside fairy shrimp (*Streptocephalus wootoni*) were performed according to USFWS protocol during the Winter/Spring of 1997/1998 (Sapphos Environmental, Inc. 1998). San Diego fairy shrimp was determined absent, however, cysts of Riverside fairy shrimp were identified from nine (9) ephemerally wetted areas at the airport.

Directed surveys for the federally listed El Segundo blue butterfly (*Euphilotes battoicles allyni*) have documented the growth of this species' population at the El Segundo Dunes (Arnold 1997; Sapphos Environmental, Inc. 1996, 1997, 1998, 1999).

Directed surveys for the federally threatened California brown pelican (*Pelecanus occidentalis californicus*), California least tern (*Sterna antillarum browni*), American peregrine falcon (*Falco peregrinus*), southwestern willow fly catcher (*Empidonax extrimus traillii*), and least Bell's vireo (*Vireo belli pusillus*) were conducted between winter 1997 and summer 1998 (Sapphos Environmental, Inc. 1998, 1998).

Directed surveys for the pacific pocket mouse (*Perognathus longimembris pacificus*) were undertaken in September 1997. This species was determined absent from the Master Plan study area (Sapphos Environmental, Inc. 1998). A ground survey for smaller mammals also failed to identify pacific pocket mouse on the Master Plan study area (Tabor, 1995).

Directed surveys for San Diego button-celery (*Eryngium aristulatum var. parishii*) and California orcutt grass (*Orcuttia californica*) were undertaken within all ephemerally wetted areas in late spring/early summer in 1998. These species were determined absent from the Master Plan study area (Sapphos Environmental, Inc. 1998).

Directed surveys for Beach spectacle-pod (*Dithyrea maritima*), Braunton's milk-vetch (*Astragalus brauntonii*), Ventura marsh milk-vetch (*Astragalus pycnostachyus* var. *lanosissimus*), Coastal dunes milk-vetch (*Astragalus tener* var. *titi*) and Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) in 1998. These species were determined absent from the Master Plan study area. Qualitative surveys conducted at the Los Angeles/El Segundo Dunes in 1995, 1996, 1997, 1998, and 1999 also failed to identify these species within the Master Plan study area.

Other Sensitive Species

Directed surveys for sensitive invertebrates were undertaken again in 1998. The USFWS, in the aforementioned letter, identified one species of gastropod, Trask's snail (*Helminthoglypta traski*), a federal species of concern, three (3) insect species of federal concern <<insert B>>, and twelve (12) additional arthropod species (Sapphos Environmental, Inc. 1998).

Directed and general surveys for sensitive amphibians and reptiles were undertaken in 1996 and again in 1998 (Sapphos Environmental, Inc. 1996, 1998). One sensitive amphibian, western spadefoot toad (*Sacaphiopus hammondi*), and two (2) sensitive reptiles silvery legless lizard (*Anniella pulchra*) and San Diego horned lizard (*Phymosoma eownatum blainvillei*) were determined present, only the western spadefoot toad was determined present on the airport airfield.

Several general and directed surveys for birds have been conducted including breeding raptors, and winter and breeding surveys for burrowing owls were located only at the El Segundo Dunes (Sapphos Environmental, Inc. 1996, 1996, 1997, 1998, 1998, 1998).

A general survey for small mammals was performed in 1995 (Tabor. 1995).

Several general and directed surveys were conducted for sensitive plants in spring and summer of 1998. Species searched for include: Los Angeles sunflower (*Helianthus nuttallii ssp. parishii*), southern tarplant (*Hemizonia parryi ssp. australis*), Coulter's goldfields (*Lasthenia glabrata ssp. coulteri*), Aphanisma (*Aphanisma blitoides*), southcoast saltscale (*Atriplex pacifica*), Parish's brittlescale (*Atriplex parishii*), Davidson's saltscale (*Atriplex serenana var. dividsonii*), Sant Barbara morning-glory (*Calystegia sepium ssp. binghamiae*), bright green dudleya (*Dudleya virens*), mud nama (*Nama stenocarpum*), Brand's phacelia (*Phacelia stellaris*), El Segundo duneflower (Pholisma paniculatum), Plummer's mariposa lily (*Calochortus plummerae*), salt spring checkerbloom (*Sidalcea neomexicana*), red sand verbena (*Abronia maritime*), Lewis' evening primrose (*Camissonia lewisii*), San Fernando Valley spineflower (*Chorizanthe parryi var. fernandina*), El Segundo spineflower (*Mucronea californica*), seaside red maids (*Calandrinia maritime*), and Ballona cinquefoil (*Potentilla multijuga*. Three sensitive plant species were determined to be present: Lewis' evening primrose, California spineflower and the El Segundo dune flower.

Should there be any questions regarding the contents of this memorandum, please contact Sapphos Environmental, Inc. (Dr. Brad Blood or Dr. Irena Mendez) at (626) 683-3547.

Sapphos Environmental Inc

environmental compliance

resource planning

May 8, 2000

MEMORANDUM FOR THE RECORD

JN 1067-007.M21

TO:

FROM: Sapphos Environmental (Dr. Irena Mendez)

SUBJECT: Results of Spring Surveys for Endangered, Threatened, and Sensitive Plant Species in the Master Plan Study Area

ATTACHMENTS:

1. 1998 Survey Locations for Sensitive Plant Species
2. Field Notes for Sensitive Plant Surveys
3. Field Notes for Directed Surveys for San Diego Button-Celery and California Orcutt Grass

This Memorandum for the Record (MFR) transmits the results of surveys conducted during the spring and summer of 1998 for endangered, threatened, and sensitive plant species within the LAX 2015 Master Plan Study Area (Study Area). The following species are considered to have potential to occur within the Study Area as a result of a query of the California Natural Diversity Database (CNDDB), and letters of comment received from the U.S. Fish and Wildlife Service (Service) and the California Department of Fish and Game (CDFG) on the Notice of Preparation for the LAX 2015 Master Plan EIS/EIR: San Diego button-celery (*Eryngium aristulatum var. parishii*), Los Angeles sunflower (*Helianthus nuttallii ssp. parishii*), southern tarplant (*Hemizonia parryi ssp. australis*), Coulter's goldfields (*Lasthenia glabrata ssp. coulteri*), Aphanisma (*Aphanisma blitoides*), southcoast saltscale (*Atriplex pacifica*), Parish's brittlescale (*Atriplex parishii*), Davidson's saltscale (*Atriplex serenana var. dividsonii*), Sant Barbara morning-glory (*Calystegia sepium ssp. binghamiae*), Santa Monica Mountains dudleya (*Dudleya cymosa ssp. ovatifolia*), bright green dudleya (*Dudleya virens*), Braunton's milk-vetch (*Astragalus brauntonii*), Ventura Marsh milk-vetch (*Astralagus pycnostachyus var. lanosissmus*), coastal dunes milk-vetch (*Astragalus tener var. titi*), mud nama (*Nama stenocarpum*), Brand's phacelia (*Phacelia stellaris*), El Segundo duneflower (Pholisma paniculatum), Plummer's mariposa lily (*Calochortus plummerae*), salt spring checkerbloom (*Sidalcea neomexicana*), red sand verbena (*Abronia maritime*), Lewis' evening primrose (*Camissonia lewisii*), California orcutt grass (*Orcuttia californica*), San Fernando Valley spineflower (*Chorizanthe parryi var. fernandina*), El Segundo spineflower (*Mucronea californica*), seaside red maids (*Calandrinia maritime*), Ballona cinquefoil (*Potentilla multijuga*), salt marsh bird's beak (*Cordylanthus maritimus ssp. maritimus*), Mexican flannelbush (*Fremontodendron mexicanum*).

As a result of regular qualitative surveys conducted by Sapphos Environmental, Inc. on the El Segundo

133 Martin Alley Pasadena California 91105

Mail P.O. Box 50241 Pasadena California 91115

Tel 626/683-3547

Fax 626/683-3548

Email sapphos@pacbell.net

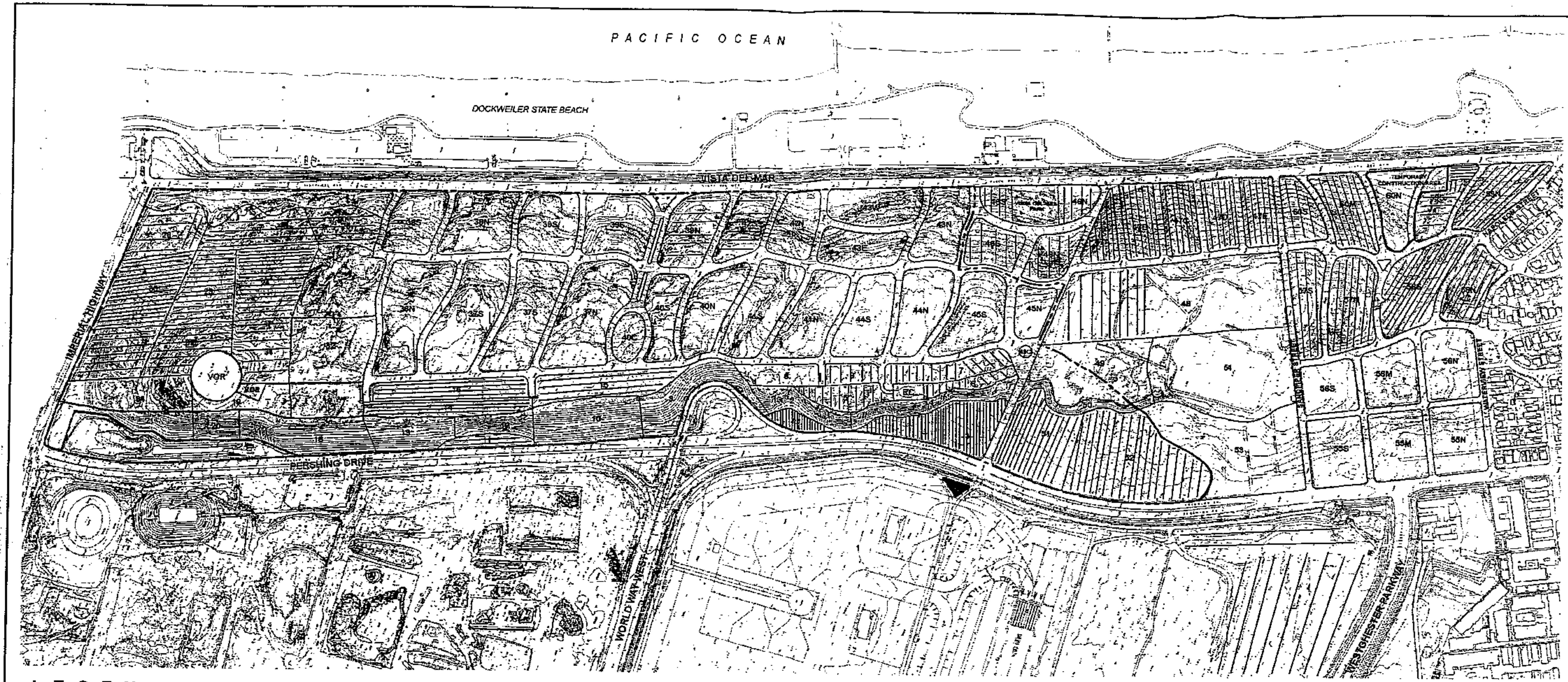
Dunes and the LAX 2015 Master Plan Boundaries, the following plants were found to occur: Lewis' evening primrose, California spineflower, and El Segundo dune flower. Directed surveys were undertaken by Sapphos Environmental, Inc. to determine the extent of these species within the Study Area. Surveys were conducted on foot, by persons familiar with the characteristics of the species being surveyed, walking parallel transects at 6-meter intervals (Attachment 1). Individuals of each species encountered during the transect survey were counted and mapped onto a one-inch equals six-hundred feet topographic base map of the survey site. A total of 10, 668 Lewis' evening primrose were observed within the El Segundo Dunes, and an additional 300 were observed within the Master Plan Boundaries. A total of 572 California spineflower were observed within the El Segundo Dunes. El Segundo dune flower was not observed at the time of directed surveys. California spineflower and El Segundo dune flower were not observed within the Master Plan Boundaries.

In addition to surveys for Lewis' evening primrose, California spineflower, and El Segundo dune flower, directed surveys were also conducted to determine the presence/absence of the federally- and state-listed endangered San Diego button celery and California orcutt grass. Surveys were conducted by identifying and surveying reference populations for these species at the Santa Rosa Plateau and Cruzan Mesa, respectively. Reference populations were surveyed to confirm germination and bloom of these species at known locations. Surveys were conducted in the Study Area by walking all ephemerally ponded areas identified as having potential to support vernal pool species (Attachment 2). As a result of directed surveys for San Diego button-celery and California orcutt grass, these species were determined not to be present within the Study Plan Area.

Please refer to the attached field notes for additional information related to these surveys. Should you have any questions regarding the contents of this memorandum, please contact Dr. Irena Mendez at (626) 683-3547.

ATTACHMENT 1

1998 SURVEY LOCATIONS FOR SENSITIVE PLANT SPECIES



LEGEND

- Road System (Many Subsites Are Delineated by Road System)
- Habitat Restoration Area Boundary
- 21 Subsite Number
- RC Remote Communications
- VOR Very High Omni Range Navigation Beacon
- T Trailer
- Transect Lines Used to Survey for Sensitive Plants*

* NOTE: Sensitive plant species surveyed included Lewis' evening primrose and El Segundo spineflower. Surveys were conducted between July 1 and July 15, 1998.

Scale 1"=600'

0' 300' 600' 1200'

N

Prepared by: Sapphos Environmental (Base map by Psomas & Associates)
Draft, July 30, 1998
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Los Angeles International Airport Master Plan

1998 Survey Locations for Sensitive Plant Species

Figure 3.1-2

ATTACHMENT 2
FIELD NOTES FOR SENSITIVE PLANT SURVEYS

Date July 1, 98 Conditions

Surveyors Katie, Rob.

1998 Directed Survey for Sensitive Plants at El Segundo Dunes and Los Angeles International Airport

	Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
	1			
	2			
2222	88	265, 75, 74, 64, 116		
	4	190		
	5			
	6			
	7			
	8			
	9			
	10			
896	11	6, 215, 675		
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24			
60	25	60,		
130	26	130		6
	27			
90	28	50, ~~3~~, 40		
	29			
	30			
	31			

	Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
	50			
475	51	361, 239, 446, 425, 320, 40, 321, 275, 99,		
470	52	12, 12, 4, 9, 2, 88, 15, 4, 1, 4, 472, 20, 45, 48, 675, 39		
321	53	321		
	54			
	55S			
	55M			
	55N			
	56S			
	56M			
	56N			
	57N	123		
	57S	36		
4/10/98	58N	14, 38, 15		
	58S	18, 1, 9		
	59N	15		
	59S			
	60N	134		
	60M	3		
	60S			

Notes: Airfield - 12, 62, 15, 142, 14, 11, 44

300

Date 7/2/98

Conditions Morning marine layer, becoming sunny in afternoon

Surveyors I. Mendez, R. Witthaus, L. Segal, K. Phillips, S. Roller, V. Tesoro

1998 Directed Survey for Sensitive Plants at El Segundo Dunes and Los Angeles International Airport

Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			

Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
32			
33			
34			
35			
36N			
36S			
37N			
37S			
38N			
38S			
39N			
39S			
40N			
40S			
40C			
41N			
41S			
42N			
42S			
43N			
43E			
43W			
44N			
44S			
45N			
45S			
46N			
46S			
47A			
47B			
47C			
47D	4		
47E			
48			
49			

Date ______ Conditions ______

Surveyors ______

1998 Directed Survey for Sensitive Plants at El Segundo Dunes and Los Angeles International Airport

	Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
6+27+	188+15 148+	15+ ~~[illegible]~~ 40+120+83+54		~~[illegible]~~
	16	459+14+3		~~[illegible]~~ 1
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24			
	25			
	26			
	27			
	28			
	29			
	30			
	31			

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Date 7/1/98 Conditions clear skies 5-10 mph winds

Surveyors Sarah Campbell & Marie Campbell

1998 Directed Survey for Sensitive Plants at El Segundo Dunes and Los Angeles International Airport

	Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
	1			
	2			
	3			80
	4			
7/14	5	41		73
7/14	6	51 + 5 + 7		0
7/14	7	721		39
7/14	8	343 + 193		47
	9			
	10			
	11			
	12			
	13			
	14	—	—	—
	15			
	16		7	
	17		0	
	18			
	19	[illegible] 7/14/98:	234 + 79 + 6	
	20			
	21			
	22		0	
	23			
	24			
	25			
	26			
	27			
	28			
	29	2.		
	30	—		
	31		0	

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Subsite	# of Lewis' Primrose	# of Pholisma	# of Spineflower
32			
33			
34			
35			
36N			
36S			
37N			
37S			
38N			
38S			
39N	279 +13		
39S			
40N			
40S			
40C			
41N			
41S			
42N	113		
42S	[illegible]		
43N			
43E			
43W			
44N			
44S			
45N			
45S			
46N			
46S			
47A			
47B			
47C			
47D			
47E			
48			
49			

ATTACHMENT 3
FIELD NOTES FOR DIRECTED SURVEYS FOR
SAN DIEGO BUTTON-CELERY AND CALIFORNIA ORCUTT GRASS

4.3 7/8/98 ①
1067-0017

Santa Rosa Plateau R. Witthans
Vernal Pools

9:00 am, sunny, no cloud cover, light breeze from West.

- Pool is still damp along boardwalk. (largest pool). Lots of Eleocharis, grasses (Elymus) - Lolium at edges of pool. Much california violet? dense carpets in some areas of the pool.

- Button celery has bolted and has many buds. Only a few plants with purplish flowers. Strong bologna odor. Majority of plants are at the ~~the~~ more shallow area of the pool at the west side of the boardwalk. Monitor took photos.

at north end of pool. Nutsedge
is dominant herbaceous cover;
unidentified Poaceae; no sign
of E. aristulatum or O. californica

VP 19 - Some mule fat; pampass
grass, bromus mollis, Lythrus;
no sign of E. aristulatum or
O. californica

VP 13 - Plantago lanceolata, Bromus
mollis, Lotus purshianus,
Lolium perenne; Dense
grass cover (~100%);
no sign of E. aristulatum
or O. californica.

(SA 008)
VP 12 - No E. aristulatum or O. californica
~~~100% cover of medicago polymorpha~~
~~[illegible]~~ Rabbit's foot grass, plantago lanceolata

VP 11 - Dense rabbit's foot grass -
No E. aristulatum or O. Californica
Pool bordered by Lolium

(4.3) 1067-007
7/16/98

Directed Surveys for O. californica & E. aristulatum at LAX

R. Withams, I. Mendez

VP 16 - dominated by cocklebur
cracking; no sign of button
celery or O. Californica.

VP 15 - dominated by Lythrus hysopifolia
& rabbit's foot grass - no E. aristulatum
or O. californica

VP 18 - Similar to 15 - melilotus indicus
& 1 arroyo willow; no E. aristulatum
or O. californica; rubble in area

VP 17 - Large pool; Unknown scrop in
bottom of pool, scant veg.; Lythrus;
no sign of E. aristulatum or
O. californica.

VP 14 - Arroyo Willow, sandbar willow,
and mulefat dominate south
end of pool. Much mule fat
~~~

VP 10 - Rabbit's foot grass dominated
no endangered plants

VP 9 - Plantago indica, dominated
by rabbit's foot grass,
no endangered plants

VP 8 - Mostly barren - no sign
of endangered plants

VP 20 - dominated by rabbit's foot
grass; no sign of endangered
plants

VP 7 - Scant veg.; dominated
by Plantago lanceolata; Trifolium
hirtum; Scarlet pimpernel; no
sign of endangered plants

VP 6 - Scant veg.; Lolium, rabbit's
foot

VP 1-5 - Some have been disced. No sign
of endangered plants

③

SA 022 – 100% } polypogon
cover } lolium,
Scarlett pimpernel
On perimeter.

SA 008 – 100% cover: polypogon
plantago l. some melilotus
indicus.

SA 009 : Polypogon
Plantago insularis
100% cover.

SA 010 : evidence of discing
~ 100% polypogon
Stephanomeria
crabgrass

SA 004, SA 002 A B+C : paved

SA007 : lotus p. Carpobrotus
trifolium. b. mollis,

SA 025 A-D : Staging area
no vegetation

(4.3) 1067-007 ①

9/3/98

Directed Surveys for:
O. californica and
E. aristulatum

Personnel: Sapphos
I. Mendez, R. Witthaus

~85°, light west wind, partially overcast,
(~ 60% cloud cover)
Scarlet pimpernel.
SA015 – Mostly bare; crab grass, (cynodon)
mulefat seedlings, lythrum,
polypogon (rabbits foot) No O. c. or
E. a.

SA013: ~~Chrysanthemum~~ Grindelia
Mulefat, Heterotheca, Bromus
mollis, trifolium hirtum, Conyza
Canadensis, Plantago lanceolata.
No O.c. or E.a.

SA012: Polypogon sparse – No
O.c. or E.a. One pampasgrass
seedling.

SA014: mostly bare ; sparse plantago,
polypogon, lythrum h. No O.c. or
E.a.

5A027: bare. Melilotus indicus: perimeter, sparse. erodium + scarlett pimpernel; 1 nut sedge.

5A028: Lotus scoparius.
Lotus purshianus.
Carpobrotus.
fennel

5A040: Polypogon
Lythrum
pampas
willow (arroyo)
crabgrass
mulefat
nut sedge.
cockleburr.

5A034 Scant vegetation
Bromus mollis
Polypogon
Lythrum h...
~~Plantago~~ horseradish
Rumex.

5A016 Plastic lined ditch - oil stained. sediment supports Polypogon + Rumex. No endangered plants.

5A017 ~~[illegible]~~% Polypogon ≈ 90%
Lotus purshianus
melilotus albus 7' tall

5A018 Polypogon No endangered
Spergularia species.
evidence of discing
Stephanomeria

5A019 Polypogon.

5A021 mostly bare. rabbit pellets
Polypogon perimeter
Lolium perenne
Algal mat
Epilobium incanum.
Lythrum
Salty crust

⑥

Site SA031
Plantago lanceolata
~~Lo~~ Lolium
mule fat bordering ditch
Red willow
Erodium sp.
~~Oxalis~~ burr clover - Medicago

SA032
Medicago
Heterotheca
Avena barbata
Carpobrotus
lotus purshianus
Plantago

SA036 AS FOR SA037

SA26 - Asphalt has been laid on site. Mostly unvegetated

⑤

~~SA~~ SA033 NBC: Acacia Lactuca ~~alba~~ alba
= Chrysanthemum. Melilotus ~~indicus~~
Heterotheca.

BC - gravel, lolium, fennel, polypogon
crab grass, mellitotus alba.

SA038 Nut sedge, mostly cocklebur
some chrysanthemum, dandylion
crabgrass.

SA039 Dirt road - no vegetation

Sapphos Environmental Inc

vironmental compliance
resource planning

February 28, 2000

MEMORANDUM FOR THE RECORD
JN 1043-010.M05

TO: Los Angeles World Airports
Environmental Management Bureau
(Mr. Steve Crowther and Mr. Andrew Huang, Ph. D.)

FROM: Sapphos Environmental, Inc.
(Ms. Irena Mendez, Ph. D. and Ms. Kristeen Penrod)

SUBJECT: 1998-1999 Vegetation Monitoring Report and Schedule for On-Going Maintenance Activities, El Segundo Blue Butterfly Habitat Restoration Area at Los Angeles International Airport, Los Angeles, California.

EXECUTIVE SUMMARY

This Memorandum for the Record serves to transmit to Los Angeles World Airports (LAWA) Environmental Management Bureau (Mr. Steve Crowther) the results of on-going vegetation monitoring conducted by Sapphos Environmental, Inc. and a proposed one-year schedule for on-going maintenance activities for the El Segundo Blue Butterfly Habitat Restoration Area (Habitat Restoration Area) at Los Angeles International Airport, Los Angeles California. The primary goal of vegetation monitoring is to assess the status of revegetated coastal dune plant species and to guide maintenance efforts of the coastal plant communities which support the federally-listed endangered El Segundo blue butterfly.

Included in this report is background information on the project and its description, project location, a description of qualitative and quantitative methodology utilized in the field, qualitative vegetation survey results (which discuss the present day status of restoration plantings and exotic plant removal of the Habitat Restoration Area), quantitative vegetation survey results and recommendations. Qualitative and quantitative vegetation surveys were conducted to gather information regarding the status of restoration plantings and exotic plant removal in an effort to guide future maintenance efforts within the Habitat Restoration Area. Quantitative vegetation surveys were undertaken to identify percent cover of vegetation in five areas determined to represent distinct topographies within the Habitat Restoration Area based on analysis of aerial photography of the site.

Recommendations provided in this memorandum address priorities and presents a proposed one-year schedule for weed control. The proposed schedule for weed abatement activities takes into account limited maintenance activities within core habitat during the ESB flight season, in addition to time sensitive application of herbicide for optimum performance on target species. The primary objective of the proposed schedule is to conduct maintenance activities on all of the 62 subsites that comprise the Habitat Restoration Area within a one year period. The number of days allocated towards each subsite is based upon the number of non-native species and their abundance and assumes two full-time landscape staff and a one-year time period comprised of two-hundred and forty-two (242) work days. Additional recommendations address supplemental labor resources that would be optimal to complete weed removal objectives within El Segundo blue butterfly occupied habitat in a timely manner. Particular attention is given to acacia removal along backdune subsites 13, 18, 20, and 21. For example, it is estimated that a County of Los Angeles Probation crew of 11-13 members working together with LAWA landscape maintenance crew could effect the removal of acacia trees and shrubs at the above-mentioned sites within 6-10 weeks.

133 Martin Alley
Pasadena California 91105

Mail
PO. Box 50241
Pasadena California 91115

Tel 626/683-3547
Fax 626/683-3548
Email sapphos@pacbell.net

1. PROJECT BACKGROUND AND DESCRIPTION

The Los Angeles/El Segundo Dunes occupy a 302 acre site to the west of Los Angeles International Airport and constitute one of the last remaining vestiges of the once extensive southern California coastal dune system. Although only a fragment of their former coastal extension, the Los Angeles/El Segundo Dunes contain the largest intact fragment of state-designated sensitive coastal dune plant communities remaining in southern California. The site comprises the largest area of occupied habitat for the federally endangered El Segundo blue butterfly (*Euphilotes battoides allyni*). Within the 302 acre site, the 203 acre El Segundo blue butterfly Habitat Restoration Area has been undergoing ecological restoration since 1987. The focus of the initial restoration was conservation and enhancement of occupied habitat for the El Segundo blue butterfly (ESB). Subsequent restoration efforts between 1987 and 1994 continued initial conservation efforts for the ESB and in addition sought to revegetate the highly degraded coastal dune plant communities. Restoration efforts culminated in the revegetation of approximately 100 acres of southern foredune (CNDDB Element Code: 21230) and southern dune scrub (CNDDB Element Code: 21330) communities (CNDDB 1998)(Holland 1986).

In 1994, the City of Los Angeles prepared a long-term habitat management plan for the site (City of Los Angeles EAD 1994) which stated as the overriding goal to "preserve this representation of the Southern California coastal dune ecosystem for both its intrinsic biological value and its cultural value to present and future generations, and to assure full recovery and long-term survival of a sustainable ecosystem and its component communities and plant and animal inhabitants". The long-term habitat management plan addresses more specific goals and objectives designed to fulfill the overriding goal. These include protecting habitat for sensitive species, controlling invasive alien and pest species, respecting the inherent physical conditions of the dune complex, maintaining a record of biological change, periodically assessing and reassessing management needs, encouraging scientific research, and ensuring that public interest continues through appropriate public involvement.

Since 1995, Los Angeles World Airports has assigned two full time landscape personnel to perform landscape maintenance within the Habitat Restoration Area. Landscape personnel have periodically been assisted by juvenile delinquent crews available through the County of Los Angeles Probation Department. From December 1997 to August 1998, County crews from the Probations Adult Alternative Work Service (PAWS) assisted landscape personnel three days a week in the removal of acacia and iceplant within the Habitat Restoration Area. Sapphos Environmental, Inc. provided Los Angeles World Airports with a monitoring status report for routine maintenance activities conducted during this period in August 1998 (Sapphos Environmental, Inc. 1998). In addition, from 1996, to 1999, volunteers visited the site on a monthly basis and conducted weed abatement activities. It is anticipated that under the new management efforts, sponsored by LAWA Environmental Management Bureau, the volunteer program will resume their monthly activities for the year 2000.

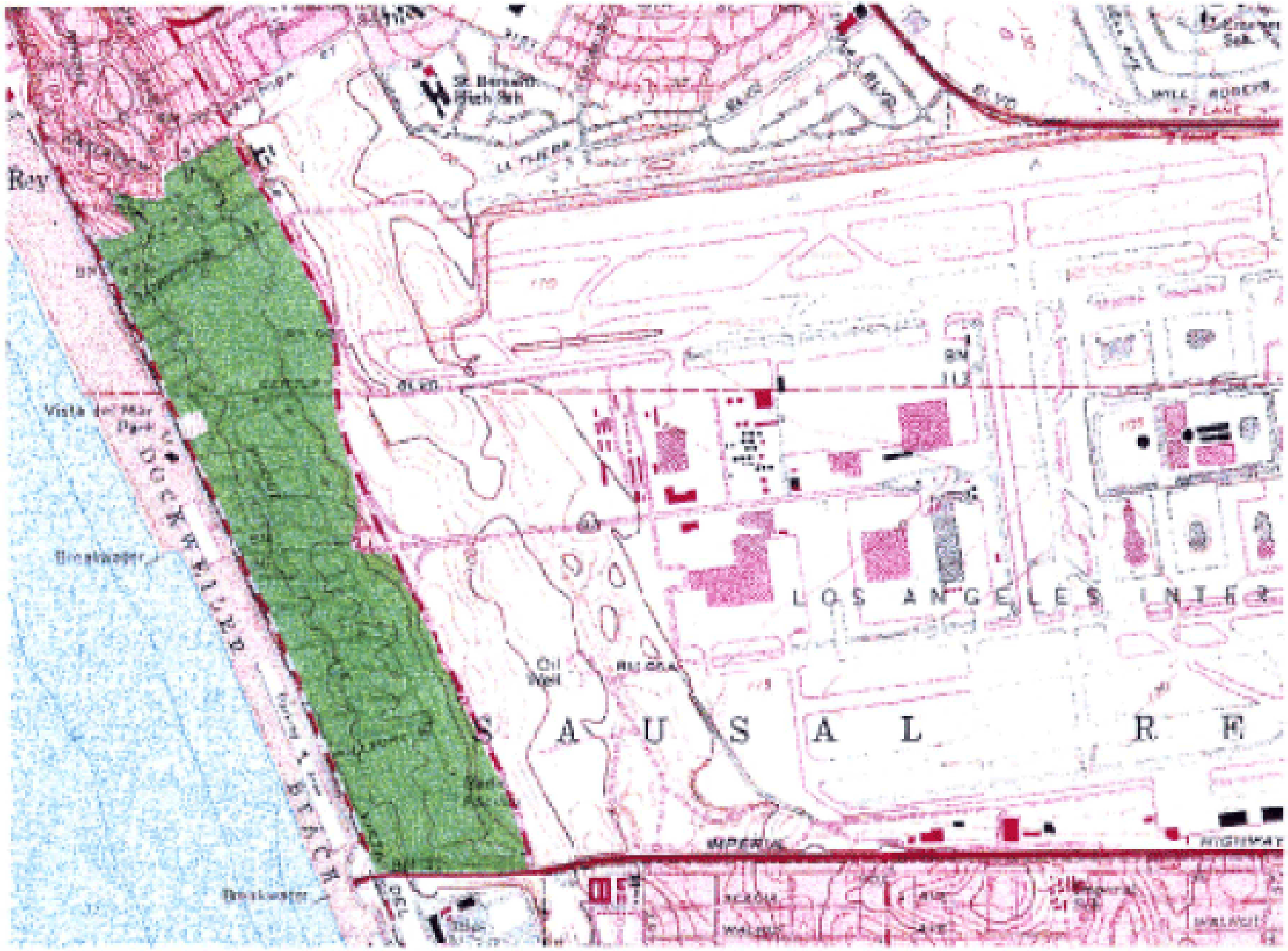
2. PROJECT LOCATION

The El Segundo Blue Butterfly Habitat Restoration Area is located on the Venice topographic quadrangle (U.S.G.S. 7.5 minute series, Range 15 West, Township 3, South) (Figure 1). The Habitat Restoration Area lies north of Imperial Highway, south of Sandpiper Street, east of Vista Del Mar Boulevard and west of Pershing Drive (Figure 2).

3. METHODS

Qualitative Surveys

On-going qualitative surveys have been conducted by Sapphos Environmental, Inc. (Dr. Irena Mendez) since 1995 (Sapphos Environmental, Inc. 1998). In 1999, Sapphos Environmental, Inc. conducted qualitative surveys on April 22, 27, May 6, 13, 20, 27, June 24, July 1, 29, September 29, October 5, 14, and December 1, 1999. Each subsite surveyed, within the study area, was surveyed by foot and the status of the plants and general conditions on the site were recorded. The surveyor had an in-depth knowledge of the flora and fauna of the study area. The survey pattern consisted of parallel transects approximately ten meters apart. A checklist of factors to be considered while conducting qualitative surveys was used as a guide for the qualitative assessment of the study area and is provided in Appendix A. The surveyor walked the center of the ten-meter transect and carefully scrutinized the vegetation making appropriate annotations on the checklist. Particular attention was given to the presence of state- and federally-listed plant species and other sensitive plant species having the potential to be present on-site as determmined by a query of the California Department of Fish and Game's California Natural Diversity Database (CNDDB) (California Department of Fish and Game 1998). The results of the query were screened for the presence of appropriate habitat within the El Segundo Dunes Habitat Restoration Area. Transects generally began at the southeast corner of each subsite and ran north and south parallel to the eastern boundary of the project area until the entire subsite had been covered. A map of the study area is provided in Figure 2. Factors that were evaluated in the checklist included but were not limited to plant community, subsite number, abundance of native vegetation, status of native vegetation after



LEGEND

Project Area

Scale 1"=2,000'

0' 1000' 2000' 4000'

N

Prepared by: Sapphos Environmental
October 5, 1998
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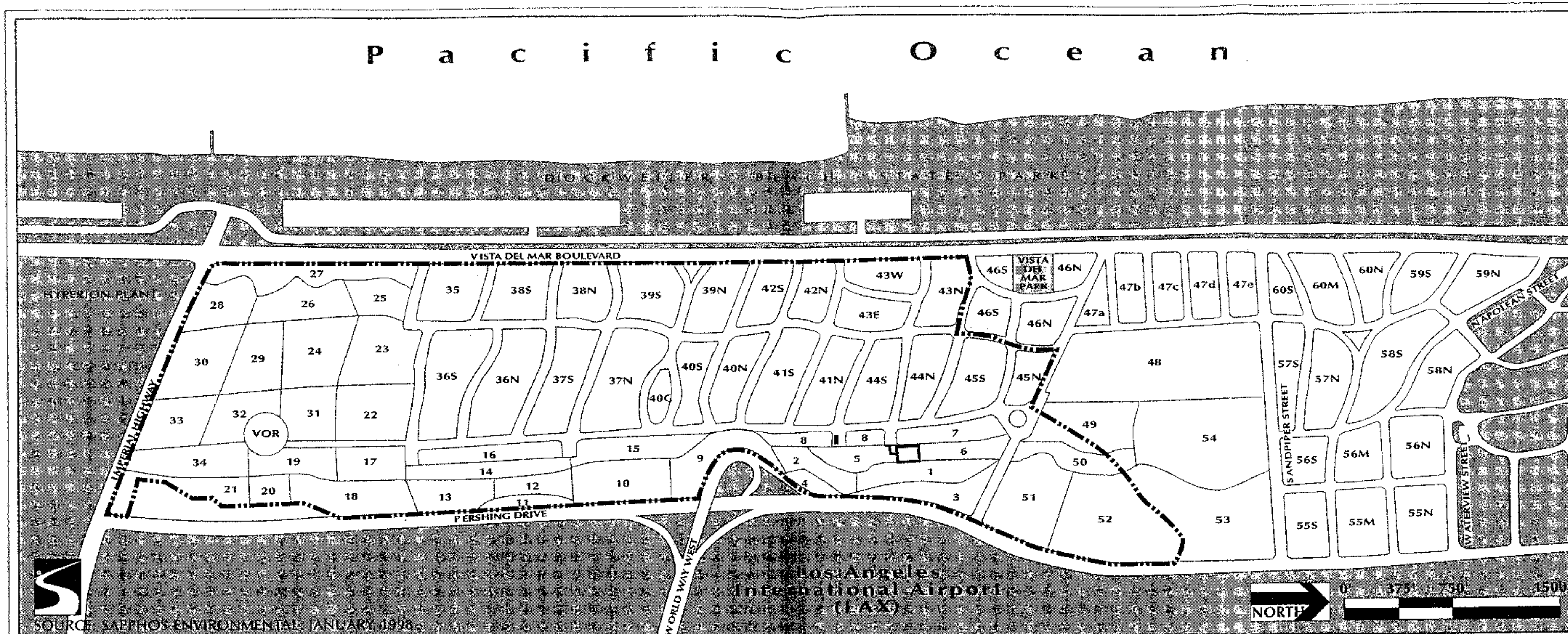
Los Angeles World Airports On Going Maintenance and Management Activites at the El Segundo Blue Habitat Restoration Area	Project Location	Figure 1



LEGEND

Road System (Many Subsites Are Delineated by Road System)

Habitat Restoration Area Boundary

21 Subsite Number

Remote Communications Site

VOR Very High Omni Range Navigation Beacon

Trailer

FIGURE 2
El Segundo Blue Butterfly Habitat Restoration Area Subsites

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summer drought or winter rains depending on when the survey was conducted, abundance of non-native vegetation, soil type, health and survival of revegetation plantings, presence and condition of volunteer native and non-native species, supplemental planting requirements, condition of irrigation and watering requirements, presence of insect infestation, and use of the site by wildlife. Plant health was evaluated based on observations of yellowing or dead leaves or stems, wilting, flowering, and the presence of new growth.

Due to the unanticipated amount of time associated with monitoring activities undertaken in support of the removal and replacement of the perimeter chain link fence and gates at the Los Angeles/El Segundo Dunes, qualitative vegetation monitoring activites within previously designated Prioriy Areas 1-6 (Sapphos Environmental, Inc. 1998) were limited to:

- Priority 1: two out of six Priority 1 subsites were surveyed (33%)
- Priority 2: seven out of twenty-five Priority 2 subsites were surveyed (28%)
- Priority 3: four out of ten Priority 3 subsites were surveyed (40%)
- Priority 4: three out of five Priority 4 subsites were surveyed (60%)
- Priority 5: four out of five Priority 5 subsites were surveyed (80%)
- Priority 6: three out of ten Priority 6 subsites were surveyed (30%)

Quantitative Surveys

Quantitative vegetation surveys were conducted by Sapphos Environmental, Inc. on October 20, 22, 28, November 10, 11, 18, 24 and December 1, 1999. The designation of polygons and the locations of permanent transects is provided in Figure 3. All transects were laid out north to south along randomly placed points by using a random numbers table (Rand Corporation 1955) in 1997. Data was collected for permanent transects with the exception of transect 20 which was abandoned in 1998. A fifty meter tape was stretched along each transect. The transect was walked, and the tape was read at 1 cm intervals. Plants that intercepted the tape were recorded by species at the beginning and end of intercept interval. Cover data was recorded in field notes and later entered into an Excel spreadsheet. Copies of 1997 and 1998 data sheets have been previously provided (Sapphos Environmental, Inc. 1998). Due to the nature of coastal dune vegetation, cover was considered in both shrub and herb stratum. As a result, in many cases, an herb layer overlapped with a shrub layer producing a total cover greater than 50 meters (5000 cm). This is indicated by a percent cover greater than 100 in the transect data sheets.

4. RESULTS

Qualitative Vegetation Surveys

Qualitative vegetation surveys conducted within the Habitat Restoration Area serve to evaluate the general condition of the plant community and determine the need for weed abatement and/or supplemental revegetation on a subsite basis. In the *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* (City of Los Angeles EAD 1994) it was recommended that qualitative surveys be conducted semi-annually. However, since the results of fall 1995 qualitative surveys indicated little variation from the results of spring 1995 qualitative surveys, qualitative surveys were conducted on an annual basis commencing

in spring of 1997. The results of these surveys were intended to serve as the primary basis for the direction of future management efforts.

In the spring of 1995, maintenance activities within the Habitat Restoration Area were prioritized into six categories, ranging from heavily invaded with non-natives (Priority #1) to overall good conditions (Priority #6). Qualitative vegetation surveys conducted in spring 1995 revealed that of the 203 acres that comprise the Habitat Restoration Area, 92 acres (45%) were designated as high priority areas (Priority #1 and #2), several of which contained significant amounts of acacia, regenerating iceplant, and California buckwheat which is not native to dune habitats in quantities that pose direct competition with restoration plantings. Priority #1 areas comprised 15.4 acres of steep backdune and Priority #2 areas comprised 76.6 acres of foredune (Sapphos Environmental, Inc. 1995)

From 1995 through 1999, qualitative vegetation surveys have revealed that management efforts to control non-natives has been largely successful and that the native vegetation is flourishing. Qualitative surveys conducted in fall of 1995 identified 66 acres of the 76.6 acre Priority #2 foredune as having significant quantities of iceplant and/or other non-native invasive plant species. Qualitative surveys conducted in spring of 1997 indicated that the aggressive management of acacia on the backdune slopes had been effective on 11 acres of the 15.4 Priority #1 backdune areas. In addition, 1997 surveys indicated a tremendous reduction of non-natives in Priority #2 areas, with only 29 acres still having a significant amount of non-native plant species. A summary of the results of 1997 and 1998 qualitative surveys can be found in Memorandum For The Record JN 1043-005.M08, dated September 30, 1999.

Qualitative vegetation surveys conducted in 1999 were spaced apart to accomodate for the blooming periods of state- and federally-listed and other sensitive plant species which resulted from a query of the California Natural Diversity Database (CNDDB) as having the potential to be present on site. No federal- and state-listed plant species were found during qualitative vegetation surveys.

Federal-and state-listed species not expected on-site due to lack of appropriate habitat include:

- San Diego button-celery (*Eryngium aristulatum* var. *parishii*), a Federal and State Endangered species, endemic to vernal pools which blooms April-June;
- Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*), a Federal Threatened species, which blooms March-June on volcanic cliff faces and within rocky outcrop habitat;
- Braunton's milk-vetch (*Astragalus brauntonii*), a Federal Endangered species endemic to limestone substrates which blooms March-July;
- Ventura marsh milk-vetch (*Astragalus pycnostachyus*), a Federal Propsed Endangered and State Candidate species, which blooms July-October within coastal salt marsh habitat;
- Mexican flannelbush (*Fremontodendron mexicanum*), a Federal Endangered and State Rare species, which blooms March-June within closed-cone coniferous forest and southern mixed chaparral habitat; and
- California orcutt grass (*Orcuttia californica*), a Federal and State Endangered species endemic to vernal pools which blooms April-June.

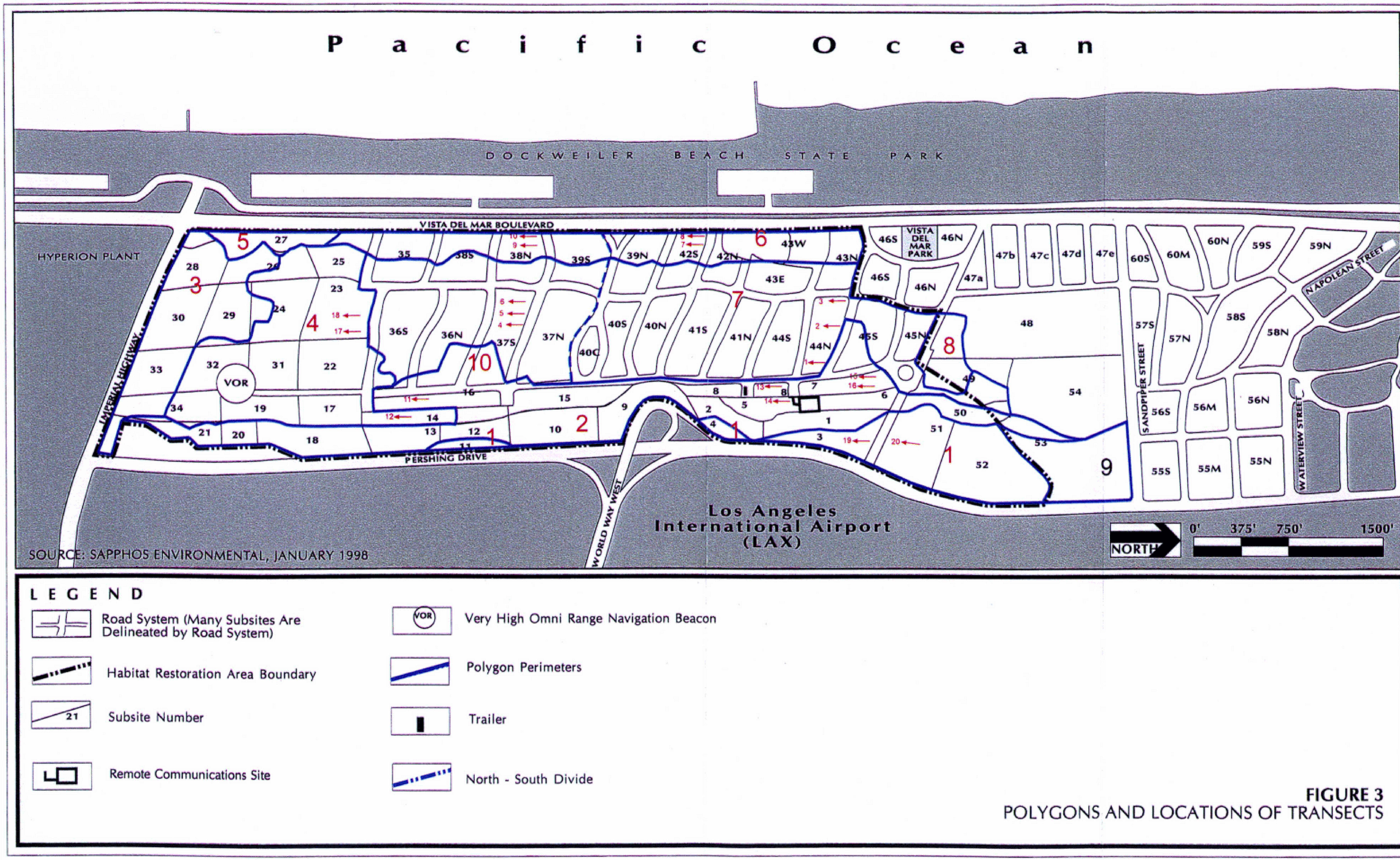

FIGURE 3
POLYGONS AND LOCATIONS OF TRANSECTS

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Federal- and state-listed species with the potential to be present on-site due to the presence of appropriate habitat but were not observed include:

- Beach spectacle-pod (*Dithyrea maritima*), a Federal Candidate and State Threatened species, which blooms April-May within coastal dunes and scrub habitat;
- Coastal dunes milk-vetch (*Astragalus tener* var. *titi*), a Federal Proposed Endangered and State Candidate species, which blooms March-May within coastal bluff and dune habitat;
- Salt marsh bird's beak (*Cordylanthus maritimus* var. *maritimus*), a Federal and State Endangered species, which blooms May October within salt marsh or coastal dunes habitat;

Other sensitive species[1] not expected on-site due to lack of appropriate habitat include:

- Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), a Federal Species of Concern, and CNPS[2] 1A plant, which blooms August-October within salt and fresh water marsh habitat;
- Santa Barbara morning-glory (*Calystegia sepium* ssp. *binghamiae*), a CNPS 1B plant, which blooms April through May within coastal marsh habitat;
- Bright green dudleya (*Dudleya virens*), a Federal Species of concern and CNPS 1B plant, which blooms April-June within rocky outcrops on bluffs facing the ocean in chaparral, coastal scrub and coastal bluff scrub habitat;
- Mud nama (*Nama stenocarpum*), a CNPS 2 plant, which blooms January-July within areas intermittently wet in marshes and swamps;
- Ballona cinquefoil (*Potentilla multijuga*), a Federal Species of Concern, and CNPS 1a plant, which blooms June-August within brackish marsh habitat.

Sensitive species with the potential to be present on-site due to the presence of appropriate habitat but were not observed include:

- Southern tarplant (*Hemizonia parryi* ssp. *australis*), a Federal Species of Concern, and CNPS 1B plant, which blooms June-November along the margins of marshes and vernal pools and within valley and footnill grassland habitat;
- Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*), a Federal Species of Concern and CNPS 1B plant, which blooms February-June, within alkali playa, vernal pool and grassland habitats;
- Aphanisma (*Aphanisma blitoides*), a Federal Species of Concern, and CNPS 1B plant, which blooms April through May within coastal bluff, dunes and scrub habitats;
- South coast saltscale (*Atriplex pacifica*), a Federal Species of Concern, and CNPS 1B plant, which blooms March-October within coastal bluff scrub, coastal scrub, playas and chenopod scrub habitats;

[1] Species with no offical status but which are of special interest within the state of California or are considered locally sensitive or represent disjunct populations.

[2] California Native Plant Society's *Inventory of Rare and Endangered Plants of California*.

- Parish's brittlescale (*Atriplex parishii*), a Federal Species of Concern, and CNPS 1B plant, which blooms June-October within alkali flats in meadow, vernal pool, chenopod scrub, and playa habitat;
- Davidson's saltscale (*Atriplex serenana* var. *davidsonii*), a Federal Species of Concern, and CNPS 1B plant, which blooms April-October within coastal bluff scrub and cooastal scrub habitat;
- Brand's phacelia (*Phacelia stellaris*), a CNPS 1B plant, which blooms March-June within open areas in coastal scrub and coastal dune habitat;
- Salt spring checkerbloom (*Sidalcea neomexicana*), a CNPS 2 plant, which blooms March-June within alakli playas, brackish marshes, chaparral, coastal scrub, lower montane coniferous forest and Mojavean desert scrub habitat;
- Red sand verbena (*Abronia maritima*), a CNPS 4 plant, which blooms February-November within coastal dunes and strand habitat;
- San Fernando spineflower (*Chorizanthe parryi* var. *fernandina*), a Federal Candidate species and CNPS 1A plant, which blooms April-June on sandy soils within coastal scrub habitat;
- Seaside red maids (*Calandrinia maritima*), a CNPS 4 plant, which blooms March-May on sandy soils on sea bluffs.
- Plummer's mariposa lily (*Calochortus plummerae*), a Federal Species of Concern and CNPS 1B plant, which blooms May-July, and occurs on rocky and sandy sites in coastal scrub, chaparral, valley and fothill grassland, cismontane woodland and lower montane coniferous forest habitat.

Sensitive species with the potential to be present on-site due to the presence of appropriate habitat and were observed include:

- El Segundo duneflower (*Pholisma paniculatum*), a locally rare plant which blooms April-July within sandy soils in coastal scrub and chaparral habitat;
- Lewis' evening primrose (*Camissonia lewisii*), a CNPS 3 plant, which blooms March-June within coastal grasslands with sandy or clay soils;
- El Segundo spineflower (*Mucronea californica*), a CNPS 4 plant, which blooms March-August on sandy soils within coastal scrub and chaparral habitat;

Qualitative surveys revealed that in general, the native vegetation continues to flourish and has become firmly established in many of the subsites. The current status of the dunes is a reflection of the aggressive management efforts from 1995 through the beginning of 1999. During the later part of 1999, LAX landscape staff determined that maintenance priorities should focus on high visibility areas elsewhere within the airport and therefore attention given to maintenance within the Habitat Restoration Area was limited. As a result, the highly competitive non-native species such as iceplant and acacia continued to regenerate. This is particulary evident when comparing the qualitative vegetation surveys conducted for 1998 and 1999. Acacia shrubs were observed to have increased their presence on 57% of the subsites surveyed from the 1997/1998 season to the 1998/1999 season. Likewise, iceplant increased in 52% of the subsites surveyed.

Quantitative Vegetation Survey

Excel spreadsheets for quantitative transect data collected in 1999 are provided in Appendix B. Transect data collected in 1997 and 1998 can be found in Memorandum For The Record JN 1043-005.M08 (Sapphos Environmental, Inc. 1998).

Transects #1, #2, #3, #4, #5, and #6 are located in the central foredune area and are encompassed by Polygon 7. Subsites where these transects are located have been designated with a priority for maintenance of 2. Comparison between 1997, 1998 and 1999 line-intercept transect data for transects #1 through #6 are provided below. The percent native cover for transects within Polygon 7 ranged from 45 to 71 percent; the average of percent native cover was 55% with a deviation of 9% (for 1998 the average of percent native cover was 56% +/- 17%). The percent non-native cover fluctuated between 7.7 to 46.6 percent; the average of percent non-native cover was 23% and a deviation of 14% (for 1998 the average of percent non-native cover 31% +/- 11%. The percent native species was significantly more constant, ranging from 50 to 69 percent; the average percent native species was 56% with a deviation of 8% (for 1998 the average of percent native species was comparable at 54% +/- 7 %. Diversity ranged from 5 to 9 species, with an average of 6 species and a deviation of 1.4 species which represented a significant decline from the previous year when diversity averaged at 12 species +/- 2.5 species.

TRANSECT 1- Priority #2	1997	1998	1999
Dominant Cover Type[3]	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	3	11	1
Wild mustard (*Brassica tournfortii*)*	1	2	-
Ripgut brome (*Bromus diandrus*)*	-	-	4
Beach evening primrose (*Camissonia chieranthifolia*)	5	6	11
Iceplant (*Carpobrotus edulis*)*	-	-	.40
Pincushion (*Chaenactis glabriuscula*)	-	1	-
Bermuda grass (*Cynodon dactylon*)*	-	5	-
Crab grass (*Digitaria sanguinalis*)*	-	-	1
Coast buckwheat (*Eriogonum parvifolium*)	3	8	13
Red-stemmed filaree (*Erodium cicutarium*)*	5	16	10
Telegraphweed (*Heterotheca grandiflora*)	-	2	4

[3]Dominant cover type does not include plant species, both native and non-native, with a total percent cover less than one percent.

*Represents a non-native species.

TRANSECT 1- Priority #2	1997	1998	1999
Deerweed (*Lotus scoparius*)	-	13	14
Dune bush lupine (*Lupinus chamissonis*)	15	13	15
Twigs	1	5	6
Bare	68	18	14
Litter/duff	0	10	13.96
Prickly pear (*Opuntia littoralis*)	-	-	1
Percent Native Cover (%)	23	43	58
Percent Non-native Cover (%)	9	34	16.4
Percent Native Species (%)	50	60	55
Native Diversity	6	10	6

TRANSECT 2- Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	0.1	14	2
Bare	65	5	3
Bermuda grass (*Cynodon dactylon*)*	-	13	-
Wild mustard (*Brassica tournefortii*)*	-	6	.40
Ripgut brome (*Bromus diandrus*)*	5	-	9
Beach evening primrose (*Camissonia chieranthifolia*)	1.5	18	10
Pincushion (*Chaenactis glabriuscula*)	-	1	-
California croton (*Croton californica*)	1	1	-
Popcorn flower (*Cryptantha clevelandii*)	0.3	2	-
Crab grass (*Digitaria sanguinalis*)*	-	-	25
Coast buckwheat (*Eriogonum parvifolium*)	3	6	4

TRANSECT 2- Priority #2	1997	1998	1999
Red-stemmed filaree (*Erodium cicutarium*)*	-	3	10
Bicolored cudweed (*Gnaphalium bicolor*)	-	-	1
Telegraph weed (*Heterotheca grandiflora*)	-	-	3
Deerweed (*Lotus scoparius*)	11	19	10
Bush lupine (*Lupinus chamissonis*)	16	13	17
Russian thistle (*Salsola iberica*)*	-	1	16
Twigs	2.5	3	15
Litter/duff	-	10	5
Percent Native Cover (%)	35	60	45
Percent Non-native Cover (%)	5.1	37	46.56
Percent Native Species (%)	75	58	50
Native Diversity	8	12	6

TRANSECT 3 - Priority #2	1997	1998	1999
Slender wild oats (*Avena sativa*)*	1	22	2
Bare	69	6	20
Pincushion (*Chaenactis glabriuscula*)	1	10	-
Bermuda grass (*Cynodon dactylon*)*	1	2	7
Wild mustard (*Brassica tournfortii*)*	-	4	-
Ripgut brome (*Bromus diandrus*)*	2	1	-
Beach evening primrose (*Camissonia chieranthifolia*)	3	11	7
Coast buckwheat (*Eriogonum parvifolium*)	2	2	3
Red-stemmed filaree (*Erodium cicutarium*)*	-	4	12
Telegraphweed (*Heterotheca grandiflora*)	0.2	1	2
Litter/duff	-	16	18

TRANSECT 3 - Priority #2	1997	1998	1999
Deerweed (*Lotus scoparius*)	3	19	12
Bush lupine (*Lupinus chamissonis*)	16	23	22
Twigs	3	1	6
Percent Native Cover (%)	25	66	46
Percent Non-native Cover (%)	4	33	21
Percent Native Species (%)	67	50	63
Native Diversity	9	12	5

TRANSECT 4 - Priority #2	1997	1998	1999
Dominant Cover type	% Cover	% Cover	% Cover
Sand verbena (*Abronia umbellatum*)	-	-	1
Burbush (*Ambrosia chamissonis*)	-	3	1.80
Wild tarragon (*Artemesia drunconculus*)	1	2	1.90
Slender wild oats (*Avena barbata*)*	-	1	.90
Bare	27	16	10.80
Wild mustard (*Brassica tournfortii*)*	-	3	-
Ripgut brome (*Bromus diandrus*)*	1	3	6
Sea rocket (*Cakile maritima*)*	-	3	-
Beach evening primrose (*Camissonia chieranthifolia*)	-	17	6
Iceplant (*Carpobrotus edulis*)*	23	-	.20
Saltgrass (*Distichlis spicata*)	0.4	3	.20
Coast goldenbush (*Ericameria ericoides*)	-	1	-
Coast buckwheat (*Eriogonum parvifolium*)	2	9	6
California poppy (*Eschscholzia californica*)	-	2	-
Woolly aster (*Lessingia filaginifolia*)	5	7	4
Litter/duff	-	1	5

TRANSECT 4 - Priority #2	1997	1998	1999
Deerweed (*Lotus scoparius*)	3	2	5
Bush lupine (*Lupinus chamissonis*)	29	37	45
Russian thistle (*Salsola tragus*)*	-		.60
Twigs	18	13	24
Percent Native Cover (%)	40	83	71
Percent Non-native Cover (%)	24	10	7.7
Percent Native Species (%)	67	63	69
Native Diversity	9	16	9

TRANSECT 5 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
California sagebrush (*Artemesia californica*)	-	4	4
Slender wild oats (*Avena barbata*)*	0.3	12	7
Bare	73	9	25
Wild mustard (*Brassica tournfortii*)*	5	8	1.4
Ripgut brome (*Bromus diandrus*)*	-	7	3
Beach evening primrose (*Camissonia chieranthifolia*)	5	13	12
Iceplant (*Carpobrotus edulis*)*	10	-	.60
Pincushion (*Chaenactis glabriuscula*)	-	1	-
Bermuda grass (*Cynodon dactylon*)*	-	1	-
Crab grass(*Digitaria sanguinalis*)*	-	-	1.20
Coast goldenbush (*Ericamena ericoides*)	2	-	-
California encelia (*Encelia californica*)	-	1	-
Coast buckwheat (*Eriogonum parvifolium*)	1	9	9

TRANSECT 5 - Priority #2	1997	1998	1999
Red-stemmed filaree (*Erodium cicutarium*)*	-	-	3
Telegraph weed (*Heterotheca grandiflora*)	-	-	1
Litter/duff	-	12	7
Deerweed (*Lotus scoparius*)	4	6	15
Bush lupine (*Lupinus chamissonis*)	3	5	13
Yellow sweet clover (*Melilotus indicus*)*	-	9	-
Twigs	6	11	14
Percent Native Cover (%)	15	39	54
Percent Non-native Cover (%)	15.3	37	16.2
Percent Native Species (%)	63	50	50
Native Diversity	8	14	6

TRANSECT 6 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	0.3	8	12
Bare	58	5	9
Wild mustard (*Brassica tournfortii*)*	7	21	1
Ripgut brome (*Bromus diandrus*)*	0.5	7	12
Beach evening primrose (*Camissonia chieranthifolia*)	7	27	18
Iceplant (*Carpobrotus edulis*)*	16	-	1
Coast buckwheat (*Eriogonum parvifolium*)	4	8	9
Red-stemmed filaree (*Erodium cicutarium*)*	4	2	5
Telegraphweed (*Heterotheca grandiflora*)	-	1	1
Litter/duff	-	21	11

TRANSECT 6 - Priority #2	1997	1998	1999
Deerweed (*Lotus scoparius*)	-	-	4
Bush lupine (*Lupinus chamissonis*)	-	11	24
Twigs	4	1	2
Percent Native Cover (%)	11	47	56
Percent Non-native Cover (%)	27.8	38	31
Percent Native Species (%)	25	44	50
Native Diversity	8	9	5

Transects #7, #8, #9 and #10 are located in the near ocean foredune and are encompassed by Polygon 6. Subsites where these transects are located have been designated with a priority for maintenance of 2. Comparison between 1997, 1998 and 1999 line-intercept transect data for transects #7 through #10 are provided below. The percent native cover for transects within Polygon 6 ranged from 47 to 54 percent; the average of percent native cover was 49% with a deviation of 3% (for 1998 the average of percent native cover was 51% +/- 13%). The percent non-native cover fluctuated greatly between 4 and 90 percent; the average of percent non-native cover was 52% and a deviation of 36% (for 1998 the average of percent non-native cover 109% +/- 26%). The percent native species ranged from 43 to 80 percent; the average percent native species was 60% with a deviation of 15% (for 1998 the average of percent native species was 44% +/- 12 %. Diversity ranged from 3 to 8 species, with an average of 5 species and a deviation of 2.2 species which represented a significant decline from the previous year when diversity averaged at 11 species +/- 2.5 species. Transect #8 illustrates the high degree of success that a specific and sustained targeting of management efforts can have. Qualitative monitoring (1995-1999) of the area where Transect #8 is located revealed that iceplant had spread extensively and formed large mats covering a significant portion of the western end of the subsite (the area had not been maintained since 1994). Quantitative monitoring in 1997 indicated non-native cover of 99%. The same monitoring one year later indicated that non-native cover had increased to 145%. A focussed and sustained volunteer effort once a month for 6 consecutive months resulted in the removal of iceplant, which was confirmed by the percent non-native cover dropping to only 4% in 1999. Quantitative monitoring during the year 2000, should reveal an increase in not only the percent of native cover and the percent of native species, but also
in native diversity, as now competition has been eliminated and the open areas can be colonized by both annual and perennial native species.

TRANSECT 7 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Bur-bush (*Ambrosia chamissonis*)	6	5	7

TRANSECT 7 - Priority #2	1997	1998	1999
Slender wild oats (*Avena barbata*)*	1	-	3
Bare	-	-	3
Wild mustard (*Brassica tournfortii*)*	-	3	.40
Ripgut brome (*Bromus diandrus*)*	25	29	17
Iceplant (*Carpobrotus edulis*)*	31	34	29
California croton (*Croton californica*)	-	-	.30
California sunflower (*Encelia californica*)	5	7	4
Coast goldenbush (*Ericameria ericoides*)	1	2	3
Coast buckwheat (*Eriogonum parvifolium*)	20	31	22
California poppy (*Eschscholzia californica*)	8	-	-
Narrow-leaved bedstraw (*Galium angustifolium*)	3	6	1
Bladderpod (*Isomeris arborea*)	4	4	7
Litter/duff	-	-	5
Yellow sweet clover (*Melilotus indicus*)*		1	-
Branching phacelia (*Phacelia ramosissima*)	3	7	3
Wild radish (*Raphanus sativus*)*	10	15	9
Russian thistle (*Salsola tragus*)*	4	-	1
Twigs	6	-	7
Percent Native Cover (%)	50	62	47
Percent Non-native Cover (%)	71	82	59
Percent Native Species (%)	62	58	57
Native Diversity	13	12	

TRANSECT 8 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
California sagebrush (*Artemesia californica*)	-	1	5

TRANSECT 8 - Priority #2	1997	1998	1999
Slender wild oats (*Avena barbata*)*	25	2	4
Bare	2	-	2
Ripgut brome (*Bromus diandrus*)*	20	48	-
Morning glory (*Calystegia macrostegia*)	-	-	2
Iceplant (*Carpobrotus edulis*)*	45	44	-
California croton (*Croton californica*)	2	-	-
California sunflower (*Encelia californica*)	5	-	7
Coast buckwheat (*Eriogonum parvifolium*)	24	31	35
Red-stemmed filaree (*Erodium cicutarium*)*	9	-	-
California poppy (*Eschscholzia californica*)	-	1	-
Narrow-leaved bedstraw (*Galium angustifolium*)	1	-	-
Litter/duff	-	-	49
Yellow sweet clover (*Melilotus indicus*)*	-	44	-
Wild radish (*Raphanus sativus*)*	-	7	-
Twigs	-	-	24
Percent Native Cover (%)	32	33	49
Percent Non-native Cover (%)	99	145	4
Percent Native Species (%)	44	38	80
Native Diversity	9	8	4

TRANSECT 9 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Burbush (*Ambrosia chamissonis*)	1	5	5
Slender wild oats (*Avena barbata*)*	-	3	-
Bare	0.2	1	2
Wild mustard (*Brassica tournfortii*)*	12	-	-

TRANSECT 9 - Priority #2	1997	1998	1999
Ripgut brome (*Bromus diandrus*)*	42	63	50
Sea rocket (*Cakile maritima*)*	2	4	7
Beach evening primrose (*Camissonia chieranthifolia*)	-	3	-
Iceplant (*Carpobrotus edulis*)*	8	21	30
California encelia (*Encelia californica*)	4	4	3
Coast buckwheat (*Eriogonum parvifolium*)	6	10	17
Red-stemmed filaree (*Erodium cicutarium*)*	-	1	-
Telegraphweed (*Heterotheca grandiflora*)	0.3	1	.40
Bladderpod (*Isomeris arborea*)	6	5	5
Litter/duff	-	2	2
Deerweed (*Lotus scoparius*)	22	23	18
Sow thistle (*Sonchus oleraceus*)*	-	7	-
Russian thistle (*Salsola tragus*)*	-	-	3
Twigs	-	-	4
Wild radish (*Raphanus sativus*)*	9	8	-
Percent Native Cover (%)	39	51	48
Percent Non-native Cover (%)	73	107	90
Percent Native Species (%)	50	50	60
Native Diversity	12	14	6

TRANSECT 10 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	-	1	2
Bare	3	1	1
Wild mustard (*Brassica tournfortii*)*	4	-	-
Ripgut brome (*Bromus diandrus*)*	69	79	5

TRANSECT 10 - Priority #2	1997	1998	1999
Sea rocket (*Cakile maritima*)*	-	3	-
Iceplant (*Carpobrotus edulis*)*	25	17	45
California sunflower (*Encelia californica*)	18	25	25
Coast buckwheat (*Eriogonum parvifolium*)	18	27	26
Iceplant (*Gazoul cristalinum*)*	-	1	-
Bicolored cudweed (*Gnaphalium bicolor*)	-	-	3
Telegraphweed (*Heterotheca grandiflora*)	1	6	-
Litter/duff	-	-	11
Cheeseweed (*Malva parviflora*)*	-	1	-
Russian thistle (*Salsola tragus*)*	2	-	3
Twigs	7	-	1
Percent Native Cover (%)	37	58	54
Percent Non-native Cover (%)	100	102	55
Percent Native Species (%)	38	30	43
Native Diversity	8	10	3

Transects #11, #13, #14, #15, and #16 are located in the foredune crest and are encompassed Polygon 10. Of these transects, only Transect 11 is located within a subsites designated with a priority for maintenance of 2. The remaining transects are all located within subsites that have been designated with a priority for maintenance of 5. Areas within a priority for maintenance of 5, when compared to areas within a priority for maintenance of 2, have a lower percent of non-native species and a greater diversity. Comparison between 1997, 1998 and 1999 line-intercept transect data for transects #13, #14, #15, and #16 (Priority 5 areas only) are provided below. The percent native cover for transects within Polygon 10 ranged from 33 to 61 percent; the average of percent native cover was 44% with a deviation of 13% (for 1998 the average of percent native cover was 56% +/- 5%). The percent non-native cover fluctuated between 24 and 71 percent; the average of percent non-native cover was 41% and a deviation of 21% (for 1998 the average of percent non-native cover 29% +/- 13%). The percent native species ranged from 60 to 79 percent; the average percent native species was 71% with a deviation of 8% (for 1998 the average of percent native species was very similar: 71% +/- 6 %. Diversity ranged from 6 to12 species, with an average of 10 species and a deviation of 3 species which represented a non-significant decline from the previous year when diversity averaged at 14 species +/- 4 species.

TRANSECT 11 - Priority #2	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Acacia (*Acacia longiflorus*)*	-	-	.20
Slender wild oats (*Avena barbata*)*	29	93	27
Bare	26	6	11
Wild mustard (*Brassica tournfortii*)*	1	8	-
Ripgut brome (*Bromus diandrus*)*	-	-	7
Beach evening primrose (*Camissonia chieranthifolia*)	2	3	6
Coast buckwheat (*Eriogonum parvifolium*)	-	-	1
Red-stemmed filaree (*Erodium cicutarium*)*	14	1	37
Telegraphweed (*Heterotheca grandiflora*)	-	1	1
Litter/duff	-	7	13
Deerweed (*Lotus scoparius*)	6	7	5
Bush lupine (*Lupinus chamissonis*)	15	19	11
Truncate lupine (*Lupinus truncatus*)	-	2	-
Russian thistle (*Salsola tragus*)*	1	-	-
Twigs	8	-	15
Percent Native Cover (%)	21	30	24
Percent Non-native Cover (%)	45	102	71.2
Percent Native Species (%)	43	63	56
Native Diversity	7	8	5

TRANSECT 13 - Priority #5	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Sweet alyssum (*Alyssum maritima*)*	1	-	-
Slender wild oat (*Avena barbata*)*	2	4	14

TRANSECT 13 - Priority #5	1997	1998	1999
Bare	8	2	2
Ripgut brome (*Bromus diandrus*)*	-	-	1
Beach evening primrose (*Camissonia chieranthifolia*)	1	6	-
Iceplant (*Carpobrotus edulis*)*	-	-	.40
Red-stemmed filaree (*Frodium cicutarium*)*	52	38	56
California encelia (*Encelia californica*)	14	22	18
Coast buckwheat (*Eriogonum parvifolium*)	3	5	2
Telegraph weed (*Heterotheca grandiflora*)	-	-	1
Litter/duff	-	4	.30
Deerweed (*Lotus scoparius*)	9	9	8
Dune bush lupine (*Lupinus chamissonis*)	4	9	2
Bladderpod (*Isomeris arborea*)	-	2	2
Nodding needlegrass (*Nasella cernua*)	1	1	-
Twigs	4	4	12
Percent Native Cover (%)	32	54	33
Percent Non-native Cover (%)	55	42	71.4
Percent Native Species (%)	67	78	60
Native Diversity	9	9	6

TRANSECT 14 - Priority #5	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Sand verbena (*Abronia umbellata*)	9	1	-
Slender wild oats (*Avena barbata*)*	2	9	23
Bare	34	6	18
Wild mustard (*Brassica tournfortii*)*	-	2	-
Ripgut brome (*Bromus diandrus*)*	3	4	3

TRANSECT 14 - Priority #5	1997	1998	1999
Beach evening primrose (*Camissonia chieranthifolia*)	3	7	2
Pincushion (*Chaenactis glabriuscula*)	-	7	.10
Popcorn flower (*Cryptantha clevelandii*)	1	3	-
California croton (*Croton californica*)	-	-	.20
California sunflower (*Encelia californica*)	-	7	4
Coast goldenbush (*Ericameria ericoides*)	1	3	2
Coast buckwheat (*Eriogonum parvifolium*)	3	2	1
Red-stemmed filaree (*Frodium cicutarium*)*	17	6	8
California poppy (*Eschscholzia californica*)	-	-	2
Narrow-leaved bedstraw (*Galium angustifolium*)	4	3	.60
Bicolored cudweed (*Gnaphalium bicolor*)	1	-	-
Telegraphweed (*Heterotheca grandiflora*)	-	2	-
Cudweed aster (*Lessingia filaginifolia*)	-	5	.20
Litter/duff	-	9	12
Deerweed (*Lotus scoparius*)	2	7	18
Bush lupine (*Lupinus chamissonis*)	9	5	4
Yellow sweet clover (*Melilotus indicus*)*	-	-	2
Russian thistle (*Salsola tragus*)*	2	1	1.60
Wand chicory (*Stephomeria virgata*)	-	10	.10
Twigs	19	6	26
Percent Native Cover (%)	33	62	34
Percent Non-native Cover (%)	24	22	37.6
Percent Native Species (%)	69	68	71
Native Diversity	13	19	12

TRANSECT 15 - Priority #5	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	1	6	.20
Bare	16	-	14
Ripgut grass (*Bromus diandrus*)*	1	1	.20
Iceplant (*Carpobrotus edulis*)*	1	2	-
Beach evening primrose (*Camissonia chieranthifolia*)	1	3	9
Pincushion (*Chaenactis glabriuscula*)	-	7	.20
Popcorn flower (*Cryptantha clevelandii*)	-	-	.20
Coast goldenbush (*Ericameria ericoides*)	-	1	-
Coast buckwheat (*Eriogonum parvifolium*)	7	9	7
Red-stemmed filaree (*Erodium cicutarium*)*	-	29	32
Dunes wallflower (*Erysimum suffrutescens*)	2	1	.90
Narrow-leaved bedstraw (*Galium angustifolium*)	1	3	2
Bicolored cudweed (*Gnaphalium bicolor*)	-	-	.50
Telegraph weed (*Heterotheca grandiflora*)	-	-	.40
Woolly aster (*Lessingia filaginifolia*)	2	5	4
Litter/duff	39	1	6
Deerweed (*Lotus scoparius*)	5	11	16
Bush lupine (*Lupinus chamissonis*)	12	5	7
Russian thistle (*Salsola tragus*)*	-	-	.50
Wand chicory (*Stephanomeria virgata*)	0.4	5	.40
Twigs	12	6	20
Percent Native Cover (%)	31	50	48
Percent Non-native Cover (%)	3	38	32.9
Percent Native Species (%)	75	64	75
Native Diversity	12	14	12

TRANSECT 16 - Priority #5	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Sand verbena (*Abronia umbellata*)	-	1	-
Bur-bush (*Ambrosia chamissonis*)	2	3	6
Slender wild oats (*Avena barbata*)*	-	10	9
Bare	32	1	12
Ripgut brome (*Bromus diandrus*)*	0.4	1	2
Beach evening primrose (*Camissonia chieranthifolia*)	1	-	7
Pincushion (*Chaenactis glabriuscula*)	-	13	-
California sunflower (*Encelia californica*)	-	-	.80
Coast goldenbush (*Ericameria ericoides*)	1	2	-
Coast buckwheat (*Eriogonum parvifolium*)	7	10	4
Red-stemmed filaree (*Erodium cicutarium*)*	-	-	13
Dune wallflower (*Erysimum suffrutescens*)	1	1	.20
Telegraph weed (*Heterotheca grandiflora*)	-	-	.90
Woolly aster (*Lessingia filaginifolia*)	0.4	1	3
Litter	37	3	8
Deerweed (*Lotus scoparius*)	4	6	19
Bush lupine (*Lupinus chamissonis*)	7	8	10
Yellow sweet clover (*Melilotus indicus*)*	-	3	-
Branching phacelia (*Phacelia ramosissima*)	-	2	9
Wand chicory (*Stephanomeria virgata*)	1	11	.60
Twigs	5	4	8
Percent Native Cover (%)	24	57	61
Percent Non-native Cover (%)	.4	14	24
Percent Native Species (%)	90	74	79
Native Diversity	10	15	11

Transects #12, #17 and #18 are located in the relatively undisturbed foredune and are encompassed by Polygon 4. Transects within Polygon 4 are all located within subsites designated as areas with a priority for maintenance of 6. Comparison between 1997, 1998 and 1999 line-intercept transect data for transects #12 , #17 and #18 are provided below. The percent native cover for transects within Polygon 4 ranged from 44 to 60 percent; the average of percent native cover was 50% with a deviation of 9% (for 1998 the average of percent native cover was 53% +/- 10%). The percent non-native cover fluctuated between 1 and 7 percent; the average of percent non-native cover was 4.5% and a deviation of 3% (for 1998 the average of percent non-native cover 7.4% +/- 5%). The percent of native species ranged from 71 to 80 percent; the average percent of native species was 77% with a deviation of 5% (for 1998 the average of percent native species was not significantly different: 85% +/- 5 %. Diversity ranged from 4 to 10 species, with an average of 7 species and a high deviation of 6 species which represented a non-significant decline from the previous year when diversity averaged at 10 species +/- 3 species.

TRANSECT 12 - Priority #6	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Sand verbena (*Abronia umbellata*)	10	12	-
Bur-bush (*Ambrosia chamissonis*)	4	2	3
Slender wild oats (*Avena barbata*)*	-	2	1
Bare	68	53	52
Beach evening primrose (*Camissonia chieranthifolia*)	7	2	12
Pincushion (*Chaenactis glabriuscula*)	26	12	
Red-stemmed filaree (*Erodium cicutarium*)*	1	-	-
Dunes wallflower (*Erysimum suffrutescens*)	1	1	1
Bicolored cudweed (*Gnaphalium bicolor*)	3	3	-
Litter	-	5	-
Bush lupine (*Lupinus chamissonis*)	4	12	29
Twigs	4	4	17
Percent Native Cover (%)	55	44	45

TRANSECT 12 - Priority #6	1997	1998	1999
Percent Non-native Cover (%)	1	2	1
Percent Native Species (%)	88	88	80
Native Diversity	8	8	4

TRANSECT 17 - Priority #6	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	-	-	.80
Sand verbena (*Abronia umbellata*)	-	6	1.30
Bur-bush (*Ambrosia chamissonis*)	4	3	.40
Bare	23	2	12
Wild mustard (*Brassica tournfortii*)*	1	6	4
Ripgut brome (*Bromus diandrus*)*	-	-	2
Beach evening primrose (*Camissonia chieranthifolia*)	1	5	6
Pincushion (*Chaenactis glabriuscula*)	-	4	.20
Dodder (*Cuscuta californica*)	-	-	.40
Coast buckwheat (*Eriogonum parvifolium*)	13	16	4
Red-stemmed filaree (*Erodium cicutarium*)*	-	6	-
Dune wallflower (*Erysimum suffrutescens*)	-	-	.20
Bicolored cudweed (*Gnaphalium bicolor*)		-	3
Woolly aster (*Lessingia filaginifolia*)	4	4	4
Litter	22	2	2
Deerweed (*Lotus scoparius*)	2	13	37
Bush lupine (*Lupinus chamissonis*)	5	8	3
Branching phacelia (*Phacelia ramosissima*)	-	-	.20
Twigs	28	29	24

TRANSECT 17 - Priority #6	1997	1998	1999
Percent Native Cover (%)	29	61	60
Percent Non-native Cover (%)	1	12	6.80
Percent Native Species (%)	86	88	80
Native Diversity	7	9	12

TRANSECT 18 - Priority #6	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Sand verbena (*Abronia umbellata*)	0.3	6	2
Bur-bush (*Ambrosia chamissonis*)	1	2	1.50
Slender wild oats (*Avena sativa*)*	1	0.2	.50
Bare	29	19	17
Wild mustard (*Brassica tournfortii*)*	-	6	1.40
Ripgut brome (*Bromus diandrus*)*	-	1	1
Beach evening primrose (*Camissonia chieranthifolia*)	2	14	16
Pincushion (*Chaenactis glabriuscula*)	-	2	-
Popcorn flower (*Cryptantha clevelandii*)	-	-	1.40
Dodder (*Cuscuta californica*)	1	1	-
Live-for-ever (*Dudleya lanceolata*)	0.4	1	.30
Coast buckwheat (*Eriogonum parvifolium*)	1	-	-
Red-stemmed filaree (*Erodium cicutarium*)*	-	-	1.70
Dune wallflower (*Erysimum suffrutescens*)	1	3	5
Bicolored cudweed (*Gnaphalium bicolor*)	1	1	1.20
Litter	15	11	4
Deerweed (*Lotus scoparius*)	2	11	9
Bush lupine (*Lupinus chamissonis*)	14	12	6
Russian thistle (*Salsola tragus*)*	-	1	.80

TRANSECT 18 - Priority #6	1997	1998	1999
Wand chicory (*Stephanomeria virgata*)	-	8	2
Twigs	32	14	41
Percent Native Cover (%)	24	61	44
Percent Non-native Cover (%)	1	8.2	5.4
Percent Native Species (%)	91	79	71
Native Diversity	11	14	10

Transects #19 and #20 are located in the lee deflation plain and are encompassed by Polygon 1. Comparison between 1997, 1998 and 1999 line-intercept transect data for transect #19 are provided below. Data for transect #20 are provided for 1997 only, since the markers were not found in 1998 or 1999.

TRANSECT 19 - Priority #4	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	2	34	38
Ripgut brome (*Bromus diandrus*)*	-	-	12
Bare	6	1	4
Beach evening primrose (*Camissonia chieranthifolia*)	-	-	.30
Lewis' evening primrose (*Camissonia lewisii*)	-	2	-
Popcorn flower (*Cryptantha clevlandii*)	-	-	.40
Horsetail (*Equisetum sp.*)	-	-	.40
Red-stemmed filaree (*Erodium cicutarium*)*	23	7	32
Telegraph weed (*Heterotheca grandiflora*)	-	-	1.90
Litter	28	15	3
Deerweed (*Lotus scoparius*)	41	36	43
Twigs	2	7	.60

TRANSECT 19 - Priority #4	1997	1998	1999
Percent Native Cover (%)	41	38	46
Percent Non-native Cover (%)	25	41	82
Percent Native Species (%)	34	50	63
Native Diversity	3	4	5

TRANSECT 20	1997	1998	1999
Dominant Cover Type	% Cover	% Cover	% Cover
Slender wild oats (*Avena barbata*)*	2.5	NA	NA
Bare	11	NA	NA
Beach evening primrose (*Camissonia chieranthifolia*)	1	NA	NA
California buckwheat (*Eriogonum fasciculatum*)*	13	NA	NA
Red-stemmed filaree (*Erodium cicutarium*)*	11	NA	NA
Litter	44	NA	NA
Deerweed (*Lotus scoparius*)	15	NA	NA
Twigs	2	NA	NA
Percent Native Cover (%)	16	NA	NA
Percent Non-native Cover (%)	26.5	NA	NA
Percent Native Species (%)	40	NA	NA
Native Diversity	5	NA	NA

6. RECOMMENDATIONS

Sapphos Environmental has developed the following recommendations for on-going maintenance to guide continuing efforts within the Habitat Restoration Area. These recommendations are based on the results of 1995-1999 qualitative vegetation surveys and are consistent with measures suggested in *Long-term Habitat Management Plan for the Los Angeles Airport/El Segundo Dunes*.

Priorities for Weed Control

The proposed maintenance activities for subsites within the Habitat Restoration Area have been prioritized based upon the importance of maintaining and enhancing southern foredune and southern dune scrub habitat for the federally endangered El Segundo blue butterfly and the potential for non-native invasive plant species to compete and displace native species within the habitat. The priority categories have been previously developed by Sapphos Environmental, Inc. in *State of the Dunes and Recommendations for Management* (Sapphos Environmental, Inc. 1995), however, the prioritization by subsites has been updated to reflect changing management needs.

Priority 1 and 2 subsites are areas that were revegetated with coastal dune species between 1987-1994
and contain abundant non-native species competing and displacing established revegetated species. ESB monitoring surveys conducted during the height of the flight season in 1996 revealed that the distribution of ESB was directly correlated with the presence of coast buckwheat. As a direct result of these surveys, Sapphos Environmental, Inc. has determined that all Priority 1 and 2 areas are occupied habitat for the ESB.

Priority 1. Six backdune subsites support acacia trees, shrubs and/or seedlings, regenerating iceplant, and other non-native species competing and displacing established southern dune scrub species which include restoration plantings.

Priority 2. These areas are similar to Priority 1 areas but non-native invasive species are less abundant.

Priority 3 and 4 subsites have had either no restoration or little and relatively unsuccessful restoration. They are assigned a lower priority than 1 and 2 since restoration plantings are not being directly displaced. Several Priority 3 subsites are within historically occupied habitat. Priority 4 subsites are adjacent to areas of occupied habitat and as such, require weed management.

Priority 3. Ten subsites on the southern end of the Habitat Restoration Area, known as the VOR area, have not been subject to restoration or enhancement activities. Three of these subsites contain coast buckwheat and are within historically occupied habitat. Numerous acacia and oleander which had spread considerably were removed as part of an aggressive weed abatement program undertaken by LAWA with the assistance of crews from Los Angeles County Department of Probation. Priority 3 subsite will need to be revisited to keep resprouts under control.

Priority 4. These six subsites, within the deflation plain of the dunes, contain numerous non-native species which include California buckwheat (*Eriogonum fasciculatum*), and to a lesser degree, iceplant, star thistle (*Centaurea melitensis*), and Russian thistle (*Salsola tragus*). Priority 4 subsites are adjacent to occupied habitat.

Priority 5 and 6 subsites are areas in relatively good condition. Because these areas have a high percentage of native plants they require less intensive weeding.

Priority 5. These four subsites were revegetated between 1990 and 1991 and overall are in good condition. They are occupied habitat for the ESB. These areas should be patrolled yearly by experienced LAWA landscape staff together with an environmental monitor and any invasive species carefully removed.

Priority 6. These ten subsites are the least disturbed within the Habitat Restoration Area. Barring subsite 50, they are occupied habitat for the ESB. With the exception of the century plant clump on subsite 2, they are overall in good condition. Priority 6 areas should be patrolled yearly by experienced LAWA landscape staff together with an environmental monitor and any invasive species carefully removed.

Figure 4 and Table II show 1998/1999 priorities for maintenance.

TABLE II
1998/1999 PRIORITIES FOR MAINTENANCE ACTIVITIES WITHIN THE EL SEGUNDO BLUE BUTTERFLY HABITAT RESTORATION AREA

SUBSITE NUMBER	ACRES	PRIORITY 1	PRIORITY 2	PRIORITY 3	PRIORITY 4	PRIORITY 5	PRIORITY 6
1	2.65						X
2	1.71						X
3	2.40				X		
4	0.75				X		
5	1.53					X	
6	1.42					X	
7	2.51					X	
8	1.43					X	
9	3.06	X					
10	3.86	X					
11	0.88				X		
12	1.41						X
13	2.32	X					
14	2.27						X
15	3.05		X				

SUBSITE NUMBER	ACRES	PRIORITY 1	PRIORITY 2	PRIORITY 3	PRIORITY 4	PRIORITY 5	PRIORITY 6
16	2.58		X				
17	2.10						X
18	3.76	X					
19	1.51						X
20	1.14	X					
21	2.45	X					
22	4.35						X
23	4.34						X
24	4.23			X			
25	2.03			X			
26	3.08			X			
27	4.16			X			
28	2.77			X			
29	3.29			X			
30	4.27			X			
31	2.95						X
32	2.76			X			
33	3.05			X			
34	3.33			X			
35	2.59		X				
36N	4.99		X				
36S	4.83		X				
37N	5.35		X				
37S	4.35		X				
38N	2.90		X				
38S	3.32		X				
39N	2.94		X				

SUBSITE NUMBER	ACRES	PRIORITY 1	PRIORITY 2	PRIORITY 3	PRIORITY 4	PRIORITY 5	PRIORITY 6
39S	3.26		X				
40N	2.99		X				
40S	2.09		X				
40C	1.08		X				
41N	3.43		X				
41S	3.72		X				
42N	2.38		X				
42S	2.19		X				
43N	2.65		X				
43E	2.37		X				
43W	2.69		X				
44N	3.05		X				
44S	3.06		X				
45N	1.37		X				
45S	3.43		X				
49	4.16		X				
50	2.22						X
51	4.89				X		
52	8.3				X		

Schedule for Weed Control

The U. S. Fish and Wildlife Service (USFWS) has indicated that all activity conducted within habitat occupied by the El Segundo blue butterfly is under the jurisdiction of the U. S. Fish and Wildlife Service. In a letter to Sapphos Environmental, dated April 10, 1997, the U. S. Fish and Wildlife Service recommended that Sapphos Environmental personnel "engaged in field surveys or other similar activities involving the endangered El Segundo blue butterfly obtain a recovery permit pursuant to section 10(a) (1) (A) in order to avoid potential violations of the Act." Potential violation of the Endangered Species Act of 1973,

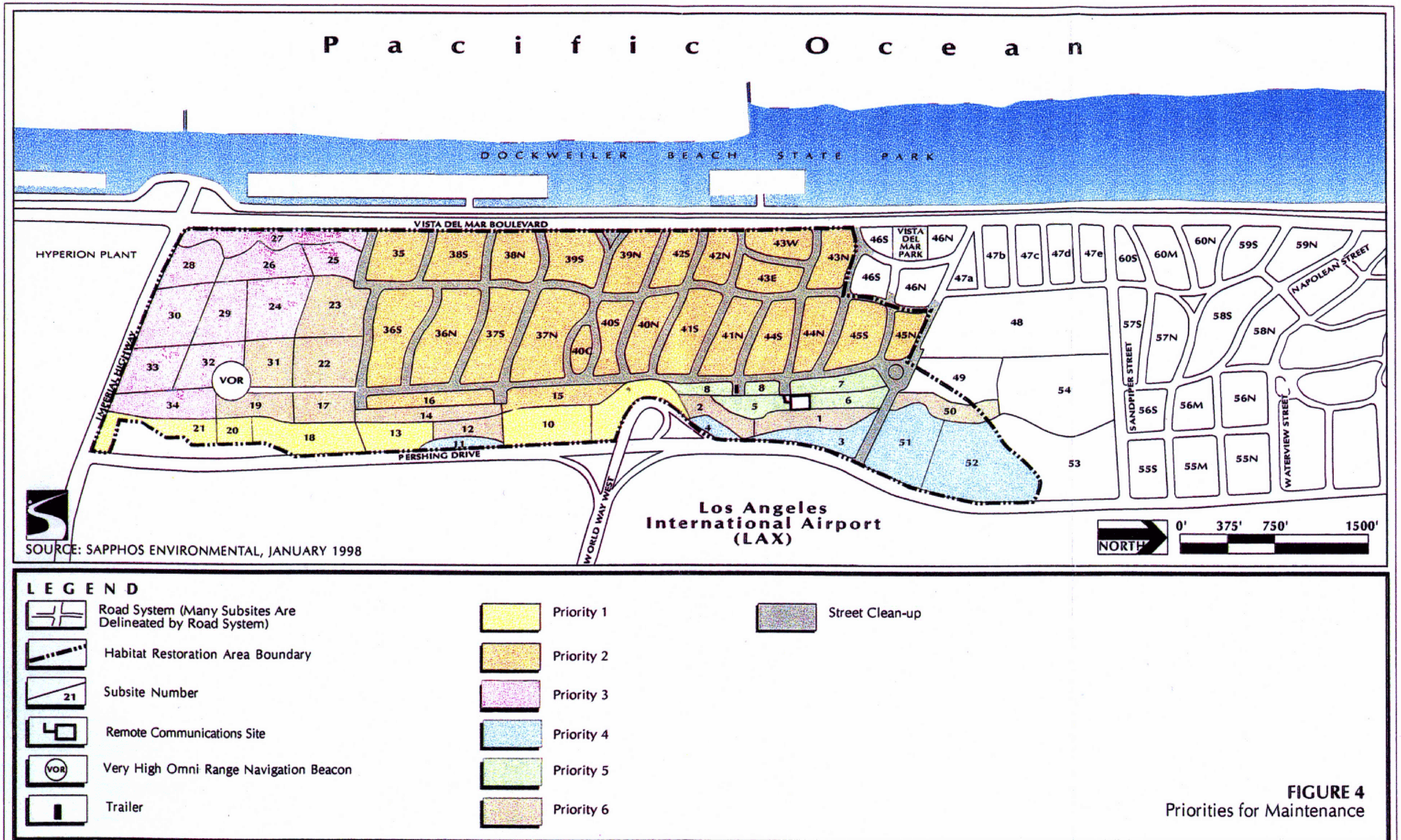

FIGURE 4
Priorities for Maintenance

w:\projects\1043-010\graphics\maintenance.fh5 as amended (Act), include activities which could result in potential take of the species. On July 24, 1998, Sapphos Environmental obtained a recovery permit in order to comply with the U. S. Fish and Wildlife recommendation. Currently, on-going maintenance and monitoring activities within the Habitat Restoration Area are being conducted under USFWS permit number TE830990-0. Special terms and conditions pursuant to this permit limit weed abatement activities in areas of occupied habitat (dune areas that contain coast buckwheat) during the height of the flight season. In addition the permit states that "the number of individual butterfly adults, pupae, larvae or eggs allowed to be incidentally injured or killed during performance of permitted activities is zero in any calendar year". As a result, Sapphos Environmental recommends that maintenance activities (i.e. weed abatement activities) within core habitat (dune areas that contain coast buckwheat) be limited and closely monitored by an environmental monitor from Sapphos Environmental during the entire flight season. The proposed schedule for weed abatement activities takes into account limited maintenance activities within core habitat during the ESB flight season, in addition to time sensitive application of herbicide for optimum performance on target species. The proposed schedule for yearly maintenance activities is provided in Table III. The primary objective of this proposed schedule is to conduct maintenance activities on all of the 62 subsites that comprise the Habitat Restoration Area within a one year period. The number of days allocated towards each subsite is based upon the number of non-native species and their abundance and assumes a one year time period comprised of two-hundred and forty-two work days (242).

TABLE III
1998/1999 Schedule for Maintenance Activities Within the El Segundo Blue Butterfly Habitat Restoration Area

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
1	2.65	6	2	Patrol for California buckwheat, iceplant and other non-native species.
2	1.71	6	2	Patrol for acacia, iceplant and other non-natives species.
3	2.40	4	3	March: cut and daub California buckwheat, patrol for iceplant and other non-native species (star thistle, trifolium). Volunteers to follow-up with removal of non-natives.
4	0.75	4	3	March: cut and daub California buckwheat, patrol for iceplant and other non-native species, check for star thistle.
5	1.53	5	2	Patrol for acacia, iceplant and other non-native species.

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
6	1.42	5	2	Patrol for acacia, iceplant and other non-native species. California buckwheat on north end.
7	2.51	5	2	Patrol for acacia, iceplant and other non-native species.
8	1.43	5	2	Patrol for acacia, iceplant and other non-native species.
9	3.06	1	4	Work on during the up-coming year: Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat). Volunteers to follow-up with removal of non-native buckwheats, African veldt grass.
10	3.86	1	4	Work on during the up-coming year: Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat).
11	0.88	4	4	Hand pull Catalina Island buckwheat, cut and daub castorbean, patrol for other non-natives.
12	1.41	6	2	Patrol for acacia, iceplant and other non-native species.
13	2.32	1	4	Work on during the up-coming year: Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat).
14	2.27	6	2	Patrol for acacia, iceplant and other non-native species. One California buckwheat on north crest.
15	3.05	2	4	Patrol for acacia, iceplant and other non-native species (pyracantha).
16	2.58	2	4	Patrol for acacia, iceplant and other non-native species.

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
17	2.10	6	2	Patrol for acacia, iceplant (along crest) and other non native species.
18	3.76	1	17	Work on during the up-coming year: Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat).
19	1.51	6	2	Patrol for acacia, iceplant and other non-native species.
20	1.14	1	12	Work on during the up-coming year. Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat).
21	2.45	1	12	Work on during the up-coming year: Apply 100 % Garlon® to 15% of tree trunk per specifications on manufacturers data sheet or foliar application on small shrubs (away from coast buckwheat). Remove Catalina Island and California buckwheat.
22	4.35	6	2	Patrol for acacia, iceplant and other non-native species.
23	4.34	6	2	Patrol for acacia, iceplant and other non-native species.
24	4.23	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
25	2.03	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species (stock).
26	3.08	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
27	4.16	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species (stock and statice).

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
28	2.77	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
29	3.29	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
30	4.27	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
31	2.95	6	2	Patrol for acacia, iceplant and other non-native species.
32	2.76	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
33	3.05	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant; patrol for other invasive species.
34	3.33	3	4	Foliar application of Garlon® on acacia resprouts; remove iceplant patrol for other invasive species.
35	2.59	2	4	Patrol for acacia, spray iceplant and remove other non-native species (statice on west perimeter). Pick-up trash. Volunteers to follow-up with removal of iceplant.
36N	4.99	2	4	Patrol for acacia, iceplant and other non-native species. Foliar application of Garlon® on resprouting pepper tree.
36S	4.83	2	4	Patrol for acacia, iceplant and other non-native species (gazania). Trash pick-up.
37N	5.35	2	4	Patrol for acacia, iceplant and other non-native species(African bur-grass: spray in spring, pyracantha, agave, elm, pepper).
37S	4.35	2	4	Patrol for acacia, iceplant and other non-native species (hawarthia on NW end).

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
38N	2.90	2	4	Patrol for acacia, spray iceplant and remove other non-native species. Pick-up trash. Volunteers to follow-up with removal of iceplant.
38S	3.32	2	4	Patrol for acacia, spray iceplant and remove other non-native species (gazania, statice, pyracantha). Pick-up trash. Volunteers to follow-up with removal of iceplant.
39N	2.94	2	4	Patrol for acacia, spray iceplant and remove other non-native species (myoporum, agave, ivy). Pick-up trash. Volunteers to follow-up with removal of iceplant.
39S	3.26	2	4	Patrol for acacia, spray iceplant and remove other non-native species (chrysanthemum on N end). Pick-up trash. Volunteers to follow-up with removal of iceplant.
40N	2.99	2	4	Patrol for acacia, iceplant and other non-native species (chrysanthemum).
40S	2.09	2	4	Patrol for acacia, iceplant and other non-native species (California buckwheat).
40C	1.08	2	4	Patrol for acacia, iceplant and other non-native species (chrysanthemum).
41N	3.43	2	4	Patrol for acacia, iceplant and other non-native species (yucca).
41S	3.72	2	4	Patrol for acacia, iceplant and other non-native species (chrysanthemum).
42N	2.38	2	4	Patrol for acacia, spray iceplant and remove other non-native species (gazul, star thistle: spray in spring). Pick-up trash. Volunteers to follow-up with removal of iceplant.
42S	2.19	2	4	Patrol for acacia, spray iceplant and remove other non-native species (star thistle: spray in spring). Pick-up trash. Volunteers to follow-up with removal of iceplant.

SUBSITE NUMBER	ACRES	PRIORITY	DAYS	ACTIVITIES
43N	2.65	2	4	Patrol for acacia, spray iceplant and remove other non-native species (star thistle: spray in spring). Pick-up trash. Volunteers to follow-up with removal of iceplant.
43E	2.37	2	4	Patrol for acacia, spray iceplant and remove other non-native species (African bur-grass: spray in spring, myoporum). Volunteers to follow-up with removal of iceplant.
43W	2.69	2	5	Patrol for acacia, spray iceplant and remove other non-native species (star thistle, California buckwheat, statice). Pick-up trash. Volunteers to follow-up with iceplant removal.
44N	3.05	2	2	Patrol for acacia, iceplant and other non-native species.
44S	3.06	2	2	Patrol for acacia, iceplant and other non-native species (elm, African bur grass: spray in spring).
45N	1.37	2	2	Patrol for acacia, iceplant and other non-native species (statice).
45S	3.43	2	2	Patrol for acacia, iceplant and other non-native species (agave).
49	4.16	2	1	Patrol for acacia, iceplant and other non-native species.
50	2.22	6	1	Patrol for acacia, iceplant and other non-native species.
51	4.89	4	9	March: Cut and daub California buckwheat.
52	8.3	4	9	March: Cut and daub California buckwheat.

Labor Resources

Los Angeles World Airports has assigned two full-time landscape personnel to perform on-going landscape maintenance activities within the Habitat Restoration Area. Since 1995, landscape personnel have systematically removed iceplant piles, pulled living iceplant, and pulled or cut and daubed with herbicide California buckwheat, acacia, oleander, malleluca and other trees from approximately 35 of the 62 subsites within the Habitat

Restoration Area. The landscape crew has also cleaned dead vegetation and debris from streets, greatly improving the general appearance of the Habitat Restoration Area as viewed from Vista Del Mar Boulevard. From 1995 to 1996 LAX landscape staff was assisted by juvenile delinquent crews available through the County of Los Angeles Department of Probation. Juvenile crews, under the supervision of an environmental monitor from Sapphos Environmental, pulled iceplant from 3 subsites, removed trash, debris, and dead vegetation which had been piled along the Pershing Drive fenceline. Their efforts have greatly improved the appearance of the backdune as seen from Pershing Drive. In addition, juvenile delinquent crews from the County of Los Angeles Probation Adult Work Service (PAWS) Program assisted LAWA landscape staff with the removal of acacia trees and shrubs predominantly in the VOR area (Sapphos Environmental 1998). Since February 1997, Sapphos Environmental has supervised a small but dedicated volunteer group which conducts weed abatement activities within the Habitat Restoration Area on the second Saturday of every month. The volunteer group has provided valuable assistance to the LAWA maintenance effort.

The optimum situation for weed control would be for all sites to be patrolled and weeded twice each year. This would prevent extensive regeneration and thereby reduce the work required in each weeding period. Successful recruitment of native plant material is dependent on an aggressive weed control program. Annual weeding of each subsite prior to seed production by native annuals would favor the reestablishment of those species. Supplemental weed removal at the end of the summer could again reduce competition. If weeding of iceplant and spraying of acacia and California buckwheat is done properly and consistently, the labor required should decrease over the next several years. However, weeding each subsite once per year should be adequate to begin to effect long-term control; a longer interval between weeding would likely result in increased labor requirements and less effective weed control. The Habitat Restoration Area, to date, has not received even an annual return to each subsite for weeding. At their current rate of weeding, the two-person landscape crew at the dunes will require between two to three years to complete their coverage.

Supplemental labor resources are required to complete weed removal objectives within the Habitat Restoration Area, in particular, acacia removal along backdune subsites 13, 18, 20, and 21. It is estimated that a PAWS crew of 11-13 members working together with LAWA landscape maintenance crew could effect the removal of acacia trees and shrubs at the above-mentioned sites within 6-10 weeks.

7. REFERENCES

California Department of Fish and Game. 1998. California Natural Diversity Database (CNDDB). *Rarefind. A Database Application for the use of the California Department of Fish and Game's Natural Diversity Database*. California.

City of Los Angeles, Environmental Affairs Department (EAD). 1994. *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes*. Prepared by Environmental

Science Associates, 301 Brannen Street, Suite 200, San Francisco, California, 94107-1811 and Sapphos Environmental, 133 martin Alley, Pasadena, California, 90105. Prepared for City of Los Angeles Environmental Affairs Department, 201 North Figueroa Street, Suite 200, Mail Stop 177 Los Angeles, California, 90012.

Holland, R. F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Non-Game Heritage Program. California Department of Fish and Game. Sacramento.

Rand Corporation. 1995. *A Million Random Digits with 100,000 Normal Deviates*. Free Press, Glencoe, Illinois.

Sapphos Environmental, Inc. 1998. Memorandum for the Record (JN 1043-005.M08), Subject:1995-1998 Vegetation Monitoring Report and 1998/1999 Schedule for On-going Maintenance Activities, el Segundo Blue Butterfly Habitat Restoration Area at Los Angeles International Airport, Los Angeles, California. Prepared for Los Angeles World Airports, Environmental Management Bureau, 1 World Way, Room 205, Los Angeles, CA 90045-5803. Prepared by Sapphos Environmental, Inc. 133 Martin Alley, Pasadena, California, 91105.

Sapphos Environmental. 1998. Memorandum for the Record (JN 1043-005.M06), Subject: Revised Monitoring Status Report for Routine Maintenance Activities at the Los Angeles/El Segundo Dunes from December 1997-June 1998. Prepared for: Los Angeles Department World Airports, 1 World Way, Room 205, Los Angeles, CA 90045-5803 and Los Angeles County Department of Probation, Probation Adult Work Service (PAWS), 7639 Painter Ave, Whittier, California, 90602. Prepared by Sapphos Environmental, Inc. 133 Martin Alley, Pasadena, California, 91105.

Sapphos Environmental. 1995. Memorandum for the Record (JN 1043-001.M06): "State of the Dunes and Recommendations for Management". Prepared for: City of Los Angeles Department of Airports, 1 World Way, Room 205, Los Angeles, CA 90045-5803. Prepared by Sapphos Environmental, Inc. 133 Martin Alley, Pasadena, California, 91105.

APPENDIX A
QUALITATIVE SURVEY CHECKLIST

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist

JN 1043-010

Date: April 22 1999

Environmental Monitor: Irena Mendez IMM Subsite: 1

Climate Overcast

Temp. High (degrees):

Temp. Low (degrees):

Humidity:

Site History

Habitat: Foredune Backdune Prairie

Revegetation Date: None 1990 1992 1993 1994

Soil Organics: L M H

Soil Testing: Y N

Rubble: R I C O

Trash: R I C O

HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:
Stakes							
Site Markers							

1 – R
I
30 – C
+ – A

Native perennials		Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitment L,M,H	Abundance R,I,C,A
Abr umb	+10				H			A
Amb cha	+10			Y	M		H	I
Art cal								
Art dru								
Cal mac				Y	H	Y		C
Cam chi								
Cir cal		L			M	Y		I
Cro cal		M		Y	M			R
Cuc foe		H				Y	H	R
Dis spi								
Dud lan	+++	H		Y			H	A
Enc cal								
Eri eri		H		Y				A
Eri par		H						A
Ery suf	+10				H	Y		C
Esc cal					H			A
Gal ang		H						A
Gna bic		H		Y	A		H	A
Hor cun					A	Y	L	I
Iso arb		M				Y		I
Les fil		H			L		M	A
Ley tri		H						A
Lot sco					A	Y		A
Lup cha					H			A
Mar mac		H		Y				R
Mel imp	+++				H	Y		A
Nas car								
Opu lit								
Pha ram	+++	M					H	A

Subsite (1)

Rhu int							
Sen dou							

Native Annuals	Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon							
Cam bis							
Cam lew							
Cam mic							
Che gla 6				M			R
Cho cal							
Cra ere							
Cry int				H		M	A
Des pin							
Eri gra							
Fes meg							
Lot pur 1	M						R
Lot str							
Lup bic							
lup tru							
Pla ere							
Ste vir 10 ++	H					H	A
Non-natives							
Aca							
bur gra							
Cal buc							
chi cap				A	Y		A
Ice							
rip bro							
Rus thi							
Sta thi							
vel gra							
wil oat							
Abr dai 1				H	Y		R [illegible]

Use by Wildlife	
Reptile	Sideblotch: 1
Butterfly	
Moth	
Spider	lynx: 1
Beetly	
Other	Bombus: 2 ladybird: 10 Flycatcher: 1

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist

JN 1043-010

Date: April 27 1999

Environmental Monitor: Irena Mendez IMM. Subsite (1)

Climate overcast

Temp. High (degrees):

Temp. Low (degrees):

Humidity:

Site History

Habitat:	Foredune	Backdune	Prairie			
Revegetation Date:	None	1990	1992	1993	1994	
Soil Organics:	L	M	H			
Soil Testing:	Y	N				
Rubble:	R	I	C	O		
Trash:	R	I	C	O		
HardWare:	Present	Absent	Good	Fair	Poor	Replace Date:
Stakes						
Site Markers						

Native perennials		Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Abr umb	卌 卌 卌 卌 卌 卌 卌 卌	M			H	Y	M	A
Amb cha	卌 卌 +10 +3 + ++						M	A
Art cal								
Art dru								
Cal mac								
Cam chi								
Cir cal	||			Y				
Cro cal	|卌			Y			M	
Cuc foe	|卌					Y		
Dis spi	|							
Dud lan								
Enc cal								
Eri eri	卌 +10 +10 +5 +8 ++	H						A
Eri par	10 + 卌 卌				L			A
Ery suf				Y	H	Y		A
Esc cal	卌 +++	H		Y	H	Y	H	A
Gal ang		H		Y			H	A
Gna bic		H		Y	H	Y	H	A
Hor cun	||	H		Y	H	Y		
Iso arb	卌 卌			Y	H	Y		
Les fil		H		Y				A
Ley tri								A
Lot sco	卌 卌 卌 ||||				H	Y		
Lup cha	卌 卌 卌 ++	H		Y	H	Y	H	A
Mar mac								
Mel imp	卌 卌 卌 卌 卌 +				H	Y		A
Nas cer								
Opu lit								
Pha ram	|			Y	L			A

Subsite (2)

		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
Rhu int								
Sen dou								
Rus cal	~~IIII~~ ~~IIII~~ IIII	H						
var	III	H				Y		
Native Annuals		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla	III			Y	H			
Cho cal								
Cra ere								
Cry int								
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic								
lup tru								
Pla ere								
Ste vir								
Non-natives								
Aca	~~IIII~~ (near adjacent)							
bur gra								
Cal buc								
chi cap								
Ice								
rip bro						Y	H	A
Rus thi								A
Sta thi								
vel gra								
wil oat	~~IIII~~ +					Y	H	A
Cor a.g.	5 +	H		Y	M	Y		

Use by Wildlife

Reptile	
Butterfly	
Moth	
Spider	
Beefly	
Other	Darkling beetle 1 + larvae - 6 Flycatcher

916-322-2492
323-8970
Roxann Bittman

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1043-010								
Date: May 6. 1999	1999							
Environmental Monitor: Irena Mendez		IWM	Subsite (3)					
Climate	Sunny clear							
Temp. High (degrees):								
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat: Foredune	Backdune	Prairie						
Revegetation Date:	None	1990	1992	1993	1994:			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble: R	I	C	O					
Trash: R	I	C	O					
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								
Native perennials		Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb								
Amb cha								
Art cal								
Art dru								
Cal mac								
Cam chi	~~IIII~~ ~~IIII~~ ~~IIII~~ +40 +40	H		Y	Y	N	A	A
Cir cal								
Cro cal								
Cuc foe	~~IIII~~ II	H						
Dis spi								
Dud lan								
Enc cal	~~IIII~~ I	H		Y	M	Y		
Eri eri	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ I							
Eri par		H		Y				I
Ery suf								
Esc cal	~~IIII~~ ~~IIII~~ I	H		Y	H	Y	L	I
Gal ang	IIII							
Gna bio	~~IIII~~ II							
Hor cun								
Iso arb								
Les fil	~~IIII~~ ~~IIII~~ III	H						
Ley tri								
Lot sco					H	Y	~~M~~ H	A
Lup cha	~~IIII~~ II	H						[illegible]
Mal mac								
Mel imp								
Nas cer					H	Y	M	A
Opu lit						—		
Pha ram	II	H		N				
Lot pur		H		Y	M	N	H	A

Arroyo Willow 2+2

Subsite (3)

Rhu int									
Sen dou									
Microseris			M		Y	H	Y	H	A
Bac sal	II				Y	Y	Y	L	R
Bra nic	II+50		H					H	R
Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew	2100		H		Y	H	Y	H	A
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int	[illegible]		H		Y	H	Y		
Des pin									
Eri gra									
Fes meg						A	Y	H	A
Lot pur			A		Y	M	N	H	A
Lot str									
Lup bic			•		Y	M	Y	H	A
lup tru	[illegible]+++		H		Y	L	Y	H	
Pla ere									
Ste vir	[illegible]		H		N	[illegible]	N	L	
Non-natives									
Aca									
bur gra									
Cal buc	[illegible]							M	
chi cap						A	A	H	A
Ice									
rip bro									
Rus thi									
Sta thi									
vel gra									
wil oat									
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other									

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist

JN 1043-010									
Date: May 13, 1999		1999		Subsite (4)					
Environmental Monitor: Irena Mendez									
Climate sunny stuff and high clouds									
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	I								
Amb cha									
Art cal									
Art dru									
Cal mac									
Cam chi	[illegible]		H		Y	H	Y		
Cir cal									
Cro cal	[illegible]		Y					H	A
Cuc foe	[illegible]		H				Y		
Dis spi									
Dud lan									
Enc cal	[illegible]		I						
Eri eri	[illegible]		H		Y	Y	Y		
Eri par									
Ery suf									
Esc cal	[illegible] ++		H		Y	H		M	A
Gal ang	[illegible]		H		Y	H	X		
Gna bic	[illegible] +5 +5 +10		H		Y	H	Y	M	A
Hor cun									
Iso arb									
Les til	[illegible]								
Ley tri									
Lot sco						H	Y	H	A
Lup cha	[illegible]+25							H	
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram	[illegible] ++		H			M	Y	H	A
Cam pic	[illegible]		H						

Subsite 4

		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
Rhu int								
Sen dou								
Dat w	[illegible]	H		Y				
Native Annuals		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon								
Cam bis								
Cam lew	[illegible]+40+3	H		Y	H	Y		
Cam mic								
Che gla								
Cho cal								
Cra ere								
Cry int								
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic								
lup tru	5+[illegible]	H		Y	H	Y		
Pla ere								
Ste vir	[illegible]	H						
Mic.	[illegible]+10+	H				Y		
Non-natives								
Aca								
bur gra								
Cal buc								
chi cap								
Ice								
rip bro						Y		A
Rus thi	[illegible]							
Sta thi								
vel gra								
wil oat						Y		A
avo cu					H	Y	H	A
Use by Wildlife								
Reptile	Side blotch III							
Butterfly	Virginia Lady, blue							
Moth								
Spider								
Beefly								
Other	3 ft long Gopher Snake; Subsite 1-2 boundary at fenceline, Datura beetle.							

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1043-010								
Date: May 20, 1999	1999			Subsite 5				
Environmental Monitor: Irena Mendez								
Climate	cool, breezy, scattered high clouds.							
Temp. High (degrees):								
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat:	Foredune	Backdune	Prairie:					
Revegetation Date:	None	1990	1992	1993	1994			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble:	R	I	C	O				
Trash:	R	I	C	O				
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								
Native perennials		Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	[illegible]+7+5+7+	H		Y	H	Y	H	A
Amb cha	[illegible]							
Art cal								
Art dru								
Cal mac	1							
Cam cni		H		Y	H	Y	H	A
Cir cal								
Cro cal	[illegible]							
Cuc foe								
Dis spi								
Dud lan	6+[illegible]	H		Y	L	N	H	
Enc cal	[illegible]							
Eri eri	[illegible]							
Eri par	11+40+[illegible]+6+5	M		Y	L	N	~~2~~ M	A
Ery suf		H		Y	H	Y	H	A
Esc cal	1	M		Y	H	N	M	A
Gal ang	[illegible]++							
Gna bic	1	M		Y	L	~~N~~ Y	[illegible] H	A
Hor cun								
Iso arb	[illegible]							
Les fil	20+[illegible]++							
Ley tri								
Lot sco		H	Y	Y	H	Y	H	A
Lup cha		H		N	Y	Y	H	A
Mar mac								
Mel imp	[illegible]							
Nas cer	11							
Opu lit	11							
Pha ram	[illegible] 11	H		Y	L	N	H	A
Car flam	8+1			Y	Y			
Cus cal	[illegible]	H						

bubsite (5)

		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
Rhu int	IIII							
Sen dou								
Sal mel	IIII							
Native Annuals		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla		L		Y	H	N	M	A
Cho cal	36+IIIII IIIII III	M	N	Y	H	N	M	A
Cra ere	IIIIIIIIII +20 (patches)	M	Y			Y		A
Cry int								
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic								
lup tru								
Pla ere								
Ste vir	IIIII III	M		N	[illegible]	N	M	
Cry cle	IIIII							
Non-natives								
Aca								
bur gra								
Cal buc								
chi cap								
Ice								
rip bro								
Rus thi								
Sta thi								
vel gra								
wil oat								
Use by Wildlife								
Reptile	IIII							
Butterfly	[illegible] metalmark 1							
Moth								
Spider								
Beefly								
Other	bumbus II							

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 5/27/99		1999	Jdn Subsite (6)						
Environmental Monitor: Irena Mendez									
Climate Cool breezy scattered high clouds									
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:	L	M	H						
Soil Testing:	Y	N							
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	IIIIIIIIIIIIIIIIIIIIIIIIIII								
Amb cha	IIIIIIIIIIIIIIIIII								
Art cal									
Art dru	I								
Cal mac	I								
Cam chi	IIIII IIII								
Cir cal									
Cro cal	IIIII IIIII III								
Cuc foe									
Dis spi									
Dud lan	IIIII IIIII IIIII ++								A
Enc cal	IIIII IIIII								
Eri eri	IIIII IIIII IIIII IIIII								
Eri par	IIIII IIIII IIIII IIIII IIIII IIIII I+								A
Ery suf	IIIII IIIII IIIII IIIII IIIII I++								A
Esc cal	IIIII IIIII IIIII ++								A
Gal ang	IIIII IIIII IIIII IIIII I								
Gna bic									A
Hor cun									
Iso arb									
Les fil									A
Ley tri									
Lot sco									A
Lup cha									
Mar mac									
Mel imo	IIIII								
Nas cer									
Opu lit									
Pha ram	IIIII IIIII IIIII IIIII IIIII IIIII +								A
Cus cal	IIIII								
Ami at	I								
Ste vir	IIIII IIIII IIIII IIIII								A
Cry cle	IIIII IIIII IIIII+P			Y			Y		

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 6/23		1999	IIII		Subsite: 7				
Environmental Monitor: Irena Mendez									
Climate	scattered high clouds, sunny warm windy 2-5mph								
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	N,L,M,H	R,I,C,A
Abr umb	IIII IIII III					M	Y	L	
Amb cha	IIII II					H	Y	L	
Art cal	I								
Art dru	II								
Cal mac	III		M	N	Y	H	Y	M	
Cam chi	10+10+IIII+10+...		M	N	Y	M	Y	~~M~~ H	A
Cir cal									
Cro cal	IIII IIII IIII IIII +10+10		H	N	Y	M	N	H	
Cuc foe									
Dis spi									
Dud lan	IIII +++		M	N	Y	H	N	~~M~~ H	A
Enc cal	IIII IIII IIII +15+		M	Y	N	H	Y	L	
Eri eri	IIII IIII II		M	N	N	N	N	L	
Eri par	IIII II+10+II+10+20+...		M	N	Y	L	N		
Ery suf	10+5+10+		H	N	N	~~H~~ L	Y	M	
Esc cal	IIII+10+		H	N	Y	H	Y		
Gal ang	IIII IIII IIII IIII +10+					M	Y		
Gna bic	IIII III								
Hor cun									
Iso arb	IIII II		M	N	Y	Y	Y		
Les fil			M	N	Y	L	N	~~M~~ H	A
Ley tri									
Lot sco			M	Y	N		Y	M	A
Lup cha									
Mar mac									
Mel imp									
Nas cer	10+8+10+		M	N	N	N	Y	L	
Opu lit									
Pha ram	IIII I		M	N	Y	M	Y		
Rhu int	I		M	N	N	N	N	N	R
Sen dou									

Subsite 7

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	N,L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int	ck I								
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru	10			Y	N		Y	M	
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal buc									
chi cap									
Ice									A
rip bro									
Rus thi	IIII IIII +10+10+								
Sta thi									
vei gra									
wil oat									A
Rha sat	I								
malva sp	I		M	N	Y	Y H	Y	N	R
Use by Wildlife									
Reptile	side blotch								
Butterfly									
Moth									
Spider	black widow - egg cases								
Beefly	3 abous on buckwheat								
Other	scorpion, red ants, several species of wasps + bees on buckwheat								

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1043-010								
Date: July 1. 1999	1999			Subsite: 8				
Environmental Monitor: Irena Mendez								
Climate: hazy, warm winds 3-5 mph								
Temp. High (degrees):								
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat: Foredune	Backdune	Prairie						
Revegetation Date:	None	1990	1992	1993	1994			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble: R	I	C	O					
Trash: R	I	C	O					
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								

Native perennials		Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom 0, L,M,H	Seedset Y/N	Recruitmt 0,L,M,H	Abundanc R,I,C,A
Abr umb	[illegible]							
Amb cha	[illegible]							
Art cal	[illegible]							
Art dru	[illegible]	M	N	Y	L	N	L	
Cal mac	[illegible]							
Cam chi		M	N	Y	M	Y	H	A
Cir cal								
Cro cal	[illegible]							
Cuc foe								
Dis spi								
Dud lan	[illegible]							
Enc cal	[illegible]+4+3+6+10+10+	M	Y	N	L	Y	M	A
Eri eri	[illegible]							
Eri par	[illegible]+30+	M	N	Y	L	N	H	A
Ery suf		M	Y	N	0	Y	M	A
Esc cal	[illegible]	M	N	Y	H	Y	M	
Gal ang	[illegible]							
Gna bic	[illegible]+10+	H	Y	Y	M	Y	H	A
Hor cun								
Iso arb	[illegible]	H	N	Y	H	Y	L	
Les fil		M	N	Y	L	N	H	A
Ley tri								
Lot sco	[illegible]	M	Y	N	L	Y	M	A
Lup cha	[illegible]+5+10+10+...	M	N	N	L	Y	M	A
Mar mac								
Mel imp								
Nas cer	[illegible]+50+	M	Y	N	0	Y	M	A 8 perimeter.
Opu lit	[illegible] M		N	N	M	Y	M	A
Pha ram	[illegible]+8+10+5+[illegible]							
Rhu int	[illegible]							
Sen dou								
Mir cal	[illegible]							
Jar ram	[illegible]	M	N	Y	N	N	L	

Native Annuals		Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla								
Cho cal								
Cra ere								
Cry intermedia	[illegible]							
Des pin								
Eri gra	[illegible]							
Fes meg								
Lot pur								
Lot str								
Lup bic								
lup tru								
Pla ere								
Ste vir								
Non-natives								
Aca	[illegible]							
bur gra								
Cal buc								A
chi cap								
Ice	[illegible]							
rip bro								A
Rus thi								A
Sta thi								
vel gra								A
wil oat								A
Erodium								A
C. beak								A
Use by Wildlife								
Reptile	Side blotch							
Butterfly	ESB, buckeye, cabbage							
Moth								
Spider								
Beefly								
Other	red harvester.							

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1042-010								
Date: 9/29/99	1999	IMM		Subsite: 9				
Environmental Monitor: Irena Mendez		IMM						
Climate: Clear Skies								
Temp. High (degrees): 72								
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat:	Foredune	Backdune	Prairie					
Revegetation Date:	None	1990	1992	1993	1994			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble: R	I	C	O					
Trash: R	I	C	O					
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								

Native perennials	Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Abr umb							
Amb cha							
Art cal	M	Y	N	M	Y	L	
Art dru							
Cal mac							
Cam chi							
Cir cal							
Cro cal							
Cuc foe							
Dis spi							
Dud lan							
Enc cal							
Eri eri	M	N	Y	H		L	
Eri par	M	Y	N	H	Y	M	A
Ery suf							
Esc cal							
Gal ang							
Gna bic	M	N	N		N	H	A
Hor cun							
Iso arb	M	N	Y	L	Y	L	
Les fil	M	N	Y	M	Y	L	
Ley tri							
Lot sco	M	Y	N		Y	H	A
Lup cha	M	Y	N	M	Y	M	
Mar mac							
Mel imp							
Nas cer							
Opu lit							
Pha ram							
Rhu int	M	N	Y	L	N	L	R
Sen dou							

Native Annuals	Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon							
Cam bis							
Cam lew							
Cam mic							
Che gla							
Cho cal							
Cra ere							
Cry int							
Des pin							
Eri gra							
Fes meg							
Lot pur							
Lot str							
Lup bic							
lup tru							
Pla ere							
Ste vir	M	N	Y	H	Y	L	
Non-natives							
Aca							A
bur gra							
Cal buc							
chi cap							A
Ice							A
rip bro							A
Rus thi							
Sta thi							A
vel gra	H	Y	N	.	Y	H	A
wil oat							
[illegible]							
[illegible]							
Use by Wildlife							
Reptile							
Butterfly							
Moth							
Spider							
Beefly							
Other							

15

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru	卌						Y		R
Pla ere									
Ste vir	II								R
Non-natives									
Aca	卌								R
bur gra									
Cal buc	卌 卌 I								I
chi cap									
ice	卌 卌 卌 I ++ 100x sqft		H	N	N		Y	H	A
rip bro	I		H						A
Rus thi	I		H	N	Y	H	Y	H	A
Sta thi									
vel gra									
wil oat	I		M	Y	N		Y	H	A
Filaree	I			Y			Y	H	A
ann (small)	II		M	N	N			L	R
Use by Wildlife									
Reptile									
Butterfly	painted lady; buckeye; common Hairstreak; Apodemia mormo;								
Moth									
Spider									
Beefly									
Other	pollos								

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043/0101									
Date: 9/18/99		1999			Subsite: 15				
Environmental Monitor: Irena Mendez									
Climate	Warm; Clear blue skies; no clouds winds: 3-5 mph.								
Temp. High (degrees):		75°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	卌		L	Y	N		Y	L	R
Amb cha									
Art cal	卌 III		M	Y	-		Y	L	R
Art dru	II								R
Cal mac									
Cam chi	卌 卌 卌 卌 卌 卌 ...		M	Y	N		Y	L	A
Cir cal									
Cro cal	卌 卌 卌 卌 卌 卌 卌 +		M	N	Y	L	N	-	A
Cuc foe									
Dis spi									
Dud lan	卌 卌								R
Enc cal	卌 卌 卌 卌 卌 I		M	Y	N		Y	L	C
Eri eri	II + 卌 卌 卌		M	N	Y	L	Y	L	I
Eri par	II + 10 + 10 + 10 + ...		M	Y	N		Y	L	A
Ery suf									
Esc cal	I								
Gal ang									
Gna bic	卌 卌 卌 卌 卌 卌 卌		M	N	N			L	A
Hor cun									
Iso arb	III		M	N	Y	L	Y	L	R
Les fil	卌 卌 III		M	N	Y	M	Y	L	I
Ley tri									
Lot sco	卌 卌 卌 卌 卌 卌 ++		M	Y	N		Y		A
Lup cha			M	~~Y~~ N	N	N	Y	H	A
Mar mac									
Mel imp									
Nas cer	卌 卌		M	Y	N		Y	L	R
Opu lit	卌		M	N	N		N	L	R
Pha ram									
Rhu int									
Sen dou									
Car rom	I		M	Y	-		Y	L	R

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist

JN 1043-010							
Date: 9/24/99	1999			Subsite: 10			
Environmental Monitor: Irena Mendez				3-5 mph winds			
Climate: Clear blue skies, no clouds							
Temp. High (degrees): 72°F							
Temp. Low (degrees):							
Humidity:							
Site History							
Habitat:	Foredune	Backdune	Prairie				
Revegetation Date:	None	1990	1992	1993	1994		
Soil Organics:	L	M	H				
Soil Testing:	Y	N					
Rubble: R	I	C	O				
Trash: R	I	C	O				
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:
Stakes							
Site Markers							

Native perennials	Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Abr umb							
Amb cha							
Art cal	M	Y	N	M	Y	L	I
Art dru							
Cal mac							
Cam chi	M	Y	N		Y	H	A
Cir cal							
Cro cal							
Cuc foe							
Dis spi							
Dud lan							
Enc cal							
Eri eri	M	N	Y	M	Y	L	A
Eri par	M	Y	N	H	Y	M	A
Ery suf							
Esc cal							
Gal ang							
Gna bic	M	Y/N	Y/N		Y	H	A
Hor cun							
Iso arb							
Les fil	M	N	Y	H	Y	L	A
Ley tri							
Lot sco	M	Y	N		Y	H	A
Lup cha	M	Y	N		Y	H	A
Mar mac							
Mel imp	M	Y	N	H	Y	M	A
Nas cer							
Opu lit							
Pha ram							
Rhu int							
Sen dou							

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Native Annuals	Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon							
Cam bis							
Cam lew							
Cam mic							
Che gla							
Cho cal							
Cra ere							
Cry int							
Des pin							
Eri gra							
Fes meg							
Lot pur							
Lot str							
Lup bic							
lup tru							
Pla ere							
Ste vir							
Non-natives							
Aca	H	N	N	[illegible]	N	H	A clumps sprouts.
bur gra							
Cat buc	M	Y	N	H	Y	L	A
chi cap							
Ice							
rip bro							
Rus thi							A
Sta thi							
vel gra							
wil oat	M	Y	N	H	Y	L H	A
Eri gla	M	Y	N	H	Y	L	A
Use by Wildlife							
Reptile							
Butterfly							
Moth							
Spider							
Beefly							
Other							

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date:	Sept 29 [illegible] 1999				Subsite:	11			
Environmental Monitor: Irena Mendez [illegible]									
Climate	Clear blue skies, no clouds, 1-2 mph winds								
Temp. High (degrees):		72°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune:	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb									
Amb cha									
Art cal									
Art dru									
Cal mac									
Cam chi									
Cir cal									
Cro cal									
Cuc foc									
Dis spi									
Dud lan									
Enc cal									
Eri eri									
Eri par									
Ery suf									
Esc cal									
Gal ang									
Gna bic									
Hor cun									
Iso arb									
Les fit									
Ley tri									
Lot sco			M	Y	N		Y	H	A
Lup cha			M	Y	N		Y	M	
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal hue									
chi cap									
Ice									
rip bro									A
Rus thi									A
Sta thi									
vel gra									
wil oat									A
Castor									C
[illegible]									R
[illegible]									A
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beetly									
Other									

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist

JN 1043/010									
Date: 7/29/99		1999			Subsite: #12				
Environmental Monitor: Irena Mendez			IMM						
Climate	Clear blue sky, uncloudy			1-2 mph winds					
Temp. High (degrees):		74°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		I	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									

Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb									
Amb cha									
Art cal									
Art dru									
Cal mac									
Cam chi									
Cir cal									
Cro cal	IIII IIII IIII		M	N	Y	M	N	L	
Cuc foe									
Dis spi									
Dud lan									
Enc cal	IIII		H	N	Y	L	Y	M	
Eri eri	IIII IIII IIII								
Eri par									
Ery suf									
Esc cal									
Gal ang									
Gna bic									
Hor cun									
Iso arb									
Les fil			M	N	Y	H	Y	L	A
Ley tri									
Lot sco	IIII		M	Y	N	M	Y	M	
Lup cha			M	Y	N	M	Y	H	A
Mar mac									
Mel imp			M	Y	N	H	Y	L	A
Nas cer									
Opu lit									
Pha ram									
Rhu int	I								
Sen dou									

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gia									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal buc	IIII		M	Y	N		Y	L	R
chi cap									
Ice									
rip bro									
Rus thi									
Sta thi									
vel gra									
wil oat									
[illegible] Erodium	IIII		M	N	N	L	Y	M	R A
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other									

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 10/5/99		1999			Subsite: 42S				
Environmental Monitor: Irena Mendez IMM									
Climate	Clear skies cool 1-2 mph winds								
Temp. High (degrees):		68°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	||		M	N	Y	L	Y	L	R
Amb cha	||		H	N	Y	L	N	L	R
Art cal			M	Y	N			L	R
Art dru									
Cal mac									
Cam chi			M	Y	N		Y	M	A
Cir cal									
Cro cal	+		M	N	Y	L	N	L	A
Cuc foe									
Dis spi									
Dud lan	|		M	Y	N		Y	L	R
Enc cal	+		M	Y/N	N		Y	L	A
Eri eri			M	N	Y	M	N	L	R, I
Eri par			M	Y	N		Y	M	A
Ery suf									
Esc cal	|||		M	N	Y	L	Y	L	R
Gal ang			M	Y	N	H	Y	L	I
Gna bic			M	Y	N		Y	M	A
Hor cun									
Iso arb			M	N	Y	H	Y	L	I
Les fil									
Ley tri									
Lot sco	+++		M	Y	N		Y	M	A
Lup cha			M	Y	N		Y	M	A
Mar mac									
Mel imp									
Nas cer									
Opu lit			M	N	N	M	N	M	R
Pha ram	|||		M	Y	N		Y	L	R
Rhu int	|| large		M	N	Y	-	N	L	R
Sen dou									
Sol doug	|		M	N	Y	L	Y	L	R

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal buc									
chi cap									
Ice			M	N	N		Y	M	A
rip bro				Y					A
Rus thi			M	N	Y	H	Y	M	A
Sta thi	++		M	N	Y	M	Y	M	A
vel gra									
wil oat									
erodium			M	Y					R
Sonc	large								R
Cakile									R
Use by Wildlife									
Reptile	Uta.								
Butterfly	buckeye on buckwheat; painted lady on Rhus; common hairstreak; mormon on buckwheat								
Moth									
Spider									
Beefly									
Other	pogo, ant lion, Harlequin bugs								

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 10/15/99		1999			Subsite: 38 N				
Environmental Monitor: Irena Mendez IMM									
Climate	Clear skies, sunny, cool			1-2 mph winds.					
Temp. High (degrees):		68°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb			M	N	Y	L	Y	L	
Amb cha	++		M	N	Y	L	N	L	A
Art cal									
Art dru									
Cal mac									
Cam chi			M	Y	N		Y	M	A
Cir cal									
Cro cal	+		M	N	Y	L	Y	~~L~~ M	A
Cuc foe									
Dis spi									
Dud lan									
Enc cal			L	Y	N		Y	L	A
Eri eri			M	N	Y	H	Y	L	
Eri par			M	Y	N		Y	M	A
Ery suf									
Esc cal			M	N	Y	L	Y	L	
Gal ang									
Gna bic			M	Y	N	M	Y	M	A
Hor cun									
Iso arb			M	N	Y	M	Y	L	I
Les fil			M	N	Y	H	Y	L	
Ley tri									
Lot sco			M	Y	N		Y	M	A
Lup cha	+		M	N	Y	L	Y	M	~~A~~ A
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									
Cus cal			H	N	Y	L	Y	M	

38N

Native Annuals		Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
		L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla								
Cho cal								
Cra ere								
Cry int								
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic								
Lup tru								
Pla ere								
Ste vir								
Non-natives								
Aca								
bur gra								
Cal buc								
chi cap								
Ice	++							A
rip bro								A
Rus thi		M	N	Y	H	Y	M	A
Sla thi								
vel gra								A
wil oat								A
erodium								A
ilex		H	N	N			M shrup	R
[illegible]	III *	M	N	Y	H	Y	L	
Use by Wildlife								
Reptile								
Butterfly	buckeye, common hairstreak (buckwheat), mormon blue (buckwheat), mormo (buckwheat)							
Moth								
Spider								
Beefly								
Other	Ant lions							

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1043-010								
Date: 10/5/99	1999			Subsite: 35				
Environmental Monitor: Irena Mendez IMM								
Climate ~~Clear skies, sunny, cool~~, 1-2 mph wind								
Temp. High (degrees): 68 °F		Foggy with intermittant sunshine. Fog rolled in ~ 11:00am.						
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat:	Foredune	Backdune	Prairie					
Revegetation Date:	None	1990	1992	1993	1994			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble: R	I	C	O					
Trash: R	I	C	O					
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								

Native perennials		Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Abr umb	[illegible]	M	N	Y	H	Y	M	I
Amb cha	[illegible]	M	N	Y	L	N	L	C
Art cal	1	M	Y	N	N	N	L	R
Art dru								
Cal mac	[illegible]	M	N	Y	L	Y	L	R
Cam chi		M	Y	N	N	Y	M	A
Cir cal								
Cro cal	[illegible] +	M	N	Y	L	Y	M	A
Cuc foe								
Dis spi	[illegible] +	M	N	N	N	N	M	A
Dud lan	1	M	Y	N	N	Y	L	R
Enc cal	[illegible]	M	Y	N	N	Y	L	A
Eri eri	[illegible]	M	N	Y	M	Y	L	I
Eri par		M	Y	N	N	Y	M	A
Ery suf								
Esc cal	[illegible]	M	N	Y	M	Y	L	
Gal ang								R
Gna bic	[illegible] ++	M	Y	N	N	Y	M	A
Hor cun		M	N	Y	M	Y	L	
Iso arb	[illegible]	M	N	Y	M	Y	L	R
Les lii	|||	M	N	Y	H	Y	L	R
Ley tri								
Lot sco		M	Y	N	N	Y	M	A
Lup cha		M	Y	N	N	Y	M	A
Mar mac								
Mel imp								
Nas cer								
Opu lit								
Pha ram								
Rhu int								
Sen dou								
Cus cal	[illegible]	M	N	Y	L	Y	M	R
[illegible] (buckwheat)		H	Y	N		Y	L	R

Native Annuals		Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla								
Cho cal								
Cra ere								
Cry int	||	M	Y	N	N	Y	L	
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic	[illegible] +++	M	Y	N	N	Y	M	A
lup tru								
Pla ere								
Ste vir	1	M	N	Y	M	Y	L	
Non-natives								
Aca	|||	M	N	N	N	N	M	
bur gra								
Cal buc								
chi cap								
Ice	[illegible]							A
rip bro								A
Rus thi		M	N	Y	M	Y	H	A
Sta thi								
vel gra								
wil oat								A
Bromus		M	Y					A
Bros [illegible]	[illegible] ++	M	Y	N	N	Y	H	A
Succulents	[illegible]							
Use by Wildlife								
Reptile								
Butterfly	common hairstreak							
Moth								
Spider								
Beetly								
Other								
Statice: 11		M	N	Y	H	Y	L	R

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 10/5/99		1999			Subsite: 44S				
Environmental Monitor: Irena Mendez IMM									
Climate	Clear skies, warming towards afternoon 1-2 mph winds								
Temp. High (degrees):		68°F - 72°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Abr umb									
Amb cha	||								
Art cal			M	Y	N	N	Y	L	
Art dru									
Cal mac									
Cam chi			M	N	Y	L	Y	M	A
Cir cal									
Cro cal									
Cuc foe									
Dis spi									
Dud lan									
Enc cal									
Eri eri			M	N	Y	H	Y	L (1)	
Eri par	|		M	Y	N	H	Y	M	A
Ery suf									
Esc cal			M	N	Y	H	Y	M	I
Gal ang									
Gna bic									
Hor cun									
Iso arb			M	N	Y	L	Y	L	
Les fil									
Ley tri									
Lot sco	|		L	Y	N		Y	M	A
Lup cha			M	N	N		Y	M	A
Mar mac									
Mel imp									
Nas cer									
Opu lit			M	N	Y	L	Y	L	
Pha ram	||		M	Y	N	M	Y	L	
Rhu int									
Sen dou	|								

Car ram |

44S

Native Annuals			Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int cle			M	Y	N	L	Y	M	
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca	removed by surveyor(5)		H	N	N	N	N	H	C
bur gra									
Cat buc									
chi cap									
Ice			M	N	Y	L	Y	H	C
rip bro			M	Y	N	N	Y	H	A
Rus thi			H	N	Y	H	Y	H	A
Sta thi									
vel gra									
wil oat			M	Y	N	N	Y	H	A
Erodium			M	Y	N	N	Y	H	A
Use by Wildlife									
Reptile									
Butterfly	Painted Lady (1) Buckeye (1)								
Moth									
Spider									
Beefly									
Other	pollos,								

409
[illegible]
365

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist								
JN 1043-010								
Date: 10/[illegible]/99	1999			Subsite: [illegible] 5				
Environmental Monitor: Irena Mendez [illegible]								
Climate	[illegible] skies, sunny, cool			1-2 mph winds				
Temp. High (degrees):								
Temp. Low (degrees):								
Humidity:								
Site History								
Habitat: Foredune	Backdune	Prairie						
Revegetation Date:	None	1990	1992	1993	1994			
Soil Organics:	L	M	H					
Soil Testing:	Y	N						
Rubble: R	I	C	O					
Trash: R	I	C	O					
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes								
Site Markers								

Native perennials		Veg Grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom N,L,M,H	Seedset Y/N	Recruitmt N,L,M,H	Abundanc R,I,C,A
Abr umb	[illegible]	M	N	Y	L	Y	M	C
Amb cha	[illegible]	M	N	Y	M	Y	L	I
Art cal	[illegible]	M	Y	N	N	Y	L	R
Art dru								
Cal mac								
Cam chi		M	Y	N	N	Y	M	A
Cir cal								
Cro cal	[illegible]	M	N	Y	M	Y	L	I
Cuc foe								
Dis spi	[illegible]	L	N	N	N	N	L	I
Dud lan	[illegible]	M	Y	N	N	Y	M	R
Enc cal	[illegible]	M	Y	N	N	Y	L	C
Eri eri	[illegible]	M	N	Y	H	Y	L	A
Eri par		M	Y	N	L	Y	M	A
Ery suf	[illegible]	M	N	N	N	N	M	I
Esc cal	[illegible]	M	N	Y	M	Y	M	I
Gal ang								[illegible]
Gna bic	[illegible]	M	Y	N	N	Y	M	I
Hor cun								
Iso arb	[illegible]	M	N	Y	M	Y	L	R
Les fil	[illegible]	M	N	Y	H	Y	M	C
Ley tri								
Lot sco		M	Y	N	N	Y	M	A
Lup cha		M	N	N	N	Y	M	A
Mar mac								
Mel imp								
Nas cer								
Opu lit	[illegible]	M	N	N	N	N	L	I
Pha ram	[illegible]	M	Y	N	N	Y	L	R
Rhu int								
Sen dou	[illegible]							R
Car ?am	[illegible]	M	Y	N	N	Y	L	R
Sol ?iu	I	N	N	N	N	Y	N	R

Native Annuals		Veg grow L,M,H	Dormant Y/N	Flowerbud Y/N	Bloom L,M,H	Seedset Y/N	Recruitmt L,M,H	Abundanc R,I,C,A
Cal mon								
Cam bis								
Cam lew								
Cam mic								
Che gla								
Cho cal								
Cra ere								
Cry inf	[illegible]							
Des pin								
Eri gra								
Fes meg								
Lot pur								
Lot str								
Lup bic								
lup tru	[illegible]							
Pla ere								
Ste vir	[illegible]							
Non-natives								
Aca	[illegible]	M	N	N	N	N	N	R
bur gra								
Cal buc								
chi cap								
Ice	[illegible]	M	N	Y	M	Y	M	L
rip bro		M	Y	N	N	N	H	A
Rus thi		M	N	Y	H	Y	M	A
Sta thi								A
vel gra								
wil oat		M	Y	N	N	Y	H	A
[illegible]		M	Y	N	N	Y	H	A
[illegible]	[illegible]	L	N	Y	M	Y	H	A
Use by Wildlife								
Reptile								
Butterfly	[illegible]							
Moth								
Spider								
Beetly								
Other								

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 10/12/99	1999			Subsite: 3B					
Environmental Monitor: Irena Mendez IMM									
Climate: Sunny (clear skies), cool 1-3 MPH winds									
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat: Foredune	Backdune	Prairie							
Revegetation Date:	None	1990	1992	1993	1994				
Soil Organics:	L	M	H						
Soil Testing:	Y	N							
Rubble: R	I	C	Ø A						
Trash: R	I	C	Ø A						
HardWare:	Present	Absent	Good	Fair	Poor	Replace	Date:		
Stakes									
Site Markers									

Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	N,L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb									
Amb cha									
Art cal									
Art dru			M	Y	N	N	Y	L	
Cal mac									
Cam chi			M	Y/N	N	N, L	Y	M	A
Cir cal									
Cro cal									
Cuc foe									
Dis spi									A
Dud lan									
Enc cal									
Eri eri									
Eri par									A
Ery suf									
Esc cal									
Gal ang			M	Y	N	N	Y		
Gna bic			M	Y	N	N	Y	M	A
Hor cun									
Iso arb									
Les fil									
Ley tri									
Lot sco									A
Lup cha									A
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									
Cor mam									

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal buc									
chi cap									
Ice									
rip bro									A
Rus thi									
Sta thi									
vel gra									
wil oat									A
pan bet									
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other	fox								

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 12/1/99		1999			Subsite: 14				
Environmental Monitor: Irena Mendez IMM									
Climate	scattered high clouds			some low clouds					
Temp. High (degrees):	~65		winds	3-5 mph					
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb			I	N	N		N	L	A
Amb cha			M	N	N	L	Y	L	A
Art cal									
Art dru									
Cal mac									
Cam chi			L	Y	N	N	Y	H	A
Cir cal									
Cro cal			M	N	Y	L	Y	L	A
Cuc foe									
Dis spi									
Dud lan									
Enc cal									
Eri eri								M	
Eri par			L	N	Y	L	Y	L	A
Ery suf			M	N	N	N	N	L	A
Esc cal									
Gal ang									
Gna bic			L	N	N	N	N		A
Hor cun									
Iso arb									
Les fil									
Ley tri									
Lot sco				Y					A
Lup cha			M		N	N	Y	M	A
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									

acacia encroaching on parvo.
Dis cal

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla				~~Y~~	N	L	Y	M	A
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca			H	N	N	N	N		
bur gra									
Cal buc									
chi cap									
Ice									
rip bro									
Rus thi									A
Sta thi									
vel gra									
wil oat									
Erodium Stork	I		M	N	N	N	N	L	R
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other									

(29)

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 12/1/99		1999			Subsite: 29				
Environmental Monitor: Irena Mendez									
Climate									
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb	卌 卌								
Amb cha	卌 卌								
Art cal									
Art dru									
Cal mac									
Cam chi									A
Cir cal									
Cro cal	卌 卌								
Cuc foe									
Dis spi									
Dud lan	卌 卌 卌 卌								
Enc cal									
Eri eri	卌 卌 卌 卌 卌 卌 卌		M	N	N	L	Y	M	A
Eri par	卌 卌 卌								
Ery suf									A
Esc cal									
Gal ang									
Gna bic	卌 卌		L	N	N	N	N	H	A
Hor cun									
Iso arb									
Les lil									
Ley tri									
Lot sco									A
Lup cha									A
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									
Cus cal	卌 卌		M	N	Y	M	X	M	

(29)

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca	卌 卌 卌								
bur gra									
Cal buc									
chi cap									
Ice									A
rip bro									
Rus thi									
Sta thi									
vel gra									
wil oat									
Erodium									
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other									

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 12/1/99	1999			Subsite:	16				
Environmental Monitor: Irena Mendez									
Climate									
Temp. High (degrees):									
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb			M	N	Y	L	Y	M	A
Amb cha			M	N	N	L	Y	M	A
Art cal									
Art dru									
Cal mac									
Cam chi									A
Cir cal									
Cro cal									
Cuc foe									
Dis spi									
Dud lan			M	N	N	N	Y	M	A
Enc cal									
Eri eri									
Eri par									
Ery suf			M	N	Y	L		H	A
Esc cal									
Gal ang									
Gna bic			M	N	N	N	N	H	A
Hor cun									
Iso arb									
Les fil									
Ley tri									
Lot sco									A
Lup cha									A
Mar mac									
Mel imp									
Nas cer									
Opu lit			H	N	N	N	Y	H	A
Pha ram			M	N	N	N	Y	H	A
Rhu int									
Sen dou									
Cus Cal			M	N	Y	M	Y	M	R

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca									
bur gra									
Cal buc									
chi cap									
Ice									I
rip bro									
Rus thi									A
Sta thi									
vel gra									
wil oat									
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beefly									
Other	Trasks Snail ~ blowout areas								

[illegible] 408

Los Angeles International Airport/El Segundo Dunes Qualitative Survey Standard Checklist									
JN 1043-010									
Date: 10/[illegible]/99		1999			Subsite: [illegible] 408				
Environmental Monitor: Irena Mendez IMM									
Climate	Clear Skies, Sunny, cool								
Temp. High (degrees):		68°F							
Temp. Low (degrees):									
Humidity:									
Site History									
Habitat:	Foredune	Backdune	Prairie						
Revegetation Date:		None	1990	1992	1993	1994			
Soil Organics:		L	M	H					
Soil Testing:		Y	N						
Rubble:	R	I	C	O					
Trash:	R	I	C	O					
HardWare:		Present	Absent	Good	Fair	Poor	Replace	Date:	
Stakes									
Site Markers									
Native perennials			Veg Grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Abr umb									
Amb cha									
Art cal									
Art dru									
Cal mac									
Cam chi									
Cir cal									
Cro cal									A
Cuc foe									
Dis spi									
Dud lan									
Enc cal									A
Eri eri									A
Eri par									A
Ery suf									
Esc cal									
Gal ang									
Gna bic	I								A
Hor cun									
Iso arb	IIII IIII IIII							M	
Les fil									
Ley tri									
Lot sco									
Lup cha									
Mar mac									
Mel imp									
Nas cer									
Opu lit									
Pha ram									
Rhu int									
Sen dou									R

[illegible] 403

Native Annuals			Veg grow	Dormant	Flowerbud	Bloom	Seedset	Recruitmt	Abundanc
			L,M,H	Y/N	Y/N	L,M,H	Y/N	L,M,H	R,I,C,A
Cal mon									
Cam bis									
Cam lew									
Cam mic									
Che gla									
Cho cal									
Cra ere									
Cry int									
Des pin									
Eri gra									
Fes meg									
Lot pur									
Lot str									
Lup bic									
lup tru									
Pla ere									
Ste vir									
Non-natives									
Aca	IIII								
bur gra									
Cal buc									
chi cap									
Ice									A
rip bro									A
Rus thi									A
Sta thi									
vel gra									
wil oat									A
[illegible]									A
Nopales									A
Use by Wildlife									
Reptile									
Butterfly									
Moth									
Spider									
Beetly									
Other									

APPENDIX B
1999 TRANSECT DATA

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
1	Avena barbata	Slender wild oats			315	335	20	25	1.00
1	Avena barbata	Slender wild oats			655	660	5		
1	Bare				460	475	15	675	14.00
1	Bare				490	500	10		
1	Bare				1410	1440	30		
1	Bare				1455	1470	15		
1	Bare				1750	1790	40		
1	Bare				1875	1910	35		
1	Bare				2210	2240	30		
1	Bare				2260	2300	40		
1	Bare				2670	2750	80		
1	Bare				3245	3260	15		
1	Bare				3745	3755	10		
1	Bare				3920	3930	10		
1	Bare				3960	3980	20		
1	Bare				3990	4010	20		
1	Bare				4055	4060	5		
1	Bare				4100	4130	30		
1	Bare				4160	4220	60		
1	Bare				4300	4350	50		
1	Bare				4415	4430	15		
1	Bare				4460	4490	30		
1	Bare				4660	4675	15		
1	Bare				4690	4695	5		
1	Bare				4765	4780	15		
1	Bare				4835	4860	25		
1	Bare				4880	4900	20		
1	Bare				4930	4950	20		
1	Bare				4955	4970	15		
1	Bromus diandrus	Ripgut brome			30	75	45	180	4.00
1	Bromus diandrus	Ripgut brome			110	140	30		
1	Bromus diandrus	Ripgut brome			155	190	35		
1	Bromus diandrus	Ripgut brome			200	240	40		
1	Bromus diandrus	Ripgut brome			550	555	5		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
1	Bromus diandrus	Ripgut brome			630	655	25		
1	Camissonia cheiranthifolia	Beach evening primrose			1365	1405	40	545	11.00
1	Camissonia cheiranthifolia	Beach evening primrose			1440	1455	15		
1	Camissonia cheiranthifolia	Beach evening primrose			1670	1690	20		
1	Camissonia cheiranthifolia	Beach evening primrose			1790	1875	85		
1	Camissonia cheiranthifolia	Beach evening primrose			1920	1945	25		
1	Camissonia cheiranthifolia	Beach evening primrose			2245	2260	15		
1	Camissonia cheiranthifolia	Beach evening primrose			3100	3190	90		
1	Camissonia cheiranthifolia	Beach evening primrose			3215	3245	30		
1	Camissonia cheiranthifolia	Beach evening primrose			3390	3450	60		
1	Camissonia cheiranthifolia	Beach evening primrose			3570	3590	20		
1	Camissonia cheiranthifolia	Beach evening primrose			3670	3690	20		
1	Camissonia cheiranthifolia	Beach evening primrose			3780	3785	5		
1	Camissonia cheiranthifolia	Beach evening primrose			3800	3845	45		
1	Camissonia cheiranthifolia	Beach evening primrose			4030	4055	25		
1	Camissonia cheiranthifolia	Beach evening primrose			4140	4160	20		
1	Camissonia cheiranthifolia	Beach evening primrose			4270	4300	30		
1	Carpobrotus edulis	Iceplant			2150	2170	20	20	0.40
1	Digitaria sanguinalis	Crab grass			610	630	20	55	1.00
1	Digitaria sanguinalis	Crab grass			2050	2085	35		
1	Duff				475	490	15	698	13.96
1	Duff				1025	1045	20		
1	Duff				1405	1410	5		
1	Duff				1655	1670	15		
1	Duff				1690	1740	50		
1	Duff				1910	1920	10		
1	Duff				2085	2150	65		
1	Duff				2440	2460	20		
1	Duff				2660	2670	10		
1	Duff				2750	2780	30		
1	Duff				2790	2850	60		
1	Duff				2870	2885	15		
1	Duff				2900	2970	70		
1	Duff				3275	3300	25		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
1	Duff				3470	3510	40		
1	Duff				3590	3670	80		
1	Duff				3690	3700	10		
1	Duff				3710	3730	20		
1	Duff				3737	3745	8		
1	Duff				3755	3780	25		
1	Duff				3785	3800	15		
1	Duff				3855	3920	65		
1	Duff				4780	4790	10		
1	Duff				4820	4835	15		
1	Eriogonum parvifolium	Coast buckwheat			1100	1180	80	655	13.00
1	Eriogonum parvifolium	Coast buckwheat			2300	2440	140		
1	Eriogonum parvifolium	Coast buckwheat			2450	2660	200		
1	Eriogonum parvifolium	Coast buckwheat			2970	3065	95		
1	Eriogonum parvifolium	Coast buckwheat			4490	4560	70		
1	Eriogonum parvifolium	Coast buckwheat			4695	4765	70		
1	Erodium cicutarium	Red-stemmed filaree			300	315	15	485	10.00
1	Erodium cicutarium	Red-stemmed filaree			365	400	35		
1	Erodium cicutarium	Red-stemmed filaree			500	515	15		
1	Erodium cicutarium	Red-stemmed filaree			570	590	20		
1	Erodium cicutarium	Red-stemmed filaree			740	790	50		
1	Erodium cicutarium	Red-stemmed filaree			795	800	5		
1	Erodium cicutarium	Red-stemmed filaree			1740	1750	10		
1	Erodium cicutarium	Red-stemmed filaree			2850	2870	20		
1	Erodium cicutarium	Red-stemmed filaree			3230	3275	15		
1	Erodium cicutarium	Red-stemmed filaree			3440	3470	30		
1	Erodium cicutarium	Red-stemmed filaree			3545	3570	25		
1	Erodium cicutarium	Red-stemmed filaree			3930	3960	30		
1	Erodium cicutarium	Red-stemmed filaree			3980	3990	10		
1	Erodium cicutarium	Red-stemmed filaree			4010	4030	20		
1	Erodium cicutarium	Red-stemmed filaree			4070	4100	30		
1	Erodium cicutarium	Red-stemmed filaree			4230	4250	20		
1	Erodium cicutarium	Red-stemmed filaree			4350	4400	50		
1	Erodium cicutarium	Red-stemmed filaree			4430	4460	30		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
1	Erodium cicutarium	Red-stemmed filaree			4860	4880	20		
1	Erodium cicutarium	Red-stemmed filaree			4900	4930	30		
1	Erodium cicutarium	Red-stemmed filaree			4950	4955	5		
1	Heterotheca grandiflora	Telegraph weed			2780	2790	10	192	4.00
1	Heterotheca grandiflora	Telegraph weed			2885	2900	15		
1	Heterotheca grandiflora	Telegraph weed			3510	3545	35		
1	Heterotheca grandiflora	Telegraph weed			3700	3710	10		
1	Heterotheca grandiflora	Telegraph weed			3730	3737	7		
1	Heterotheca grandiflora	Telegraph weed			3845	3855	10		
1	Heterotheca grandiflora	Telegraph weed			4050	4070	20		
1	Heterotheca grandiflora	Telegraph weed			4130	4145	15		
1	Heterotheca grandiflora	Telegraph weed			4220	4230	10		
1	Heterotheca grandiflora	Telegraph weed			4250	4270	20		
1	Heterotheca grandiflora	Telegraph weed			4400	4415	15		
1	Heterotheca grandiflora	Telegraph weed			4675	4690	15		
1	Heterotheca grandiflora	Telegraph weed			4790	4800	10		
1	Lotus scoparius	Deerweed			0	110	110	705	14.00
1	Lotus scoparius	Deerweed			120	155	35		
1	Lotus scoparius	Deerweed			190	300	110		
1	Lotus scoparius	Deerweed			515	550	35		
1	Lotus scoparius	Deerweed			660	810	150		
1	Lotus scoparius	Deerweed			1045	1100	55		
1	Lotus scoparius	Deerweed			2145	2210	65		
1	Lotus scoparius	Deerweed			3065	3130	65		
1	Lotus scoparius	Deerweed			3175	3225	50		
1	Lotus scoparius	Deerweed			4970	5000	30		
1	Lupinus chamissonis	Dune bush lupine			835	1025	190	770	15.00
1	Lupinus chamissonis	Dune bush lupine			1165	1390	225		
1	Lupinus chamissonis	Dune bush lupine			1520	1655	135		
1	Lupinus chamissonis	Dune bush lupine			1945	2050	105		
1	Lupinus chamissonis	Dune bush lupine			2180	2190	10		
1	Lupinus chamissonis	Dune bush lupine			3300	3405	105		
1	Opuntia littoralis	Prickly pear			1515	1550	35	35	1.00
1	Twigs				335	370	35	280	6.00

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
1	Twigs				400	460	60		
1	Twigs				555	570	15		
1	Twigs				590	610	20		
1	Twigs				805	835	30		
1	Twigs				1070	1110	40		
1	Twigs				1470	1530	60		
1	Twigs				4800	4820	20		
							5320	**5320**	**108.36**
2	Avena barbata	Slender wild oats			1240	1287	47	87	2.00
2	Avena barbata	Slender wild oats			4305	4310	5		
2	Avena barbata	Slender wild oats			4615	4650	35		
2	Bare				80	100	20	**145**	3.00
2	Bare				210	240	30		
2	Bare				245	255	10		
2	Bare				680	700	20		
2	Bare				2215	2230	15		
2	Bare				3885	3900	15		
2	Bare				4855	4890	35		
2	Brassica tournfortii	Wild mustard			1770	1790	20	20	0.40
2	Bromus diandrus	Ripgut brome			720	755	35	435	9.00
2	Bromus diandrus	Ripgut brome			1780	1810	30		
2	Bromus diandrus	Ripgut brome			2230	2290	60		
2	Bromus diandrus	Ripgut brome			2925	2965	40		
2	Bromus diandrus	Ripgut brome			3340	3455	115		
2	Bromus diandrus	Ripgut brome			4030	4155	125		
2	Bromus diandrus	Ripgut brome			4810	4840	30		
2	Camissonia cheiranthifolia	Beach evening primrose			15	65	50	495	10.00
2	Camissonia cheiranthifolia	Beach evening primrose			255	260	5		
2	Camissonia cheiranthifolia	Beach evening primrose			2655	2745	90		
2	Camissonia cheiranthifolia	Beach evening primrose			2770	2805	35		
2	Camissonia cheiranthifolia	Beach evening primrose			3290	3330	40		
2	Camissonia cheiranthifolia	Beach evening primrose			3520	3550	30		
2	Camissonia cheiranthifolia	Beach evening primrose			3730	3770	40		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
2	Camissonia cheiranthifolia	Beach evening primrose			3790	3820	30		
2	Camissonia cheiranthifolia	Beach evening primrose			4520	4615	95		
2	Camissonia cheiranthifolia	Beach evening primrose			4365	4390	25		
2	Camissonia cheiranthifolia	Beach evening primrose			4760	4810	50		
2	Camissonia cheiranthifolia	Beach evening primrose			4850	4855	5		
2	Digitaria sanguinalis	Crab grass			100	105	5	1270	25.00
2	Digitaria sanguinalis	Crab grass			120	125	5		
2	Digitaria sanguinalis	Crab grass			140	210	70		
2	Digitaria sanguinalis	Crab grass			240	245	5		
2	Digitaria sanguinalis	Crab grass			260	285	25		
2	Digitaria sanguinalis	Crab grass			330	340	10		
2	Digitaria sanguinalis	Crab grass			820	890	70		
2	Digitaria sanguinalis	Crab grass			900	1175	275		
2	Digitaria sanguinalis	Crab grass			1200	1280	80		
2	Digitaria sanguinalis	Crab grass			1330	1370	40		
2	Digitaria sanguinalis	Crab grass			1420	1500	80		
2	Digitaria sanguinalis	Crab grass			1560	1625	65		
2	Digitaria sanguinalis	Crab grass			1640	1680	40		
2	Digitaria sanguinalis	Crab grass			1720	1900	180		
2	Digitaria sanguinalis	Crab grass			2550	2690	140		
2	Digitaria sanguinalis	Crab grass			2815	2855	40		
2	Digitaria sanguinalis	Crab grass			3470	3540	70		
2	Digitaria sanguinalis	Crab grass			3680	3700	20		
2	Digitaria sanguinalis	Crab grass			3900	3940	40		
2	Digitaria sanguinalis	Crab grass			4080	4090	10		
2	Duff				50	60	10	250	5.00
2	Duff				890	900	10		
2	Duff				2760	2770	10		
2	Duff				2805	2815	10		
2	Duff				3550	3650	100		
2	Duff				3700	3730	30		
2	Duff				3770	3790	20		
2	Duff				3820	3865	45		
2	Duff				4650	4665	15		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
2	Eriogonum parvifolium	Coast buckwheat			2330	2520	190	190	4.00
2	Erodium cicutarium	Red-stemmed filaree			370	375	5	500	10.00
2	Erodium cicutarium	Red-stemmed filaree			490	565	75		
2	Erodium cicutarium	Red-stemmed filaree			585	590	5		
2	Erodium cicutarium	Red-stemmed filaree			620	665	45		
2	Erodium cicutarium	Red-stemmed filaree			1555	1560	5		
2	Erodium cicutarium	Red-stemmed filaree			1900	1940	40		
2	Erodium cicutarium	Red-stemmed filaree			2090	2215	125		
2	Erodium cicutarium	Red-stemmed filaree			2620	2655	35		
2	Erodium cicutarium	Red-stemmed filaree			2865	2925	60		
2	Erodium cicutarium	Red-stemmed filaree			3880	3885	5		
2	Erodium cicutarium	Red-stemmed filaree			3940	4000	60		
2	Erodium cicutarium	Red-stemmed filaree			4140	4150	10		
2	Erodium cicutarium	Red-stemmed filaree			4200	4230	30		
2	Gnaphalium bicolor	Bicolored cudweed			700	720	20	70	1.00
2	Gnaphalium bicolor	Bicolored cudweed			770	790	20		
2	Gnaphalium bicolor	Bicolored cudweed			2730	2760	30		
2	Heterotheca grandiflora	Telegraph weed			1085	1130	45	125	2.50
2	Heterotheca grandiflora	Telegraph weed			1170	1250	80		
2	Lotus scoparius	Deerweed			565	680	115	620	10.00
2	Lotus scoparius	Deerweed			750	830	80		
2	Lotus scoparius	Deerweed			1610	1640	30		
2	Lotus scoparius	Deerweed			1940	2050	110		
2	Lotus scoparius	Deerweed			2130	2210	80		
2	Lotus scoparius	Deerweed			2300	2330	30		
2	Lotus scoparius	Deerweed			2580	2630	50		
2	Lotus scoparius	Deerweed			2855	2900	45		
2	Lotus scoparius	Deerweed			3640	3720	80		
2	Lupinus chamissonis	Dune bush lupine			375	530	155	1035	16.70
2	Lupinus chamissonis	Dune bush lupine			1310	1325	15		
2	Lupinus chamissonis	Dune bush lupine			1980	2030	50		
2	Lupinus chamissonis	Dune bush lupine			2980	3330	350		
2	Lupinus chamissonis	Dune bush lupine			4260	4620	360		
2	Lupinus chamissonis	Dune bush lupine			4665	4770	105		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
2	Salsola tragus	Russian thistle			4840	4850	10	10	0.16
2	Twigs				0	15	15	935	15.10
2	Twigs				65	80	15		
2	Twigs				105	120	15		
2	Twigs				125	140	15		
2	Twigs				285	330	45		
2	Twigs				340	370	30		
2	Twigs				1280	1310	30		
2	Twigs				1325	1330	5		
2	Twigs				1370	1420	50		
2	Twigs				1500	1555	55		
2	Twigs				1680	1780	100		
2	Twigs				2050	2090	40		
2	Twigs				2260	2300	40		
2	Twigs				2520	2550	30		
2	Twigs				2965	2980	15		
2	Twigs				3330	3340	10		
2	Twigs				3350	3520	170		
2	Twigs				3865	3880	15		
2	Twigs				4000	4210	210		
2	Twigs				4230	4260	30		
							6187	**6187**	**113.86**
3	Avena barbata	Slender wild oats			1530	1610	80	105	2.00
3	Avena barbata	Slender wild oats			4810	4835	25		
3	Bare				0	15	15	990	20.00
3	Bare				145	180	35		
3	Bare				225	235	10		
3	Bare				245	255	10		
3	Bare				275	320	45		
3	Bare				400	420	20		
3	Bare				425	455	30		
3	Bare				535	560	25		
3	Bare				570	585	15		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
3	Bare				605	630	25		
3	Bare				635	650	15		
3	Bare				655	660	5		
3	Bare				670	690	20		
3	Bare				710	720	10		
3	Bare				795	865	70		
3	Bare				1445	1470	25		
3	Bare				2090	2130	40		
3	Bare				2690	2710	20		
3	Bare				2755	2910	155		
3	Bare				2990	3030	40		
3	Bare				3045	3090	45		
3	Bare				3395	3430	35		
3	Bare				3460	3500	40		
3	Bare				3540	3555	15		
3	Bare				3610	3660	50		
3	Bare				3670	3715	45		
3	Bare				4250	4310	60		
3	Bare				4330	4370	40		
3	Bare				4780	4810	30		
3	Cammisonia chieranthifolia	Beach evening primrose			505	525	20	345	7.00
3	Cammisonia chieranthifolia	Beach evening primrose			560	570	10		
3	Cammisonia chieranthifolia	Beach evening primrose			595	605	10		
3	Cammisonia chieranthifolia	Beach evening primrose			1645	1700	55		
3	Cammisonia chieranthifolia	Beach evening primrose			1710	1775	65		
3	Cammisonia chieranthifolia	Beach evening primrose			2305	2330	25		
3	Cammisonia chieranthifolia	Beach evening primrose			2465	2480	15		
3	Cammisonia chieranthifolia	Beach evening primrose			2930	2960	30		
3	Cammisonia chieranthifolia	Beach evening primrose			3360	3395	35		
3	Cammisonia chieranthifolia	Beach evening primrose			4650	4730	80		
3	Cynodon dactylon	Crab grass			3090	3360	270	340	7.00
3	Cynodon dactylon	Crab grass			3430	3460	30		
3	Cynodon dactylon	Crab grass			3505	3535	30		
3	Cynodon dactylon	Crab grass			3600	3610	10		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
3	Duff				110	120	10	920	18.00
3	Duff				205	225	20		
3	Duff				235	245	10		
3	Duff				255	275	20		
3	Duff				320	330	10		
3	Duff				330	350	20		
3	Duff				350	400	50		
3	Duff				455	505	50		
3	Duff				525	535	10		
3	Duff				585	595	10		
3	Duff				730	770	40		
3	Duff				1220	1260	40		
3	Duff				1330	1410	80		
3	Duff				1420	1445	25		
3	Duff				1470	1530	60		
3	Duff				1610	1645	35		
3	Duff				1700	1710	10		
3	Duff				1775	1820	45		
3	Duff				1980	2090	110		
3	Duff				2130	2220	90		
3	Duff				2290	2305	15		
3	Duff				2910	2930	20		
3	Duff				2960	2990	30		
3	Duff				3030	3045	15		
3	Duff				4175	4250	75		
3	Duff				4310	4330	20		
3	Eriogonum parvifolium	Coast buckwheat			4395	4535	140	140	3.00
3	Erodium cicutarium	Red-stemmed filaree			15	60	45	595	12.00
3	Erodium cicutarium	Red-stemmed filaree			90	105	15		
3	Erodium cicutarium	Red-stemmed filaree			420	425	5		
3	Erodium cicutarium	Red-stemmed filaree			630	635	5		
3	Erodium cicutarium	Red-stemmed filaree			650	655	5		
3	Erodium cicutarium	Red-stemmed filaree			660	670	10		
3	Erodium cicutarium	Red-stemmed filaree			690	710	20		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
3	Erodium cicutarium	Red-stemmed filaree			770	795	25		
3	Erodium cicutarium	Red-stemmed filaree			865	1015	150		
3	Erodium cicutarium	Red-stemmed filaree			1070	1150	80		
3	Erodium cicutarium	Red-stemmed filaree			1410	1420	10		
3	Erodium cicutarium	Red-stemmed filaree			2360	2465	105		
3	Erodium cicutarium	Red-stemmed filaree			2500	2600	100		
3	Erodium cicutarium	Red-stemmed filaree			3500	3505	5		
3	Erodium cicutarium	Red-stemmed filaree			3535	3540	5		
3	Erodium cicutarium	Red-stemmed filaree			3660	3670	10		
3	Heterotheca grandiflora	Telegraph weed			75	110	35	95	2.00
3	Heterotheca grandiflora	Telegraph weed			120	145	25		
3	Heterotheca grandiflora	Telegraph weed			190	205	15		
3	Heterotheca grandiflora	Telegraph weed			720	730	10		
3	Heterotheca grandiflora	Telegraph weed			1110	1120	10		
3	Lotus scoparius	Deerweed			920	990	70	620	12.00
3	Lotus scoparius	Deerweed			1010	1105	95		
3	Lotus scoparius	Deerweed			1180	1380	200		
3	Lotus scoparius	Deerweed			2480	2535	55		
3	Lotus scoparius	Deerweed			2550	2690	140		
3	Lotus scoparius	Deerweed			3555	3600	45		
3	Lotus scoparius	Deerweed			4830	4845	15		
3	Lupinus chamissonis	Dune bush lupine			1820	1990	170	1085	22.00
3	Lupinus chamissonis	Dune bush lupine			2220	2290	70		
3	Lupinus chamissonis	Dune bush lupine			3715	4175	460		
3	Lupinus chamissonis	Dune bush lupine			4470	4690	220		
3	Lupinus chamissonis	Dune bush lupine			4835	5000	165		
3	Twigs				60	75	15	320	6.00
3	Twigs				180	190	10		
3	Twigs				1150	1180	30		
3	Twigs				2160	2220	60		
3	Twigs				2330	2360	30		
3	Twigs				2710	2755	45		
3	Twigs				4370	4410	40		
3	Twigs				4690	4780	90		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
							5555	5555	111.00
4	Abronia umbellatum	Sand verbena			4450	4500	50	50	1.00
4	Ambrosia chamissonis	Beach bur			4055	4140	85	85	1.80
4	Artemisia dracunculus	Wild tarragon			1415	1510	95	95	1.90
4	Avena barbata	Slender wild oats			4100	4145	45	45	0.90
4	Bare				110	150	40	538	10.76
4	Bare				180	235	55		
4	Bare				290	310	20		
4	Bare				320	335	15		
4	Bare				505	550	45		
4	Bare				700	710	10		
4	Bare				780	790	10		
4	Bare				792	880	88		
4	Bare				920	940	20		
4	Bare				1230	1270	40		
4	Bare				1330	1360	30		
4	Bare				1515	1530	15		
4	Bare				1720	1740	20		
4	Bare				1960	2000	40		
4	Bare				2780	2805	25		
4	Bare				3685	3700	15		
4	Bare				3750	3800	50		
4	Bromus diandrus	Ripgut brome			150	155	5	302	6.00
4	Bromus diandrus	Ripgut brome			165	170	5		
4	Bromus diandrus	Ripgut brome			240	290	50		
4	Bromus diandrus	Ripgut brome			525	530	5		
4	Bromus diandrus	Ripgut brome			790	792	2		
4	Bromus diandrus	Ripgut brome			2000	2010	10		
4	Bromus diandrus	Ripgut brome			3320	3360	40		
4	Bromus diandrus	Dune bush lupine			3500	3530	30		
4	Bromus diandrus	Ripgut brome			3560	3570	10		
4	Bromus diandrus	Ripgut brome			4060	4070	10		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
4	Bromus diandrus	Ripgut brome			4150	4220	70		
4	Bromus diandrus	Ripgut brome			4675	4710	35		
4	Bromus diandrus	Ripgut brome			4890	4920	30		
4	Camissonia cheiranthifolia	Beach evening primrose			0	20	20	315	6.00
4	Camissonia cheiranthifolia	Beach evening primrose			60	75	15		
4	Camissonia cheiranthifolia	Beach evening primrose			170	180	10		
4	Camissonia cheiranthifolia	Beach evening primrose			880	920	40		
4	Camissonia cheiranthifolia	Beach evening primrose			940	1050	110		
4	Camissonia cheiranthifolia	Beach evening primrose			1285	1330	45		
4	Camissonia cheiranthifolia	Beach evening primrose			1490	1515	25		
4	Camissonia cheiranthifolia	Beach evening primrose			1910	1960	50		
4	Carpobrotus edulis	Iceplant			3040	3050	10	10	0.20
4	Distichlis spicata	Salt grass			1735	1775	10	10	0.20
4	Duff				130	140	10	270	5.00
4	Duff				155	165	10		
4	Duff				310	320	10		
4	Duff				1810	1825	15		
4	Duff				2540	2570	30		
4	Duff				3060	3210	150		
4	Duff				3360	3390	30		
4	Duff				4710	4725	15		
4	Eriogonum parvifolium	Coast buckwheat			335	505	170	285	6.00
4	Eriogonum parvifolium	Coast buckwheat			550	610	60		
4	Eriogonum parvifolium	Coast buckwheat			3845	3900	55		
4	Lessingia filaginifolia	Wooly aster			550	700	150	220	4.00
4	Lessingia filaginifolia	Wooly aster			1200	1230	30		
4	Lessingia filaginifolia	Wooly aster			1270	1285	15		
4	Lessingia filaginifolia	Wooly aster			1300	1325	25		
4	Lotus scoparius	Deerweed			3840	3950	110	235	5.00
4	Lotus scoparius	Deerweed			4550	4675	125		
4	Lupinus chamissonis	Dune bush lupine			235	280	45	2245	45.00
4	Lupinus chamissonis	Dune bush lupine			1360	1445	85		
4	Lupinus chamissonis	Dune bush lupine			1825	1870	45		
4	Lupinus chamissonis	Dune bush lupine			1915	1955	40		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
4	Lupinus chamissonis	Dune bush lupine			2030	2350	320		
4	Lupinus chamissonis	Dune bush lupine			2390	2540	150		
4	Lupinus chamissonis	Dune bush lupine			2570	2780	210		
4	Lupinus chamissonis	Dune bush lupine			2805	3160	355		
4	Lupinus chamissonis	Dune bush lupine			3210	3230	20		
4	Lupinus chamissonis	Dune bush lupine			3260	3360	100		
4	Lupinus chamissonis	Dune bush lupine			3390	3500	110		
4	Lupinus chamissonis	Dune bush lupine			3565	3625	60		
4	Lupinus chamissonis	Dune bush lupine			3670	3685	15		
4	Lupinus chamissonis	Dune bush lupine			3700	3750	50		
4	Lupinus chamissonis	Dune bush lupine			3800	3860	60		
4	Lupinus chamissonis	Dune bush lupine			3910	4060	150		
4	Lupinus chamissonis	Dune bush lupine			4120	4215	95		
4	Lupinus chamissonis	Dune bush lupine			4225	4560	335		
4	Salsola tragus	Russian thistle			1870	1900	30	30	0.60
4	Twigs				0	130	130	1160	24.00
4	Twigs				710	780	70		
4	Twigs				960	1040	80		
4	Twigs				1030	1200	170		
4	Twigs				1530	1720	190		
4	Twigs				1740	1810	70		
4	Twigs				1900	1910	10		
4	Twigs				2005	2030	25		
4	Twigs				2350	2400	50		
4	Twigs				3230	3260	30		
4	Twigs				3530	3560	30		
4	Twigs				3625	3670	45		
4	Twigs				4220	4225	5		
4	Twigs				4725	5000	275		
							5830	**5915**	**118.36**
5	Artemisia californica	Coastal sagebrush			4540	4750	210	210	4.00
5	Avena barbata	Slender wild oats			460	510	50	330	7.00
5	Avena barbata	Slender wild oats			540	545	5		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
5	Avena barbata	Slender wild oats			640	650	10		
5	Avena barbata	Slender wild oats			670	680	10		
5	Avena barbata	Slender wild oats			690	735	45		
5	Avena barbata	Slender wild oats			650	680	30		
5	Avena barbata	Slender wild oats			1310	1330	20		
5	Avena barbata	Slender wild oats			1430	1480	50		
5	Avena barbata	Slender wild oats			1500	1530	30		
5	Avena barbata	Slender wild oats			3210	3280	70		
5	Avena barbata	Slender wild oats			3860	3870	10		
5	Bare				220	245	25	1240	25.00
5	Bare				290	380	90		
5	Bare				545	580	35		
5	Bare				650	670	20		
5	Bare				680	805	125		
5	Bare				1170	1200	30		
5	Bare				1220	1310	90		
5	Bare				1350	1390	40		
5	Bare				1415	1430	15		
5	Bare				1490	1500	10		
5	Bare				1630	1640	10		
5	Bare				1650	1660	10		
5	Bare				1890	1910	20		
5	Bare				2055	2065	10		
5	Bare				2100	2110	10		
5	Bare				2115	2130	15		
5	Bare				2210	2225	15		
5	Bare				2260	2270	10		
5	Bare				2280	2340	60		
5	Bare				2450	2525	75		
5	Bare				2535	2600	65		
5	Bare				3090	3145	55		
5	Bare				3150	3170	20		
5	Bare				3550	3560	10		
5	Bare				3830	3860	30		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
5	Bare				4220	4320	100		
5	Bare				4340	4380	40		
5	Bare				4420	4440	20		
5	Bare				4490	4515	25		
5	Bare				4750	4760	10		
5	Bare				4820	4880	60		
5	Bare				4890	4980	90		
5	Brassica tournfortii	Wild mustard			2340	2410	70	70	1.40
5	Bromus diandrus	Ripgut brome			1100	1170	70	130	3.00
5	Bromus diandrus	Ripgut brome			1940	1990	50		
5	Bromus diandrus	Ripgut brome			4880	4890	10		
5	Camissonia cheiranthifolia	Beach evening primrose			880	905	25	620	12.00
5	Camissonia cheiranthifolia	Beach evening primrose			2020	2050	30		
5	Camissonia cheiranthifolia	Beach evening primrose			2065	2100	35		
5	Camissonia cheiranthifolia	Beach evening primrose			2110	2115	5		
5	Camissonia cheiranthifolia	Beach evening primrose			2600	2670	70		
5	Camissonia cheiranthifolia	Beach evening primrose			2960	2985	25		
5	Camissonia cheiranthifolia	Beach evening primrose			3170	3225	55		
5	Camissonia cheiranthifolia	Beach evening primrose			3235	3250	15		
5	Camissonia cheiranthifolia	Beach evening primrose			3765	3810	45		
5	Camissonia cheiranthifolia	Beach evening primrose			3960	4130	170		
5	Camissonia cheiranthifolia	Beach evening primrose			4440	4490	50		
5	Camissonia cheiranthifolia	Beach evening primrose			4525	4560	35		
5	Camissonia cheiranthifolia	Beach evening primrose			4760	4820	60		
5	Carpobrotus edulis	Iceplant			1660	1680	20	30	0.60
5	Carpobrotus edulis	Iceplant			4990	5000	10		
5	Digitaria sanguinalis	Crab grass			2380	2440	60	60	1.20
5	Duff				400	460	60	345	7.00
5	Duff				680	690	10		
5	Duff				1200	1220	20		
5	Duff				1540	1600	60		
5	Duff				1990	2010	20		
5	Duff				2050	2055	5		
5	Duff				2130	2160	30		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
5	Duff				2180	2210	30		
5	Duff				2275	2280	5		
5	Duff				2430	2450	20		
5	Duff				2525	2535	10		
5	Duff				2615	2645	30		
5	Duff				2985	3000	15		
5	Duff				4320	4340	20		
5	Duff				4515	4525	10		
5	Eriogonum parvifolium	Coast buckwheat			2135	2140	5	430	9.00
5	Eriogonum parvifolium	Coast buckwheat			2790	2980	190		
5	Eriogonum parvifolium	Coast buckwheat			3000	3065	65		
5	Eriogonum parvifolium	Coast buckwheat			3260	3360	100		
5	Eriogonum parvifolium	Coast buckwheat			3720	3790	70		
5	Erodium cicutarium	Red-stemmed filaree			1330	1350	20	140	3.00
5	Erodium cicutarium	Red-stemmed filaree			1480	1490	10		
5	Erodium cicutarium	Red-stemmed filaree			1535	1540	5		
5	Erodium cicutarium	Red-stemmed filaree			1720	1730	10		
5	Erodium cicutarium	Red-stemmed filaree			1775	1805	30		
5	Erodium cicutarium	Red-stemmed filaree			1910	1955	45		
5	Erodium cicutarium	Red-stemmed filaree			2010	2020	10		
5	Erodium cicutarium	Red-stemmed filaree			2270	2275	5		
5	Erodium cicutarium	Red-stemmed filaree			3145	3150	5		
5	Heterotheca grandiflora	Telegraph weed			1530	1535	5	30	1.00
5	Heterotheca grandiflora	Telegraph weed			4090	4115	25		
5	Lotus scoparius	Deerweed			1000	1120	120	750	15.00
5	Lotus scoparius	Deerweed			2130	2185	55		
5	Lotus scoparius	Deerweed			2225	2260	35		
5	Lotus scoparius	Deerweed			2640	2800	160		
5	Lotus scoparius	Deerweed			2860	2910	50		
5	Lotus scoparius	Deerweed			3410	3550	140		
5	Lotus scoparius	Deerweed			3560	3600	40		
5	Lotus scoparius	Deerweed			3625	3720	95		
5	Lotus scoparius	Deerweed			3800	3830	30		
5	Lotus scoparius	Deerweed			3870	3895	25		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
5	Lupinus chamissonis	Dune bush lupine			30	150	120	640	13.00
5	Lupinus chamissonis	Dune bush lupine			150	220	70		
5	Lupinus chamissonis	Dune bush lupine			280	290	10		
5	Lupinus chamissonis	Dune bush lupine			380	410	30		
5	Lupinus chamissonis	Dune bush lupine			470	540	70		
5	Lupinus chamissonis	Dune bush lupine			580	640	60		
5	Lupinus chamissonis	Dune bush lupine			695	750	55		
5	Lupinus chamissonis	Dune bush lupine			900	975	75		
5	Lupinus chamissonis	Dune bush lupine			3030	3090	60		
5	Lupinus chamissonis	Dune bush lupine			3360	3430	70		
5	Lupinus chamissonis	Dune bush lupine			3950	3960	10		
5	Lupinus chamissonis	Dune bush lupine			4070	4080	10		
5	Rubble				4130	4220	90	90	2.00
5	Twigs				0	30	30	710	14.00
5	Twigs				100	150	50		
5	Twigs				245	280	35		
5	Twigs				805	880	75		
5	Twigs				975	1055	80		
5	Twigs				1390	1415	25		
5	Twigs				1600	1630	30		
5	Twigs				1640	1650	10		
5	Twigs				1680	1720	40		
5	Twigs				1730	1840	110		
5	Twigs				1840	1890	50		
5	Twigs				3570	3640	70		
5	Twigs				3895	3950	55		
5	Twigs				4380	4420	40		
5	Twigs				4980	4990	10		
							5825	**5825**	**118.20**
6	Avena barbata	Slender wild oats			0	120	120	575	12.00
6	Avena barbata	Slender wild oats			190	220	30		
6	Avena barbata	Slender wild oats			590	610	20		
6	Avena barbata	Slender wild oats			635	720	85		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
6	Avena barbata	Slender wild oats			1000	1060	60		
6	Avena barbata	Slender wild oats			1155	1185	30		
6	Avena barbata	Slender wild oats			1380	1400	20		
6	Avena barbata	Slender wild oats			1435	1455	20		
6	Avena barbata	Slender wild oats			1525	1570	45		
6	Avena barbata	Slender wild oats			1590	1625	35		
6	Avena barbata	Slender wild oats			1750	1860	110		
6	Bare				145	165	20	450	9.00
6	Bare				610	635	25		
6	Bare				770	800	30		
6	Bare				910	920	10		
6	Bare				1110	1125	15		
6	Bare				1185	1210	25		
6	Bare				1340	1370	30		
6	Bare				1400	1415	15		
6	Bare				1590	1590	0		
6	Bare				2160	2180	20		
6	Bare				2230	2250	20		
6	Bare				2265	2270	5		
6	Bare				2655	2680	25		
6	Bare				2890	2920	30		
6	Bare				2970	2990	20		
6	Bare				3185	3200	15		
6	Bare				3275	3290	15		
6	Bare				3355	3375	20		
6	Bare				3730	3740	10		
6	Bare				3770	3795	25		
6	Bare				4035	4050	15		
6	Bare				4430	4460	30		
6	Bare				4900	4930	30		
6	Brassica tournfortii	Wild mustard			4400	4430	30	40	1.00
6	Brassica tournfortii	Wild mustard			4860	4870	10		
6	Bromus diandrus	Ripgut brome			800	870	70	610	12.00
6	Bromus diandrus	Ripgut brome			870	910	40		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
6	Bromus diandrus	Ripgut brome			920	965	45		
6	Bromus diandrus	Ripgut brome			1210	1340	130		
6	Bromus diandrus	Ripgut brome			1500	1520	20		
6	Bromus diandrus	Ripgut brome			1635	1685	50		
6	Bromus diandrus	Ripgut brome			1950	2000	50		
6	Bromus diandrus	Ripgut brome			2255	2265	10		
6	Bromus diandrus	Ripgut brome			2285	2325	40		
6	Bromus diandrus	Ripgut brome			2515	2555	40		
6	Bromus diandrus	Ripgut brome			2955	2970	15		
6	Bromus diandrus	Ripgut brome			3255	3275	20		
6	Bromus diandrus	Ripgut brome			4830	4860	30		
6	Bromus diandrus	Ripgut brome			4930	4960	30		
6	Bromus diandrus	Ripgut brome			4970	4990	20		
6	Camissonia cheiranthifolia	Beach evening primrose			1290	1320	30	880	18.00
6	Camissonia cheiranthifolia	Beach evening primrose			1895	1935	40		
6	Camissonia cheiranthifolia	Beach evening primrose			2100	2160	60		
6	Camissonia cheiranthifolia	Beach evening primrose			2180	2230	50		
6	Camissonia cheiranthifolia	Beach evening primrose			2920	2955	35		
6	Camissonia cheiranthifolia	Beach evening primrose			2990	3025	35		
6	Camissonia cheiranthifolia	Beach evening primrose			3200	3255	55		
6	Camissonia cheiranthifolia	Beach evening primrose			3290	3355	65		
6	Camissonia cheiranthifolia	Beach evening primrose			3375	3460	85		
6	Camissonia cheiranthifolia	Beach evening primrose			3670	3700	30		
6	Camissonia cheiranthifolia	Beach evening primrose			3850	3955	105		
6	Camissonia cheiranthifolia	Beach evening primrose			3985	4035	50		
6	Camissonia cheiranthifolia	Beach evening primrose			4050	4060	10		
6	Camissonia cheiranthifolia	Beach evening primrose			4070	4150	80		
6	Camissonia cheiranthifolia	Beach evening primrose			4290	4350	60		
6	Camissonia cheiranthifolia	Beach evening primrose			4370	4390	20		
6	Camissonia cheiranthifolia	Beach evening primrose			4480	4520	40		
6	Camissonia cheiranthifolia	Beach evening primrose			4810	4830	20		
6	Camissonia cheiranthifolia	Beach evening primrose			4960	4970	10		
6	Carpobrotus edulis	Iceplant			530	575	45	45	1.00
6	Duff				120	145	25	545	11.00

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
6	Duff				175	185	10		
6	Duff				720	770	50		
6	Duff				1060	1075	15		
6	Duff				1370	1380	10		
6	Duff				1415	1435	20		
6	Duff				1455	1500	45		
6	Duff				1935	1950	15		
6	Duff				2270	2285	15		
6	Duff				2860	2890	30		
6	Duff				3600	3670	70		
6	Duff				3700	3715	15		
6	Duff				4060	4070	10		
6	Duff				4150	4190	40		
6	Duff				4205	4290	85		
6	Duff				4350	4370	20		
6	Duff				4390	4400	10		
6	Duff				4725	4760	35		
6	Duff				4775	4800	25		
6	Eriogonum parvifolium	Coast buckwheat			4480	4725	245	465	9.00
6	Eriogonum parvifolium	Coast buckwheat			220	440	220		
6	Erodium cicutarium	Red-stemmed filaree			165	175	10	226	5.00
6	Erodium cicutarium	Red-stemmed filaree			189	190	1		
6	Erodium cicutarium	Red-stemmed filaree			410	435	25		
6	Erodium cicutarium	Red-stemmed filaree			570	610	40		
6	Erodium cicutarium	Red-stemmed filaree			850	870	20		
6	Erodium cicutarium	Red-stemmed filaree			960	1000	40		
6	Erodium cicutarium	Red-stemmed filaree			1090	1110	20		
6	Erodium cicutarium	Red-stemmed filaree			1125	1170	45		
6	Erodium cicutarium	Red-stemmed filaree			1520	1525	5		
6	Erodium cicutarium	Red-stemmed filaree			1625	1635	10		
6	Erodium cicutarium	Red-stemmed filaree			2250	2255	5		
6	Erodium cicutarium	Red-stemmed filaree			3730	3770	10		
6	Erodium cicutarium	Red-stemmed filaree			3735	3740	-55		
6	Erodium cicutarium	Red-stemmed filaree			3955	3985	30		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
6	Erodium cicutarium	Red-stemmed filaree			4460	4480	20		
6	Heterotheca grandiflora	Telegraph weed			3715	3730	15	67	1.00
6	Heterotheca grandiflora	Telegraph weed			3740	3742	2		
6	Heterotheca grandiflora	Telegraph weed			3935	3955	20		
6	Heterotheca grandiflora	Telegraph weed			4190	4205	15		
6	Heterotheca grandiflora	Telegraph weed			4760	4775	15		
6	Lotus scoparius	Deerweed			3455	3640	185	185	4.00
6	Lupinus chamissonis	Dune bush lupine			430	590	160	1180	24.00
6	Lupinus chamissonis	Dune bush lupine			1030	1035	5		
6	Lupinus chamissonis	Dune bush lupine			1075	1095	20		
6	Lupinus chamissonis	Dune bush lupine			1685	1790	105		
6	Lupinus chamissonis	Dune bush lupine			1860	1900	40		
6	Lupinus chamissonis	Dune bush lupine			2000	2145	145		
6	Lupinus chamissonis	Dune bush lupine			2300	2515	215		
6	Lupinus chamissonis	Dune bush lupine			2555	2655	100		
6	Lupinus chamissonis	Dune bush lupine			2680	2890	210		
6	Lupinus chamissonis	Dune bush lupine			3005	3175	170		
6	Lupinus chamissonis	Dune bush lupine			4990	5000	10		
6	Twigs				3175	3185	10	108	2.00
6	Twigs				3742	3760	18		
6	Twigs				3810	3850	40		
6	Twigs				4800	4810	10		
6	Twigs				4870	4900	30		
							5376	**5376**	**109.00**
7	Ambrosia chamissonis	Beach bur			700	1040	340	340	7.00
7	Avena barbata	Slender wild oats			400	550	150	150	3.00
7	Bare				370	400	30	145	3.00
7	Bare				1275	1310	35		
7	Bare				1520	1540	20		
7	Bare				1770	1790	20		
7	Bare				2160	2200	40		
7	Brassica tournfortii	Wild mustard			1565	1585	20	20	0.40
7	Bromus diandrus	Ripgut brome			190	370	180	860	17.00

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
7	Bromus diandrus	Ripgut brome			1310	1420	110		
7	Bromus diandrus	Ripgut brome			1585	1700	115		
7	Bromus diandrus	Ripgut brome			1935	2180	245		
7	Bromus diandrus	Ripgut brome			2580	2790	210		
7	Carpobrotus edulis	Iceplant			3180	3365	185	1435	29.00
7	Carpobrotus edulis	Iceplant			3490	4230	740		
7	Carpobrotus edulis	Iceplant			4490	5000	510		
7	Croton californicus	California croton			1390	1405	15	15	0.30
7	Duff				1420	1520	100	270	5.00
7	Duff				1540	1565	25		
7	Duff				1790	1935	145		
7	Encelia californica	California encelia			4340	4560	220	220	4.00
7	Ericameria ericoides	Coast goldenbush			0	150	150	150	3.00
7	Eriogonum parvifolium	Coast buckwheat			490	710	220	1090	22.00
7	Eriogonum parvifolium	Coast buckwheat			2200	2650	450		
7	Eriogonum parvifolium	Coast buckwheat			4090	4385	295		
7	Eriogonum parvifolium	Coast buckwheat			4775	4900	125		
7	Galium angustifolium	Narrow-leaved bedstraw			4900	4930	30	30	1.00
7	Isomeris arborea	Bladderpod			1035	1275	240	325	7.00
7	Isomeris arborea	Bladderpod			1610	1695	85		
7	Phacelia ramosissima	Branching phacelia			3365	3530	165	165	3.00
7	Raphanus sativus	Wild raddish			1690	1770	80	425	9.00
7	Raphanus sativus	Wild raddish			2020	2160	140		
7	Raphanus sativus	Wild raddish			2610	2815	205		
7	Salsola tragus	Russian thistle			150	210	60	60	1.00
7	Twigs				2815	3180	365	365	7.00
							6065	**6065**	**121.70**
8	Artemisia californica	California sagebrush			1610	1840	230	230	5.00
8	Avena barbata	Slender wild oats			0	200	200	200	4.00
8	Bare				380	405	25	80	2.00
8	Bare				1000	1020	20		
8	Bare				3770	3790	20		
8	Bare				4740	4755	15		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
8	Calystegia macrostegia	Morning glory			1960	2040	80	80	2.00
8	Duff				200	215	15	2440	49.00
8	Duff				240	380	140		
8	Duff				405	490	85		
8	Duff				610	650	40		
8	Duff				1450	1530	80		
8	Duff				2000	3030	1030		
8	Duff				3275	3770	495		
8	Duff				3790	4100	310		
8	Duff				4755	5000	245		
8	Encelia californica	California encelia			1045	1370	325	325	7.00
8	Eriogonum parvifolium	Coast buckwheat			0	195	195	1750	35.00
8	Eriogonum parvifolium	Coast buckwheat			215	240	25		
8	Eriogonum parvifolium	Coast buckwheat			675	905	230		
8	Eriogonum parvifolium	Coast buckwheat			1285	1450	165		
8	Eriogonum parvifolium	Coast buckwheat			2100	2130	30		
8	Eriogonum parvifolium	Coast buckwheat			2180	2415	235		
8	Eriogonum parvifolium	Coast buckwheat			2535	3185	650		
8	Eriogonum parvifolium	Coast buckwheat			3650	3770	120		
8	Eriogonum parvifolium	Coast buckwheat			4640	4740	100		
8	Twigs				490	610	120	1210	24.00
8	Twigs				650	715	65		
8	Twigs				905	1000	95		
8	Twigs				1020	1050	30		
8	Twigs				1530	1610	80		
8	Twigs				1810	2000	190		
8	Twigs				3185	3275	90		
8	Twigs				4100	4640	540		
							6315	**6315**	**128.00**
9	Ambrosia chamissonis	Beach bur			4490	4730	240	255	5.00
9	Ambrosia chamissonis	Beach bur			4860	4875	15		
9	Bare				2480	2530	50	120	2.00
9	Bare				2540	2580	40		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
9	Bare				2790	2820	30		
9	Bromus diandrus	Ripgut brome			580	605	25	2520	50.00
9	Bromus diandrus	Ripgut brome			635	655	20		
9	Bromus diandrus	Ripgut brome			680	730	50		
9	Bromus diandrus	Ripgut brome			770	1220	450		
9	Bromus diandrus	Ripgut brome			1470	1950	480		
9	Bromus diandrus	Ripgut brome			2200	2480	280		
9	Bromus diandrus	Ripgut brome			2580	2670	90		
9	Bromus diandrus	Ripgut brome			2730	2790	60		
9	Bromus diandrus	Ripgut brome			2820	2850	30		
9	Bromus diandrus	Ripgut brome			2890	3100	210		
9	Bromus diandrus	Ripgut brome			3290	3385	95		
9	Bromus diandrus	Ripgut brome			3520	3900	380		
9	Bromus diandrus	Ripgut brome			3920	3930	10		
9	Bromus diandrus	Ripgut brome			3940	3960	20		
9	Bromus diandrus	Ripgut brome			3995	4005	10		
9	Bromus diandrus	Ripgut brome			4015	4105	90		
9	Bromus diandrus	Ripgut brome			4150	4190	40		
9	Bromus diandrus	Ripgut brome			4210	4265	55		
9	Bromus diandrus	Ripgut brome			4290	4305	15		
9	Bromus diandrus	Ripgut brome			4350	4390	40		
9	Bromus diandrus	Ripgut brome			4440	4490	50		
9	Bromus diandrus	Ripgut brome			4820	4830	10		
9	Bromus diandrus	Ripgut brome			4850	4860	10		
9	Cakile maritima	Sea rocket			2095	2460	365	365	7.00
9	Carpobrotus edulis	Iceplant			0	400	400	1485	30.00
9	Carpobrotus edulis	Iceplant			460	610	150		
9	Carpobrotus edulis	Iceplant			1220	1705	485		
9	Carpobrotus edulis	Iceplant			3060	3330	270		
9	Carpobrotus edulis	Iceplant			4650	4830	180		
9	Duff				2055	2095	40	110	2.00
9	Duff				2530	2540	10		
9	Duff				2670	2730	60		
9	Encelia californica	California encelia			60	225	165	165	3.00

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
9	Eriogonum parvifolium	Coast buckwheat			215	635	420	845	17.00
9	Eriogonum parvifolium	Coast buckwheat			1750	1995	245		
9	Eriogonum parvifolium	Coast buckwheat			4820	5000	180		
9	Heterotheca grandiflora	Telegraph weed			4800	4820	20	20	0.40
9	Isomeris arborea	Bladderpod			2850	3085	235	235	5.00
9	Lotus scoparius	Deerweed			1030	1220	190	895	18.00
9	Lotus scoparius	Deerweed			3350	3600	250		
9	Lotus scoparius	Deerweed			3680	3860	180		
9	Lotus scoparius	Deerweed			4240	4490	250		
9	Lotus scoparius	Deerweed			4825	4850	25		
9	Salsola tragus	Russian thistle			1860	1965	105	165	3.00
9	Salsola tragus	Russian thistle			1995	2055	60		
9	Twigs				655	680	25	215	4.00
9	Twigs				720	770	50		
9	Twigs				3900	3920	20		
9	Twigs				3930	3940	10		
9	Twigs				3960	3995	35		
9	Twigs				4005	4015	10		
9	Twigs				4105	4150	45		
9	Twigs				4190	4210	20		
							7395	7395	146.40
10	Avena barbata	Slender wild oats			0	120	120	120	2.00
10	Avena barbata	Slender wild oats			1200	1250	50		
10	Avena barbata	Slender wild oats			1970	1990	20		
10	Avena barbata	Slender wild oats			2060	2070	10		
10	Bare				780	790	10	25	1.00
10	Bare				1790	1805	15		
10	Bromus diandrus	Ripgut brome			190	230	40	225	5.00
10	Bromus diandrus	Ripgut brome			245	270	25		
10	Bromus diandrus	Ripgut brome			310	335	25		
10	Bromus diandrus	Ripgut brome			590	650	60		
10	Bromus diandrus	Ripgut brome			750	780	30		
10	Bromus diandrus	Ripgut brome			1475	1510	35		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
10	Bromus diandrus	Ripgut brome			1780	1790	10		
10	Carpobrotus edulis	Iceplant			790	1200	410	2245	45.00
10	Carpobrotus edulis	Iceplant			1590	1760	170		
10	Carpobrotus edulis	Iceplant			1805	1810	5		
10	Carpobrotus edulis	Iceplant			2450	2600	150		
10	Carpobrotus edulis	Iceplant			2630	2960	330		
10	Carpobrotus edulis	Iceplant			3360	3720	360		
10	Carpobrotus edulis	Iceplant			4090	4790	700		
10	Carpobrotus edulis	Iceplant			4880	5000	120		
10	Duff				160	180	20	530	11.00
10	Duff				270	310	40		
10	Duff				650	750	100		
10	Duff				1760	1780	20		
10	Duff				1880	1970	90		
10	Duff				1990	2060	70		
10	Duff				2070	2260	190		
10	Encelia californica	California encelia			2920	3400	480	1270	25.00
10	Encelia californica	California encelia			3700	4260	560		
10	Encelia californica	California encelia			4660	4890	230		
10	Eriogonum parvifolium	Coast buckwheat			335	625	290	1280	26.00
10	Eriogonum parvifolium	Coast buckwheat			1250	1385	135		
10	Eriogonum parvifolium	Coast buckwheat			1425	1475	50		
10	Eriogonum parvifolium	Coast buckwheat			1510	1650	140		
10	Eriogonum parvifolium	Coast buckwheat			2260	2700	440		
10	Eriogonum parvifolium	Coast buckwheat			70	295	225		
10	Gnaphalium bicolor	Bicolored cudweed			2835	2980	145	145	3.00
10	Salsola tragus	Russian thistle			1385	1465	80	150	3.00
10	Salsola tragus	Russian thistle			1810	1880	70		
10	Twigs				130	160	30	45	1.00
10	Twigs				230	245	15		
							6035	6035	122.00
11	Acacia longiflorus	Acacia			1450	1460	10	10	0.20
11	Avena barbata	Slender wild oats			35	50	15	1335	27.00

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
11	Avena barbata	Slender wild oats			60	150	90		
11	Avena barbata	Slender wild oats			450	525	65		
11	Avena barbata	Slender wild oats			1440	1570	130		
11	Avena barbata	Slender wild oats			1600	1685	85		
11	Avena barbata	Slender wild oats			1700	1725	25		
11	Avena barbata	Slender wild oats			1810	1890	80		
11	Avena barbata	Slender wild oats			1970	2010	40		
11	Avena barbata	Slender wild oats			2030	2045	15		
11	Avena barbata	Slender wild oats			2130	2215	85		
11	Avena barbata	Slender wild oats			2250	2395	145		
11	Avena barbata	Slender wild oats			2370	2400	30		
11	Avena barbata	Slender wild oats			2570	2590	20		
11	Avena barbata	Slender wild oats			2670	2770	100		
11	Avena barbata	Slender wild oats			2900	3020	120		
11	Avena barbata	Slender wild oats			3310	3350	40		
11	Avena barbata	Slender wild oats			3750	3810	60		
11	Avena barbata	Slender wild oats			4110	4175	65		
11	Avena barbata	Slender wild oats			4255	4290	35		
11	Avena barbata	Slender wild oats			4315	4330	15		
11	Avena barbata	Slender wild oats			4400	4475	75		
11	Bare				20	35	15	555	11.00
11	Bare				275	290	15		
11	Bare				1570	1600	30		
11	Bare				1735	1770	35		
11	Bare				2110	2130	20		
11	Bare				2225	2240	15		
11	Bare				2320	2340	20		
11	Bare				2475	2490	15		
11	Bare				3210	3240	30		
11	Bare				3360	3390	30		
11	Bare				4175	4225	50		
11	Bare				4540	4560	20		
11	Bare				4650	4725	75		
11	Bare				4775	4800	25		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
11	Bare				4840	5000	150		
11	Bromus diandrus	Ripgut brome			200	230	30	335	7.00
11	Bromus diandrus	Ripgut brome			250	275	25		
11	Bromus diandrus	Ripgut brome			290	310	20		
11	Bromus diandrus	Ripgut brome			1010	1230	220		
11	Bromus diandrus	Ripgut brome			1320	1345	25		
11	Bromus diandrus	Ripgut brome			1380	1395	15		
11	Cammisonia chieranthifolia	Beach evening primrose			430	530	100	275	6.00
11	Cammisonia chieranthifolia	Beach evening primrose			2210	2225	15		
11	Cammisonia chieranthifolia	Beach evening primrose			2780	2830	50		
11	Cammisonia chieranthifolia	Beach evening primrose			3890	3920	30		
11	Cammisonia chieranthifolia	Beach evening primrose			4030	4065	35		
11	Cammisonia chieranthifolia	Beach evening primrose			4410	4435	25		
11	Cammisonia chieranthifolia	Beach evening primrose			4755	4775	20		
11	Duff				50	60	10	650	13.00
11	Duff				150	200	50		
11	Duff				230	245	15		
11	Duff				365	375	10		
11	Duff				520	630	110		
11	Duff				650	790	140		
11	Duff				985	1010	25		
11	Duff				2080	2110	30		
11	Duff				3020	3130	110		
11	Duff				3200	3210	10		
11	Duff				3290	3310	20		
11	Duff				3390	3420	30		
11	Duff				3625	3635	10		
11	Duff				4380	4390	10		
11	Duff				4725	4755	30		
11	Duff				4800	4840	40		
11	Eriogonum parvifolium	Coast buckwheat			4330	4385	55	55	1.00
11	Erodium cicutarium	Red-stemmed filaree			0	20	20	1835	37.00
11	Erodium cicutarium	Red-stemmed filaree			310	365	55		
11	Erodium cicutarium	Red-stemmed filaree			630	650	20		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
11	Erodium cicutarium	Red-stemmed filaree			1400	1450	50		
11	Erodium cicutarium	Red-stemmed filaree			1490	1570	80		
11	Erodium cicutarium	Red-stemmed filaree			1640	1670	30		
11	Erodium cicutarium	Red-stemmed filaree			1685	1735	50		
11	Erodium cicutarium	Red-stemmed filaree			1770	1855	85		
11	Erodium cicutarium	Red-stemmed filaree			1890	2110	220		
11	Erodium cicutarium	Red-stemmed filaree			2130	2190	60		
11	Erodium cicutarium	Red-stemmed filaree			2240	2255	15		
11	Erodium cicutarium	Red-stemmed filaree			2340	2370	30		
11	Erodium cicutarium	Red-stemmed filaree			2535	2600	65		
11	Erodium cicutarium	Red-stemmed filaree			2620	2720	100		
11	Erodium cicutarium	Red-stemmed filaree			2800	2985	185		
11	Erodium cicutarium	Red-stemmed filaree			3130	3200	70		
11	Erodium cicutarium	Red-stemmed filaree			3240	3290	50		
11	Erodium cicutarium	Red-stemmed filaree			3635	4110	475		
11	Erodium cicutarium	Red-stemmed filaree			4225	4255	30		
11	Erodium cicutarium	Red-stemmed filaree			4290	4315	25		
11	Erodium cicutarium	Red-stemmed filaree			4390	4400	10		
11	Erodium cicutarium	Red-stemmed filaree			4480	4500	20		
11	Erodium cicutarium	Red-stemmed filaree			4560	4650	90		
11	Heterotheca grandiflora	Telegraph weed			245	250	5	50	1.00
11	Heterotheca grandiflora	Telegraph weed			375	380	5		
11	Heterotheca grandiflora	Telegraph weed			705	710	5		
11	Heterotheca grandiflora	Telegraph weed			2035	2060	25		
11	Heterotheca grandiflora	Telegraph weed			3910	3920	10		
11	Lotus scoparius	Deerweed			2260	2320	60	225	5.00
11	Lotus scoparius	Deerweed			2400	2475	75		
11	Lotus scoparius	Deerweed			2600	2655	55		
11	Lotus scoparius	Deerweed			3770	3805	35		
11	Lupinus chamissonis	Dune bush lupine			380	540	160	555	11.00
11	Lupinus chamissonis	Dune bush lupine			760	985	225		
11	Lupinus chamissonis	Dune bush lupine			3420	3590	170		
11	Twigs				995	1430	435	725	15.00
11	Twigs				2490	2590	100		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
11	Twigs				2720	2820	100		
11	Twigs				3350	3360	10		
11	Twigs				3590	3625	35		
11	Twigs				4475	4480	5		
11	Twigs				4500	4540	40		
							6605	6605	**134.20**
12	Ambrosia chamissonis	Beach bur			2430	2505	75	140	3.00
12	Ambrosia chamissonis	Beach bur			4180	4245	65		
12	Avena barbata	Slender wild oats			2550	2555	5	45	1.00
12	Avena barbata	Slender wild oats			3930	3970	40		
12	Bare				0	50	50	2580	52.00
12	Bare				60	90	30		
12	Bare				95	180	85		
12	Bare				195	320	125		
12	Bare				330	335	5		
12	Bare				360	550	190		
12	Bare				660	670	10		
12	Bare				705	1190	485		
12	Bare				1270	1355	85		
12	Bare				1415	1480	65		
12	Bare				1575	1590	15		
12	Bare				1615	1710	95		
12	Bare				1890	1930	40		
12	Bare				2175	2185	10		
12	Bare				2335	2355	20		
12	Bare				2390	2430	40		
12	Bare				2570	2595	25		
12	Bare				2655	2660	5		
12	Bare				2665	2670	5		
12	Bare				3090	3230	140		
12	Bare				3260	3330	70		
12	Bare				3500	3620	120		
12	Bare				4245	4250	5		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
12	Bare				4400	4975	575		
12	Bare				4505	4540	35		
12	Bare				4620	4765	145		
12	Bare				4775	4815	40		
12	Bare				4830	4895	65		
12	Cammisonia chieranthifolia	Beach evening primrose			1225	1270	45	595	12.00
12	Cammisonia chieranthifolia	Beach evening primrose			1590	1615	25		
12	Cammisonia chieranthifolia	Beach evening primrose			1710	1745	35		
12	Cammisonia chieranthifolia	Beach evening primrose			1930	2000	70		
12	Cammisonia chieranthifolia	Beach evening primrose			2185	2210	25		
12	Cammisonia chieranthifolia	Beach evening primrose			2595	2600	5		
12	Cammisonia chieranthifolia	Beach evening primrose			2660	2665	5		
12	Cammisonia chieranthifolia	Beach evening primrose			2730	2760	30		
12	Cammisonia chieranthifolia	Beach evening primrose			2970	2995	25		
12	Cammisonia chieranthifolia	Beach evening primrose			3020	3090	70		
12	Cammisonia chieranthifolia	Beach evening primrose			3230	3260	30		
12	Cammisonia chieranthifolia	Beach evening primrose			3330	3365	35		
12	Cammisonia chieranthifolia	Beach evening primrose			3455	3500	45		
12	Cammisonia chieranthifolia	Beach evening primrose			3660	3700	40		
12	Cammisonia chieranthifolia	Beach evening primrose			4000	4030	30		
12	Cammisonia chieranthifolia	Beach evening primrose			4140	4170	30		
12	Cammisonia chieranthifolia	Beach evening primrose			4475	4505	30		
12	Cammisonia chieranthifolia	Beach evening primrose			4615	4620	5		
12	Cammisonia chieranthifolia	Beach evening primrose			4815	4830	15		
12	Duff				1745	1765	20	45	1.00
12	Duff				2505	2520	15		
12	Duff				4390	4400	10		
12	Erysimum suffrutescens	Dunes wallflower			2355	2390	35	35	1.00
12	Lupinus chamissonis	Dune bush lupine			90	95	5	1430	29.00
12	Lupinus chamissonis	Dune bush lupine			335	360	25		
12	Lupinus chamissonis	Dune bush lupine			595	650	55		
12	Lupinus chamissonis	Dune bush lupine			670	705	35		
12	Lupinus chamissonis	Dune bush lupine			1190	1225	35		
12	Lupinus chamissonis	Dune bush lupine			1355	1415	60		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
12	Lupinus chamissonis	Dune bush lupine			1480	1575	95		
12	Lupinus chamissonis	Dune bush lupine			1765	1875	110		
12	Lupinus chamissonis	Dune bush lupine			1930	2175	245		
12	Lupinus chamissonis	Dune bush lupine			2520	2550	30		
12	Lupinus chamissonis	Dune bush lupine			2595	2655	60		
12	Lupinus chamissonis	Dune bush lupine			2670	2760	90		
12	Lupinus chamissonis	Dune bush lupine			2800	2975	175		
12	Lupinus chamissonis	Dune bush lupine			2900	2930	30		
12	Lupinus chamissonis	Dune bush lupine			3670	3730	60		
12	Lupinus chamissonis	Dune bush lupine			4250	4390	140		
12	Lupinus chamissonis	Dune bush lupine			4540	4615	75		
12	Lupinus chamissonis	Dune bush lupine			4765	4775	10		
12	Lupinus chamissonis	Dune bush lupine			4895	4990	95		
12	Twigs				50	60	10	860	17.00
12	Twigs				180	195	15		
12	Twigs				320	330	10		
12	Twigs				550	595	45		
12	Twigs				650	660	10		
12	Twigs				1875	1890	15		
12	Twigs				2210	2335	125		
12	Twigs				2760	2765	5		
12	Twigs				2765	2800	35		
12	Twigs				2930	3020	90		
12	Twigs				3365	3455	90		
12	Twigs				3620	3670	50		
12	Twigs				3730	3930	200		
12	Twigs				3970	4000	30		
12	Twigs				4030	4140	110		
12	Twigs				4170	4180	10		
12	Twigs				4990	5000	10		
							5730	**5730**	**116.00**
13	Avena barbata	Slender wild oats			920	940	20	875	14.00
13	Avena barbata	Slender wild oats			1080	1365	285		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
13	Avena barbata	Slender wild oats			2940	3010	70		
13	Avena barbata	Slender wild oats			3275	3285	10		
13	Avena barbata	Slender wild oats			3470	3640	170		
13	Avena barbata	Slender wild oats			4870	4950	80		
13	Avena barbata	Slender wild oats			4750	4770	20		
13	Avena barbata	Slender wild oats			4610	4630	20		
13	Bare				25	35	10	100	2.00
13	Bare				235	265	30		
13	Bare				2195	2255	60		
13	Bromus diandrus	Ripgut brome			540	580	40	40	1.00
13	Carpobrotus edulis	Iceplant			60	80	20	20	0.40
13	Duff				3320	3335	15	15	0.30
13	Encelia californica	California encelia			1760	2150	390	895	18.00
13	Encelia californica	California encelia			2255	2760	505		
13	Eriogonum parvifolium	Coast buckwheat			3335	3385	50	120	2.00
13	Eriogonum parvifolium	Coast buckwheat			3490	3540	50		
13	Eriogonum parvifolium	Coast buckwheat			3590	3600	20		
13	Erodium cicutarium	Red-stemmed filaree			580	775	195	2820	56.00
13	Erodium cicutarium	Red-stemmed filaree			830	1090	260		
13	Erodium cicutarium	Red-stemmed filaree			1160	1200	40		
13	Erodium cicutarium	Red-stemmed filaree			1130	1760	630		
13	Erodium cicutarium	Red-stemmed filaree			2760	3320	560		
13	Erodium cicutarium	Red-stemmed filaree			3370	3500	130		
13	Erodium cicutarium	Red-stemmed filaree			3855	4035	180		
13	Erodium cicutarium	Red-stemmed filaree			4175	5000	825		
13	Heterotheca grandiflora	Telegraph weed			1550	1555	5	70	1.00
13	Heterotheca grandiflora	Telegraph weed			2165	2195	30		
13	Heterotheca grandiflora	Telegraph weed			4355	4370	15		
13	Heterotheca grandiflora	Telegraph weed			4230	4250	20		
13	Isomeris arborea	Bladderpod			3630	3710	80	80	2.00
13	Lotus scoparius	Deerweed			60	130	70	385	8.00
13	Lotus scoparius	Deerweed			775	860	85		
13	Lotus scoparius	Deerweed			1010	1020	10		
13	Lotus scoparius	Deerweed			1100	1180	80		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
13	Lotus scoparius	Deerweed			1610	1660	50		
13	Lotus scoparius	Deerweed			3840	3855	15		
13	Lotus scoparius	Deerweed			4015	4090	75		
13	Lupinus chamissonis	Dune bush lupine			130	235	105	105	2.00
13	Twigs				0	25	25	585	12.00
13	Twigs				35	60	25		
13	Twigs				265	550	285		
13	Twigs				2150	2165	15		
13	Twigs				3700	3840	140		
13	Twigs				4080	4175	95		
							5910	**5910**	**118.70**
14	Avena barbata	Slender wild oats			1060	1150	90	1150	23.00
14	Bare				320	350	30	875	18.00
14	Bare				380	420	40		
14	Bare				1015	1045	30		
14	Bare				1285	1300	15		
14	Bare				1505	1520	15		
14	Bare				1580	1590	10		
14	Bare				1635	1655	20		
14	Bare				1775	1810	35		
14	Bare				1900	1930	30		
14	Bare				2020	2060	40		
14	Bare				2145	2170	25		
14	Bare				2190	2220	30		
14	Bare				2320	2385	65		
14	Bare				2570	2640	70		
14	Bare				2810	2850	40		
14	Bare				3000	3060	60		
14	Bare				3310	3450	140		
14	Bare				3540	3565	25		
14	Bare				3660	3735	75		
14	Bare				4710	4740	30		
14	Bare				4830	4860	30		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
14	Bare				4860	4880	20		
14	Bromus diandrus	Ripgut brome			4500	4670	170	170	3.00
14	Cammisonia chieranthifolia	Beach evening primrose			70	90	20	85	2.00
14	Cammisonia chieranthifolia	Beach evening primrose			180	200	20		
14	Cammisonia chieranthifolia	Beach evening primrose			1520	1540	20		
14	Cammisonia chieranthifolia	Beach evening primrose			2170	2185	15		
14	Cammisonia chieranthifolia	Beach evening primrose			4510	4520	10		
14	Chaenactis glabriuscula	Yellow pincushion			1810	1815	5	5	0.10
14	Croton californica	California croton			2960	2970	10	10	0.20
14	Duff				230	295	65	620	12.00
14	Duff				350	380	30		
14	Duff				430	500	70		
14	Duff				810	850	40		
14	Duff				870	895	25		
14	Duff				910	920	10		
14	Duff				940	960	20		
14	Duff				990	1015	25		
14	Duff				1590	1595	5		
14	Duff				1655	1730	75		
14	Duff				1765	1775	10		
14	Duff				1930	2020	90		
14	Duff				2550	2570	20		
14	Duff				2640	2675	35		
14	Duff				3285	3310	25		
14	Duff				4360	4410	50		
14	Duff				4670	4695	25		
14	Encelia californica	California encelia			2500	2550	50	205	4.00
14	Encelia californica	California encelia			3130	3285	155		
14	Ericameria ericoides	Coast goldenbush			2385	2480	95	95	2.00
14	Eriogonum parvifolium	Coast buckwheat			2675	2700	25	25	1.00
14	Erodium cicutarium	Red-stemmed filaree			920	940	20	400	8.00
14	Erodium cicutarium	Red-stemmed filaree			1270	1285	15		
14	Erodium cicutarium	Red-stemmed filaree			1815	1830	15		
14	Erodium cicutarium	Red-stemmed filaree			1855	1870	15		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
14	Erodium cicutarium	Red-stemmed filaree			3450	3540	90		
14	Erodium cicutarium	Red-stemmed filaree			3570	3660	90		
14	Erodium cicutarium	Red-stemmed filaree			4695	4710	15		
14	Erodium cicutarium	Red-stemmed filaree			4740	4830	90		
14	Erodium cicutarium	Red-stemmed filaree			4880	4900	20		
14	Erodium cicutarium	Red-stemmed filaree			4970	5000	30		
14	Eschscholzia californica	California poppy			2050	2070	10	90	2.00
14	Eschscholzia californica	California poppy			2185	2190	5		
14	Eschscholzia californica	California poppy			2220	2250	30		
14	Eschscholzia californica	California poppy			2280	2285	5		
14	Eschscholzia californica	California poppy			2930	2940	10		
14	Eschscholzia californica	California poppy			3105	3135	30		
14	Galium angustifolium	Narrow-leaved bedstraw			295	320	25	30	0.60
14	Galium angustifolium	Narrow-leaved bedstraw			2495	2500	5		
14	Lessingia filaginifolia	California aster			4260	4270	10	10	0.20
14	Lotus scoparius	Deerweed			655	690	35	900	18.00
14	Lotus scoparius	Deerweed			960	990	30		
14	Lotus scoparius	Deerweed			1045	1090	45		
14	Lotus scoparius	Deerweed			1140	1160	20		
14	Lotus scoparius	Deerweed			1190	1205	15		
14	Lotus scoparius	Deerweed			1240	1270	30		
14	Lotus scoparius	Deerweed			1300	1405	105		
14	Lotus scoparius	Deerweed			1535	1580	45		
14	Lotus scoparius	Deerweed			1595	1635	40		
14	Lotus scoparius	Deerweed			1755	1765	10		
14	Lotus scoparius	Deerweed			1830	1855	25		
14	Lotus scoparius	Deerweed			2070	2145	75		
14	Lotus scoparius	Deerweed			3880	4220	340		
14	Lotus scoparius	Deerweed			4900	4985	85		
14	Lupinus chamissonis	Dune bush lupine			895	910	15	185	4.00
14	Lupinus chamissonis	Dune bush lupine			1160	1200	40		
14	Lupinus chamissonis	Dune bush lupine			4310	4360	50		
14	Lupinus chamissonis	Dune bush lupine			4410	4490	80		
14	Melilotus indicus	Yellow sweet-clover			140	230	90	115	2.00

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
14	Melilotus indicus	Yellow sweet-clover			295	320	25		
14	Phacelia ramosissima	Branching phacelia			775	810	35		
14	Salsola tragus	Russian thistle			720	780	60	80	1.60
14	Salsola tragus	Russian thistle			850	870	20		
14	Stephanomeria virgata	Twiggy wreathplant			3565	3570	5	5	0.10
14	Twigs				0	70	70	1275	26.00
14	Twigs				90	140	50		
14	Twigs				420	430	10		
14	Twigs				500	655	155		
14	Twigs				675	760	85		
14	Twigs				1080	1100	20		
14	Twigs				1130	1150	20		
14	Twigs				1205	1240	35		
14	Twigs				1400	1405	5		
14	Twigs				1730	1755	25		
14	Twigs				1870	1900	30		
14	Twigs				2250	2280	30		
14	Twigs				2285	2320	35		
14	Twigs				2480	2495	15		
14	Twigs				2700	2810	110		
14	Twigs				2850	2925	75		
14	Twigs				2925	2960	35		
14	Twigs				2970	3000	30		
14	Twigs				3060	3105	45		
14	Twigs				3735	3880	145		
14	Twigs				4220	4260	40		
14	Twigs				4270	4310	40		
14	Twigs				4490	4660	170		
15	Avena barbata	Slender wild oats			1220	1230	10	10	0.20
15	Bare				0	15	15	700	14.00
15	Bare				75	85	10		
15	Bare				110	175	65		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
15	Bare				230	240	10		
15	Bare				260	275	15		
15	Bare				285	300	15		
15	Bare				320	380	60		
15	Bare				405	425	20		
15	Bare				490	520	30		
15	Bare				845	960	115		
15	Bare				975	995	20		
15	Bare				1010	1030	20		
15	Bare				1095	1120	25		
15	Bare				1500	1510	10		
15	Bare				1520	1540	20		
15	Bare				2110	2125	15		
15	Bare				2140	2150	10		
15	Bare				2925	2960	35		
15	Bare				2975	3000	25		
15	Bare				3610	3645	35		
15	Bare				3720	3745	25		
15	Bare				4370	4410	40		
15	Bare				4805	4830	25		
15	Bare				4900	4940	40		
15	Boards				815	845	30	30	0.60
15	Bromus diandrus	Ripgut brome			3090	3100	10	10	0.20
15	Cammisonia chieranthifolia	Beach evening primrose			75	230	55	440	9.00
15	Cammisonia chieranthifolia	Beach evening primrose			380	405	25		
15	Cammisonia chieranthifolia	Beach evening primrose			1030	1065	35		
15	Cammisonia chieranthifolia	Beach evening primrose			1280	1330	50		
15	Cammisonia chieranthifolia	Beach evening primrose			2745	2790	45		
15	Cammisonia chieranthifolia	Beach evening primrose			3680	3720	40		
15	Cammisonia chieranthifolia	Beach evening primrose			3780	3830	50		
15	Cammisonia chieranthifolia	Beach evening primrose			3865	3920	55		
15	Cammisonia chieranthifolia	Beach evening primrose			4760	4805	45		
15	Cammisonia chieranthifolia	Beach evening primrose			4830	4870	40		
15	Chaenactis glabriuscula	Pincushion			65	75	10	10	0.20

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
15	Cryptantha clevelandii	Popcorn flower			300	310	10	10	0.20
15	Duff				40	55	15	305	6.00
15	Duff				240	260	20		
15	Duff				275	285	10		
15	Duff				310	320	10		
15	Duff				425	450	25		
15	Duff				960	975	15		
15	Duff				995	1010	15		
15	Duff				1230	1270	40		
15	Duff				3285	3305	20		
15	Duff				3745	3780	35		
15	Duff				4410	4475	65		
15	Duff				4500	4505	5		
15	Duff				4870	4900	30		
15	Eriogonum parvifolium	Coast buckwheat			1820	1890	70	360	7.00
15	Eriogonum parvifolium	Coast buckwheat			3305	3555	250		
15	Eriogonum parvifolium	Coast buckwheat			4140	4180	40		
15	Erodium cicutarium	Red-stemmed filaree			55	65	10	1579	32.00
15	Erodium cicutarium	Red-stemmed filaree			1065	1095	30		
15	Erodium cicutarium	Red-stemmed filaree			1330	1375	45		
15	Erodium cicutarium	Red-stemmed filaree			1380	1500	120		
15	Erodium cicutarium	Red-stemmed filaree			1510	1520	10		
15	Erodium cicutarium	Red-stemmed filaree			1540	1550	10		
15	Erodium cicutarium	Red-stemmed filaree			2080	2110	30		
15	Erodium cicutarium	Red-stemmed filaree			2125	2140	15		
15	Erodium cicutarium	Red-stemmed filaree			2150	2155	5		
15	Erodium cicutarium	Red-stemmed filaree			2155	2320	165		
15	Erodium cicutarium	Red-stemmed filaree			2350	2540	190		
15	Erodium cicutarium	Red-stemmed filaree			2640	2925	285		
15	Erodium cicutarium	Red-stemmed filaree			2960	2975	15		
15	Erodium cicutarium	Red-stemmed filaree			3000	3290	290		
15	Erodium cicutarium	Red-stemmed filaree			3526	3610	84		
15	Erodium cicutarium	Red-stemmed filaree			3645	3700	55		
15	Erodium cicutarium	Red-stemmed filaree			4260	4370	110		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
15	Erodium cicutarium	Red-stemmed filaree			4710	4760	50		
15	Erodium cicutarium	Red-stemmed filaree			4940	5000	60		
15	Erysimum suffrutescens	Dune wallflower			520	545	25	45	0.90
15	Erysimum suffrutescens	Dune wallflower			610	630	20		
15	Galium angustifolium	Narrow-leaved bedstraw			1120	1220	100	100	2.00
15	Gnaphalium bicolor	Bicolored cudweed			745	750	5	25	0.50
15	Gnaphalium bicolor	Bicolored cudweed			3930	3950	20		
15	Heterotheca grandiflora	Telegraph weed			2900	2920	20	20	0.40
15	Lessingia filaginifolia	Wooly aster			4505	4710	205	205	4.00
15	Lotus scoparius	Deerweed			1590	1630	40	810	16.00
15	Lotus scoparius	Deerweed			1680	1700	20		
15	Lotus scoparius	Deerweed			1830	2030	200		
15	Lotus scoparius	Deerweed			1980	2110	130		
15	Lotus scoparius	Deerweed			2220	2310	90		
15	Lotus scoparius	Deerweed			2410	2665	255		
15	Lotus scoparius	Deerweed			3180	3200	20		
15	Lotus scoparius	Deerweed			3230	3285	55		
15	Lupinus chamissonis	Dune bush lupine			3810	3955	145	330	7.00
15	Lupinus chamissonis	Dune bush lupine			3980	4140	160		
15	Lupinus chamissonis	Dune bush lupine			4475	4500	25		
15	Salsola tragus	Russian thistle			2525	2550	25	25	0.50
15	Stephanomeria virgata	Twiggy wreathplant			20	40	20	20	0.40
15	Twigs				15	20	5	990	20.00
15	Twigs				85	110	25		
15	Twigs				450	490	40		
15	Twigs				545	815	270		
15	Twigs				1270	1375	105		
15	Twigs				1550	1860	310		
15	Twigs				2290	2405	115		
15	Twigs				3940	3980	40		
15	Twigs				4180	4260	80		
							6024	**6024**	**12[illegible].10**
16	Avena barbata	Slender wild oats			575	600	25	455	9.00

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
16	Avena barbata	Slender wild oats			2330	2605	275		
16	Avena barbata	Slender wild oats			2690	2700	10		
16	Avena barbata	Slender wild oats			2755	2770	15		
16	Avena barbata	Slender wild oats			2790	2885	95		
16	Avena barbata	Slender wild oats			2960	2995	35		
16	Bare				75	105	30	585	12.00
16	Bare				120	170	50		
16	Bare				180	200	20		
16	Bare				675	690	15		
16	Bare				700	710	10		
16	Bare				1170	1180	10		
16	Bare				1185	1200	15		
16	Bare				1380	1410	30		
16	Bare				1425	1440	15		
16	Bare				1450	1470	20		
16	Bare				1520	1530	10		
16	Bare				1670	1690	20		
16	Bare				1705	1720	15		
16	Bare				1725	1740	15		
16	Bare				1745	1770	25		
16	Bare				2030	2045	15		
16	Bare				2060	2130	70		
16	Bare				2605	2635	30		
16	Bare				2645	2660	15		
16	Bare				3355	3365	10		
16	Bare				3520	3530	10		
16	Bare				3545	3570	25		
16	Bare				4325	4380	55		
16	Bare				4770	4780	10		
16	Bare				4870	4900	30		
16	Bare				4905	4920	15		
16	Bromus diandrus	Ripgut brome			495	530	35	120	2.00
16	Bromus diandrus	Ripgut brome			2875	2960	85		
16	Cammisonia chieranthifolia	Beach evening primrose			810	870	60	365	7.00

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
16	Cammisonia chieranthifolia	Beach evening primrose			1200	1205	5		
16	Cammisonia chieranthifolia	Beach evening primrose			1230	1260	30		
16	Cammisonia chieranthifolia	Beach evening primrose			1290	1315	25		
16	Cammisonia chieranthifolia	Beach evening primrose			1350	1380	30		
16	Cammisonia chieranthifolia	Beach evening primrose			1470	1485	15		
16	Cammisonia chieranthifolia	Beach evening primrose			3250	3265	15		
16	Cammisonia chieranthifolia	Beach evening primrose			3365	3400	35		
16	Cammisonia chieranthifolia	Beach evening primrose			3880	3920	40		
16	Cammisonia chieranthifolia	Beach evening primrose			3930	3945	15		
16	Cammisonia chieranthifolia	Beach evening primrose			4710	4770	60		
16	Cammisonia chieranthifolia	Beach evening primrose			4965	5000	35		
16	Duff				650	675	25	415	8.00
16	Duff				870	920	50		
16	Duff				980	1060	80		
16	Duff				1135	1140	5		
16	Duff				1205	1210	5		
16	Duff				1260	1290	30		
16	Duff				1315	1350	35		
16	Duff				1570	1590	20		
16	Duff				1770	1780	10		
16	Duff				2000	2030	30		
16	Duff				2660	2680	20		
16	Duff				2740	2750	10		
16	Duff				3160	3190	30		
16	Duff				3330	3355	25		
16	Duff				3570	3585	15		
16	Duff				3860	3880	20		
16	Duff				3945	3950	5		
16	Encelia californica	California encelia			1480	1520	40	40	0.80
16	Eriogonum parvifolium	Coast buckwheat			920	970	50	180	4.00
16	Eriogonum parvifolium	Coast buckwheat			1410	1425	15		
16	Eriogonum parvifolium	Coast buckwheat			2495	2570	75		
16	Eriogonum parvifolium	Coast buckwheat			4440	4480	40		
16	Erodium cicutarium	Red-stemmed filaree			105	115	10	640	13.00

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
16	Erodium cicutarium	Red-stemmed filaree			170	180	10		
16	Erodium cicutarium	Red-stemmed filaree			615	625	10		
16	Erodium cicutarium	Red-stemmed filaree			640	650	10		
16	Erodium cicutarium	Red-stemmed filaree			690	700	10		
16	Erodium cicutarium	Red-stemmed filaree			970	980	10		
16	Erodium cicutarium	Red-stemmed filaree			1140	1170	30		
16	Erodium cicutarium	Red-stemmed filaree			1180	1185	5		
16	Erodium cicutarium	Red-stemmed filaree			1210	1230	20		
16	Erodium cicutarium	Red-stemmed filaree			1440	1450	10		
16	Erodium cicutarium	Red-stemmed filaree			1530	1570	40		
16	Erodium cicutarium	Red-stemmed filaree			1690	1705	15		
16	Erodium cicutarium	Red-stemmed filaree			1720	1725	5		
16	Erodium cicutarium	Red-stemmed filaree			2045	2060	15		
16	Erodium cicutarium	Red-stemmed filaree			2130	2150	20		
16	Erodium cicutarium	Red-stemmed filaree			2180	2330	150		
16	Erodium cicutarium	Red-stemmed filaree			2680	2695	15		
16	Erodium cicutarium	Red-stemmed filaree			2700	2735	35		
16	Erodium cicutarium	Red-stemmed filaree			2750	2755	5		
16	Erodium cicutarium	Red-stemmed filaree			2770	2815	45		
16	Erodium cicutarium	Red-stemmed filaree			3190	3260	70		
16	Erodium cicutarium	Red-stemmed filaree			3460	3520	60		
16	Erodium cicutarium	Red-stemmed filaree			3530	3545	15		
16	Erodium cicutarium	Red-stemmed filaree			4850	4870	20		
16	Erodium cicutarium	Red-stemmed filaree			4900	4905	5		
16	Erysimum suffrutescens	Dunes wallflower			4115	4125	10	10	0.20
16	Heterotheca grandiflora	Telegraph weed			2150	2180	30	45	0.90
16	Heterotheca grandiflora	Telegraph weed			2635	2645	10		
16	Heterotheca grandiflora	Telegraph weed			2735	2740	5		
16	Lessingia filaginifolia	Wooly aster			0	25	25	167	3.00
16	Lessingia filaginifolia	Wooly aster			200	305	105		
16	Lessingia filaginifolia	Wooly aster			550	587	37		
16	Lotus scoparius	Deerweed			0	75	75	970	19.00
16	Lotus scoparius	Deerweed			285	625	340		
16	Lotus scoparius	Deerweed			710	855	145		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
16	Lotus scoparius	Deerweed			1060	1135	75		
16	Lotus scoparius	Deerweed			1590	1670	80		
16	Lotus scoparius	Deerweed			1780	2035	255		
16	Lupinus chamissonis	Dune bush lupine			3600	3625	25	480	10.00
16	Lupinus chamissonis	Dune bush lupine			3950	4115	165		
16	Lupinus chamissonis	Dune bush lupine			4460	4680	220		
16	Lupinus chamissonis	Dune bush lupine			4780	4850	70		
16	Phacelia ramosissima	Branching phacelia			2995	3160	165	425	9.00
16	Phacelia ramosissima	Branching phacelia			3585	3845	260		
16	Stephanomeria virgata	Twiggy wreathplant			1740	1745	5	30	0.60
16	Stephanomeria virgata	Twiggy wreathplant			3400	3425	25		
16	Twigs				625	640	15	400	8.00
16	Twigs				3265	3330	65		
16	Twigs				3425	3460	35		
16	Twigs				3845	3860	15		
16	Twigs				3920	3930	10		
16	Twigs				4125	4250	125		
16	Twigs				4380	4440	60		
16	Twigs				4680	4710	30		
16	Twigs				4920	4965	45		
							5602	**5327**	**106.50**
17	Abronia umbellata umbellata	Sand verbena			590	600	10	65	1.30
17	Abronia umbellata umbellata	Sand verbena			1500	1555	55		
17	Ambrosia chamissonis	Beach bur			4780	4800	20	20	0.40
17	Avena barbata	Slender wild oats			1390	1430	40	40	0.80
17	Bare				260	280	20	610	12.00
17	Bare				300	330	30		
17	Bare				510	550	40		
17	Bare				560	590	30		
17	Bare				600	620	20		
17	Bare				1160	1190	30		
17	Bare				2300	2390	90		
17	Bare				2420	2450	30		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
17	Bare				2510	2570	60		
17	Bare				2760	2775	15		
17	Bare				2810	2880	70		
17	Bare				2890	2920	30		
17	Bare				2970	3005	35		
17	Bare				3120	3230	110		
17	Brassica tournfortii	Wild mustard			1190	1235	45	195	4.00
17	Brassica tournfortii	Wild mustard			4610	4760	150		
17	Bromus diandrus	Ripgut brome			330	365	35	75	2.00
17	Bromus diandrus	Ripgut brome			1790	1800	10		
17	Bromus diandrus	Ripgut brome			1850	1880	30		
17	Cammisonia chieranthifolia	Beach evening primrose			280	300	20	300	6.00
17	Cammisonia chieranthifolia	Beach evening primrose			640	685	45		
17	Cammisonia chieranthifolia	Beach evening primrose			3030	3090	60		
17	Cammisonia chieranthifolia	Beach evening primrose			3370	3430	60		
17	Cammisonia chieranthifolia	Beach evening primrose			3830	3860	30		
17	Cammisonia chieranthifolia	Beach evening primrose			3875	3930	55		
17	Cammisonia chieranthifolia	Beach evening primrose			4060	4090	30		
17	Chaenactis glabriuscula	Pincushion			2960	2970	10	10	0.20
17	Cuscuta sp.	Dodder			4010	4030	20	20	0.40
17	Duff				365	370	5	75	2.00
17	Duff				840	870	30		
17	Duff				2390	2420	30		
17	Duff				2880	2890	10		
17	Eriogonum parvifolium twigs	Coast buckwheat			1230	1350	120	190	4.00
17	Eriogonum parvifolium twigs	Coast buckwheat			3300	3370	70		
17	Erysimum suffrutescens	Dunes wallflower			470	475	5	10	0.20
17	Erysimum suffrutescens	Dune wallflower			3035	3040	5		
17	Gnaphalium bicolor	Bicolored cudweed			195	260	65	155	3.00
17	Gnaphalium bicolor	Bicolored cudweed			1910	1960	50		
17	Gnaphalium bicolor	Bicolored cudweed			3700	3730	30		
17	Gnaphalium bicolor	Bicolored cudweed			3850	3860	10		
17	Lessingia filaginifolia	Wooly aster			40	230	190	200	4.00
17	Lessingia filaginifolia	Wooly aster			540	550	10		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
17	Lotus scoparius	Deerweed			370	490	120	1850	37.00
17	Lotus scoparius	Deerweed			620	660	40		
17	Lotus scoparius	Deerweed			700	840	140		
17	Lotus scoparius	Deerweed			1080	1160	80		
17	Lotus scoparius	Deerweed			1400	1500	100		
17	Lotus scoparius	Deerweed			1655	1700	45		
17	Lotus scoparius	Deerweed			1745	1920	175		
17	Lotus scoparius	Deerweed			1960	2300	340		
17	Lotus scoparius	Deerweed			2630	2760	130		
17	Lotus scoparius	Deerweed			2785	2810	25		
17	Lotus scoparius	Deerweed			3540	3660	120		
17	Lotus scoparius	Deerweed			3955	4010	55		
17	Lotus scoparius	Deerweed			4030	4310	280		
17	Lotus scoparius	Deerweed			4470	4630	160		
17	Lotus scoparius	Deerweed			4730	4770	40		
17	Lupinus chamissonis	Dune bush lupine			2920	2970	50	140	3.00
17	Lupinus chamissonis	Dune bush lupine			3930	3955	25		
17	Lupinus chamissonis	Dune bush lupine			3995	4060	65		
17	Phacelia ramosissima	Branching phacelia			995	1005	10	10	0.20
17	Twigs				0	70	70	1205	24.00
17	Twigs				490	510	20		
17	Twigs				550	560	10		
17	Twigs				685	700	15		
17	Twigs				870	1110	240		
17	Twigs				1350	1390	40		
17	Twigs				1555	1655	100		
17	Twigs				1700	1745	45		
17	Twigs				1890	1900	10		
17	Twigs				2450	2510	60		
17	Twigs				2570	2630	60		
17	Twigs				2775	2785	10		
17	Twigs				3005	3030	25		
17	Twigs				3090	3120	30		
17	Twigs				3230	3370	140		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
17	Twigs				3430	3540	110		
17	Twigs				3630	3700	70		
17	Twigs				3765	3830	65		
17	Twigs				3860	3875	15		
17	Twigs				4310	4170	-140		
17	Twigs				4770	4780	10		
17	Twigs				4800	5000	200		
							5170	**5170**	104.50
18	Abronia umbellata umbellata	Sand verbena			1465	1575	110	110	2.00
18	Ambrosia chamissonis	Beach bur			4505	4580	75	75	1.50
18	Avena barbata	Slender wild oats			460	485	25	25	0.50
18	Bare				75	85	10	850	17.00
18	Bare				90	170	80		
18	Bare				320	330	10		
18	Bare				485	500	15		
18	Bare				530	630	100		
18	Bare				1395	1415	20		
18	Bare				1725	1810	85		
18	Bare				1870	1890	20		
18	Bare				1960	1970	10		
18	Bare				2140	2150	10		
18	Bare				2155	2175	20		
18	Bare				2350	2370	20		
18	Bare				2420	2455	35		
18	Bare				2545	2565	20		
18	Bare				2580	2640	60		
18	Bare				2705	2730	25		
18	Bare				3135	3200	65		
18	Bare				3540	3600	60		
18	Bare				4075	4130	55		
18	Bare				4225	4250	25		
18	Bare				4285	4330	45		
18	Bare				4900	4960	60		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
18	Brassica tournfortii	Wild mustard			1810	1830	20	70	1.40
18	Brassica tournfortii	Wild mustard			4730	4780	50		
18	Bromus diandrus	Ripgut brome			1820	1845	25	50	1.00
18	Bromus diandrus	Ripgut brome			1915	1925	10		
18	Bromus diandrus	Ripgut brome			2910	2915	5		
18	Bromus diandrus	Ripgut brome			2955	2965	10		
18	Cammisonia chieranthifolia	Beach evening primrose			0	75	75	780	16.00
18	Cammisonia chieranthifolia	Beach evening primrose			1040	1085	45		
18	Cammisonia chieranthifolia	Beach evening primrose			1100	1140	40		
18	Cammisonia chieranthifolia	Beach evening primrose			1455	1465	10		
18	Cammisonia chieranthifolia	Beach evening primrose			1865	1870	5		
18	Cammisonia chieranthifolia	Beach evening primrose			1890	1960	70		
18	Cammisonia chieranthifolia	Beach evening primrose			2990	3135	145		
18	Cammisonia chieranthifolia	Beach evening primrose			3200	3240	40		
18	Cammisonia chieranthifolia	Beach evening primrose			3280	3480	200		
18	Cammisonia chieranthifolia	Beach evening primrose			4140	4190	50		
18	Cammisonia chieranthifolia	Beach evening primrose			4375	4430	55		
18	Cammisonia chieranthifolia	Beach evening primrose			4795	4840	45		
18	Cryptantha clevelandii	Popcorn flower			2750	2770	20	71	1.40
18	Cryptantha clevelandii	Popcorn flower			2795	2810	15		
18	Cryptantha clevelandii	Popcorn flower			2840	2845	5		
18	Cryptantha clevelandii	Popcorn flower			2865	2885	20		
18	Cryptantha clevelandii	Popcorn flower			4274	4285	11		
18	Dudleya lanceolata	Lance-leaved dudleya			1355	1360	5	15	0.30
18	Dudleya lanceolata	Lance-leaved dudleya			1890	1895	5		
18	Dudleya lanceolata	Lance-leaved dudleya			1975	1980	5		
18	Duff				1140	1165	25	205	4.00
18	Duff				1280	1290	10		
18	Duff				1330	1335	5		
18	Duff				1415	1445	30		
18	Duff				1845	1855	10		
18	Duff				1860	1865	5		
18	Duff				2120	2140	20		
18	Duff				2225	2290	65		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
18	Duff				2575	2580	5		
18	Duff				2690	2705	15		
18	Duff				3695	3710	15		
18	Erodium cicutarium	Red-stemmed filaree			330	340	10	85	1.70
18	Erodium cicutarium	Red-stemmed filaree			1085	1100	15		
18	Erodium cicutarium	Red-stemmed filaree			1225	1235	10		
18	Erodium cicutarium	Red-stemmed filaree			1235	1280	45		
18	Erodium cicutarium	Red-stemmed filaree			2150	2155	5		
18	Erysimum suffrutescens	Dune wallflower			2290	2350	60	250	5.00
18	Erysimum suffrutescens	Dune wallflower			2370	2420	50		
18	Erysimum suffrutescens	Dune wallflower			2655	2690	35		
18	Erysimum suffrutescens	Dune wallflower			3600	3610	10		
18	Erysimum suffrutescens	Dune wallflower			3630	3695	65		
18	Erysimum suffrutescens	Dune wallflower			3710	3740	30		
18	Gnaphalium bicolor	Bicolored cudweed			170	215	45	60	1.20
18	Gnaphalium bicolor	Bicolored cudweed			2220	2225	5		
18	Gnaphalium bicolor	Bicolored cudweed			3940	3950	10		
18	Lotus scoparius	Deerweed			340	450	110	455	9.00
18	Lotus scoparius	Deerweed			1165	1230	65		
18	Lotus scoparius	Deerweed			1335	1395	60		
18	Lotus scoparius	Deerweed			3740	3800	60		
18	Lotus scoparius	Deerweed			4570	4730	160		
18	Lupinus chamissonis	Dune bush lupine			1000	1065	65	310	6.00
18	Lupinus chamissonis	Dune bush lupine			1290	1330	40		
18	Lupinus chamissonis	Dune bush lupine			2040	2120	80		
18	Lupinus chamissonis	Dune bush lupine			2455	2475	20		
18	Lupinus chamissonis	Dune bush lupine			3610	3695	85		
18	Lupinus chamissonis	Dune bush lupine			4820	4840	20		
18	Salsola tragus	Russian thistle			703	745	42	42	0.80
18	Stephanomeria virgata	Twiggy wreathplant			2565	2575	10	120	2.00
18	Stephanomeria virgata	Twiggy wreathplant			2755	2770	15		
18	Stephanomeria virgata	Twiggy wreathplant			2790	2885	95		
18	Twigs				85	90	5	2065	41.00
18	Twigs				210	320	110		

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
18	Twigs				450	460	10		
18	Twigs				500	530	30		
18	Twigs				630	1000	370		
18	Twigs				1445	1460	15		
18	Twigs				1435	1725	290		
18	Twigs				1925	1950	25		
18	Twigs				1970	2040	70		
18	Twigs				2175	2220	45		
18	Twigs				2475	2545	70		
18	Twigs				2640	2655	15		
18	Twigs				2730	2755	25		
18	Twigs				2770	2790	20		
18	Twigs				2840	3000	160		
18	Twigs				3220	3290	70		
18	Twigs				3440	3540	100		
18	Twigs				3800	4075	275		
18	Twigs				4130	4225	95		
18	Twigs				4250	4275	25		
18	Twigs				4330	4375	45		
18	Twigs				4425	4505	80		
18	Twigs				4780	4795	15		
18	Twigs				4840	4900	60		
18	Twigs				4960	5000	40		
							5638	**5638**	**111.80**
19	Avena barbata	Slender wild oats			165	170	5	1895	33.00
19	Avena barbata	Slender wild oats			265	300	35		
19	Avena barbata	Slender wild oats			310	404	94		
19	Avena barbata	Slender wild oats			505	530	25		
19	Avena barbata	Slender wild oats			570	590	20		
19	Avena barbata	Slender wild oats			640	645	5		
19	Avena barbata	Slender wild oats			735	745	10		
19	Avena barbata	Slender wild oats			930	940	10		
19	Avena barbata	Slender wild oats			982	990	8		

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Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
19	Avena barbata	Slender wild oats			1025	1030	5		
19	Avena barbata	Slender wild oats			1220	1230	10		
19	Avena barbata	Slender wild oats			1230	1240	10		
19	Avena barbata	Slender wild oats			1250	1260	10		
19	Avena barbata	Slender wild oats			1305	1375	70		
19	Avena barbata	Slender wild oats			1445	1470	25		
19	Avena barbata	Slender wild oats			1520	1695	175		
19	Avena barbata	Slender wild oats			2010	2200	190		
19	Avena barbata	Slender wild oats			2330	2410	80		
19	Avena barbata	Slender wild oats			2460	2585	125		
19	Avena barbata	Slender wild oats			2635	2655	20		
19	Avena barbata	Slender wild oats			2690	2730	40		
19	Avena barbata	Slender wild oats			2760	2790	30		
19	Avena barbata	Slender wild oats			2320	2865	45		
19	Avena barbata	Slender wild oats			2915	2920	5		
19	Avena barbata	Slender wild oats			2990	3000	10		
19	Avena barbata	Slender wild oats			3010	3035	25		
19	Avena barbata	Slender wild oats			3070	3110	40		
19	Avena barbata	Slender wild oats			3237	3310	73		
19	Avena barbata	Slender wild oats			3325	3380	55		
19	Avena barbata	Slender wild oats			3405	3470	65		
19	Avena barbata	Slender wild oats			3550	3690	140		
19	Avena barbata	Slender wild oats			3750	3760	10		
19	Avena barbata	Slender wild oats			3770	3780	10		
19	Avena barbata	Slender wild oats			3790	3990	200		
19	Avena barbata	Slender wild oats			3930	4000	70		
19	Avena barbata	Slender wild oats			4090	4175	85		
19	Avena barbata	Slender wild oats			4190	4200	10		
19	Avena barbata	Slender wild oats			4220	4250	30		
19	Avena barbata	Slender wild oats			4920	4925	5		
19	Avena barbata	Slender wild oats			4950	4965	15		
19	Bare				0	19	19	206	4.00
19	Bare				26	50	24		
19	Bare				53	65	12		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
19	Bare				97	100	3		
19	Bare				103	120	17		
19	Bare				124	130	6		
19	Bare				130	135	5		
19	Bare				135	145	10		
19	Bare				530	545	15		
19	Bare				1470	1480	10		
19	Bare				1730	1745	15		
19	Bare				3000	3010	10		
19	Bare				3310	3325	15		
19	Bare				3470	3485	15		
19	Bare				4710	4740	30		
19	Bromus diandrus	Ripgut brome			430	470	40	598	12.00
19	Bromus diandrus	Ripgut brome			1505	1520	15		
19	Bromus diandrus	Ripgut brome			1745	1820	75		
19	Bromus diandrus	Ripgut brome			2260	2280	20		
19	Bromus diandrus	Ripgut brome			3190	3200	10		
19	Bromus diandrus	Ripgut brome			3485	3520	35		
19	Bromus diandrus	Ripgut brome			4290	4360	70		
19	Bromus diandrus	Ripgut brome			4380	4435	55		
19	Bromus diandrus	Ripgut brome			4485	4505	20		
19	Bromus diandrus	Ripgut brome			4512	4685	173		
19	Bromus diandrus	Ripgut brome			4740	4775	35		
19	Bromus diandrus	Ripgut brome			4785	4835	50		
19	Cammisonia chieranthifolia	Beach evening primrose			2900	2915	15	15	0.30
19	Cryptantha clevelandii	Popcorn flower			960	980	20	20	0.40
19	Duff				228	265	37	162	3.00
19	Duff				405	415	10		
19	Duff				470	480	10		
19	Duff				1260	1305	45		
19	Duff				2920	2925	5		
19	Duff				3035	3045	10		
19	Duff				4250	4260	10		
19	Duff				4265	4280	15		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
19	Duff				4460	4480	20		
19	Equisetum sp.	Horsetail			4060	4080	20	20	0.40
19	Erodium cicutarium	Red-stemmed filaree			19	25	6	1593	32.00
19	Erodium cicutarium	Red-stemmed filaree			51	52	1		
19	Erodium cicutarium	Red-stemmed filaree			65	97	32		
19	Erodium cicutarium	Red-stemmed filaree			100	103	3		
19	Erodium cicutarium	Red-stemmed filaree			119	124	5		
19	Erodium cicutarium	Red-stemmed filaree			145	228	83		
19	Erodium cicutarium	Red-stemmed filaree			170	195	25		
19	Erodium cicutarium	Red-stemmed filaree			220	228	8		
19	Erodium cicutarium	Red-stemmed filaree			480	505	25		
19	Erodium cicutarium	Red-stemmed filaree			545	550	5		
19	Erodium cicutarium	Red-stemmed filaree			560	580	20		
19	Erodium cicutarium	Red-stemmed filaree			590	640	50		
19	Erodium cicutarium	Red-stemmed filaree			645	665	20		
19	Erodium cicutarium	Red-stemmed filaree			745	780	35		
19	Erodium cicutarium	Red-stemmed filaree			805	830	25		
19	Erodium cicutarium	Red-stemmed filaree			850	1000	150		
19	Erodium cicutarium	Red-stemmed filaree			1050	1075	25		
19	Erodium cicutarium	Red-stemmed filaree			1180	1250	70		
19	Erodium cicutarium	Red-stemmed filaree			1420	1445	25		
19	Erodium cicutarium	Red-stemmed filaree			1480	1490	10		
19	Erodium cicutarium	Red-stemmed filaree			1915	2010	95		
19	Erodium cicutarium	Red-stemmed filaree			2205	2305	100		
19	Erodium cicutarium	Red-stemmed filaree			2440	2460	20		
19	Erodium cicutarium	Red-stemmed filaree			2580	2635	55		
19	Erodium cicutarium	Red-stemmed filaree			2670	2690	20		
19	Erodium cicutarium	Red-stemmed filaree			2835	2880	45		
19	Erodium cicutarium	Red-stemmed filaree.			2890	2900	10		
19	Erodium cicutarium	Red-stemmed filaree			2930	2995	65		
19	Erodium cicutarium	Red-stemmed filaree			3340	3420	80		
19	Erodium cicutarium	Red-stemmed filaree			3520	3530	10		
19	Erodium cicutarium	Red-stemmed filaree			3540	3580	40		
19	Erodium cicutarium	Red-stemmed filaree			3745	3795	50		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (if >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
19	Erodium cicutarium	Red-stemmed filaree			4080	4100	20		
19	Erodium cicutarium	Red-stemmed filaree			4145	4160	15		
19	Erodium cicutarium	Red-stemmed filaree			4170	4225	55		
19	Erodium cicutarium	Red-stemmed filaree			4260	4265	5		
19	Erodium cicutarium	Red-stemmed filaree			4280	4295	15		
19	Erodium cicutarium	Red-stemmed filaree			4360	4405	45		
19	Erodium cicutarium	Red-stemmed filaree			4430	4460	30		
19	Erodium cicutarium	Red-stemmed filaree			4480	4550	70		
19	Erodium cicutarium	Red-stemmed filaree			4755	4785	30		
19	Erodium cicutarium	Red-stemmed filaree			4810	4815	5		
19	Erodium cicutarium	Red-stemmed filaree			4835	4890	55		
19	Erodium cicutarium	Red-stemmed filaree			4900	4920	20		
19	Erodium cicutarium	Red-stemmed filaree			4935	4950	15		
19	Heterotheca grandiflora	Telegraph weed			550	560	10	94	1.90
19	Heterotheca grandiflora	Telegraph weed			1000	1025	25		
19	Heterotheca grandiflora	Telegraph weed			2925	2930	5		
19	Heterotheca grandiflora	Telegraph weed			3690	3710	20		
19	Heterotheca grandiflora	Telegraph weed			3725	3730	5		
19	Heterotheca grandiflora	Telegraph weed			4335	4345	10		
19	Heterotheca grandiflora	Telegraph weed			4430	4437	7		
19	Heterotheca grandiflora	Telegraph weed			4505	4512	7		
19	Heterotheca grandiflora	Telegraph weed			4755	4760	5		
19	Lotus scoparius	Deerweed			198	220	24	2164	43.00
19	Lotus scoparius	Deerweed			265	405	140		
19	Lotus scoparius	Deerweed			665	735	70		
19	Lotus scoparius	Deerweed			780	805	25		
19	Lotus scoparius	Deerweed			830	850	20		
19	Lotus scoparius	Deerweed			910	925	15		
19	Lotus scoparius	Deerweed			1000	1050	50		
19	Lotus scoparius	Deerweed			1075	1180	105		
19	Lotus scoparius	Deerweed			1360	1405	45		
19	Lotus scoparius	Deerweed			1475	1560	85		
19	Lotus scoparius	Deerweed			1600	1730	130		
19	Lotus scoparius	Deerweed			1745	1780	35		

VEGETATION DATA FOR THE EL SEGUNDO DUNES: 1999

Transect	Plant (Scientific Name)	Plant (Common Name)	Number (If >1)	Dead	Begin (cm)	End (cm)	Total (cm)	Total Cover by Species (cm)	Total Cover (%)
19	Lotus scoparius	Deerweed			1815	1915	100		
19	Lotus scoparius	Deerweed			2010	2120	110		
19	Lotus scoparius	Deerweed			2165	2255	90		
19	Lotus scoparius	Deerweed			2280	2340	60		
19	Lotus scoparius	Deerweed			2530	2610	80		
19	Lotus scoparius	Deerweed			2650	2690	40		
19	Lotus scoparius	Deerweed			2710	2840	130		
19	Lotus scoparius	Deerweed			2880	2890	10		
19	Lotus scoparius	Deerweed			3045	3247	202		
19	Lotus scoparius	Deerweed			3290	3300	10		
19	Lotus scoparius	Deerweed			3389	3400	11		
19	Lotus scoparius	Deerweed			3520	3527	7		
19	Lotus scoparius	Deerweed			3530	3550	20		
19	Lotus scoparius	Deerweed			3575	3605	30		
19	Lotus scoparius	Deerweed			3625	3755	130		
19	Lotus scoparius	Deerweed			3815	3930	115		
19	Lotus scoparius	Deerweed			3945	4085	140		
19	Lotus scoparius	Deerweed			4295	4310	15		
19	Lotus scoparius	Deerweed			4620	4710	90		
19	Lotus scoparius	Deerweed			4870	4900	30		
19	Twigs				415	430	15	30	0.60
19	Twigs				1405	1420	15		
							6797	6797	135.60

REPORT OF EL SEGUNDO BLUE MONITORING ACTIVITIES AT THE LOS ANGELES INTERNATIONAL AIRPORT IN JULY, AUGUST, AND SEPTEMBER 1999

Conducted under USFWS Permit PRT-830990

Prepared for:
U.S. Fish & Wildlife Service, Carlsbad Field Office
2730 Loker Ave. West, Carlsbad, CA 92008

and

Irena Mendez, Ph.D.
Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, CA 91105

Prepared by:
Richard A. Arnold, Ph.D.
Entomological Consulting Services, Ltd.
104 Mountain View Court
Pleasant Hill, CA 94523
(925) 825-3784

October 1999

INTRODUCTION

This report summarizes the findings of monitoring activities for the endangered El Segundo Blue (ESB) butterfly (*Euphilotes battoides allyni*) that occurred in July, August, and September 1999, at the Los Angeles International Airport (LAX). All activities described in this report were conducted under the auspices of permit number PRT-830990, issued by the U.S. Fish & Wildlife Service to Sapphos Environmental, Inc. (Pasadena, CA), the consulting firm that is assisting LAX with environmental issues. Entomological Consulting Services, Ltd. assisted Sapphos and LAX with issues regarding the El Segundo Blue butterfly.

During the ESB's adult flight season in 1999, the following activities were performed at LAX:

a) counts of El Segundo Blue adults along the historical transect route; and
b) block counts of El Segundo Blue adults throughout the dune preserve area.

Using the findings of the transect and block counts along with information from earlier capture-recapture studies, a seasonal population estimate for the ESB throughout the entire 200-acre LAX preserve was calculated.

The remainder of this report describes the LAX study site, and the 1999 ESB monitoring activities and findings. The 1999 monitoring results are compared to findings of previous years to discern trends in the ESB population at LAX and to identify future management needs.

Before proceeding, I should note that a change in the scientific name of the El Segundo Blue occurred since last year's report. Pratt and Emmel (1998) split *Euphilotes bernardino* into two species, *E. bernardino* and *E. battoides*. Further, they realigned the subspecies *allyni* with *E. battoides*. As a result of these changes the El Segundo Blue is now known scientifically as *Euphilotes battoides allyni*.

STUDY SITE

Figure 1 illustrates the location of the LAX dunes using a portion of the Venice 7.5" USGS topographic map. In particular, Figure 1 illustrates that portion of the LAX dunes which comprises the preserve area. The preserve measures approximately 200 acres. An additional, approximately 100 acres of undeveloped, degraded dunes lies immediately north of the preserve. The entire dune area measures 302 acres.

Predominant dune landforms that remain today at LAX include foredunes, backdunes, and deflation plain. Strand and bluff landforms were formerly located where Dockweiler Beach is now located. There are approximately 204 acres of foredunes, 27 acres of backdune, and 24 acres of deflation plan. The area also includes 23 acres of non-dune soil type and 24 acres of roads and buildings.

Because of the former residential neighborhood, movement of sand to uplift the current VOR site, former sand mining activities, and the construction of roads around the periphery of

Figure 1. Study Area for El Segundo Blue Butterfly at the Los Angeles International Airport
USGS 7.5" Venice Quadrangle, from Sure! Maps Raster

the dunes, most of the dunes have been disturbed to some degree. The disturbance is reflected in mixture of native plant communities and various weeds and exotics that now grow at the dunes. More recently, habitat restoration activities have resulted in the removal of various non-native plant species in portions of the dunes and plantings of native species to improve habitat quality.

Native plant communities at the LAX dunes include southern foredune, southern dune scrub, and valley needlegrass grassland. The southern foredune community is found on the foredunes, the southern dune scrub on the backdunes, and the valley needlegrass grassland on the deflation plain. Coast buckwheat, *Eriogonum parvifolium* (Polygonaceae), the sole larval and primary adult foodplant of the El Segundo Blue butterfly, grows primarily in the foredune and backdune portions of the preserve, although a few individuals can be found in portions of the valley needlegrass grassland.

The southern foredune plant community is dominated by perennials with a high proportion of shrubs and sub-shrubs. Characteristic species of the southern foredune plant community include: Coast Buckwheat (*Eriogonum parvifolium*), Bush Lupine (*Lupinus chamissonis*), Coast Goldenbush (*Ericameria ericoides*), Beach Evening Primrose (*Camissonia chieranthifolia*), Dune Wallflower (*Erysimum suffrutescens*), Beach Sand Verbena (*Abronia umbellata*), and Beach Bur (*Ambrosia chamissonis*). The southern dune scrub plant community consists of a coastal scrub community of shrubs and sub-shrubs characterized by most of the aforementioned taxa. One of the main differences between these communities is the degree of plant cover, as the southern foredune is generally characterized by sparser vegetative cover than the dense vegetative growth characteristic of southern dune scrub plant communities. The valley needlegrass grassland community is now almost completely absent at the LAX dunes due to grading for the construction of Pershing Blvd., and subsequent invasion of exotics and annual grasses that now dominate in portions of the dunes where the valley needlegrass grassland occurred. Under more natural conditions, this prairie would be dominated by bunchgrasses, primarily, Purple Needle Grass (*Nassella cernua*), a mixture of herbaceous flowers and shrubs, including California Encelia (*Encelia californica*), Lewis' Evening Primrose (*Camissonia lewisii*), Deerweed (*Lotus scoparius*), and Bush Lupine.

Figure 2 is a map of the LAX dunes and preserve that identifies the various subareas that were used for the block counts. Many of the subareas are polygons of variable size as delineated by the existing network of streets, leftover from the former residential neighborhood that was razed in the early 1970's. These subareas are also referred to as "blocks" elsewhere in this report and were used as the sampling areas for the block counts. In addition, Figure 2 illustrates the location of the historical transect route.

METHODS

Historical Transect.

Dr. Rudi Mattoni previously established a transect route for monitoring the El Segundo Blue butterfly at the airport and Sapphos Environmental, Inc. has continued to use the same transect route. This transect route is referred to as the historical transect. It was walked on 11

days between July 8th and September 9th, during the butterfly's flight season in 1999. Additional survey dates were July 10th, 15th, 22nd, and 27th, August 3rd, 11th, 17th, 24th, and 31st, plus September 9th.

The transect route is illustrated in Figure 2. It meanders approximately 1.5 miles through a portion of the foredunes that lie immediately west of the VOR facility, and along the top and toe of the backdunes within the preserve area. It traverses sectors of the dunes where the ESB's foodplant, *Eriogonum parvifolium*, was abundant and thriving in prior years, areas where the foodplant is currently abundant and thriving, some hillside areas where natural regeneration has occurred, areas where non-natives have been removed, and portions of the dune preserve where restoration activities have occurred.

The beginning, ending, and numerous intermediate points along the historical transect route are marked by stakes in the field with unique identifying numbers or letters. The locations of all stakes were mapped on aerial photographs of this sector of the LAX dunes. A portion of the transect between two consecutive stakes is referred to as an interval. There are 35 intervals in the entire transect, which vary in length from about 50 to 700 feet (Table 1). The intervals vary in length because the beginning and ending points of each interval are located where there are changes in the vegetation, changes in topographic relief, and man-made features, all of which are used to identify the transect route in the field (Figure 3). Table 1 provides the length of every interval of the historical transect route and the total transect length. Interval lengths were measured to the nearest 5 feet using an aerial photograph (1 in. = 200 ft. scale, non-rectified) of the LAX dunes.

As an observer walks the transect from beginning to end (i.e., interval #1 to #35), the numbers of adult ESBs that are observed along the route within approximately 10-15 feet on either side of the centerline of the transect are counted. Tallies are recorded as males or females when diagnostic characteristics are clearly observed, and as undetermined sex when sexual characteristics cannot be observed. No ESBs are captured or otherwise handled. The locations of observed adults are noted by the transect interval between consecutive stake locations. Hand held weather instruments were used to measure air temperature and wind speed. Cloud cover was also noted during the counts. All transect counts occurred when weather conditions were suitable for ESB activity, as evidenced by ESB adults and other butterflies being active at the times of the transect counts. Dr. Irena Mendez of Sapphos Environmental, Inc. conducted all transect walks during 1999.

Block Counts.

When the historical transect was initiated in the mid-1980's, the distribution of *Eriogonum parvifolium*, the ESB's foodplant, at LAX was restricted primarily to those portions of the dunes included in the transect route. However, in the early 1990's, *E. parvifolium* was planted in many portions of the southern approximately 200 acres of the LAX dunes (i.e., the preserve), in particular in the foredunes where the former residential neighborhood was located (i.e., blocks #35 -#52). These areas were planted because the buckwheat had not naturally colonized the blocks in the approximately 20 years since the former residential neighborhood was razed. Since the historical transect route did not include most portions of the preserve where

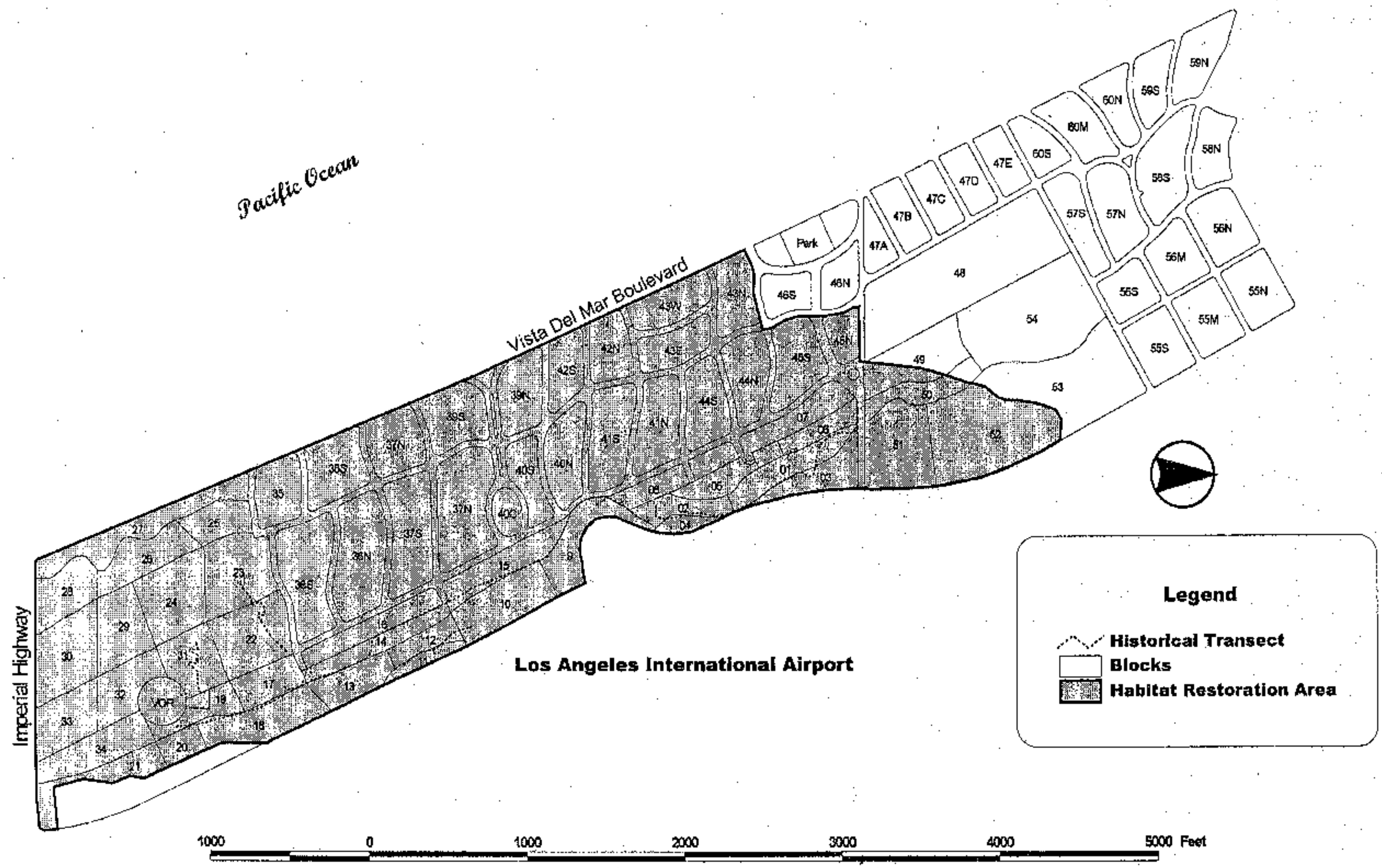


Figure 2 Blocks and Historical Transect Route at LAX Dunes

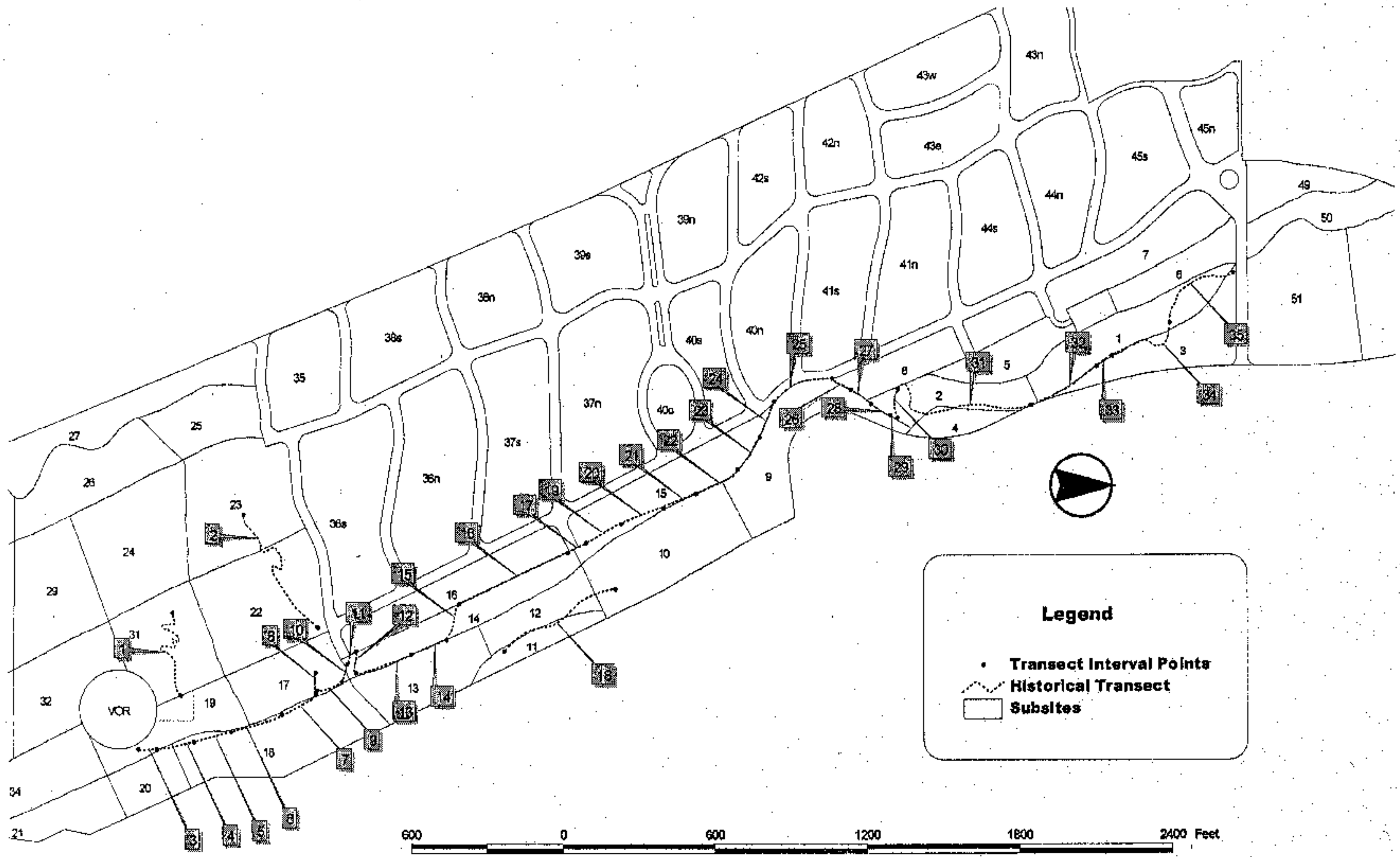
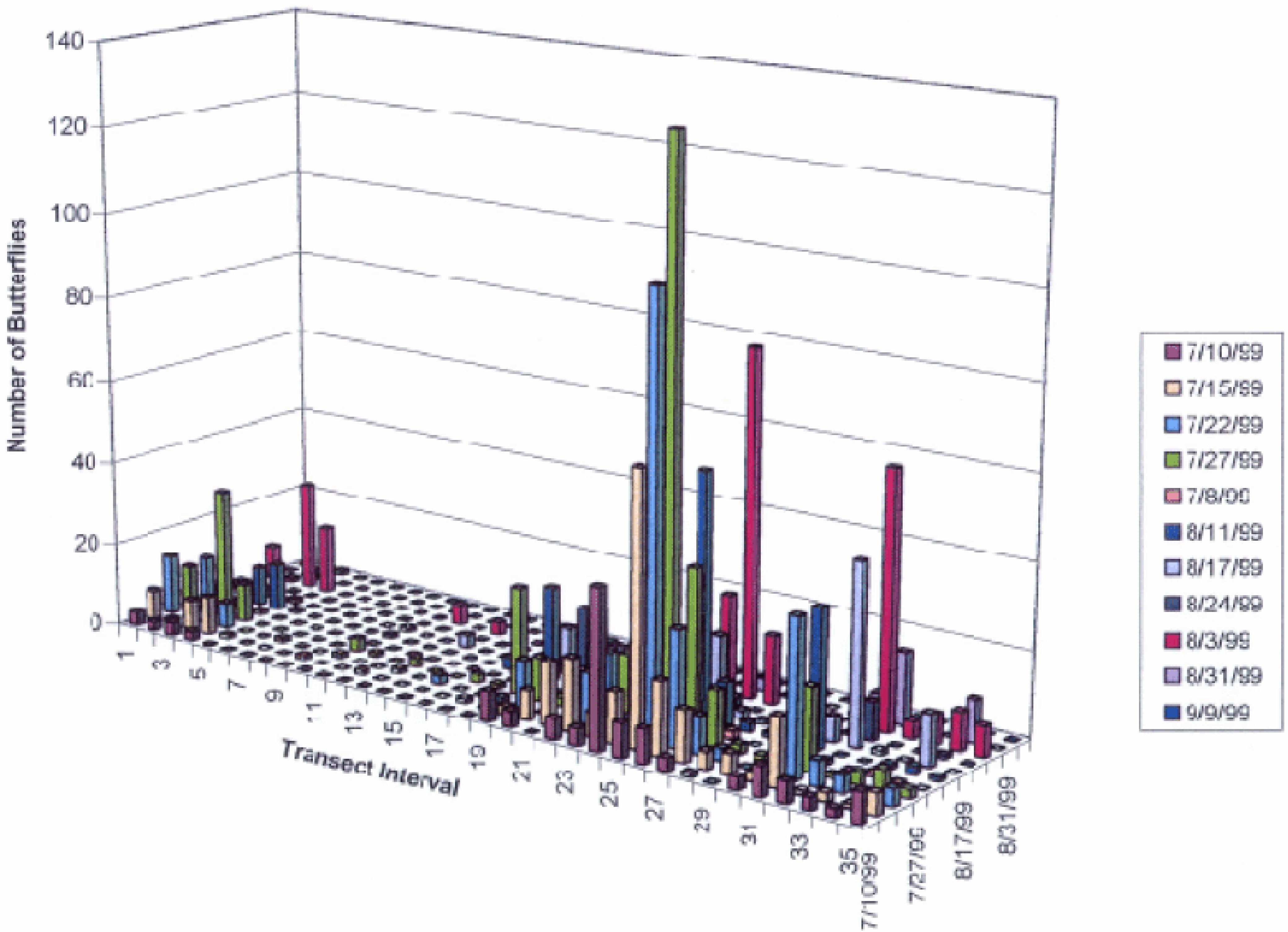


Figure 3 Historical Transect and Transect Segments

Figure 4. ESB transect counts for 1999 at LAX by interval and date



habitat restoration activities were undertaken, an alternative survey method was necessary to monitor the ESB in these areas, as well as other parts of the dunes that supported the ESB's foodplant. Thus, to assess the distribution and abundance of the ESB throughout the entire 200-acre preserve area, blocks counts were initiated during the butterfly's 1996 flight season and were repeated in 1997, 1998, and 1999. ESB counts were conducted in 61 blocks during the butterfly's 1999 flight season.

During the block counts, all blocks are visited once during the flight season within a period of a few days. The visit is timed to coincide with the approximate peak of the ESB's flight season. Using the information gathered from the counts along the historical transect route, the timing of the approximate peak of the ESB flight season can be estimated while the flight season is in progress by examining the trend in the numbers of butterflies observed on the transect counts and the sex ratio of males to females. During 1999, the block counts were conducted between July 28th and 31st a 4-day period that coincided with the approximate peak of the ESB's 1999 flight season.

The boundaries of each block are delineated by the streets that remain from the former residential neighborhood. In other portions of the preserve where there are no streets, existing topographic and vegetation features are utilized to determine the boundaries of each "block". Every block at the LAX dunes is uniquely identified, as illustrated in Figure 2. During the 1996 monitoring activities, the location of every buckwheat plant within each block was mapped on acetate overlays of the aerial photograph for every block (scale 1 in. = 40 ft.). In the 1997, 1998, and 1999 block counts, these photos and overlays of the buckwheats were used to guide surveyors where to look for ESB adults. If new buckwheats were found, they were also mapped. Similarly, if dead buckwheats were observed, their locations were noted.

During the block count, an observer systematically surveys all portions of a particular block and visits every buckwheat plant only once, while looking for ESB adults. As adults are observed, their numbers are tallied and their locations are mapped on an acetate overlay of the aerial photograph of the dunes (scale 1 in. = 40 ft.). Tallies were recorded as males or females when diagnostic characteristics could be observed. Tallies were recorded as undetermined sex (undet. sex on the attached tables) when sexual characteristics could not be readily observed, or in a few cases, when butterflies were so abundant at a single plant that individuals could not be tracked to reliably sex all individuals. No ESBs are captured or otherwise handled. By repeating this procedure, all blocks within the preserve can be visited in approximately four or five days (weather permitting).

Under ideal circumstances, all 61 blocks in the preserve would be simultaneously inventoried and the counts of observed ESB adults would represent a census (i.e., a complete count of all individuals) of the butterfly population at that time. This approach would minimize the chance of counting the same individual more than once during the census, which could result in inflated census counts. Using this approach, the ESB population could be considered demographically and geographically closed, because the sampling period is short enough that no births, deaths, immigration, or emigation occurs.

Unfortunately, such a study design would require that 61 qualified surveyors were available at the peak of the butterfly's flight season to conduct the census counts. Since 61 surveyors were not available to conduct the census counts in this manner, the counts were performed over a four-day period. Because the butterflies were not marked, it is possible that some individuals were counted more than once during the census effort as the butterflies dispersed from one location to another within the dunes. Similarly, because the count occurred over a 4-day period, some unknown quantity of births and deaths occurred during this period, thus the ESB population is considered open during the block counts. Also, it is possible that some unknown number of butterflies dispersed from the LAX dunes during the census period and were not detected. Despite these limitations, the block counts still provide useful information on the distribution and relative abundance of the ESB at the LAX dunes.

As during the transect surveys, hand held weather instruments were used to measure air temperature and wind speed during the block counts. All counts were conducted during portions of each survey day when weather conditions were suitable for ESB adults to be active. Surveyors for the block counts included: Dr. Brad Blood, Marie Campbell, Nancy Carlton, Michelle Dohrn, Anne Dove, Mary Freeman, Scott Graff, Dr. Irena Mendez, Loren Siegal, Matthew Weeks, and Suzy Weeks of Sapphos Environmental, Inc., plus Dr. Richard Arnold of Entomological Consulting Services, Ltd.

Seasonal Population Estimate for the ESB.

After the 1998 monitoring report was submitted, Dr. Andrew Huang of LAX utilized his mathematical skills to calculate a seasonal population estimate for the ESB within the detection area of the historical transect route. This value in conjunction with the findings of the block counts and information from prior capture-recapture studies of the ESB (Arnold 1983 and 1986) were then used to extrapolate a seasonal population estimate for the entire LAX dune preserve. These methods are briefly summarized in the remainder of this section, but are explained in greater detail in Dr. Huang's memo (1998). Although Dr. Huang's methodology has not been published yet, it has been informally reviewed by insect population biologists at Yale University and the University of California, Davis (Arnold, personal communication).

Monitoring observations and the transect counts establish the starting and ending dates of the ESB's flight season, plus the magnitude and shape of the seasonal population curve. When the transect counts are plotted against the flight day, the seasonal population curve of ESB adult numbers closely tracks a normal bell shape or Gaussian curve, which can be described mathematically.

On any particular day of the ESB's flight season, the butterfly population consists of individuals that emerged earlier that same day, as well as individuals that emerged on prior days and survived to the present day. Similarly, the butterflies observed on the day of each transect count are comprised of individuals that just emerged and survivors from previous days. Estimated residence rates for the ESB at the Chevron refinery in El Segundo and at LAX were derived from prior capture-recapture studies of the ESB (Arnold 1983 and 1986). These capture-recapture studies also revealed that the maximum residence for ESB adults in the field is six days, even though the maximum observed adult life span under lab conditions is about 14 days

(Mattoni 1992). The shorter lifespan in the field is due to mortality from predation and inclement weather conditions (i.e., foggy days or cool temperatures that can prevent cold-blooded ESB adults from warming up sufficiently and limit their activity).

Thus, mathematically the transect survey count for the butterflies, P(x), on any particular survey date within the ESB's flight season can be expressed as:

$$P(x) = P_1(x) + P_2(x) + P_3(x) + P_4(x) + P_5(x) + P_6(x) \qquad (1)$$

where x is the flight day of the survey. $P_1(x)$, $P_2(x)$, $P_3(x)$, $P_4(x)$, $P_5(x)$, and $P_6(x)$, are the butterflies that just emerged, and those who survived from two, three four, five and six days ago, respectively. $P_1(x) > P_2(x) > P_3(x) > P_4(x) > P_5(x) > P_6(x)$, as fewer and fewer butterflies are left in each successive day, as demonstrated by the capture-recapture studies (Arnold 1983 and 1986).

The rate of mortality for a population can be expressed mathematically by the following equation from Pianka [Pianka 1988]:

$$dN/dt = -a\,N \qquad (2)$$

This commonly accepted model assumes that the rate of decrease in a population is proportional to the number of individuals within a population. Using equation (2) and the fact that the ESB lives only 4 to 6 days under field conditions, the remaining butterflies for each successive day after the first day of emergence can be described mathematically as:

$$N = N_0 \exp(-a(t-1)) \quad 2 \le t \le 6 \qquad (3)$$

$$= 0 \quad 6 < t$$

where t is in days and N_0 is the number of butterflies emerging on day one.

Assuming that at the end of day four, only 5% of the original butterflies that emerged 4 days earlier still remained, then the value of "a" in the above equation can be shown to be 0.998. Substituting this value and evaluating equation (3) for day 2, 3, 4, 5 and 6, we have mathematically

$$P(x) = 1.00\,P_1(x) + 0.37\,P_1(x) + 0.14\,P_1(x) + 0.05\,P_1(x) + 0.02\,P_1(x) + 0.01\,P_1(x) \qquad \textbf{(4a)}$$

or

$$P(x) = 1.59\,P_1(x) \qquad \textbf{(4b)}$$

Equation 4b suggests that on any day of the transect survey, the actual number of emerging butterflies is the total number counted divided by 1.59, as suggested by Huang's

mathematical derivation, or 1.66 as indicated by field results. Either number can be used since they are close in value. A capture-recapture study at the Chevron preserve for the ESB indicates that this factor may be as low as 1.21 (Arnold 1986).

For the entire flight season, the total ESB population size is the number of newly emerged butterflies on each day added over the total days of the flight season. This summation is equivalent to integrating $P_1(x)$, the population distribution function, over the total number of flight days. Mathematically, it is described by:

$$\text{Total seasonal count} = \int P_1(x)\,dx \qquad (5)$$

Equation (5) can be assessed from the field count data by using equation (4b), in which we have

$$\text{Total seasonal count} = \int P_1(x)\,dx = \int P(x)\,dx / 1.59 \qquad (6)$$

To calculate a seasonal population estimate for the entire dunes, the first step is to determine the number of butterflies for the entire flight season for the transect acreage alone. This is mathematically equivalent to evaluating the right side of equation (6). The integral $\int P(x)\,dx$ is simply the area under the Gaussian curve that illustrates the ESB seasonal population numbers based on the transect counts. Huang (1998) described two methods to solve this integral; using a trapezoidal numerical approximation method and a best-fitted Gaussian curve integration method. Both methods yield similar solutions. In this report, the 1999 ESB transect survey data, in conjunction with the trapezoidal numerical approximation method, were used to estimate the total seasonal population number of ESB for the transect route in 1999.

After establishing the total seasonal ESB population number for the transect, this number is scaled up proportionately to estimate the seasonal population number for the entire 200-acre ESB preserve area. Since the block count data was obtained during the peak flight period of the ESB, the scaling factor is simply the ratio of the block count to the transect peak value. Thus, the ESB seasonal count for the entire LAX dunes is obtained by multiplying the total seasonal population number of the transect survey by this scaling factor.

RESULTS AND DISCUSSION

The El Segundo Blue's adult flight season at LAX in 1999 began approximately two weeks later compared to its starting times in recent years, as the first adults were not observed until July 1st. The last adult was observed on September 9th, which indicates that the butterfly's flight season was at least 71 days in 1999 or approximately 10 weeks in duration.

The later onset of the flight season was probably due to the cooler and wetter spring weather conditions, which not only delayed the start of the butterfly's flight season, but also delayed the flowering of its buckwheat foodplant. For similar reasons, the start of the 1998 flight season was also approximately two weeks later than normal. Many insects and plants use a combination of seasonal changes in daily photoperiod and degree-days (i.e., number of days above a minimal threshold temperature value) as environmental cues to trigger their emergence or flowering. Thus, the delay in emergence of the butterfly and flowering of the buckwheat is consistent with the weather conditions that were experienced in the Los Angeles area during the spring of 1999.

Historical Transect.

A total of 1,741 adult ESBs were observed on the 11 survey dates in 1999, including 1,235 males, 434 females, and 72 individuals of unknown sex. The seasonal total applies to only the area of the transect belt (i.e., ca. 30 ft. x 7,880 ft. or approximately 5.4 acres), rather than to the entire dune preserve. Table 2 summarizes the total numbers (males + females + undetermined sex) of ESB adults observed by survey date. The transect counts indicate that the seasonal population peak occurred on or about July 27th.

Tallies of the numbers of observed males, females, and individuals of undetermined sex for every transect interval and survey date in 1999 are presented in Table 3. Figure 4 illustrates the numbers of butterflies observed for every transect interval and survey date. The greatest numbers of butterflies were observed in intervals #25 and #31. Most of the butterflies were observed along the northern intervals, especially #18-#27 and #31-#35, compared to other intervals along the transect route. A smaller portion of the ESB numbers were concentrated in intervals #1-#4. Throughout the ESB flight season, very few butterflies were observed on any survey date in intervals #5-#17, #28, and #29.

Table 4 summarizes the annual ESB transect counts at LAX. The historical transect counts have been performed annually since 1984, except for 1985 when no counts were undertaken. As depicted in Table 4, the number of ESB adults observed in 1999 was higher than counts for all of the prior years except 1998, when 2,175 butterflies were tallied.

Comparison of annual numbers of ESB from the transect counts in 1998 and 1999, initially suggest that the ESB populations declined about 20% in 1999. Yet, this initial conclusion is somewhat misleading even though both flight seasons were nearly identical in length, 72 days in 1998 and 71 days in 1999, and the span of survey dates was similar, 60 days in 1998 and 64 days in 1999. This is because the 1999 annual count was based on 11 survey dates, while the 1998 count was based on only six survey dates. Thus, the numbers of ESBs observed on most dates in 1999 were less than similar dates in 1998, which indicates that the numbers of ESBs in 1999 were probably substantially fewer than the initial 20% decline suggests.

Block Counts.

A total of 2,129 adult ESBs were observed during the block counts, including 1,330 males, 752 females, and 47 individuals of undetermined sex. Each block, as illustrated on the attached map of the LAX dunes (Figure 2), was visited only once during the period July 28th – 31st. Table 5 summarizes the numbers of ESBs that were observed in every block during 1999. Copies of the field data sheets for each block surveyed during the block counts, are attached as an appendix to this report.

Prior to the habitat restoration activities, the distribution of the ESB at the LAX dunes was limited to only portions of the VOR and backdunes of the preserve, i.e., blocks #1-#34 (Figure 2). Suitable habitat for the ESB was actually restricted to portions of only 12 of these 34 blocks, namely #1, #2, #11, #12, #14, #17, #20, #22, #23, #24, #31, and #34. During the past decade, restoration activities within this portion of the dunes have been focused primarily in blocks #6, #7, #8, #9, #10, #13, and #18. Elsewhere, restoration activities have also occurred throughout other portions of the preserve, specifically blocks #35 - #52.

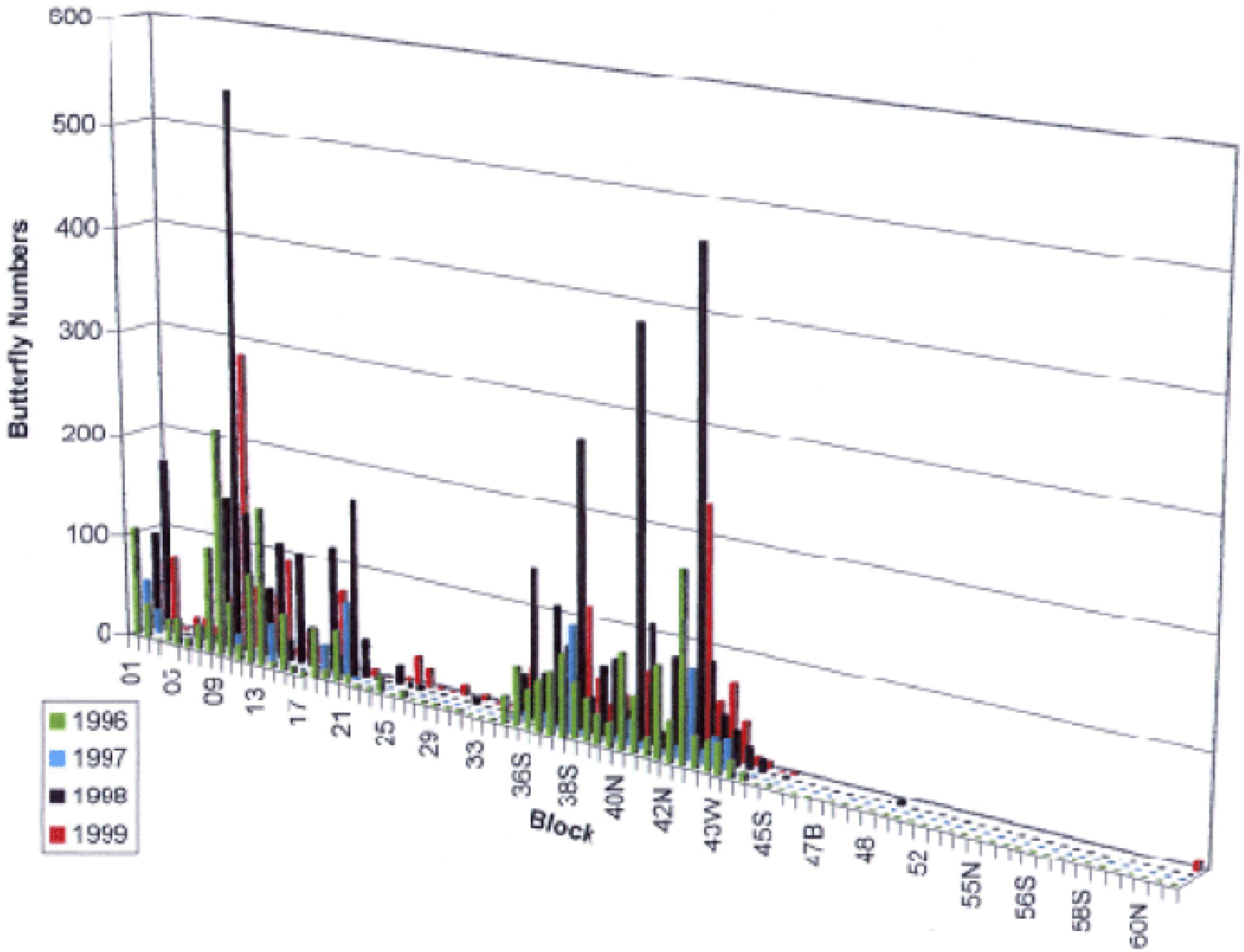
Within the 200-acre preserve, tallies of the numbers of ESB adults observed during the block counts ranged from zero individuals in nine blocks to 286 individuals in block #9. In 1999, about 43% of the adults observed during the block counts were in blocks #35 - #45S, where the buckwheat food plant of the ESB did not grow prior to the onset of restoration activities. These findings demonstrate that the habitat restoration efforts to benefit the ESB have been very successful at the LAX dunes because the butterfly is now considerably more widely distributed throughout the preserve.

Figure 5 is a three-dimensional bar graph that illustrates the numbers of ESB adults observed in each of the 61 blocks during 1996, 1997, 1998, and 1999. Table 5 lists the numbers of adults observed in every block during each of these same four years as well as the total numbers observed in each block for the 4-year period. Block counts in 1996, 1998, and 1999 were conducted at the approximate peaks of the respective flight seasons; hence counts from these three years are more comparable for the purpose of assessing the trend in population numbers of the ESB. The block counts for 1997 were conducted late in the adult flight season rather than at its peak, and for this reason are not comparable to block counts from 1996, 1998, and 1999.

The total numbers of ESBs tallied during the block counts in 1996 and 1999 were very similar, 2,093 versus 2,135; however, the totals in both of these years are only about one-half of the butterfly numbers observed during the 1998 block counts. Thus, the ESB population appears to have declined by approximately 50% in one year after it had increased about 50% during the prior year. During the 1996, 1998, and 1999 block counts, adult ESBs were generally found in the same blocks in all three years and most blocks exhibited a similar trend in population numbers during this four year period. Thus, the observed increase and subsequent decline occurred throughout the entire dune preserve.

Figure 6 is a map of the dunes that illustrates the counts of the ESB for every block in 1999. Note that blocks at the southern and northern ends of the preserve had lower counts than those in the eastern, western, and central portions. Lower ESB numbers and densities in the southern part of the preserve (i.e., south of Kilgore) are not surprising as buckwheats resident there include a higher proportion of senescent plants. Although blocks in the north central part of the preserve have been restored to some degree by buckwheat plantings, ESB continues to make little use of this portion of the preserve. Future restoration activities should include establishment of more buckwheats in these two portions of the preserve to encourage the butterfly to better utilize these blocks.

Figure 5. ESB block counts at LAX for 1996-1999



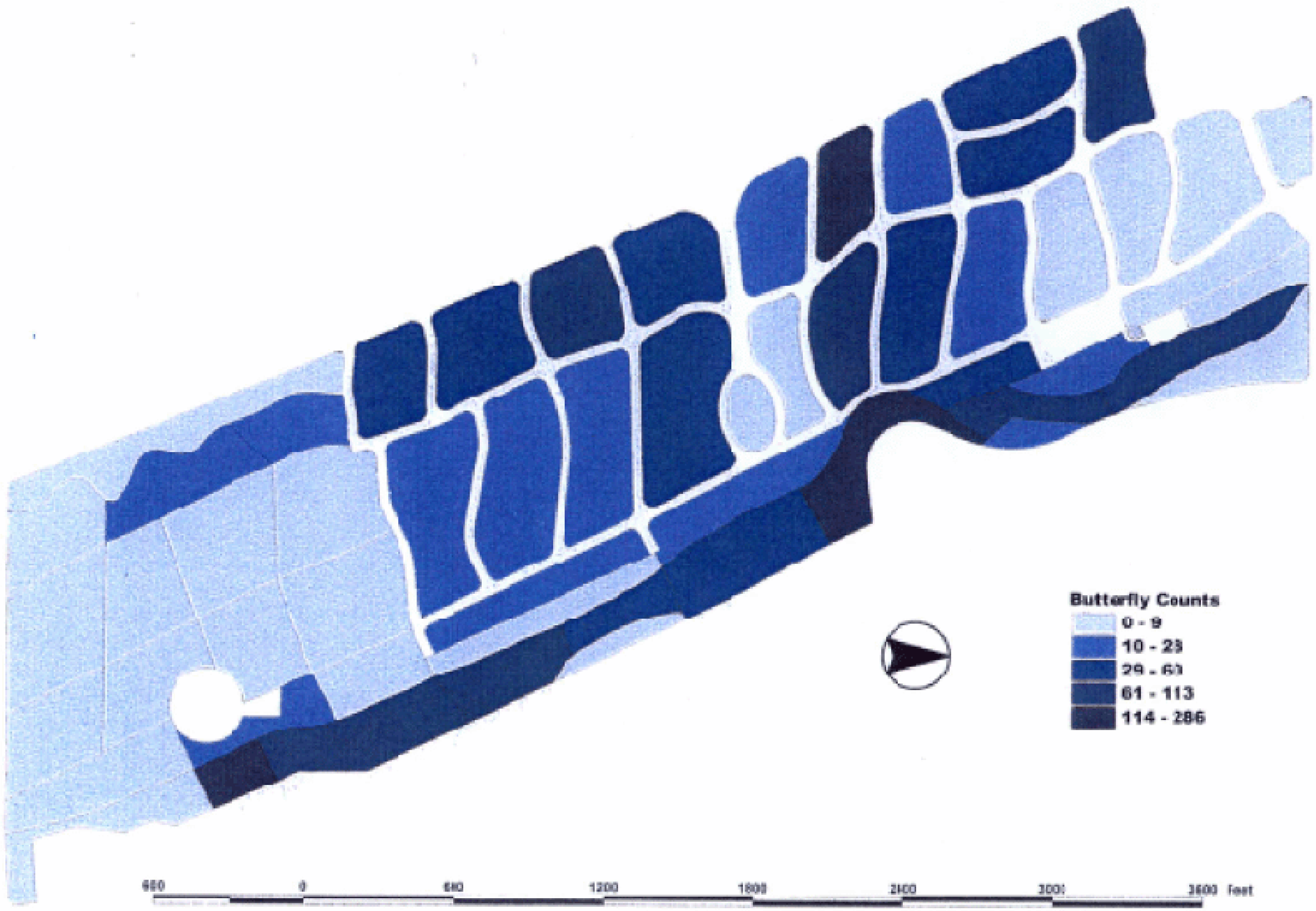


Figure 6. ESB counts by block in 1999 at LAX

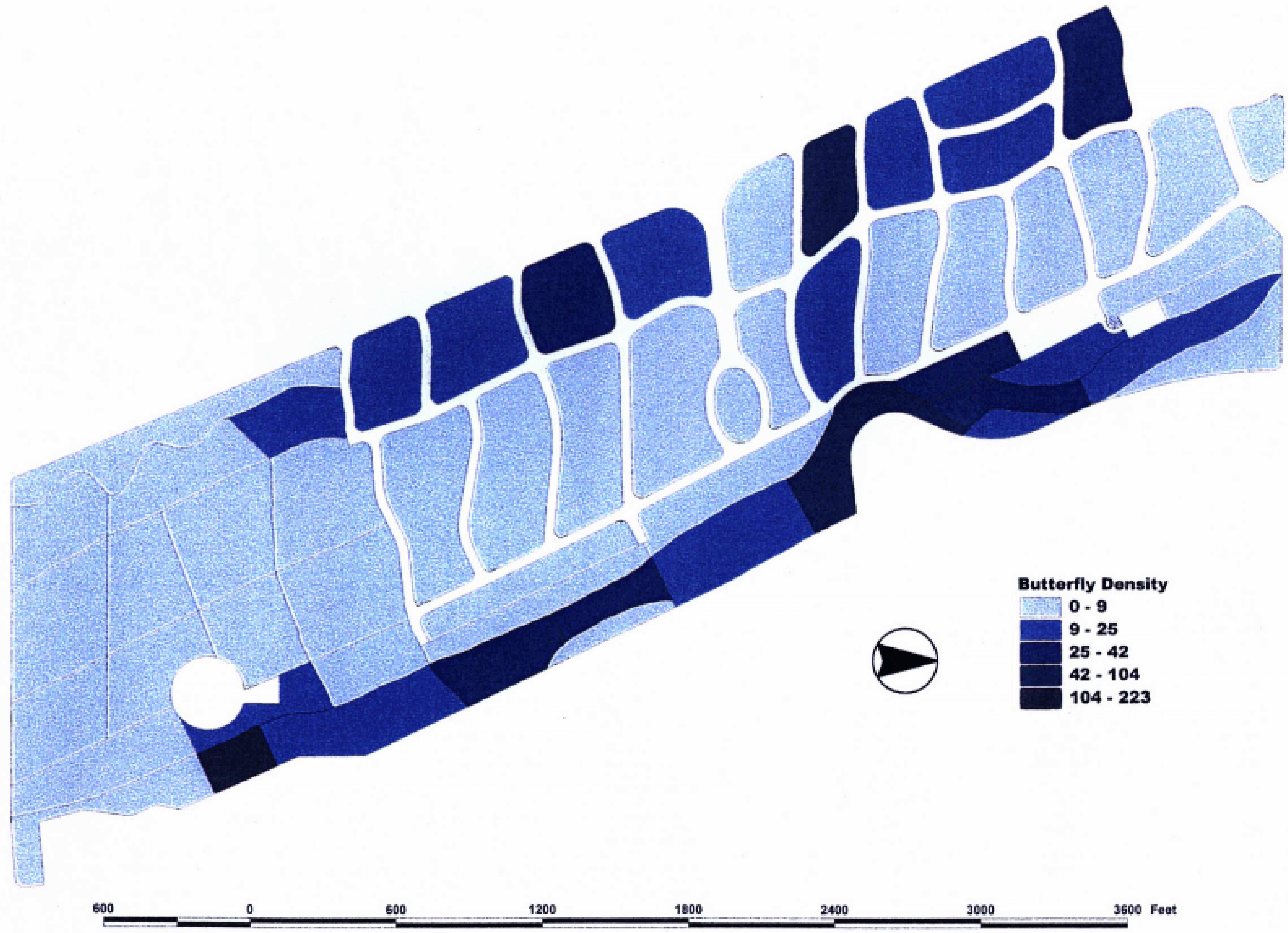


Figure 7. ESB density by block in 1999 at LAX

Figure 8. Buckwheat density vs. ESB numbers in 1996, 1998, and 1999

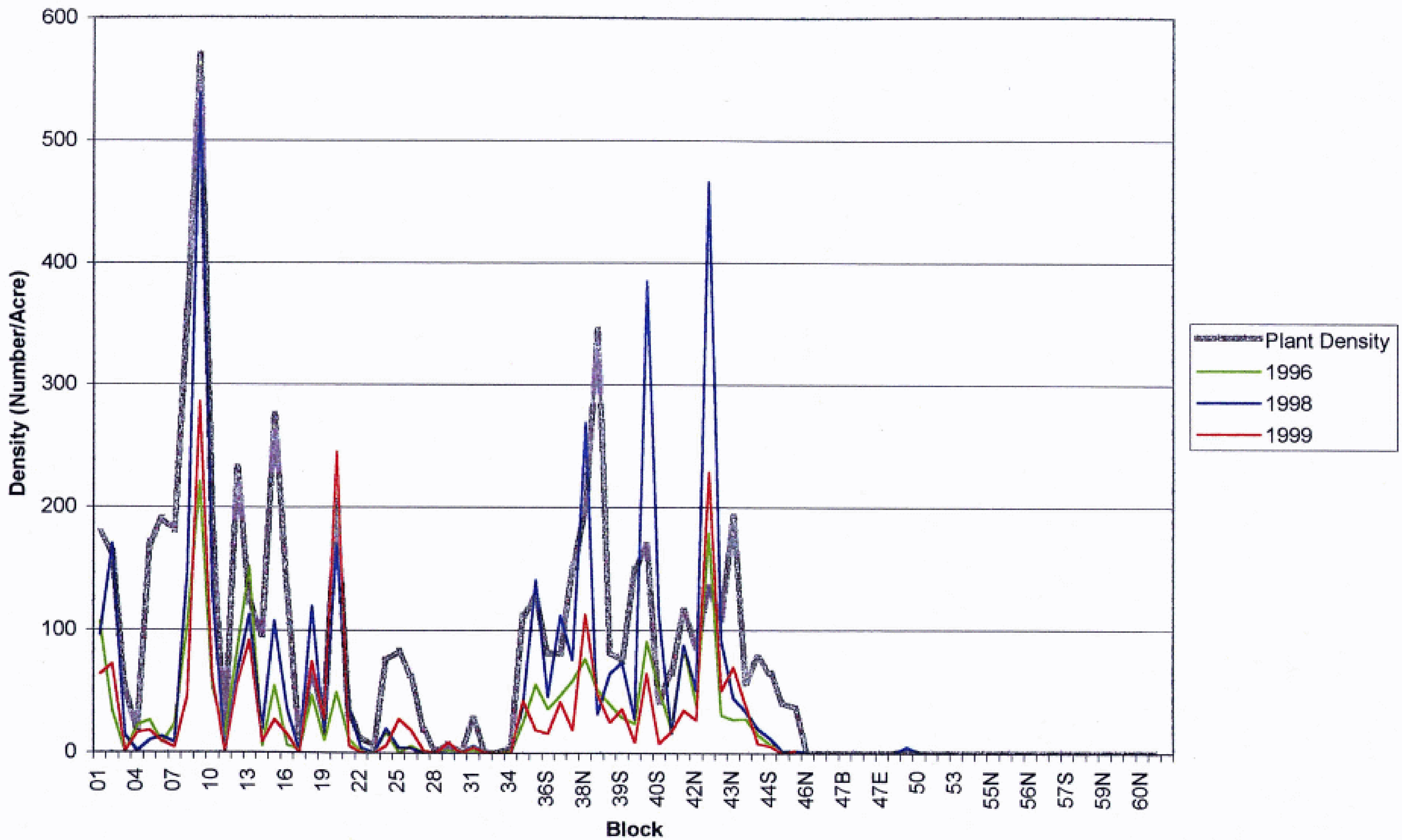
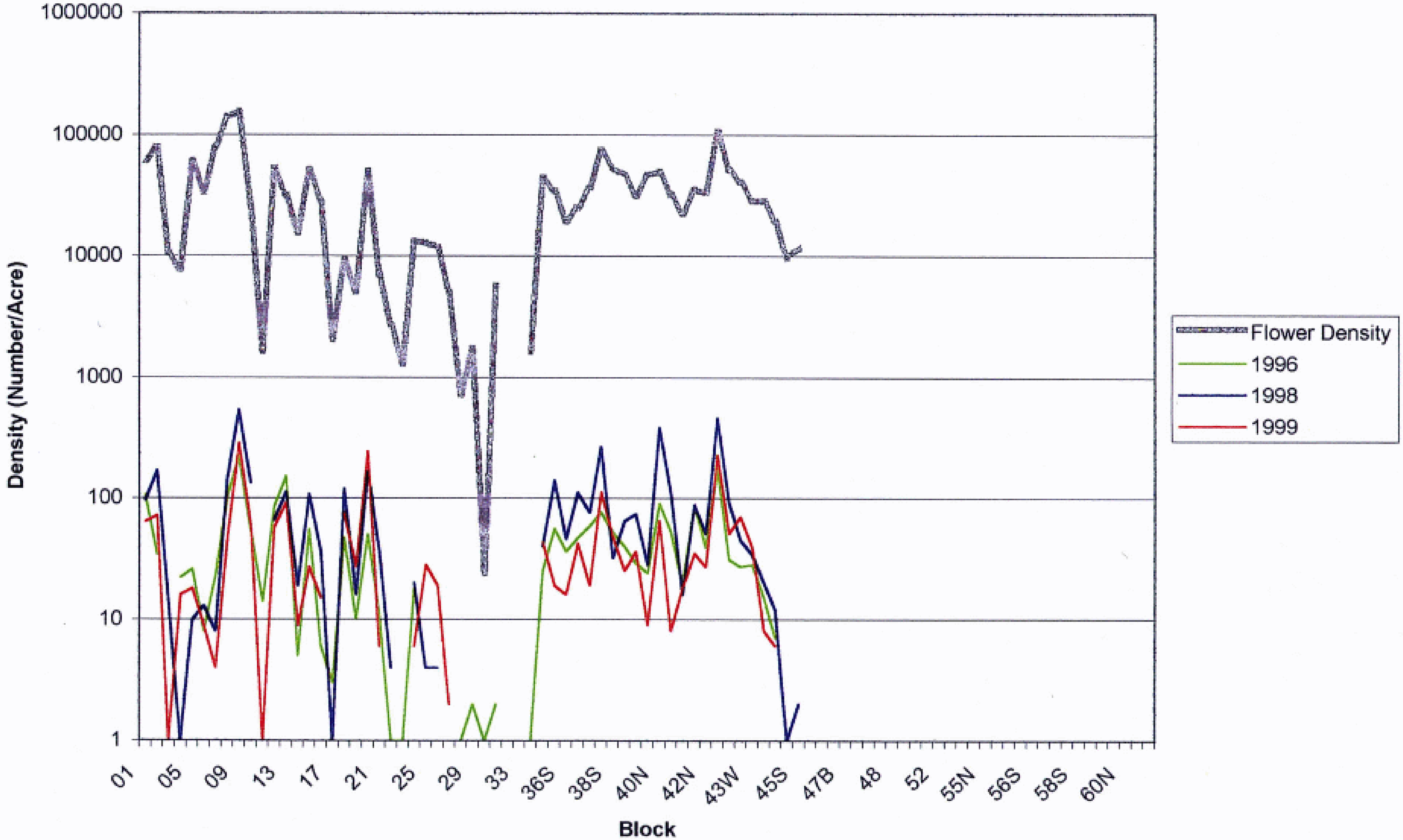


Figure 9. Flower density vs. ESB numbers in 1996, 1998, and 1999 (log scale)



Interestingly, when the block counts are converted to a measurement of density (i.e., numbers of butterflies per acre), as illustrated in Figure 7, the eastern and western blocks exhibit the highest densities, but the central blocks, along with the southern and northern blocks, exhibit low densities. This finding suggests that although the butterfly counts in the central blocks are high, they are probably concentrated in portions of each block where mature, flower-producing buckwheats are also concentrated, rather than uniformly distributed throughout each block. Alternatively, the gaps between the areas of concentration may be characterized by young buckwheats that are not yet producing many flowers. In either case, these gaps between the areas of concentration should be identified and targeted for additional buckwheat establishment as necessary to augment existing buckwheat plants as necessary.

Using the 1996 buckwheat inventory data, the numbers of ESBs observed in each block during 1996, 1998, and 1999 were plotted against plant density (Figure 8) and flower density (Figure 9). The 1997 block counts were not plotted since only the latter portion of the flight season was sampled in that year. In both cases, higher numbers of butterflies were observed where higher numbers of plants grew and greater flower densities occurred. In general, the population curve of butterfly numbers was fairly similar in form for each of the three years, but varied in magnitude. ESB numbers exceeded the buckwheat numbers in a few blocks, such as #42S, which suggests that the plants in those blocks probably consist primarily of mature, flower producing buckwheats compared to other blocks that might be characterized by a higher proportion of younger buckwheats.

Since the plant data is now three years old, future monitoring efforts should be include updating this information. Ideally, the plots of plant and flower densities would depict the relationship of butterfly numbers versus the plant or flower data from the same year. In this way, year to year changes in butterfly abundance could be better correlated with changes in the buckwheats and appropriate management actions could be identified and implemented more quickly to benefit the butterfly. The use of a statistically based sampling design would enable collection of plant data from selected portions of the dunes annually rather than a complete census effort as was conducted in 1996.

Seasonal Population Estimate for the ESB.

Using the trapezoidal numerical integration method, the seasonal population estimate for the ESB population throughout the entire LAX dune preserve ranged from 37,624 to 39,282 individuals in 1999. These estimates are slightly less than one-half of the 1998 seasonal estimates of 83,000 to 87,000 individuals (Huang 1998).

Clearly, all three population estimation techniques, the historical transect counts, the block counts, and the seasonal population estimate indicate that the ESB population declined in 1999. Results of the transect counts suggest that the magnitude of the observed decline was about 20%, but both the block counts and the seasonal population estimation method suggest that the decline was closer to 50% compared to 1998 estimates.

Declines of this magnitude are not unusual among insects, especially those that have but a single generation per year. Indeed, several moths that are routinely monitored because they are

forest pests, can exhibit a 10-fold increase in population numbers within a few generations (i.e., an outbreak) or may decline just as rapidly (Varley, Gradwell, and Hassell 1974). Factors such as seasonal weather conditions, increased parasitism and predation, a higher incidence of disease, or a decline in food plant numbers, may individually or collectively affect population numbers.

Thus, the 50% increase in ESB numbers that occurred between 1996 and 1998, as well as the 50% decline that was observed between 1998 and 1999, may be within the "normal" range of population fluctuations for the ESB. Long term monitoring of the ESB, conducted in a standardized and repeatable manner, will provide the results necessary to determine this degree of fluctuation that is normal, but such information is not available at this time.

Several possible explanations of the observed decline of the ESB exist, including:

1) During the transect and block counts, surveyors noted that the blooming times of the ESB's buckwheat food plant varied quite dramatically in different portions of the LAX dunes. Although buckwheats in some blocks were in peak bloom, the majority of buckwheats in other blocks were either still in bud or were even past their peak bloom at the time of the block surveys. Since the peak blooming period of the buckwheats was not synchronized throughout the LAX dunes, numbers of the ESB were undoubtedly affected.

2) In addition to the asynchronous bloom of the buckwheats, two consecutive years of unusual weather conditions, namely El Nino and La Nina, may have affected both the buckwheats and the ESB. In particular, the late spring rains in 1999 may have exposed the pupae to disease agents that could have increased mortality.

3) As the ESB colonized new portions of the LAX dunes where restoration plantings of buckwheat occurred, there may have been a time lag of a few generations for parasites, predators, and competitors to also colonize the new areas of the dunes and impact ESB numbers. Such time lags involving interspecific interactions are quite common in ecology. The reduced numbers of ESB adults observed in 1999 may have been the result, at least in part, of such interspecific interactions.

4) Finally, population numbers of the buckwheat and its flower numbers have not been monitored throughout the LAX dunes since the 1996 inventory by Sapphos Environmental, Inc. Propagation and outplanting of buckwheats has been limited in recent years since the major restoration effort that occurred in the early 1990's. Thus, it is possible that the numbers of buckwheat plants or the numbers of buckwheat flowers may have declined in some blocks, a situation that would likely result in a decline of ESB numbers. For this reason, some monitoring of buckwheat plants should be performed in future years to determine when declines in plant or flower numbers occur.

Population monitoring in the year 2000 and beyond will provide a better basis to understand why the ESB numbers declined in 1999, and whether the observed decline is temporary and within the normal range of fluctuation for this butterfly at LAX.

REFERENCES CITED

Abramowitz M., and Stegun I. 1970. Handbook of Mathematical Functions. National Bureau of Standards, pp. 297-310.

Arnold, RA. 1983. Ecological studies of six endangered butterflies (Lepidoptera: Lycaenidae): island biogeography, patch dynamics, and the design of habitat preserves. Univ. California Pub. Ent. 99:1-161.

Arnold, R.A. 1986. Studies of the El Segundo Blue Butterfly -1984. Inland Fisheries Administrative Report No. 86-4, pp.14-15.

Huang, Andrew. 1998. Memo to Maurice Laham, dated 25 Nov. 1998. Estimate of the 1998 LAX El Segundo Blue butterfly population. 8 pp.

Mattoni, RH. 1992. The endangered El Segundo blue butterfly. J. Res. Lep. 29:277-304.

Pianka, E.R. 1988. Evulutioriary Ecology. 4th Edition. Harper Collins Publishers. p. 273.

Pratt, G.F. and J.F. Emmel. 1998. Revision of the *Euphilotes enoptes* and *E. battoides* complexes (Lepidoptera: Lycaenidae). IN, Emmel, T.C. (Editor). Systematics of western North American butterflies. Mariposa Press. Gainesville, FL. Pp. 207-270.

Varley, G.C., G.R. Gradwell, and M.P. Hassell. 1974. Insect population ecology. University of California Press. Berkeley, CA 212 pp.

Table 1. Lengths of the 35 intervals along the historical ESB transect at LAX.

Interval Number	Interval Length (feet)
1	480
2	700
3	100
4	125
5	175
6	200
7	175
8	125
9	200
10	90
11	50
12	75
13	300
14	260
15	150
16	300
17	90
18	480
19	200
20	190
21	265
22	240
23	100
24	140
25	220
26	125
27	75
28	100
29	50
30	190
31	440
32	180
33	50
34	380
35	560
Total Length (feet)	7,880

Table 2. 1999 Historical Transect Count Tallies by Survey Date

Survey Date	Numbers of Observed Adult ESBs			Daily Total
	Males	Females	Undetermined Sex	
08-Jul-99	30	1	0	31
10-Jul-99	109	5	0	114
15-Jul-99	182	33	0	215
22-Jul-99	227	49	5	281
27-Jul-99	263	89	24	376
03-Aug-99	211	96	27	334
11-Aug-99	113	73	7	193
17-Aug-99	68	49	7	124
24-Aug-99	14	14	2	30
31-Aug-99	17	25	0	42
09-Sep-99	1	0	0	1
Seasonal Totals	1235	434	72	1741

Table 3. Numbers of ESB adults observed for every interval and all survey dates in 1999 of the historical transect.

Survey Date: 08-Jul-99

Interval	Males	Females	Undetermined	Interval Total
1	1	0	0	1
2	0	0	0	0
3	3	0	0	3
4	1	0	0	1
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	2	0	0	2
19	0	0	0	0
20	1	0	0	1
21	1	0	0	1
22	10	0	0	10
23	5	1	0	6
24	0	0	0	0
25	0	0	0	0
26	2	0	0	2
27	2	0	0	2
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	1	0	0	1
32	0	0	0	0
33	1	0	0	1
34	0	0	0	0
35	0	0	0	0
Totals	30	1	0	31

Survey Date: 10-Jul-99

Interval	Males	Females	Undetermined	Interval Total
1	1	2	0	3
2	2	0	0	2
3	2	1	0	3
4	2	0	0	2
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	7	0	0	7
20	3	1	0	4
21	0	0	0	0
22	5	0	0	5
23	4	0	0	4
24	36	1	0	37
25	8	0	0	8
26	8	0	0	8
27	3	0	0	3
28	1	0	0	1
29	0	0	0	0
30	3	0	0	3
31	7	0	0	7
32	5	0	0	5
33	3	0	0	3
34	2	0	0	2
35	7	0	0	7
Totals	109	5	0	114

Survey Date: 15-Jul-99

Interval	Males	Females	Undetermined	Interval Total
1	6	1	0	7
2	1	0	0	1
3	5	2	0	7
4	6	3	0	9
5	0	1	0	1
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	1	0	0	1
10	0	0	0	0
11	0	0	0	0
12	1	0	0	1
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	1	0	0	1
18	0	0	0	0
19	1	1	0	2
20	4	3	0	7
21	13	2	0	15
22	16	1	0	17
23	4	2	0	6
24	9	3	0	12
25	57	6	0	63
26	15	2	0	17
27	9	3	0	12
28	4	0	0	4
29	5	0	0	5
30	2	0	0	2
31	16	0	0	16
32	1	0	0	1
33	1	1	0	2
34	0	1	0	1
35	4	1	0	5
Totals	182	33	0	215

Survey Date: 22-Jul-99

Interval	Males	Females	Undetermined	Interval Total
1	11	3	0	14
2	1	0	0	1
3	9	7	0	16
4	3	3	0	6
5	0	0	0	0
6	0	0	0	0
7	1	0	0	1
8	0	0	0	0
9	0	0	0	0
10	1	0	0	1
11	0	0	0	0
12	0	0	0	0
13	1	0	0	1
14	0	0	0	0
15	1	1	0	2
16	0	0	0	0
17	0	0	0	0
18	1	0	0	1
19	7	4	0	11
20	0	0	0	0
21	0	0	0	0
22	11	1	0	12
23	18	2	0	19
24	5	0	0	5
25	89	12	0	101
26	24	3	0	27
27	9	0	0	9
28	3	0	0	3
29	0	0	0	0
30	0	0	0	0
31	21	10	5	36
32	6	0	0	6
33	2	2	0	4
34	2	0	0	2
35	3	1	0	4
Totals	227	49	5	281

Survey Date: 27-Jul-99

Interval	Males	Females	Undetermined	Interval Total
1	7	3	0	10
2	2	1	0	3
3	15	12	4	31
4	4	4	1	9
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	2	1	0	3
11	1	0	0	1
12	0	0	0	0
13	2	0	0	2
14	0	0	0	0
15	0	0	0	0
16	1	1	0	2
17	0	1	0	1
18	18	6	1	25
19	8	2	0	10
20	2	0	0	2
21	4	2	0	6
22	7	1	0	8
23	11	5	0	16
24	22	6	0	28
25	97	26	10	133
26	26	8	5	39
27	11	2	0	13
28	1	0	1	2
29	0	1	0	1
30	0	1	0	1
31	15	3	1	19
32	1	0	0	1
33	1	1	1	3
34	4	1	0	5
35	1	1	0	2
Totals	263	89	24	376

Survey Date: 03-Aug-99

Interval	Males	Females	Undetermined	Interval Total
1	8	0	0	8
2	1	0	0	1
3	16	10	0	26
4	8	8	0	16
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	1	4	0	5
12	0	0	0	0
13	2	1	0	3
14	0	0	0	0
15	0	0	0	0
16	1	0	0	1
17	1	0	0	1
18	10	2	0	12
19	0	0	0	0
20	4	1	0	5
21	18	1	3	22
22	4	1	0	5
23	4	3	0	7
24	17	6	0	23
25	45	27	9	81
26	9	6	1	16
27	4	4	2	10
28	0	1	0	1
29	0	0	0	0
30	2	1	1	4
31	38	12	9	60
32	2	1	1	4
33	2	4	1	7
34	8	1	0	9
35	6	1	0	7
Totals	211	96	27	334

Survey Date: 11-Aug-99

Interval	Males	Females	Undetermined	Interval Total
1	2	0	0	2
2	0	0	0	0
3	5	3	0	9
4	8	2	1	11
5	1	0	0	1
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	1	0	1
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	3	0	0	3
17	0	0	0	0
18	10	11	1	22
19	0	0	0	0
20	10	1	0	11
21	1	0	0	1
22	0	4	0	4
23	12	3	0	15
24	1	2	0	3
25	31	21	5	57
26	4	6	0	10
27	2	0	0	2
28	1	0	0	1
29	1	3	0	4
30	17	15	0	32
31	0	0	0	0
32	0	0	0	0
33	1	0	0	1
34	1	1	0	2
35	1	0	0	1
Totals	113	73	7	193

Survey Date: 17-Aug-99

Interval	Males	Females	Undetermined	Interval Total
1	1	1	0	2
2	0	0	0	0
3	1	2	0	3
4	1	0	0	1
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	1	0	1
11	0	0	0	0
12	0	0	0	0
13	1	2	0	3
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	1	1	0	2
18	6	5	0	11
19	0	0	0	0
20	4	1	0	5
21	0	0	0	0
22	0	0	0	0
23	2	1	0	3
24	8	3	0	11
25	8	10	0	18
26	1	1	0	2
27	0	1	0	1
28	0	0	0	0
29	0	0	0	0
30	4	2	0	6
31	20	17	5	42
32	0	1	0	1
33	0	0	0	0
34	10	0	2	12
35	0	0	0	0
Totals	68	49	7	124

Survey Date: 24-Aug-99

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	6	8	0	14
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	1	1	2
24	2	0	0	2
25	2	0	0	2
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	4	4	1	9
32	0	0	0	0
33	0	0	0	0
34	0	1	0	1
35	0	0	0	0
Totals	14	14	2	30

Survey Date: 31-Aug-99

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	0	0	0	0
3	1	2	0	3
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	1	0	1
16	0	0	0	0
17	0	0	0	0
18	0	2	0	2
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	3	0	3
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	3	3	0	6
31	8	9	0	17
32	0	0	0	0
33	0	0	0	0
34	5	5	0	10
35	0	0	0	0
Totals	17	25	0	42

Survey Date: 09-Sep-99

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	0	0	0	0
3	1	0	0	1
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
Totals	1	0	0	1

Table 4. Summary of Annual ESB Transect Counts at LAX

Year	Number of Survey Dates	Span of Survey Dates	Number of ESB Observed
1984	4	19	193
1986	5	35	258
1987	9	56	473
1988	10	61	1,049
1989	11	54	1,390
1990	10	63	1,192
1991	12	90	906
1992	13	111	1,051
1993	10	58	925
1994	8	63	500
1995	10	69	1,239
1996	4	21	1,455
1997	4	21	126
1998	6	60	2,175
1999	11	64	1,741

Table 5. El Segundo Blue Block Butterfly counts for 1996-1999 at LAX

Block	1996	1997	1998	1999	Total
01	107	51	96	64	318
02	34	25	170	72	301
03	0	0	14	1	15
04	22	1	1	16	40
05	26	3	10	18	57
06	8	1	13	9	31
07	23	1	8	4	36
08	103	9	147	46	305
09	221	48	539	286	1094
10	54	18	134	60	266
11	14	1	0	1	16
12	85	55	66	57	263
13	152	35	113	92	392
14	5	3	19	9	36
15	55	0	108	27	190
16	6	0	36	15	57
17	3	0	1	0	4
18	47	28	120	75	270
19	10	10	16	27	63
20	50	75	169	245	294
21	11	5	37	6	59
22	1	0	4	0	5
23	1	0	0	0	1
24	18	0	20	6	44
25	0	0	4	28	32
26	6	0	4	19	29
27	0	1	0	2	3
28	1	0	1	0	2
29	2	0	0	9	11
30	1	0	0	0	1
31	2	0	6	5	13
32	0	0	0	0	0
33	0	0	0	0	0
34	1	0	0	0	1
35	25	3	40	43	111
36N	56	10	141	19	226
36S	36	1	46	16	99
37N	47	14	112	42	215

Block	1996	1997	1998	1999	Total
37S	59	5	76	19	159
38N	77	100	269	113	559
38S	52	6	32	48	138
39N	40	1	65	25	131
39S	29	3	74	36	142
40C	24	9	28	9	70
40N	91	26	385	65	567
40S	53	6	113	8	180
41N	19	0	16	18	53
41S	88	3	88	35	214
42N	39	11	51	27	128
42S	179	86	466	229	960
43E	31	13	92	51	187
43N	27	29	45	70	171
43W	28	29	34	39	130
44N	15	0	20	8	43
44S	7	1	12	6	26
45N	0	0	1	0	1
45S	2	0	2	2	6
46N	0	0	0	0	0
46S	0	0	0	0	0
47A	0	0	0	0	0
47B	0	0	0	0	0
47C	0	0	0	0	0
47D	0	0	0	0	0
47E	0	0	0	0	0
48	0	0	0	0	0
49	0	0	5	0	5
50	0	0	0	0	0
51	0	0	0	0	0
52	0	0	0	0	0
53	0	0	0	0	0
54	0	0	0	0	0
55M	0	0	0	0	0
55N	0	0	0	0	0
55S	0	0	0	0	0
56M	0	0	0	0	0
56N	0	0	0	0	0
56S	0	0	0	0	0
57N	0	0	0	0	0

Block	1996	1997	1998	1999	Total
57S	0	0	0	0	0
58N	0	0	0	0	0
58S	0	0	0	0	0
59N	0	0	0	0	0
59S	0	0	0	0	0
60M	0	0	0	0	0
60N	0	0	0	0	0
60S	0	0	0	0	0
61 CIRCLE	0	0	0	8	8
Totals	2093	726	4069	2135	9023

APPENDIX:

Data Sheets from 1999 Block Counts

2.6 1043-010

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

January 4, 1999

MEMORANDUM FOR THE RECORD
JN 1043-010.M03

TO: Los Angeles World Airports
(Mr. Steve Crowther)

FROM: Sapphos Environmental
(Ms. Tracey Alsobrook, Dr. Brad Blood)

SUBJECT: Winter Bird Count at El Segundo Dunes 1998/1999

ATTACHMENT: Field Notes of Winter Bird Count on12/22/98

REFERENCES:

1. Sapphos Environmental Memorandum for the Record 1067-007.M08 dated April 9, 1998. Subject: Results of Winter Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, February 9 to 25, 1998

2. Sapphos Environmental Memorandum for the Record 1043-008.M06 dated August 18, 1998. Subject: Results of Directed Surveys for American Peregrine Falcon, California Least Tern, Southwestern Willow Flycatcher, Least Bell's Vireo and Loggerhead Shrike at LAX/El Segundo Dunes

This Memorandum for the Record transmits the results of the Winter Bird Count which took place on December 22, 1998 at the El Segundo Dunes (Dunes), including the El Segundo Blue (ESB) Habitat Restoration Area and the portion of the Dunes north of Sandpiper Street. This survey was performed in support of ongoing maintenance and monitoring of the ESB Habitat Restoration Area (Los Angeles International Airport, U.S.G.S. 7.5 minute Venice Quadrangle, Range 15 West, Township 2 South, lies within the Sausal Redondo Land Grant Boundary). The survey was initiated at 6:30 a.m. and was completed at 12:30 p.m. on December 22, 1998. The survey was conducted by wildlife biologists from Sapphos Environmental (Ms. Tracey Alsobrook, Dr. Brad Blood). Weather conditions during the survey hours were as follows: temperatures varied between 40° F and 58° F; cloud cover was 0%, and wind speed was approximately 5 to 10 miles per hour.

The ESB Habitat Restoration Area and the portion of the Dunes north of Sandpiper Street were covered by foot. The survey methods are described in the attached field notes. All birds observed were counted and recorded in the field notes. A total of twenty-six species of birds were observed on, or flying directly over the Dunes. During the winter bird count conducted for the 1997/1998 winter season seventeen species were observed. The increase in species observed this year may be due to more favorable weather conditions. An additional five species were observed either on Dockweiler State Beach, flying over the open ocean, or on the open water. The three most abundant species on the Dunes were white-crowned sparrow (*Zonotrichia leucophrys*), western meadowlark (*Sturnella neglecta*), rock dove (*Columba livia*) or pigeon, house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*) and European starling (*Sturnus vulgaris*). There was an especially large concentration of rock doves at the entrance gates into the northern Dunes area on Waterview Street. These birds are attracted to the area because of habitual public feeding at this location.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241

Tel 626/683-3547 Fax 626/683-3548

No state or federally listed rare, threatened or endangered species were observed on the Dunes. Three California Department of Fish and Game "Species of Special Concern" were observed - sharp-shinned hawk (*Accipiter striatus*), burrowing owl (*Athene cunicularia*) and loggerhead shrike (*Lanius ludovicianus*). The sharp-shinned hawk is a winter resident or migrant in southern California and does not breed in the area. One burrowing owl was flushed from a roost site on subsite 385 while walking transects. This species is known to winter on the Dunes as documented in Sapphos Environmental's Memorandum for the Record (1067-007.M08) transmitting the results of directed surveys for the burrowing owl during February, 1998. Five loggerhead shrikes were observed on the Dunes. This species is a known breeding resident on the Dunes (Sapphos Environmental MFR 1043-008.M06). An additional species observed, white-tailed kite (*Elanus leucurus*), is a California Department of Fish and Game Fully Protected Species. This bird was seen hovering over the Dunes in the vicinity of the north ILS Critical Area.

One species observed flying out over the open ocean, the California brown pelican, (*Pelecanus occidentalis californicus*) is listed as a state and federally endangered species. The majority of birds on the Dunes were observed either in the vicinity of the VOR or the acreage north of Sandpiper Street where there are more trees.

If you have any questions concerning this Memorandum For the Record please contact Dr. Brad R. Blood or Ms. Tracey Alsobrook at (626) 683-3547.

12/22/98 (1)
1043-010
T Alsobrook

Winter Bird Count at the
El Segundo Dunes

Date: Tuesday, December 22, 1998
Time: 6:30 am
Weather Conditions: temp ≈ 40°F, 0% cloud cover; wind ≈ 5-10 mph
Observers: T. Alsobrook, B. Blood

6:30 am: Observers each walked 3 transects across Dunes in a north ⇄ South direction from Imperial to Sandpiper St. Observers were spaced approx. 50' apart. Observers each walked a single transect around the VOR and along the back dune area. In the area north of Sandpiper St, the streets were walked. Observations of birds over Dockweiler Beach were made as the Dune transects were walked.

12/22/98 (2)

All birds observed were noted as to species and number. Separate lists were recorded for the Dunes south of Sandpiper St., Dunes north of Sandpiper St. and Dockweiler Beach. Incidental sightings of other animals were also recorded.

Species lists follow -

El Segundo Dunes (south of Sandpiper St.)

mourning dove 卌 卌 卌 卌 || (22)
loggerhead shrike 卌 (5)
white-crowned sparrow 22 + 17 + 36 + 17 + 26 +23 (144)
house finch 卌 卌 卌 卌 卌 卌 || (32)
Anna's hummingbird 卌 || (7)
yellow-rumped warbler || (2)
American crow 卌 卌 | (11)
American Kestrel |||| (4)
European starling 卌 卌 || (12)
sharp-shinned hawk | (1)
California towhee | (1)
Say's phoebe ||| (3)
spotted dove ||| (3)

12/22/98 (3)

savannah sparrow |||| (4)
W. meadow lark 卌 卌 卌 卌 卌 卌 卌 卌 卌 || (47)
white-shouldered kite | (1)
great egret | (1)
California gull | (1)
red-tailed hawk ||| (3)
rock dove 卌 卌 卌 卌 卌 卌 卌 || (37)
burrowing owl | (1) - 38.5 subsite
N. mockingbird | (1)
Bewick's wren | (1)
gull species 卌 | (6)

El Segundo Dunes (north of Sandpiper St.)

Say's phoebe | (1)
rock dove ≈ 60
American Kestrel || (2)
W. scrub-jay || (2)
black phoebe | (1)
W. meadow lark 卌 卌 卌 卌 |||| (24)
mourning dove ||| (3)
house finch 卌 (5)
Anna's hummingbird || (2)
yellow-rumped warbler | (1)
spotted dove || (2)

12/22/98 (4)

Species observed on, or flying over Dockweiler State Beach or open ocean (observed from Dunes)

California brown pelican ≈ 24
willet |||| (4)
surf scoter 卌 卌 ||| (13)
Western grebe 卌 卌 卌 (15)
Western gull 卌 卌 ||| (13)
California gull 卌 卌 (10)

Other wildlife observed:

domestic dog - 1
red fox - |||
pocket gopher - numerous active burrows
California side-blotched lizard - 6
immature Southern alligator lizard - 1

Jones & Stokes Associates, Inc.

2600 V Street • Sacramento, CA 95818-1914

Final

Analysis and Culture of *Streptocephalus* Cysts from Los Angeles International Airport

Prepared for:

Los Angeles International Airport
Environmental Management Bureau
1 World Way, Room 219
Los Angeles, CA 90045
Contact: Andrew Huang
310/646-3853

Prepared by:

Jones & Stokes Associates, Inc.
2600 V Street, Suite 100
Sacramento, CA 95818-1914
Contact: Christopher Rogers
916/737-3000

and

Richard Hill Biological Consulting
3900 Central Avenue
Fair Oaks, CA 95628
Contact: Richard Hill
916/962-2431

January 1999

This document should be cited as:

Jones & Stokes Associates, Inc., and Richard Hill Biological Consulting. 1999. Analysis and culture of *Streptocephalus* cysts from Los Angeles International Airport. Final. January. (JSA 98-307.) Sacramento, CA, and Fair Oaks, CA. Prepared for Los Angeles International Airport, Los Angeles, CA.

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INTRODUCTION

Los Angeles International Airport (LAX) retained Jones & Stokes Associates to perform species-level identification of potential special-status shrimp cysts from a seasonally ponded area on LAX property. Dry season soil sampling was performed by RECON Associates in 1997, and subsequent analysis of the samples by Jones & Stokes Associates recovered fairy shrimp cysts (desiccation-resistant eggs) from the genus *Streptocephalus* Baird 1852. Based on distributional and habitat preference data, the cysts were tentatively identified as *Streptocephalus wootoni*. This species is federally listed as endangered.

After receiving approval from the U.S. Fish and Wildlife Service (USFWS) to proceed, qualified invertebrate ecologists from Jones & Stokes Associates and Richard E. Hill, Biological Consulting, analyzed the remaining soil from RECON Associates' original surveys. Scanning electron micrographs and light microscopy were used to analyze the cysts, and additional cysts were used for culturing adult shrimp. Analysis of the cysts and adult shrimp reared from the cysts, plus diagnostic material from adult shrimp remains found in the soil, demonstrated that the population of *Streptocephalus* at LAX is *Streptocephalus wootoni*.

METHODS

A RECON Associates biologist collected soil samples on November 6, 1997, from a seasonally ponded area at LAX. Ten soil samples from each potential special-status shrimp habitat were collected, with a combined total of approximately 1 liter of soil being removed from the potential habitat.

Soil Sample Preparation

The soil samples were received by Jones & Stokes Associates on April 30, 1998, and were analyzed according to USFWS guidelines as stated in the Interim Survey Guidelines to Permittees for Recovery Permits under Section 10a (1a) of the Endangered Species Act for the Listed Vernal Pool Branchiopods (U.S. Fish and Wildlife Service 1996).

Soil samples were prepared for examination in the laboratory by dissolving the clumps of soil in water and sequentially sieving the material through clean 500-, 300-, and 150-μm-pore-size screens. The small size of these screens ensured that the eggs from the shrimp species would be retained. The portion of each sample retained in the screens was dispersed in a brine solution to separate the organic material from the inorganic material. The organic fraction was then examined under a light microscope to recover the shrimp cysts.

Cyst Identification

Two fairy shrimp genera are reported from Los Angeles County: *Branchinecta* and *Streptocephalus*. Genus-level identifications are readily made with a light microscope. Cysts from the genus *Streptocephalus* bear larger, elongated, angular polygonal depressions across their entire surface so that the cysts resemble a crumpled piece of paper. Cysts from the fairy shrimp genus *Branchinecta*, however, bear smaller, ovate, polygonal, hemispherical depressions so that they resemble a golf ball. Therefore, scanning electron micrographs and reference specimens were used to identify shrimp cysts to the species level.

Cysts were prepared for electron microscopy following Hill and Shepard (1997). On December 11, 1998, a number of air-dried cysts were placed on scanning electron microscope stubs with double-stick tape. Previous work has demonstrated that air-dried cysts maintain the same appearance as cysts prepared in alcohol baths and critical point dried (Hill, unpublished data). Some cysts were bisected to reveal internal structures of the cyst wall. The cysts were coated with gold and examined with a Zeiss DSM 940 scanning electron microscope. Micrographs (photographs taken through an electron microscope) were taken of the cysts' exterior surfaces and of cross sections of the cyst wall.

Cyst micrographs from the LAX site were compared to micrographs and cyst reference specimens of all other reported and described *Streptocephalus* species from California, Oregon, Nevada, Arizona, and New Mexico in the United States and from Sonora and Baja del Norte in Mexico.

Culture

Adult shrimp were reared from the recovered cysts using methods following U.S. Environmental Protection Agency (1985), Anderson and Hsu (1990), Maeda-Martinez et al. (1995c, 1995d), Jawahar and Dumont (1995), and Hathaway and Simovich (1996). Approximately 100 dry cysts were removed from the filtered debris left over from the soil sieving. Twenty-five apparently undamaged cysts were placed in each of four hatching chambers. A combination of dechlorinated tap water and deionized water with an ultimate conductivity of 30 µS (microsiemens) was added to each chamber. Chambers were incubated at 9-12°C, 14-17°C, 9-22°C, and 23-27°C.

Nauplii (newly hatched shrimp) were transferred to 2.5-liter culture chambers. Nauplii were fed a standard *Daphnia* food that includes fish food, fish oil, baker's yeast, and the alga *Selenastrum capricornutum*.

Adult Identification

Adult shrimp reared from culture were killed in 90% ethyl alcohol and examined under a stereo dissection microscope. Identifications were made based on comparisons with specimens in our collections, the original species descriptions, and professional experience.

Descriptive terminology for second antennae of the males follows Maeda-Martinez et al. (1995a). The second antennae of fairy shrimp are comprised of a basal and a distal segment. These segments are variously shaped and ornamented in a manner characteristic to each genus. Each second antennae of male *Streptocephalus* bears a large cheliform (claw-like) outgrowth at the end of a peduncle, extending from the apex of the basal segment and lying parallel to the base of the distal segment (Figure 1). The outgrowth is split into two parts: the anterior "thumb" and the posterior "finger". The different species of *Streptocephalus* are distinguished from each other based on the shape and ornamentation of these structures.

RESULTS

The population of *Streptocephalus* occurring in the LAX pool were conclusively identified as *Streptocephalus wootoni* based on cyst morphology, remains of adult shrimp in the soil samples, and adult shrimp cultured from cysts recovered from the soil samples.

Cyst Identification

Cysts from the genus *Streptocephalus* are easily recognizable. They bear larger, elongated angular, polygonal depressions across their entire surface so that the cysts resemble a crumpled piece of paper. All examined cysts from the LAX site were typical *Streptocephalus wootoni* cysts (Figure 6).

In addition to the cysts, portions of several exuviae (molted exoskeletons), particularly the "finger" of the cheiliform outgrowth of the male, were recovered (Figure 7). These portions retain the "teeth", which are diagnostic of western *Streptocephalus*. The fingers bear the typical spatulate proximal tooth and distal tooth with a medial "benchlike" shoulder that differentiates *Streptocephalus wootoni* from all other *Streptocephalus* species (Eng et al. 1990, Maeda-Martinez et al. 1995a).

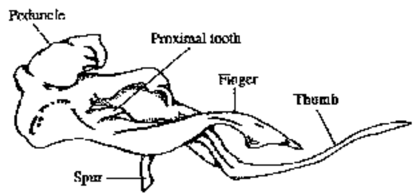


Figure 1. *Streptocephalus dorothae* medial view of hand

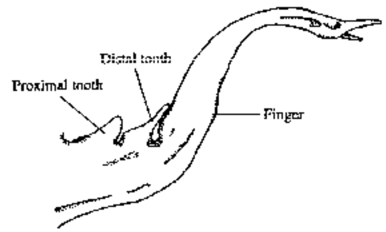


Figure 2. *Streptocephalus mackini* medial view of finger

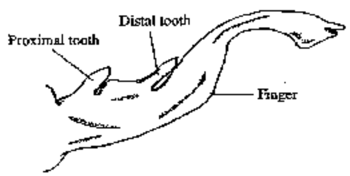


Figure 3. *Streptocephalus texanus* medial view of finger

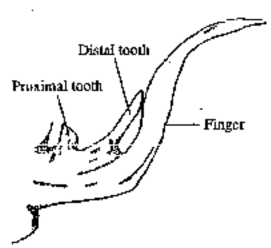


Figure 4. *Streptocephalus sealii* medial view of finger

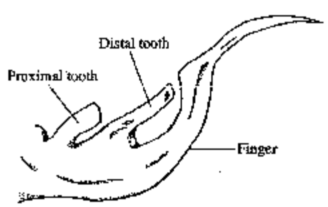


Figure 5. *Streptocephalus woottoni* medial vew of finger

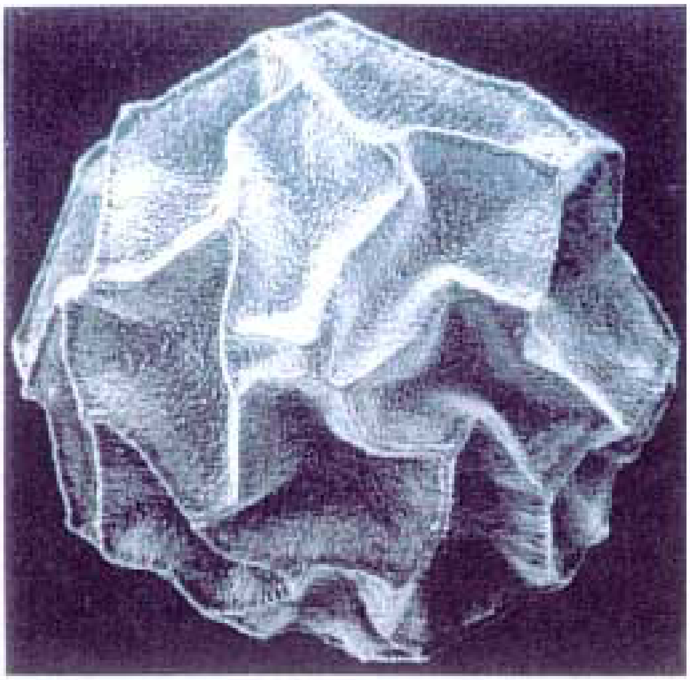


Figure 6A. Streptocephalus cyst exterior view

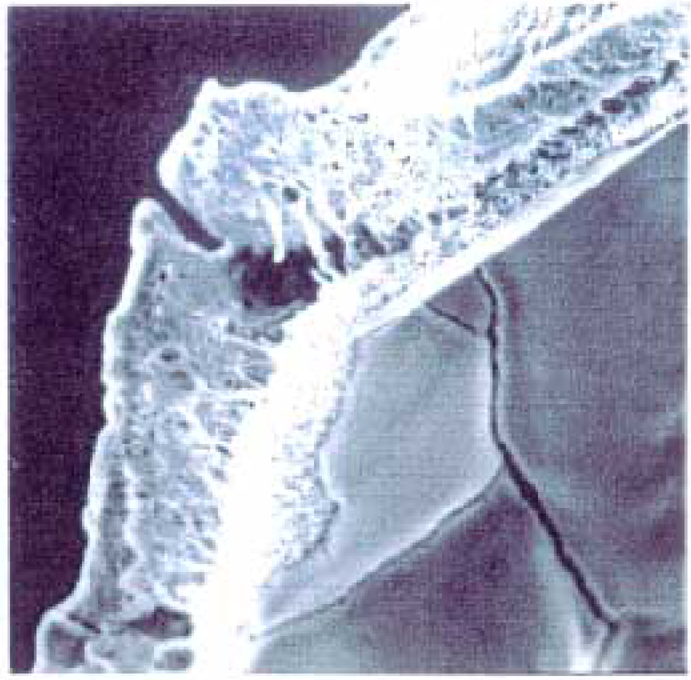


Figure 6B. Streptocephalus cyst cross sectional view

Figure 7. Finger exuviae

Figure 8a. Lateral view of cultured shrimp. Note shape of proximal and Distal teeth.

Figure 8b. Ventral view of cultured fairy shrimp showing the second antenna.

Figure 8c. Ventral view of cultured shrimp hand showing shelf on the distal tooth and flat side of the spatulate proximal tooth.

Culture

Cysts incubated at 23-27°C hatched 1 week after being hydrated. The remaining cultures were combined and incubated at 23-27°C, and hatching occurred within a few days. Mature identifiable specimens were available after 3 weeks. Using light microscopy, males were readily identifiable as *Streptocephalus wootoni* (Figure 8).

DISCUSSION

Five species of *Streptocephalus* occur in California and adjacent areas of Mexico, Arizona, Nevada, and Oregon. The species are segregated into two species groups, primarily separated by variations in the structure of the peduncle.

The torvicornis species group is separated from other North American species groups by the elongated peduncle of the cheiliform outgrowth, the finger without spines or protuberances, and a well-developed spur. Three species are known to occur within 300 miles of Los Angeles.

Streptocephalus dorothae Mackin, 1942 (Figure 1), is separated from other *Streptocephalus* by the conical protuberances on the medial surface of the peduncle, the subapically swollen apex of the finger, and the bilobed frontal appendage. The distal tooth on the finger is broad at the base, becoming slender toward the apex. The basal tooth is less than half the length of the distal tooth and is rounded at the tip. *Streptocephalus dorothae* is reported from Wyoming, the southwestern United States, Baja California, and northern Mexico. In California, it has been reported from a single locality in Riverside County, northwest of Palm Springs near the San Bernardino County border. This species has no regulatory status.

Streptocephalus mackini Moore, 1966 (Figure 2), is not known in California; however, it is found in adjacent Mexico and Arizona. *Streptocephalus mackini* is separated from other *Streptocephalus* by the presence of a subapical swelling at the apex of the finger, armed with a single spine. The teeth of the finger are similar to those of the *Streptocephalus dorothae*. *Streptocephalus mackini* is reported from the southwestern United States and northern and central Mexico. This species has no regulatory status.

Streptocephalus texanus Packard, 1871 (Figure 3), is distinguished from other California *Streptocephalus* by the presence of a lateral lamella, forming a lobe, at the apex of the finger. The distal tooth on the finger is semi-quadrate with the distal corner elongated. This species is known from the United States west of the Mississippi River and in Mexico from Oaxaca north. In California, it has been reported only from the Colorado Desert in eastern Riverside and Imperial Counties. This species has no regulatory status.

The sealii species group is separated from other North American species groups by a lack of protuberances on the medial side of the basal portion of the peduncle and by uniramous ovaries. The

peduncle of the cheiliform outgrowth is of a typical length. Two species of this group are known to occur within 300 miles of Los Angeles.

Streptocephalus sealii Ryder, 1879 (Figure 4) has an elongated distal tooth and a triangular basal tooth on the finger. *Streptocephalus sealii* populations in Oregon, California, and Arizona are found at altitudes of 6,000 feet or higher (Belk 1977, Eng et al. 1990) and are reported from high mountain lakes, ponds, and wet meadows in coniferous forests. In California *Streptocephalus sealii* is known from northeastern Fresno County along the Sierra Nevada and Cascade Ranges to Siskiyou County, west to Del Norte County. This species is widespread from southern Canada to northern Mexico and may represent a species complex (Maeda-Martinez et al. 1995b). This species has no regulatory status.

Streptocephalus wootoni Eng, Belk, and Eriksen 1990 (Figure 5) can be distinguished from all other *Streptocephalus* by the short, spatulate basal tooth on the finger and the semirectangular distal tooth that bears a lateral "shoulder". *Streptocephalus wootoni* is a coastal species and is reported from Los Angeles, Orange, and eastern Riverside and San Diego Counties in California, United States, and from coastal Baja north of Bajamar in Mexico (Brown et al. 1993). This species is listed as an endangered species under the federal Endangered Species Act ([50 CFR 17.11] for listed animals and various Federal Register notices for proposed species).

Scanning electron microscopy and light microscopy of the cysts and portions of exuviae recovered from the soil, combined with identification of adult shrimp reared from those same cysts, demonstrates that a population of *Streptocephalus wootoni* occurs at the LAX project site. No adult *Streptocephalus* were collected during wet season surveys.

CITATIONS

Anderson, G., and S-Y. Hsu. 1990. Growth and maturation of a North American fairy shrimp, *Streptocephalus sealii* (Crustacea: Anostraca): a laboratory study. Freshwater Biology 24:429-442.

Belk, D. 1977. Zoogeography of the Arizona fairy shrimps (Crustacea: Anostraca). J. Arizona Academy of Science 12:70-78.

Brown, J. W., H. A. Wier, and D. Belk. 1993. New records of fairy shrimp (Crustacea:Anostraca) from Baja California, Mexico. Southwestern Naturalist 38:389-390.

Eng, L. L., D. Belk, and C. H. Eriksen. 1990. Californian Anostraca: distribution, habitat and status. Journal of Crustacean Biology 10: 247-277.

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

Hill, R. E., and W. D. Shepard. 1997. Observations on the identification of California anostracan cysts. Hydrobiologia 359:113-123.

Jawahar, A., and H. J. Dumont. 1995. Larviculture of the fairy shrimp, *Streptocephalus probocideus* (Cruatacea: Anostraca): effect of food concentration and physical and chemical properties of the culture medium. Hydrobiologia 298:159-165.

Maeda-Martinez, A. M., D. Belk, H. Obregón-Barboza, and H. J. Dumont. 1995a. Diagnosis and phylogeny of the New World Streptocephalidae (Branchiopoda: Anostraca). Hydrobiologia 298:15-44.

__________. 1995b. A contribution to the systematics of the Streptocephalidae (Branchiopoda: Anostraca). Hydrobiologia 298:203-232.

__________. 1995c. Food-dependant color patterns in Thamnocephalus platyurus Packard (Branchiopoda: Anostraca); a laboratory study. Hydrobiologia 298:133-139.

__________. 1995d. Laboratory culture of fairy shrimps using baker's yeast as basic food in a flow-through system. Hydrobiologia 298:141-157.

U.S. Environmental Protection Agency. 1985. Methods for measuring the acute toxicity of effluents too freshwater and marine organisms. (EPA/600/4-85/013.) Environmental Research Laboratory. Duluth, MN.

U.S. Fish and Wildlife Service. 1996. Interim survey guidelines to permittees for recovery permits under the Endangered Species Act for the listed vernal pool branchiopods. Sacramento, CA.

2.6 1067-007

environmental compliance
resource management planning

December 21, 1998

MEMORANDUM FOR THE RECORD
JN 1067-007.M15

TO:	U.S. Fish and Wildlife Service (Dr. John Bradley)
	California Department of Fish and Game (Mr. Ronald Rempel, Mr. Bill Tippets)
	Los Angeles World Airports (Mr. Steve Crowther)
	Federal Aviation Administration (Mr. David Kessler)
	Landrum & Brown (Ms. Sheila Murphy, Ms. Karen Yamamoto)
FROM:	Sapphos Environmental (Ms. Tracey Alsobrook, Dr. Brad Blood, Dr. Irena Mendez)
SUBJECT:	Results of Directed Summer Surveys for Sensitive Amphibians, Reptiles, California Brown Pelican, California Least Tern, and the Endangered El Segundo Blue Butterfly at LAX/El Segundo Dunes
REFERENCE:	Sapphos Environmental Memorandum for the Record (JN: 1067-007.M08, date April 9, 1998) Subject: Results of Winter Directed Surveys for Burrowing Owls at the LAX/El Segundo Dunes

ATTACHMENTS:
1. Project Location
2. Existing Biotic Communities
3. Location of Pitfall Trap Arrays
4. Representative Photograph of Pitfall Trap Array
5. Field Notes
6. ESB Survey Site and Historical Transect
7. Photographs of Representative Species
8. Distribution of Sensitive Species

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of 1998 directed summer surveys for sensitive herpetofauna (San Diego horned lizard [*Phrynosoma coronatum blainvillei*] and silvery legless lizard [*Anniella pulchra pulchra*]), birds (California brown pelican [*Pelecanus occidentalis californicus*] and California least tern [*Sterna antillarum browni*]), and the endangered El Segundo blue butterfly (*Euphilotes battoides allyni*) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). The results of these surveys indicate the following:

- San Diego horned lizard and silvery legless lizard are present on the El Segundo Dunes, and absent from the LAX airfield.
- No amphibian species were observed within the Master Plan Study Area (Study Area)
- California brown pelican and California least tern are not present within the Study Area. California brown pelican are present off the coast at Dockweiler State Beach and are not expected to occur in the Study Area due to lack of suitable habitat. California least tern occur only at the breeding colony approximately 4 miles north of the Study Area.
- Two thousand one hundred and twenty-nine (2,129) El Segundo blue butterfly (ESB) were observed during five transect walks along the historical transect in 1998. This indicates a significant increase in numbers when compared to transect counts from 1996 and 1997. Presence/absence surveys conducted at the height of the flight season across the entire El Segundo Blue Butterfly Habitat Restoration Area (Habitat Restoration Area) yielded a count of 4,058 ESB. This indicates a significant increase in numbers when compared to presence/absence counts from 1996 and 1997.

These surveys were conducted to address comments provided by the U.S. Fish and Wildlife Service (Service) and the California Department of Fish and Game (Department) in response to the Notice of Preparation (NOP) and Notice of Intent (NOI) for a Joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the *Los Angeles International Airport 2015 Expansion Master Plan*.

INTRODUCTION

This Memorandum for the Record (MFR) summarizes the results of directed summer surveys for sensitive herpetofauna (San Diego horned lizard and silvery legless lizard), birds (California brown pelican and California least tern), and the endangered El Segundo blue butterfly (ESB) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion Master Plan Study Area during the summer of 1998. Los Angeles World Airports (LAWA) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the *Los Angeles International Airport 2015 Expansion Master Plan*. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of sensitive herpetofauna as well as, the endangered California brown pelican and California least tern. In their letter dated August 13, 1997 the Department directed LAWA and FAA to conduct directed surveys for all state designated sensitive species.

This MFR summarizes information regarding the habitat of the Study Area, survey methods and results.

PROJECT LOCATION

Directed surveys were undertaken at Los Angeles International Airport and the Los Angeles/El Segundo Dunes located on the USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary (see Attachment 1).

SURVEY AREA

The Los Angeles International Airport Master Plan LAX 2015 Expansion Study Area includes seven existing biotic communities (see Attachment 2): non-native grassland, disturbed, developed, southern foredune, southern dune scrub, valley needle grassland and disturbed former dune. These biotic communities have been fully described in previous Sapphos Environmental documents, including a Sapphos Environmental MFR transmitting the results of winter directed surveys for burrowing owl at LAX/El Segundo Dunes (MFR JN1067-007.M08, dated April 9, 1998).

SURVEY METHODS

Surveys for the sensitive reptile and amphibian species were conducted in all habitats and plant communities at the El Segundo Dunes and in those biotic communities present on the western LAX airfield. The survey methods for sensitive herpetofauna, birds, and the El Segundo blue butterfly vary, and are described below.

Herpetofauna

Prior to initiation of surveys for sensitive herpetofauna species, Sapphos Environmental and Consulting Biologist, Mr. Peter Bloom, surveyed the El Segundo Dunes and LAX airfield on July 27, 1998. At that field meeting, sites for pitfall traps and board habitats were located and marked on a field map. Potential pitfall sites were examined on foot, and the surrounding habitat was visually surveyed in order to locate each pitfall array in a representative site for that area of the El Segundo Dunes. Eight pitfall

sites were determined to be adequate. Pitfall traps were placed only at the El Segundo Dunes, and not on the LAX airfield. It was determined by Sapphos Environmental and Consulting Biologist, Mr. Peter Bloom, that given (a) the level of disturbance known at the airfield, (b) the severe invasion by exotic plants on the airfield, (c) the routine maintenance schedule, and (d) the nature of the substrate, that walking surveys would be adequate for the airfield. The locations of pitfall trap arrays is provided in Attachment 3.

A pitfall trap apparatus was designed that would best sample the areas and that would not form a permanent barrier to animals living in the vicinity of each array. A photograph of a representative pitfall trap array can be found in Attachment 4, Representative Photograph of Pitfall Trap Array. Arrays were placed so that they would not disturb any coast buckwheat (*Origanum parvifolium*). Each array contained seven buckets, which consisted of one central bucket, and three arms with two buckets each. Each bucket was placed approximately 30 feet from the nearest bucket and sunk into the ground so that the opening was flush or slightly lower than the surrounding substrate. Drift fencing made of shade cloth was installed between each bucket. The shade cloth fencing was buried approximately 0.5 ft. into the ground, and protruded approximately 1.0 feet above the ground. Each drift line fence terminated in a pitfall trap bucket (five gallon plastic buckets with modified lids). Wooden "feet" were attached to the lid so that when the trap was opened and the lid was inverted and placed above the bucket opening, the feet straddled the bucket opening. The lid then provided shade and also limited the trap opening to a vertical clearance of approximately 1.5 to 2.0 inches which prevented larger animals, such as red foxes from preying upon the animals in the traps.

Eight pitfall trap arrays were installed on the El Segundo Dunes on August 18 and August 19,1998, by Sapphos Environmental (Ms. Tracey Alsobrook and Dr. Brad Blood) and Consulting Biologist, Mr. Peter Bloom and his assistant Mr. Andrew Fisher.

Three pitfall trap sessions were each run for three consecutive nights. Traps were inspected every morning and emptied of all trapped organisms. Each animal was identified and released and captures were recorded as to date, and array and bucket number. Copies of field notes are provided in Attachment 5, and original field notes and original survey maps are on file with Sapphos Environmental. Pitfall trap surveys were conducted on August 19, 20, 21, 25, 26, 27 and September 2, 3 and 4, 1998. Sapphos biologists holding valid State of California scientific collecting permits performed all sessions (Ms. Tracey Alsobrook, Permit No. 801037-01; Dr. Brad Blood, Permit No. 801244-03). At the end of each trapping session the lids were closed in order to prevent any organisms from falling into the bucket between trapping sessions.

Thirty 4 foot by 4 foot plywood boards were placed over the subsites (across the El Segundo Dunes). These boards were left in place and checked once per week. Animals seen under the boards were identified as to species, and the date and subsite location recorded.

In addition, walking transects were conducted across the El Segundo Dunes and western LAX north and south airfield. Walking transects were performed on the El Segundo Dunes by Sapphos Environmental biologists prior to opening the pitfall trap arrays. After the pitfall trap arrays were in place, limited directed searches were performed in areas with potential to support the silvery legless lizards. Transects were walked from north to south across all subsites on the El Segundo Dunes. Observers noted the presence of all species seen and any signs of species not directly observed (i.e. scat and tracks). Transects across the LAX airfield were performed by Sapphos Environmental biologists Dr. B.

Blood, Ms. T. Alsobrook, assisted by Ms. K. Phillips and Ms. V. Tersoro. The north airfield was surveyed on August 20, 1998 and the south airfield was surveyed on August 27, 1998.

Birds

California Brown Pelican and California Least Tern

Summer bird surveys took place during the morning hours of July 8, 15, 22, 29, and August 6, 12, 18 and 26, 1998. An observation station was established at a location just west of the VOR which afforded observers a clear view of the coast immediately adjacent to Dockweiler State Beach, and the western extent of the El Segundo Dunes. Observers from Sapphos Environmental (Ms. T. Alsobrook, Dr. B. Blood) scanned the immediate coast with binoculars and a spotting scope. Observations of all species of birds seen were noted. Special notes were made of California brown pelican indicating numbers seen and direction of flight.

Sapphos Environmental biologists inspected the California least tern colony on three occasions. Notes were made of numbers of birds, and distance and direction of flight when feeding. In addition, notes were made of how high the birds flew during foraging flights.

El Segundo Blue Butterfly

The 1998 El Segundo blue butterfly flight season commenced on July 1, 1998 and extended through September 9, 1998. During the 1998 flight season, two separate sets of surveys were conducted. Transect surveys were conducted along the historic transect route that has been surveyed since 1984 and, for the third consecutive year, the entire Habitat Restoration Area was surveyed to determine the presence or absence of ESB. The historical transect has been surveyed by Sapphos Environmental since 1995 in support of on-going maintenance and monitoring activities for Los Angeles World Airports (Environmental Management Bureau). Presence/absence surveys have been conducted by Sapphos Environmental since 1996 in support of the *Los Angeles International Airport 2015 Master Plan* EIR/EIS. All 1998 surveys for ESB were conducted pursuant to U. S. Fish and Wildlife Permit # TE830990-0. A *Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July, August and September 1998* was prepared for the U. S. Fish and Wildlife Service upon conclusion of the 1998 monitoring period (Sapphos Environmental 1998).

Historical Transect

The transect route is illustrated in Attachment 6, ESB Survey Site and Historical Transect. The historical transect meanders approximately 1.5 miles through foredunes to the west of the Very High Omni Range Navigation Beacon (VOR), and along the top and toe of the backdune within the Habitat Restoration Area. The transect route, originally laid out by Mattoni in 1984 (and modified in 1986 to be more comprehensive), was designed to sample all habitat types which were recognized during a cursory walk-through at that time (Mattoni 1990). The transect was intended to include what was considered high quality ESB habitat, indicated by the presence of coast buckwheat (*Origanum parvifolium*), and low quality habitat, according to anthropocentric judgement (Mattoni, 1990). At the present time, the transect continues to traverse areas of non-uniform habitat which include: areas where coast buckwheat is no longer thriving, areas where coast buckwheat is thriving and recruiting seedlings

as a result of restoration activities, areas where coast buckwheat coexists with weedy non-native species, and areas devoid of buckwheat.

The transect is staked and is comprised of 35 intervals from beginning to end. Surveys along the historical transect were conducted on seven days during the height of the ESB flight season, from July 17, 1998 to September 9, 1998. The transect was surveyed: July 11, 17, 24, August 3, 11, 25 and September 9, 1998. The surveyor walked the transect from interval 1 - 35 and observed the number of adult ESB's along the route within 10-15 feet on either side of the centerline of the transect. Numbers were recorded as males, females, or undetermined in the case that the sex cannot be determined. Observations were recorded on standardized field data sheets in the appropriate transect interval. Hand held weather instruments were used to measure air temperature and wind speed. Cloud cover was also noted. The transect was surveyed during optimum weather conditions. Dr. Richard A. Arnold and Dr. Irena Mendez conducted all transect walks during 1998 pursuant to U. S. Fish and Wildlife Permit # TE830990-0.

Presence/Absence Surveys

The presence/absence survey over the entire Habitat Restoration Area was conducted during roughly the same timespan as the transect. These surveys were conducted by a team of researchers who surveyed all 61 subsites within the Restoration Area during 1998. Subsites were delineated by Mattoni (1990) and with minor modifications remain the same today. They have become reference points for all data collection. Presence/absence surveys were conducted between July 24 and July 28, a five-day period that coincided with the height of the 1998 flight season. During the presence/absence surveys, all subsites were surveyed once during the 5-day survey period. For the presence/absence surveys, an observer surveyed each buckwheat plant once, while looking for adult ESB butterflies. Observations were noted on standardized field data sheets and their locations were mapped on an acetate overlay to an aerial photograph of the site at one inch equals forty feet scale. As in the historical transect surveys, observations were recorded as males, females, or undetermined in the case that the sex could not be determined. Hand held weather instruments were used to measure air temperature and wind speed. Cloud cover was also noted. Presence/absence surveys were conducted during optimum weather conditions. Presence/absence surveys were conducted by Dr. Richard A. Arnold, Barrett Anderson, Dr. Oakley Shields, Tracey Alsobrook, Anne Dove, Marie Campbell, and Dr. Irena Mendez, pursuant to U. S. Fish and Wildlife Permit # TE830990-0.

RESULTS

Herpetofauna

Walking transects of the LAX airfield provided sightings of side-blotched lizard and two dead southern alligator lizards. No individuals or sign of San Diego horned lizard or silvery legless lizard were observed on the LAX airfield.

A summary of pitfall trapping results on the El Segundo Dunes is summarized in Table 1, *Results of Summer 1998 Pitfall Trapping at the El Segundo Dunes*. No amphibians were found during these surveys. Three species of lizard were observed in the pitfall traps: side-blotched lizard (*Uta stansburiana*), San Diego horned lizard and southern alligator lizard (*Gerrhonotus multicarinatus*).

TABLE 1
RESULTS OF SUMMER 1998 PITFALL TRAPPING AT THE EL SEGUNDO DUNES
8/19/98 THROUGH 9/4/98

	SPECIES					
Array No.	Side-blotched lizard	San Diego Horned Lizard	S. Alligator Lizard	House Mouse	Sun Spider	Scorpion
3	65	5	0	0	0	94
15	72	2	0	0.	0	58
23	69	7	0	1	0	94
31	58	1	0	2	0	92
39S	47	2	2	0	1	14
40N	66	8	1	3	5	19
54	67	3	0	1	0	69
58S	67	0	0	0	3	76

An additional three species of reptiles are known to be present on the El Segundo Dunes based upon direct observation: silvery legless lizard, common gopher snake (*Pituophis melanoleucus*) and common kingsnake (*Lampropeltis getulus*). During the course of earlier wildlife surveys Sapphos Environmental personnel directly observed common gopher snake and silvery legless lizard. LAX employees and volunteer workers have reported observations of common kingsnake, gopher snake and silvery legless lizard on the El Segundo Dunes.

Walking transect surveys of the El Segundo Dunes resulted in observations of two of the three lizard species found in the pitfall traps: side-blotched lizard and San Diego horned lizard. Representative photographs of individuals observed at the El Segundo Dunes can be seen in Attachment 7, Photographs of Representative Species.

Following is a brief description of the distribution of each reptile species known to occur on the El Segundo Dunes as a result of pitfall trapping or direct observation:

- Side-blotched lizards were found in large numbers across all subsites on the El Segundo Dunes. This species was the most commonly observed reptile during these surveys.

- San Diego horned lizard, a California Species of Special Concern, was found to be widely distributed across the El Segundo Dunes. San Diego horned lizard individuals were found in 7 of 8 pitfall trap arrays. It was absent from the array on subsite 58S (situated north of Sandpiper Street). This species was not observed on the LAX airfield and is assumed to be absent from the airfield. Pitfall trap results indicate this species was most abundant on subsites 40N and 23. The known distribution of San Diego Horned Lizard is shown in Attachment 8, Distribution of Sensitive Species.

- Southern alligator lizard was found on only two subsites, 39S and 40N and on the southwest corner of the airfield.

- Silvery legless lizards were observed during winter and spring wildlife surveys on subsites 3, 53, 40S, and 36N. The known distribution of silvery legless lizard is shown in Attachment 8, Distribution of Sensitive Species.

- Common gopher snakes have been observed on subsite 56N (north of Sandpiper Street), subsite 53, near Vista del Mar Park, and along Imperial Highway.

- Common kingsnake was observed by LAX employees on subsite 33.

Birds

California Least Tern and California Brown Pelican

California brown pelicans were observed flying over the ocean on all survey days. A maximum of 26 birds were seen on a single day over a two hour period. The majority of California brown pelicans were observed flying north at low altitudes over the open ocean.

Although expected to occur offshore, no California least terns were observed during the directed surveys. The California least tern colony situated just north of the Marina del Rey breakwater and approximately four miles north of the Study Area was visited on three occasions. California least terns were observed flying no higher than 30' to 40' in altitude and their foraging was restricted to the immediate offshore area. Personal observation by Sapphos Environmental biologists indicated that a majority of the California least terns had departed from the Marina del Rey colony by August 12, 1998 and all California least terns had departed by August 26, 1998.

At no time were any individuals of California brown pelican or California least tern observed over the El Segundo Dunes or over the LAX airfield.

El Segundo Blue Butterfly

Although the route has remained basically the same each year, the number of days of sampling for ESB has varied over the years. On average, the transects have been conducted approximately one week apart; some years beginning slightly earlier in the calendar year and ending later than in other years. Conducting transects at one week intervals reduces the likelihood of counting the same butterfly twice, but does not preclude it. These two factors must be considered when comparing the total butterflies counted each year.

Results of surveys along the historic transect are shown in Table 2, *ESB Observed along Historic Transect*. Two thousand one hundred and twenty-nine (2,129) ESB were observed during five transect walks in 1998. This number is significantly greater than the number of ESB observed during the 1997 season. The low number of butterflies observed in 1997 are attributed to the surveys being conducted past the peak of the flight season. This was unavoidable since surveys were conducted under U. S. Fish and Wildlife Service sub-permits and these were not issued until the later part of the butterflies flight season.

TABLE 2
ESB OBSERVED ALONG HISTORIC TRANSECT

Year	# of samples	Span of days	# of ESB observed
1984	4	19	193
1985	no data	—	—
1986	5	35	258
1987	9	56	473
1988	10	61	1049
1989	11	54	1390
1990	10	63	1192
1991	12	90	906
1992	15	111	1051
1993	10	58	925
1994	8	63	500
1995	10	69	1,239
1996	4	21	1455
1997	4	23	126
1998	5	31	2,129

The source for ESB counts for the years 1984 through 1994 is Table 13 of Mattoni's 1994 *Final Report.*

Results of the presence/absence surveys since 1996 are provided in Table 3, *ESB Observed Across the Entire El Segundo Blue Butterfly Habitat Restoration Area*. A total of 4,058 ESB were observed during the whole Dunes survey.

TABLE 3
ESB OBSERVED ACROSS THE ENTIRE
EL SEGUNDO BLUE BUTTERFLY HABITAT RESTORATION AREA

YEAR	# OF MALE ESB	# OF FEMALE ESB	# OF ESB OF UNDETERMINED SEX	TOTAL
1996	1225	782	86	2093
1997	380	259	84	723
1998	2513	1416	129	4058

Some of the older plantings in the Restoration area are now seven years old, however, the bulk of the restoration plantings were completed in 1994, making them four years old when the ESB surveys were conducted in 1998. At four years of age, these plants are just becoming large enough to support the ESB. Nevertheless, ESB were observed in all areas within the Habitat Restoration Area, with some areas supporting higher numbers than others. Some of the seven year old restoration plantings now support the highest concentration of ESB.

Other Species

Other species observed in the pitfall traps include: house mouse (*Mus musculus*), El Segundo sun spider (*Eremobates* new species), scorpion (*Vejovis* sp.), sand roach (*Arenivaga* sp.), mole cricket, western short horned walkingstick (*Parabacillus hesperus*), minor ground mantid (*Litaneutria minor*), California mantid (*Stagmomantis californica*), globose dune beetle, stick bug (*Eleodes* sp.), woolly darkling beetle (*Cratidus oscalons*), velvet ant, millipede, and several unidentified spiders.

DISCUSSION

The following discussion relates to those species which are known to occur on the El Segundo Dunes either through pitfall trapping or direct observation.

- Side-blotched lizards are often one of the most common ground-dwelling species of lizard in southern California. They are habitat generalists and so are able to adapt to many situations.

- San Diego horned lizard is found in arid or semi-arid areas, coastal sage, chaparral, and sagebrush scrub (Schoenherr 1976). It typically requires an abundance of native ants and open areas with limited overstory for basking, and low, but relatively dense shrubs for refuge (Jennings and Hayes 1994). The entire El Segundo Dunes provides suitable habitat for this species except for the area north of Sandpiper Street. The LAX airfield does not provide suitable habitat due to the level of disturbance, routine maintenance schedule and invasion by exotic plants - especially grasses and iceplant.

- The silvery legless lizard inhabits riparian, oak woodland, and upper alluvial fans of coastal sage scrub (Schoenherr 1976). This lizard requires sandy soil for its subsistence, and is unable to live in hard-packed soils, because it lives almost entirely underground. Silvery legless lizards also require damp soils and are never found in dry soils. Therefore, this species has only been found at sites on the El Segundo Dunes with loose-packed sand and under boards that trap moisture. They are not expected north of Sandpiper Street or on the LAX airfield due to the heavier hard compacted soils and greater level of disturbance.

- The El Segundo sun spider at the El Segundo Dunes is possibly a new species of sun spider. Sun spiders as a group are found in hot arid regions. They are good diggers and construct burrows for nesting in soil under objects such as wooden boards, stones, or logs.

- California brown pelicans breed on the Channel Islands in California. They are present in southern California year-round. Their numbers increase in summer and fall with an influx of post-breeding migrants from Mexico. The protection of California brown pelican roost sites is included as a primary objective in the *California Brown Pelican Recovery Plan* (U.S. Fish and Wildlife Service 1983). There are no roost sites at the El Segundo Dunes or at Dockweiler State Beach. The nearest major California brown pelican roost site in the vicinity of LAX is at the Marina del Rey breakwater. The roost site at Marina del Rey is a reliable, high-capacity roost site and is one of the largest along the southern California mainland. In censuses conducted between December 1991 and June 1992 over 1,000 birds were counted during each survey (Jaques et al. 1996). The California brown pelicans observed during the 1998 summer surveys conducted by Sapphos Environmental were most likely birds heading northward from their breeding grounds in Mexico, possibly roosting at Marina del Rey. California brown pelicans are not expected to roost at the El Segundo Dunes, because this species prefers to roost in habitats that are at least partly surrounded by water (Jaques et. al. 1996).

- California least terns breed at a protected site on Venice Beach just north of the Marina del Rey channel. They arrive as early as the first week in April and depart in late summer for their wintering grounds south of the United States. In 1996, the California least terns arrived at Venice Beach on approximately April 10, 1996 and departed on approximately July 28, 1996. A preliminary figure for 1998 indicates an increase to 356 nests from 271 in 1996 (Keane, personal communication 1998). At Venice Beach, a study of foraging ecology revealed that at least 60% of all foraging took place within approximately 2 miles of the nesting sites (Atwood and Minsky 1983). Foraging areas are characterized by relatively shallow, near shore ocean water in the vicinity of major river mouths (Atwood and Minsky 1983). Observations by Sapphos Environmental of the California least terns foraging near the Marina del Rey colony support this data.

CONCLUSIONS

Herpetofauna

Based on the results of pitfall trapping and walking transects, San Diego horned lizard is expected to occur on all subsites south of Sandpiper Street. It is not expected to occur on the LAX airfield due to lack of suitable habitat and the prevalence of thick grasses, ice-plant and other invasive, exotic plant species.

Based upon observations of individuals and habitat, it is expected that the silvery legless lizard is wide spread at the El Segundo Dunes south of Sandpiper Street. However, the exact distribution is currently unknown and future surveys are recommended during late winter and spring when this species is known to occur closer to the ground surface.

Birds

California Least Tern and California Brown Pelican

California brown pelican and California least tern do not occur within the Study Area. California brown pelican occurs regularly offshore, while California least tern occurs seasonally at the Marina del Rey breeding colony approximately 4 miles north of the Study Area. California least tern may occur offshore during migration, and possibly while foraging.

El Segundo Blue Butterfly

The numbers from the ESB transect study and the presence/absence study should not be combined because the transect area was included within the area surveyed for the presence/absence study. The transect number represents five weeks of sampling, whereas the whole Dunes number is a one-time count. Nevertheless, it is instructive to note that the one-time survey of the whole Dunes yielded nearly twice as many ESB as had been counted over a whole season along the transect in any previous year.

Though absolute numbers of ESB present at the Dunes are not known, this nevertheless indicates a significant increase in its population over the past years on record.

Other Species

The El Segundo sun spider, a species of local concern, is expected to occur more broadly than results indicate. Suitable habitat and prey occurs throughout the El Segundo Dunes. Future surveys would provide additional distribution data on this species.

Should there be any questions regarding the information contained in this memorandum, please contact Sapphos Environmental (Ms. Tracey Alsobrook or Dr. Brad Blood) at (626) 683 3547.

REFERENCES

Atwood, J.J. and Dennis F. Minsky. 1983. "Least Tern Ecology at Three Major California Breeding Colonies." *Western Birds*, 14(2):57-71.

City of Los Angeles, Department of Airports. (1990). *Species Diversity and Habitat Evaluation Across the El Segundo Sand Dunes* at *LAX*. Prepared by Mattoni, R. H. T., Agresearch, Inc. 9620 Heather Road, Beverly Hills, California 90210. Prepared for The Board of Airport Commissioners, One World Way West, Los Angeles, California 90009

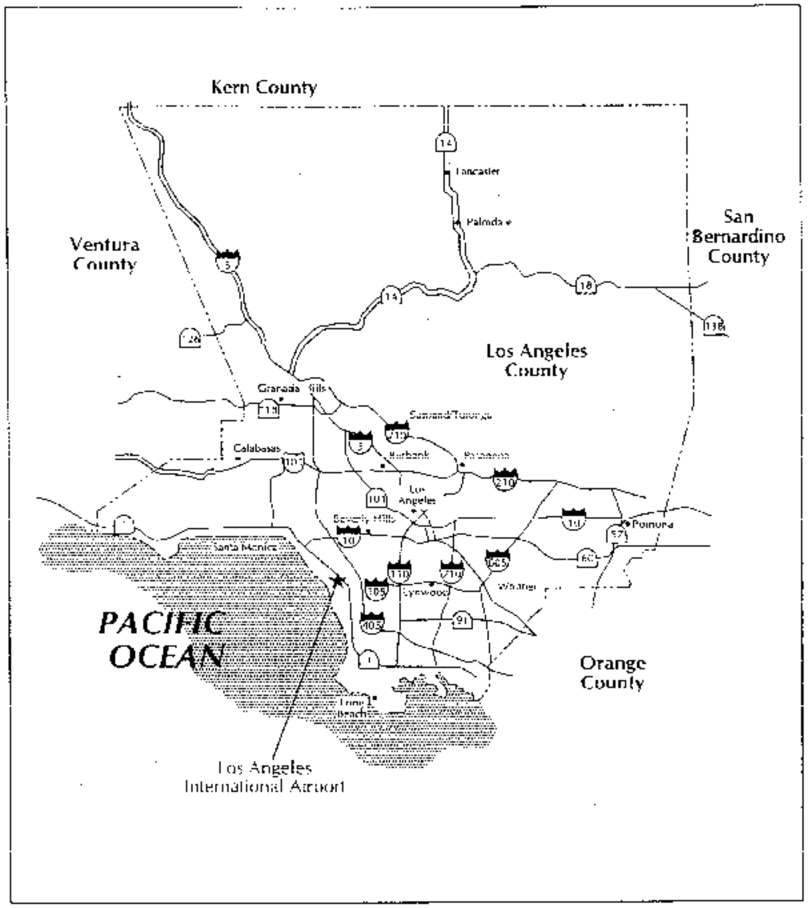
Jacques, D.L., C.S. Strong, T.W. Keeney. 1996. *Brown Pelican Patterns and Responses to Disturbance at Mugu Lagoon and Other Nonbreeding Sites in California Bight*. U.S. Department of Interior. Tuscon, AZ

Jennings, M.R. and M.P. Hayes 1994. *Amphibian and Reptiles Species of Special Concern in California*. California Department of Fish and Game.

Sapphos Environmental. 1998. Memorandum for the Record 1043-010 M01, Subject: El Segundo Blue Monitoring Activities for the 1998 Flight Season at Los Angeles International Airport, December 17, 1998

Schoenherr, A.A. 1996. *The Herpetofauna of the San Gabriel Mountains Los Angeles County, California*. Special Publication of Southwestern Herpetologist's Society.

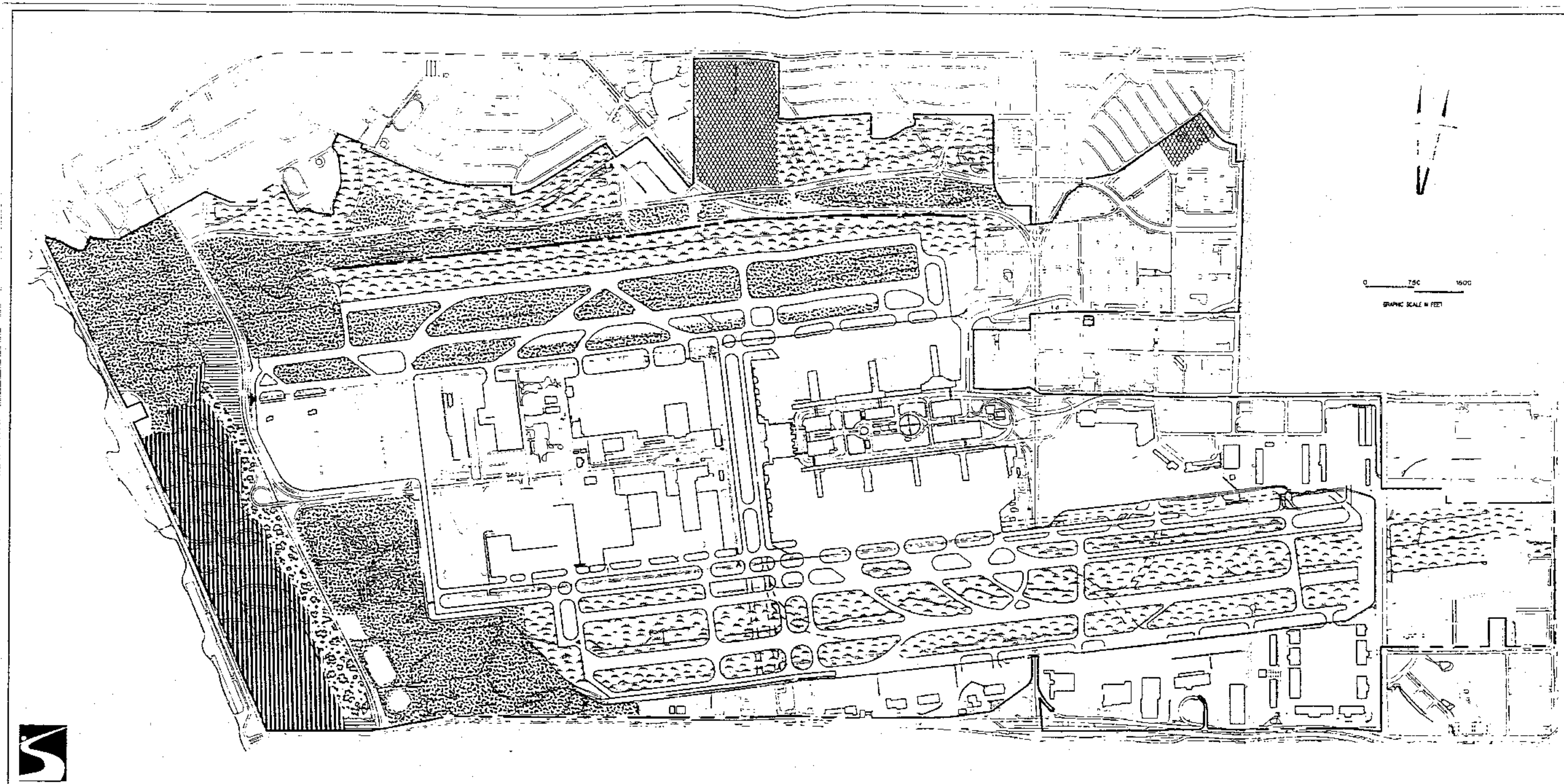
ATTACHMENT 1
PROJECT LOCATION



Not to Scale

ATTACHMENT 1
Project Location

ATTACHMENT 2
EXISTING BIOTIC COMMUNITIES



LEGEND

Non-Native Grassland/Ruderal
Disturbed
Southern Dune Scrub
Airport Boundary
Landscaped
Valley Needlegrass Grassland
Southern Foredune
Drainage Ditch

ATTACHMENT 2
Existing Biotic Communities

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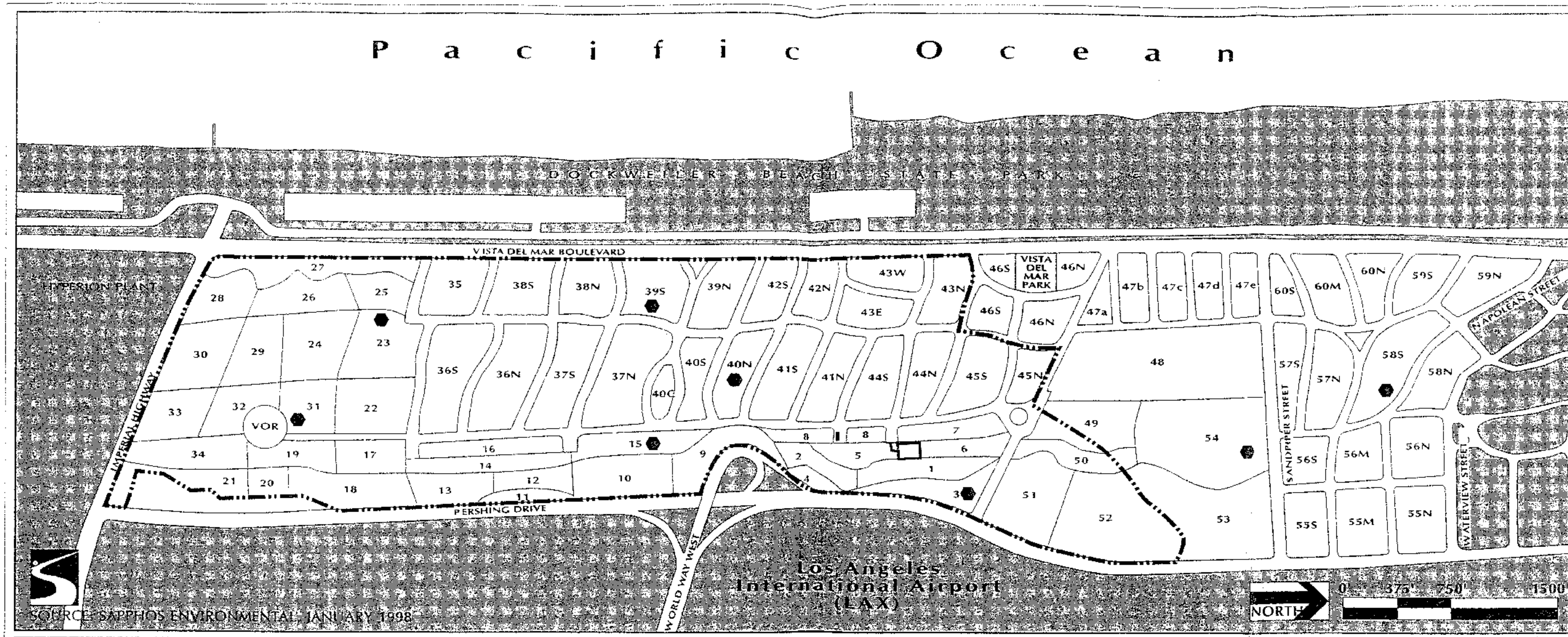
ATTACHMENT 3

LOCATION OF PITFALL TRAP ARRAYS



LEGEND

Road System (Many Subsites Are Delineated by Road System)

Habitat Restoration Area Boundary

Subsite Number (21)

Remote Communications Site

Very High Omni Range Navigation Beacon (VOR)

Trailer

Pitfall Trap Arrays

ATTACHMENT 3
Location of Pitfall Traps

ATTACHMENT 4

REPRESENTATIVE PHOTOGRAPH OF PITFALL TRAP ARRAY

Pitfall Trap Array at Subsite 31

ATTACHMENT 4
Representative Photograph of Pitfall Trap

ATTACHMENT 5
FIELD NOTES

7/8/98

Sapphos Environ

B Blood

1067-007

Summer Bird Surveys

7:30 AM

I drove to several locations throughout the Dunes in order to decide the best locations to set up viewing stations for Ca. brown pelican & Ca least terns. I chose 1 location next to the bunker, 1 central location on the low road, and 1 location near the east culverts next to sand piper. The ocean can be clearly seen from these areas (see site maps).

Suggested protocol is to spend 30 min at each location — scanning ocean. Between stations spend 15 mins scanning air field from the road. If need drive to the wider beach to get a closer view of birds

(2)

7/8/98

1067-007

OBSERVATIONS

South viewing station

- Rock Dove - on beach
- West. Gull " "
- Amer. Crow
- Brown Pelican - 6 ±150 yds offshore flying to south.
- Small pale terns - too far out to identify ≈ 300 yds offshore slow fluttering flight.
- Morning dove - Dunes
- Loggerhead - "
- Amer. Kestrel "
- Willets - ≈ 15

Central Viewing Station
rock dove on beach
western gull
20 surf scoters ≈ 100 yds off
shore in water

North Station
3 brown pelican ≈ 50 yds off shore
flying south
Flock ≈ 20 willets flying N
over shore line
Flock of mixed species of sandpipers
large + small terns feeding
far off shore in vicinity
of a fishing boat.
whimbrel - 2
Surf Scoter ≈ 15 @
50 yds off shore
1 feeding b. pelican

7/15/98 (1)

T. Alsobrook

Summer Bird Survey at El Segundo Dunes

Date - Wednesday, July 15 1998
Time 8:00 am
Observer: T. Alsobrook
Weather Conditions 60°
hazy visibility .5 mile, wind < 5 mph.

8:00 Arrived at Dunes. Drove to area where Dockweiler Beach visible. Set up scope. Observed area between concrete pier to the south and rock breakwater to the north for approx. 2 hrs

10:00 am Drove slowly along road closest to ocean in Dunes looking for pelicans and/or terns.

10:15 am Departed

Species list

(1) Ca brown pelican ‖ ~~||||~~ +19 N 1 - 5
Heermans gulls 35, 30
rock dove 25, 20
willet 32
marbled godwit 3
Western gull 25+
Ca gull 5
American crow 4 + 8
mourning dove 3
loggerhead shrike 1

(1) seen flying over open ocean approx. 1/8 mile - 50' offshore, direction of travel noted
species observed on Dockweiler State Beach

7/26/78
Sapphos Envir.
B. Blood
T. Alsobrook

Summer Bird Surveys
1067-007

0800: Met Tracey at Dunes' Gate.
Weather: overcast and cool 63-65°F
slight wind.
Drove to Least Tern Colony at
Ballona. Located colony on
Beach. Many birds still
present. Nesting is over.
Many juvenile least terns present.
Least terns were observed in
the fenced area of the nesting colony,
also many birds observed sitting
on beach surrounding the
fenced area.
Birds were also observed
foraging over the ocean.
Most were foraging within
100 m of shore line, and most
of these were juveniles.

Sapphos Environ.
1067-007
B. Blood
T. Alsobrook

Summer Bird Survey

We observed the least terns flying
and foraging over the ocean.
Those foraging nearest the shore
were not observed to fly above
50'. Those least terns observed
foraging and flying further out
≈ 300m were at an altitude of
less than 100'.

7/24/97
Sapphos Gurrow
1067-007
B. Blood
F. Holsobrook.

Dunes observation

Returned from Least Tern Colony and set up and observation station west of the VOR.

Used binoculars, spotting scope to scan offshore area. esp. those areas off flight path.

Species observed

Co. b. pelican 7 flying North
Ca. Rock dove: on state beach - many
W. gull (adults on State ...). many.
Am. Crow: over state beach
Heermann gull: on Beach many.

Co. b. pelican THH III - ~~fo~~ Flying south.
Terns.
Caspian Tern - Foraging near an offshore fishing boat.
Willet 1 on beach.

[illegible]

1062 [illegible]

Sapphos Environmental

B. Blood / T. Alosbrook

Summer Bird Surveys

5 00 am

Set up observation point

weather clear over [illegible] overcast

skies not normal, but clearing

wind 5-10 mph, Temp ≈ 68 [illegible] °F.

Species list

Rock Dove > 50

W gull [illegible] Deer [illegible] State Beach

H Gull ≈ 10

Starlings Large flock on Dunes

Ca brown pelican ~~THIII~~ flying north

Pacific ~~white-sided~~ Common Dolphin 11

Caspian tern ~~HH~~ - flying N.

Small (gull terns (Least) ~~THIHH~~ } 100 - 300 yds off shore.

[illegible] no [illegible] on tail

Heermann's gull

w gull

[illegible]

Sapphos Environmental

1062 [illegible]

B. Blood / T. Alosbrook

Summer Bird Survey

weather Overcast

65°F

visibility 1-5 miles

Arrived and set up observation station

Scanned N-S over beach and open ocean

at regular intervals. Fog ↓ visibility.

Species list

Am Black-bellied Plover 1

W gull 2

Heermann's gull ≈ 10

[illegible] ≈ [illegible]

Rock dove - [illegible]

Sanderling 2

Whimbrel 1

Pelican 9 - flying North

D. c. Cormorant 1

[illegible] 11

[illegible]

8/6/93
Sapphos Environmental
1067-007
B. Blood/T. Alsabrook

TAA + I went to the Least Tern Breeding Colony. Approximately 12-20 Least Terns were still present. 1/3 of these juveniles - some of which were being fed by Parents, some were foraging on their own. Foraging Least Terns were observed flying out only 20-30 yds off-shore from breeding colony. Also in enclosure were 8-10 Blk-bellied Plovers.
on Beach next to Enclosure was a flock ≈ 70 Western Sandpipers; approximately 6 Western Snowy plovers.
Colony should be empty within 2 weeks.

Returned to Desmond.

T. Alsobrook
1067 CO7

Summer Bird Surveys at
El Segundo Dunes

Date - August 18, 1998
Time 6:00 am
Observer T. Alsobrook
Weather 60° 70° F, 50% overcast,
wind < 5 mph

Drove to area with good
view of Dockweiler Beach
+ ocean. Scoped the area, over
the Dunes + out over the
ocean.

Species
beach rock dove ≈ 100
American crow 7
willet 5
western gull III
Heermann's gull 30
Ca gull 20
Ca brown pelican IIII (flying north

Dunes
loggerhead shrike III
American kestrel II
American crow I
Anna's hummingbird I
European starling 50

05/12/10 [illegible]
1067 [illegible]

Summer Bird Surveys at
El Segundo Dunes

Date - Wednesday, August 12, 1998
time 6:00 am
Observer T. Alsobrook
Weather Conditions 57°F - 73°
90% clear, wind < 5 mph

Drove to area with good view of beach + ocean. Set up scope. Surveyed beach + ocean area west of Dunes as well as Dunes area visible.

Species observed
beach
whimbrel 1
rock dove ≈ 75
Ca gull 40
Heermann's gull ≈ 50
American crow 1
terns (8) light wings, small flying south
willet ||
western gull ||
Ca brown pelican || (flying north just skimming the water)

Dunes
European starling 75
mourning dove ||||
American crow 1
loggerhead shrike ||
American kestrel ||
Anna's hummingbird ||

8/26/10

Sappho's Environmental

R. Blood, T. Alaabrook

1067-007

Summer Surveys: Birds.

Time: 0800

Weather: cool ± 65°F, mostly clear, good visibility.

Arrived at Dunes and drove to observation station.

Species observed:

on Beach.

- Rock Dove >50
- western Gull >30
- Herman's Gull ± 10
- Amer. Crow 3
- Starlings: many - same flock as has been observed on several occasions.

Over Ocean:

- Forster Terns >80 flying ± 300 yds out.
- CA. Brown Pelican: 15 - Birds were observed

flying both northward and southward. Several were observed fly backward forth over shore: Hunting?

We made a visit to the least Tern Colony. All least Terns were gone. A flock of western sandpipers was present on beach infront of enclosure. Also some sanderlings.

Sappho Environmental
1043-005 / 1067-007
B. Blood / P. Bloom

Reptile / Amphibian Survey Planning

1100 AM: met Pete at the Dunes Gate, Tracy let us in. We drove to the trailer and looked over a map of the Dunes and Airfield. We determined where the best localities would be to place pit-fall trap arrays. B/c of the ground conditions, and FAA regulations, and highly disturbed nature of the western airfield we decided not to place pit-fall traps on Airfield. - But to cover those areas with walking transects.

We discussed that a combination of techniques would be best in the Dunes situation: pit-falls, walking, and wood planks.

Sappho Environmental
1043-005 / 1067-007
B. Blood / P. Bloom

We mapped out placing approximately 6 pit fall arrays in strategic localities: See attached map. Pitfall arrays are lettered A-A', B, C, D, D', and E. (' indicates pit fall will go in if there is budget for time + material). Pete estimates that he and 2 can do 2-3 ~~pit~~ pit-fall arrays in 1 8 hr. day. But he thinks that it will 4 day approximately for him and 2 to do 5 or 6

Each array will be 300' long with (mesh) shade cloth (small screen like ~~grade~~ opennings). The Shade Cloth should be 24" in height, we will bury up to 12" of this into the soil between Traps.

X 23178
Sypphos Environ.
1043005
B Blood / Pete Bloom

Each array will be linear ≈ 300' in length with 14 buckets total 7 pairs arranged as shown

We choose linear arrays b/c of the simplicity of the habitat.

Each bucket will be 5 gallons w/ a lid - lid needs to be beveled and have 3 legs attached -
legs are 1-3" square pieces of pine that are 4" long and we can screw them in place. Legs are attached to top so that lids can be placed back on bucket to close it off.

Sypphos Environ
1043005
B.Blood / Pete Bloom

Stakes for cloth fence placed every 5-10'. Stakes are 3' long, 2" to 4" square. Shade cloth put on w/ staples and staple gun

We visited subsites on map.

2nd option
Wood: use cheap 3/8" plywood if possible and put 2 4'x4' squares in each of 20-24 subsite (ea. subsite if possible).

3rd option - Walking line Transects
We will combine walking transects with the placement of wood debris.

11/4/11/10
Sapphos Environmental
1043 005
B Blood, P. Bloom

After Reviewing a Map of the study area Pete and myself drove to each site of a proposed pit Fall Trap array and surveyed the area. At each site we determined the proper alignment for each. We determined that for the VOR area a linear pit fall array of approx 300' would be appropriate.

In fact, after viewing each site it was determined that each pit fall array would be a linear length of 300' with 14 buckets along each array.

We placed a stake with a blue flag at the end point of each proposed pit fall array.

Proposed locations are noted on the field map.

5

Sapphos Environ
1043005
B Blood, P. Bloom

Also noted on the field Map are proposed locations of the wood debris shelters. If possible we will place wood planks + palettes in each subsite.

Pete + I will compare schedules to determine when to install the pitfalls. I will Check budget for projects.

6

6/13/10

Sapphos Environmental
1067-007
B. Blood, T. Holbrook
P. Bloom, A. Fisher

Summer Herp Surveys

0600: met T. Holbrook, P. Bloom and A Fisher at Dennis Gate.

We installed the last 2 pitfall trap arrays. We placed one on subsite 15 at the top of the foreclosure area and the other was placed in ~~the~~ a central subsite of the property north of Sandpiper.

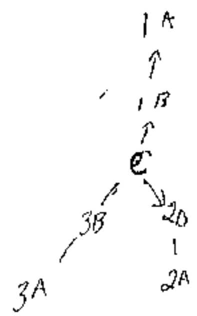
All arrays were checked and numbered, numbering follows the diagram on the following page.

Pitfall trap check

species account.

ARRAY 31

1A Adult ♀, Juv. ♂ + ♀ UTA 3



1B UTA ♂

C UTA 3 Juv. ♀
1 mole cricket

2B UTA Juv ♂, Scorpian

2A Ø

3B Ø

3A Ø

ARRAY 23

1A Ø

1B Horned Liz Juv
scorpian
UTA - Juv. ♀

C UTA Juv. ♀

2B - Scorpion (2)
Adult ♂/♀ UTA

2A Ø

3B Juv ♂/♀ UTA

3A Juv ♀ -2

ARRAY 395

1B Juv ♀, UTA

1A Juv ♀ Adult ♀, Juv ♂ 2

Comm. Spider.

C " Spider

2B ∅

2A Juv ♀ UTA

3B ∅

3A ∅

ARRAY 40

1A ∅

1B Housemouse - preg ♀
UTA 2 Juv ♂ (killed by mouse)

2B 2 Juv ♀ / 1 Juv ♂ UTA

2A Adult ♂ 1 ♀, 2 Juv ♂ UTA

C 2 Juv ♂ / 1 Juv ♀ UTA

3B Subadult ♂ 1, 2 Juv ♂ 3 Juv ♀ UTA

3A Juv ♂ UTA

ARRAY 3

1B Adult ♀, 5 Juv ♂, Juv ♀
Scorpian

1A 3 Scorpian, Adult ♂, Juv ♂ Juv ♀ UTA,
1 Tenebrionidae beetle

C 3 Scorpian
Darkling beetle
Juv ♂, 1 Juv killed by Scorpian

2B 2 Scorpian

2A 2 Juv ♂ UTA

3B 2 Scorpian, 2 Juv ♂ UTA

3A 1 Scorpian,
Juv ♂ Juv ♀ UTA

ARRAY 54

1A Scorpian

1B ∅

C 2 Juv ♂ + 3 Juv ♀ UTA
Darkling Beetle,
Longhorn Beetle
unk Beetle

2B 3 Scorpian, 2 Juv ♂ UTA
3 Darkling beetle

2A 2 Scorpian, 1 Juv ♂ UTA
2 Darkling Beetle

3B Scorpian, Adult ♀ + Juv ♀ UTA

3A Scorpian, 2 Juv ♂

0/20/78 (1)

Sapphos Environmental

1062-007

R. Blood / T. Holsobrook

Summer Herp Survey

0700 Clear 70°F

Pitfall Trap Check

15

1A 1 Juv ♀ UTA

1B 1 Adult ♀ UTA

C Scorpion, D. Beetle, Bee (Dead)

1 Juv ♀, 1 Juv ♀ UTA

2B 2♂ 3♀ Juv UTA

2A 1 Juv ♂ UTA

3B 1 Juv ♂ + ♀ UTA

3A 1 Juv ♂ UTA

31 3A Ø

3B 1 Juv ♀ UTA

C 1 Juv ♂ UTA, ~~wolf~~ Corner spider

2B 2 Juv ♂ UTA (killed by Scorpion), 1 small Scorpion

2A 1 Juv ♂ ", 1 Scorpion, 1 yellow/BLK caterpillar

1B 1 Juv ♂ 1♀ UTA

1A 1 ♂ Juv UTA

23 1A 2 scorpions, 2 millipedes

1B 1 scorpion, 2 ♀ juvenile UTA,

1 ♂ juvenile UTA, 1 juvenile horned lizard

C 1 ~~wolf~~ spider, 1 millipede, 1 ♂ juvenile UTA, 1 sand dune roach

2B 1♀ juv. UTA

2A 1 ♀ juv. UTA, 2 globe dune beetles

3B 1 scorpion, 1 ♂ juv. UTA

3A 1 scorpion, 1 ~~juv~~ nymph western short-horned walking-stick,

1 ♀ juv. UTA

39 S 1A Ø

1B 1 ♂ juv. UTA

C 1 ♂ juv. UTA

2B 1 ♂ juv. UTA, 1 ♀ juv. UTA

2A 1 ♂ juv. UTA

3B 1 ~~wolf~~ Corner spider

3A 1 ~~wolf~~ Corner spider

40N 1A 1 ♀ juv. UTA

1B 1 ♀ juv. UTA, 1 ~~wolf~~ corner spider

C 1 adult S. Alligator lizard - dull coloring

2B 1 ♂ juv. UTA

2A 1 ~~santacouse~~ darkling beetle,

1 ♂ juv. UTA, 1 ♀ juv. UTA

3B 1 ♀ juv. UTA

3A 1 sun spider

8/20/96 (5)

~~#85~~ 584 1A 1 ♂ adult UTA, 11 ♂ juv. UTA
1B 1 ♂ ~~adult~~ juv UTA.
1 sand roach, 1 darkling beetle,
1 scarabaeoid beetle
C 1 ♀ juv. UTA, 1 black beetle,
1 silverfish
3B 3 scorpions, 1 mole cricket,
1 black beetle, 1 millipede
3A 2 scorpions, 1 ♂ juv. UTA,
1 sand roach
2B 1 scorpion, 1 darkling beetle
2A 2 scorpions, 2 darkling beetles
3 3A 1 ♀ juv. UTA
3B 1 scorpion, 1 sand roach (dead)
C 1 scorpion, 1 horned lizard - juvenile
2B 1 scorpion, 1 darkling beetle
1 ♀ juv. UTA
2A 1 scorpion, 1 ♀ juv. UTA
1B 2 scorpions, 11 black beetles
1A 1 scorpion, 11 ♀ juv. UTA
1 velvet red ant
585 1A 1 ♂ juv. UTA
1B 1 ♂ adult UTA, 1 ♂ juv UTA
C 1 velvet ant, 1 scorpion,
111 ♂ juv. UTA

2B many red ants
2A 1 scorpion, 1 ♀ juv. UTA
3B 1 ♂ juv. UTA
3A 1 scorpion, 1 ♂ adult UTA

Herp Survey - North Airfield
B. Blood, T. Alsobrooks, K. Philips, V.
NW Corner
Sideblotched ~~##~~ lizards

Side notes: Ponded area sites:
NA001, 002, 003 recently
mixed, area dirt darker than
surrounding area, loose, NOT
compact. Area ~~[illegible]~~ recently dried
Walked 8 transects across
north airfield including north-west corner
and western 1/2 mile of argo ditch and
area N of ditch.
=> Sideblotched lizards were
scattered over area. No other
reptiles or sign observed.

8/21/13

Sappkos Environmental

1062-007

B. Blood, T. Alsobrook

Pit Fall Trap Check

Subsite No.

3 3A 1 scorpion, 1 ♀ adult Uta, 1 ♀ juv. Uta, 1 mole cricket, 1 ♂ juv. Uta, 1 black beetle

3B 1 juv. scorpion, 1 sand roach

C 1 scorpion

2B 1 velvet ant, 2 scorpions

2A 1 juv. horned lizard, 1 ♂ juv. Uta, 1 millipede, 1 juv. scopion

1B 3 scorpions, 1 millipede, 1 ♀ juv. Uta

1A 1 ♂ juv. Uta, 2 ~~wolf~~ corner spiders

15 1A 1 juv. horned lizard, 1 juv. ♂ Uta, 1 juv. ♀ Uta

1B 1 ♂ juv Uta, 3 scorpions

C 11 ♀ juv. Uta, 111 ♂ juv. Uta, 1 scorpion,

15 cont. 2B 2 ♂ juv. Uta, 3 ♀ juv Uta

2A 1 ♂ juv. Uta, 1 ♀ juv. Uta

3B 11 ♀ juv. Uta, 2 scorpions

3A 11 ♂ juv. Uta

31 1A 4 scorpions, 11 ♂ juv. Uta, 11 ♀ juv. Uta

1B 1 scorpion, 11 ♂ juv. Uta, 1 sand roach,

C 1 black beetle, ~~#~~ 11 juv. ♂ Uta

3B 1 scorpion, 1 ♂ juv Uta, 1 ♀ juv. Uta

3A 1 ♀ juv. Uta

2B 1 juv. scorpion, 1 black beetle, 1 juv ♀ Uta, 1 sand roach

2A Ø

23 1A 2 scorpions, 1 ♂ adult Uta, 1 ♂ juv. Uta

1B 1 scorpion, 1 ♀ juv. Uta, 1 ♂ juv. Uta

C Ø

3B 2 scorpions, 11 ♂ juv. Uta, 1 ♀ juv. Uta

3A 1 scorpion

2B 1 scorpion, 1 millipede, 1 ~~♂~~ ♀ juv. Uta, 1 sand roach, 1 black beetle

2A 1 ♀ juv. Uta, 1 ♂ juv. Uta

8/21/98

395 1A ∅
1B 1 corner wolf spider
C 1 ♂ juv. Uta
2B 1 scorpion, 1 ♀ juv. Uta
2A 2 ♀ juv. Utas, 1 ~~wolf~~ corner spider
3B 1 corner wolf spider
3A 1 ♂ juv. Uta

40SV 1A 1 scorpion, 1 ♂ juv. Uta (dead)
1B 1 ♂ juv. Uta.
C 1 scorpion, III ♂ juv. Uta,
1 ♀ juv. Uta, II black weevil,
1 horned lizard juv.
2B 1 ♂ adult Uta, 1 ♀ juv. Uta
2A 1 corner wolf spider
3B ∅
3A 2 ♀ juv. Utas

~~45~~ 54 1A 1 ♀ juv Uta, 1 ♂ juv. Uta
1B 1 black hairy beetle
C 1 scorpion, II ♂ juv. Uta,
1 ♀ juv. Uta
2B 2 scorpions, 1 ♀ juv. Uta,
1 ♂ juv. Uta
2A 1 darkling beetle, 1 ♀ juv Uta,
3B 1 inchworm, 1 juv. horned
lizard, 1 millipede, 2
juv. scorpions, 1 mole cricket

54 ~~45~~ cont 3A 1 scorpion

~~58~~

585 1A 1 scorpion, 1 ♂ juv Uta
1B 1 scorpion, 1 ♂ juv. Uta, 1 velvet ant,
1 mole cricket
C II ♂ juv. Uta
2B II scorpions
2A II scorpions, 1 black beetle,
1 ♀ juv. Uta,
3B 1 scorpion, 1 ♀ juv. Uta,
1 ♂ juv. Uta, 1 sun spider
3A 2 scorpions

8/24/78

Sapphos Environmental

1067-007

B Blood

Summer Herp Surveys

Weather. Overcast 75°F, humid

0700

Arrived at Dunes.

Opened pit fall traps on Dunes and pitfall array on property North of Sand Ridge.

All arrays in order no live or dead animals in traps.

No arrays were disturbed over week end.

Sapphos Environmental

1067-007

B. Blood T. Alsobrook

Summer Herp Surveys

Weather partly overcast, 75°F

Pit-Fall Trap Check

Subsite # 3:

3A 2 scorpions

3B - 2 darkling beetles, 5 scorpions, 1 black beetle
1 ♀ juv. Uta, 1 ♂ juv. Uta

C - 1 darkling beetle, 2 scorpions, 1 black beetle, 1 juv. horned lizard

1B - 2 scorpions, 1 ♀ juv. Uta, 1 black beetle, 1 ♂ juv. Uta

1A 3 scorpions, 1 ♀ juv Uta, 1 ♂ juv. Uta

2B 2 scorpions, 1 darkling beetle, III mole crickets, 1 weevil

2A 3 scorpions, 1 ~~♂~~ ♀ juv Uta,

15 1A - ✓

1B 1 mole cricket, 1 ~~wolf~~ corner spider

15 cont. C 2 scorpions ~~[illegible]~~, 1 mole cricket,
1 ♀ juv Uta 1 ~~wolf~~ comer spider
3B - 3 scorpions, II ♀ juv. Uta,
1 ♂ juv Uta
3A - 1 horned lizard (juv.), 1 ♀
juv. Uta
2B - ∅
2A - 3 scorpions, 1 darkling beetle

31 1A - 4 scorpions, II ♂ adult Uta
1B - 2 scorpions
C - 1 ♂ juv Uta, 5 scorpions,
1 sand roach
3B - 1 ♀ juv. Uta, 1 ~~praying~~ CA mantid
3A 1 ♀ juv Uta
2B - 2 scorpions, 1 millipede
C 1 1 scorpion, 1 ♀ juv. Uta

23 1A - ∅
1B - 1 scorpion, 1 darkling beetle
1 ♀ juv. Uta
C - II ♀ juv Uta 2 praying mantids;
1 ~~wolf~~ crim. spider
3B 1 scorpion 1 darkling beetle,
1 juv. horned lizard, II ♂ juv. Uta;
3A - II ♀ juv Uta, 1 beetle,
1 ♂ juv Uta

23 cont. 2B - 4 scorpions 1 adult ♀ Uta
2A - 1 scorpion 1 darkling beetle
1 mole cricket

39 S 1A - 1 juv. alligator lizard (dead)
1B - 1 ♀ juv. Uta
C - 1 ♂ juv. Uta (dead), 1
darkling beetle
2B - 1 ♀ juv Uta
2A - 1 scorpion, 1 ♂ juv. Uta
3B - ∅
3A - 1 scorpion

40 N 1A - 1 ♂ juv Uta
1B - black ants
C - 1 ♀ juv Uta, 1 beetle
3B - 2 scorpions 1 ♂ adult Uta,
1 millipede
3A - 1 juv ♀ Uta
2B - 1 sm spider, 1 juv horned
lizard,
2A 1 black widow spider

~~41~~ 54 1A - 2 scorpions, 1 ♀ juv. Uta
1B - 1 scorpion, II ♂ juv. Uta,
1 ♀ juv. Uta
C - 3 scorpions, 1 darkling beetle,
1 weevil, II ♀ juv. Uta, 1 ♂
juv. Uta, 1 juv. horned lizard
(OVER)

1/20/98 (2)

15 cont. C 2 scorpions, 1 mole cricket,
1 ♀ juv Uta 1 ~~wolf~~ comb spider
3B - 3 scorpions, 1 ♀ juv. Uta,
1 ♂ juv. Uta
3A - 1 horned lizard (juv.), 1 ♀
juv. Uta
2B - ∅
2A - 3 scorpions, 1 darkling beetle

31 1A - 4 scorpions, 1 ♂ adult Uta
1B - 2 scorpions
C - 1 ♂ juv Uta, 5 scorpions,
1 sand roach
3B - 1 ♀ juv. Uta, 1 ~~praying~~ CA
mantid
3A 1 ♀ juv Uta
2B - 2 scorpions, 1 millipede
C 1 1 scorpion, 1 ♀ juv. Uta

22 1A - ∅
1B - 1 scorpion, 1 darkling beetle
1 ♀ juv. Uta
C - 1 ♀ juv Uta & 2 praying mantids
1 ~~wolf~~ comb spider
3B 1 scorpion 1 darkling beetle,
1 juv. horned lizard, 1 ♂ juv. Uta
3A - 1 ♀ juv Uta, 1 beetle,
1 ♂ juv Uta

(3)

23 cont. 2B - 4 scorpions 1 adult ♀ Uta
2A - 1 scorpion 1 darkling beetle,
1 mole cricket

39S 1A - 1 juv. alligator lizard (dead)
1B - 1 ♀ juv. Uta
C - 1 ♂ juv. Uta (dead), 1
darkling beetle
2B - 1 ♀ juv Uta
2A - 1 scorpion, 1 ♂ juv. Uta
3B - ∅
3A - 1 scorpion

40N 1A - 1 ♂ juv Uta
1B - black ants
C - 1 ♀ juv Uta, 1 beetle
3B - 2 scorpions 1 ♂ adult Uta,
1 millipede
3A - 1 juv ♀ Uta
2B - 1 sun spider, 1 juv horned
lizard,
2A 1 black widow spider

~~42~~ 54 1A - 2 scorpions, 1 ♀ juv. Uta
1B - 1 scorpion, 1 ♂ juv. Uta,
1 ♀ juv. Uta
C - 3 scorpions, 1 darkling beetle,
1 weevil, 1 ♀ juv. Uta, 1 ♂
juv. Uta, 1 juv. horned lizard
(OVER)

(1) 000178

~~48~~ 51 cont. 2B - 2 scorpions, 1 hairy beetle,
1 ♂ juv. Uta
2A - 1 darkling beetle, 1 ♀ juv Uta,
||| ♂ juv Uta
3B 1 Mus, 1 ♂ juv Uta
3A - 3 scorpions

585 1A - 2 scorpions
1B - 1 scorpion, 1 ~~red~~ orange wasp (dead)
C - 5 scorpions, 1 ♂ juv Uta
3B - 5 scorpions
3A - 2 scorpions, 1 ♀ juv Uta
2B - 1 velvet ant, 2 scorpions,
1 weevil
2A - 2 scorpions

8/26/98 ①

Sapphos Environmental

1002-007

B. Brd, T. Allbrook

Summer Herp Survey

0700 AM

0730 TAA + BRB went to Deliver Alas Mitigation Plan to S. Crowther at Environmental Management (LAX). A brief discussion on fauna, shrimp and butterflies followed.

0900 Returned to Dunes

Board Check

Subsite	Species
57	UTA, P.B., C.S., MB
1	" " "
46	"
43 N	Ø
39 N	UTA (Adult)
38.5	Ø
25	Ø
19	Scorpion
17	"
16	Ø
15	Ø
8	
7	Ø
41.V	Uta
56.4	Ø
57.5	Uta (adult)
58.5	Uta

②

Pit-Fall Trap Check

Subsite #	Species
~~[illegible]~~ 54	1A 1 ♂ juv. Uta 1 scorpion
	1B 1 ♀ juv. Uta
	C 11 ♀ juv Uta, 1 ♂ juv. Uta 1 juv horned lizard
	2B 3 scorpions, 1 ♀ juv. Uta 1 ♂ juv Uta
	2A 2 scorpions
	3B 1 scorpion, 1 darkling beetle
	3A 3 scorpions, 1 ♀ juv. Uta
39.5	1A 1 scorpion
	1B 1 black beetle
	C 11 ♀ juv. Uta
	2B 11 ♀ juv. Uta, 1 corner spider
	2A 1 ♀ juv Uta
	3B Ø
	3A 1 scorpion, 1 ♂ juv Uta, 1 adult ♂ Uta
23	1A 1 scorpion
	1B 1 scorpion, 1 mole cricket 1 ♂ juv. Uta
	C 2 scorpions, 1 ♀ juv Uta
	3B 1 scorpion, 1 darkling beetle 1 ♀ juv. Uta, 1 juv horned lizard

23 cont. 3A 2 scorpions, 1 ♀ juv. Uta
2B 1 ♀ juv Uta, 5 scorpions
2A 1 scorpion, 1 ♀ juv. Uta,
1 ♂ juv. Uta, 1 juv. Mus

31 1A 3 scorpions, 1 ♂ juv. Uta
1 adult ♀ Uta
1B 3 scorpions
C 4 scorpion
3B 1 ♀ juv. Uta, 1 silverfish
3A 2 scorpions, 1 darkling beetle,
11 ♀ juv. Uta
2B 1 ♀ juv. Uta
2A 2 scorpions, 11 ♀ juv Uta
11 ♂ juv Uta

15 1A 1 ♀ juv Uta
1B ~~1 ♀ juv Uta~~, 11 ♂ juv Uta,
2 scorpions
C 11 scorpions 1 darkling beetle,
3 ♂ juv Uta
3B 3 scorpions, 1 ♂ juv. Uta (dead)
3A 1 ♀ juv Uta
2B 1 scorpion
2A 1 scorpion, 1 darkling beetle

40N 1A 1 ♀ juv Uta
1B 1 Mus
C 111 ♀ juv Uta

40N cont. 3B 1 scorpion, 1 millipede,
1 1 ♀ juv. Uta
3A 1 (A mantid
2B 1 parasitic wasp
2A 1 scorpion

3 3A 11 scorpion, 1 darkling beetle
3B 1 darkling beetle, 1 black " "
C 1 ♂ adult Uta, 1 ♂ juv. Uta,
1 sand roach, 1 scorpion
1B 3 scorpions, 1 ♀ juv Uta
11 ♂ juv Uta
1A 1 scorpion, darkling beetle
1 ♂ juv. Uta
2B 2 scorpions
2A 1 scorpion

58S 1A 1 scorpion, 1 ♂ juv Uta
1B 11 scorpions, 1 ♀ juv Uta
C 4 scorpions, 1 ♀ juv. Uta (dead)
2B 4 scorpions, 1 ♂ juv Uta
2A 2 scorpions
3B 1 darkling beetle, 2 scorpions
1 ♀ juv. Uta (dead), 1 ♀ juv. Uta
3A 1 scorpion

0/21/10

Sappho Environmental
1067-007

B. Blood, T Alsobrook

Summer Herp Survey

Weather overcast, 70°F
07:00 am

Pitfall Trap check

Subsite # Species

3 3A 2 scorpions, 1 darkling beetle,
3B 1 darkling beetle, 1 scorpion,
1 hairy darkling beetle
C 1 ~~darkling beetle~~ scorpion, 1
corner spider, 1 millipede,
1 ♀ adult Uta
1B 2 scorpions
1A 1 scorpion, 1 ♀ juv. Uta
2B ∅
2A 1 sand roach

15 1A 1 spider, 1 millipede
1B 2 scorpions, 1 ♀ juv. Uta
C 1 darkling beetle, 1 scorpion
2B 2 scorpions, 1 ♀ juv. Uta
1 hairy darkling beetle
2A 1 corner spider
3B 1 ♀ juv. Uta
3A 1 scorpion, 11 ♀ juv. Uta

31 1A - 1 scorpion, 1 green spider,
1 Ca mantid
1B - 2 scorpions
C - 1 scorpion (dead), 1 Mus (juv)
3B - 1 corner spider, 1 ♀ juv Uta,
1 Ca. mantid
3A - 1 scorpion, 1 ♀ juv Uta
2B - 1 Mus
2A - 1 scorpion

23 1A 1 scorpion
1B 1 scorpion, 1 ♀ juv Uta,
1 ♂ juv Uta, 2 black beetles
C 1 scorpion, 1 mole cricket
2B 2 scorpions, 1 ♀ juv Uta (dead)
2A 11 mole crickets
3B 1 darkling beetle, 1 hairy beetle,
1 ♀ juv. Uta, 1 ♂ juv Uta
3A 11 ♀ juv. Uta, 11 sand roach,
1 ♂ juv. Uta

395 1A 2 scorpions
1B 1 black beetle, 1 ♂ juv Uta
C ∅
2B 1 ♀ juv. Uta
2A ∅
3B 1 mole cricket
3A 1 ♂ juv. Uta

40N 1A 1 ♂ juv. Uta
1B 1 sun spider, 1 ♂ juv. Uta
C 1 darkling beetle, 1 sun spider,
1 ♀ juv. Uta, 1 ♂ juv. Uta
3B 1 ♀ juv. Uta, 1 corner spider
3A 1 ♀ juv. Uta, 1 ♂ juv. Uta
2B 1 ♀ juv. Uta, 1 horned lizard
2A 1 hairy beetle

~~48~~ 54 1A ∅
1B 1 ♀ juv. Uta
C 1 ♀ juv. Uta, 1 ♂ juv. Uta
2B 3 scorpions, 1 darkling beetle
2A 2 scorpions, 1 ♂ juv. Uta
3B ∅
3A 1 ♂ juv. Uta

585 1A 1 scorpion, 2 ♂ juv. Uta
1B 1 scorpion
C 3 scorpions
2B 1 ♂ juv. Uta, 2 scorpions
1B ∅
3B 1 ♂ juv. Uta 1 ♀ juv. Uta
3A 1 darkling beetle, 1 ♂ juv. Uta

So. Airfield Herp Survey B. Bird, T. Ausobrook, K. Phillips, R, V. Tesoro

Met Katie and Victoria at Dunes Gate at 10:00 AM. Called operations and got an escort at Gate 437B. Left jumper at the Dunes - no signage:

We walked transect lines across the south airfield. Started near the construction area near Taxiway AA, walked west across open space at 50-70' spacing. We investigated all debris piles, rock outcrops, stray wood, and under bushes and large shrubs. We checked under bales of hay and the plastic liner along the plastic-lined drainage ditch which runs parallel to the perimeter road next to Parking Dr.

8/22/70
1067-007

We next walked south across the open space, and slightly east until we stopped at vernal pool test site SA-031. We next walked across the mesa to the perimeter road 11 to Imperial highway. Finally we walked the area back toward the Hot Drill site and met operations there.

Observations → (UTA stansburiana)
Side-Blotched lizards were distributed across the entire area- less so in the ice-plants areas.
Observed 2 dead So. alligator lizard, also 1 Mus, 1 dried-up dead western spade foot toad near vernal pool site SA 011.

Sapphos Environmental
1067-007
B. Blood

Summer Herp Survey
Weather: Partly Cloudy, humid, ≈ 75°F.

Arrived Dunes 7:30 am, opened pit fall trap arrays this AM. All arrays were in order all pit traps were closed, and undisturbed.
Arrived at Sapphos Office @ 10 AM.

7/21/98 (1)
Tryptus Environmental
1067007
B Blood, T. Alsobrooks

Summer Herp Surveys
Weather: High scattered clouds, humid,
Temp. 75°F

Pit Fall Traps here
subsite # 3:

3A 4 scorpions
3B 8 black beetles
11 juv Uta ♂
3C 2 scorpions
1 darkling beetle
1 imm horn lizard
1B 1 scorpion
1 darkling beetle
1 juv Uta ♂
1A 1 darkling beetle
III corner spider
1 juv ♀ Uta
2B 1 scorpion, 1 darkling beetle, 1 ♀ juv. Uta
2A 2 darkling beetles
15 1A 1 darkling beetle
1B 1 darkling beetle, 1 mole cricket

15 cont C 3 scorpions, 1 ♂ juv. Uta (dead), 1 ♂ juv Uta
2B 1 black beetle, 1 ♂ juv Uta, 2 corner spiders
2A 1 scorpion, 1 darkling beetle, 1 ♂ juv Uta, 1 ♀ juv Uta
3B 1 ♀ juv Uta, 11 ♂ juv. Uta, 1 corner spider
3A 1 scorpion, 1 ♂ juv. Uta
31 1A 2 scorpions
1B 2 scorpions, 1 ♀ juv. Uta, 1 black beetle
C 3 scorpion
3B 2 scorpions, 1 corner spider
3A 2 scorpions
2B 1 scorpion, 1 silverfish
2A 2 scorpions, 1 black beetle, 1 ♂ juv. Uta
23 1A 1 scorpion
1B 4 scorpions, 1 ♂ juv Uta, 1 millipede, 1 ♀ juv Uta
C 1 grey beetle
3B 1 ♂ juv Uta, 5 scorpions
3A 1 ♂ juv. Uta, 1 horned lizard
2B 2 scorpions, 1 ♂ juv. Uta

20 cont 9/21/??

2A 1 scorpion, 2 ♀ juv Utas, 1 banded-wing grasshopper

395 1A 1 darkling beetle, 1 scorpion
1B 1 ♂ juv. Uta
C 1 ♀ juv. Uta, 1 corner spider
2B 1 scorpion, 1 mole cricket, 1 ♂ juv. Uta
2A 2 scorpions 1 ♂♀ juv Uta
3B 1 ♂ juv Uta 1 ♀ juv. Uta
3A ∅

40N 1A 1 scorpion, 1 ♂ juv Uta, 1 juv. horned lizard
1B 1 Mus juv.
C 2 hairy darkling beetles, 1 ♂ juv. Uta 1 scorpion
3B 1 juv. horned lizard, 1 juv. ♂ Uta
3A 1 earwig, 1 millipede
2B ∅
2A 1 darkling beetle, 1 ♂♀ juv. Uta

~~48~~ 54 1A 1 darkling beetle, 2 scorpions, 1 ♂ juv. Uta
1B 1 crab spider, 1 corner spider
C 1 scorpion 2 darkling beetles, 1 mole cricket.

~~48~~ cont 54 C 1 ♀ juv. Uta 1 hairy darkling beetle, 1 ♂ juv Uta 1 black beetle
3B 3 scorpions, 1 ♂ juv. Uta
3A 1 black beetle, 1 darkling beetle, 1 scorpion
2B 1 darkling beetle, 1 corner spider 1 pill bug
2A 11 darkling beetles, 1 ♂ adult Uta

58.5 1A 1 scorpion, 1 hairy darkling beetle, 1 ♂ adult Uta
1B 1 ♀ juv. Uta, 1 black beetle
C 3 scorpions. 1 black beetle
2B 1 scorpion (dead), black ants, 1 ♀ juv. Uta, 111 ♂ juv. Uta
2A 1 black beetle, 1 sun spider 1 ♀ juv Uta
3B 11 dead scorpions, 11 ♂ juv Utas, 1 black beetle, 1 ♀ juv Uta, Argentine ants
3A 1 black beetle

7/6/10 (2)

Board Check
north of Sandpiper St
Subsite #	Species
56 M	ø
56 M	2 ♀ Utas
57 S	1 ♀ adult Uta,
~~58 S~~	1 scorpion
58 S	ll ♂ adult Uta, 1 ♀
58 S	adult Uta
3	ø
51	ø
46 N	1 Uta
43 N	ø
42 N	ø
39 N	ø
36 S	1 Uta
2 S	1 juv. Uta
17	ø
19	ø
16	1 adult Uta
13	ø
8	~~ø~~ 1 ♂ Uta
7	ø
44 N	1 Uta

1067-007
B. Blood, T Abobrook

Summer Herp Surveys
Weather: 75°F high clouds 100% cover, wind 5-10 mph

Pitfall Trap Check
Subsite	#	Species
3	3A	2 scorpions
	3B	5 scorpions, 2 black beetles
	3C	2 scorpions, 1 imm Uta ♂, 1 imm horned liz.
	2B	3 scorpions, 1 darkl. g. beetle, 2 black beetles
	2A	1 ♀ juv. Uta, 1 corner spider
	1B	4 scorpions, 1 ♀ juv Uta, lll ♂ juv. Uta
	1A	1 ♂ juv. Uta, 1 scorpion, 1 ♀ juv. Uta
15	1A	1 scorpion
	1B	3 scorpions, 1 ♂ juv Uta
	C	lll ♂ juv. Uta, 3 scorpions, ll ♀ juv Uta
	3B	1 scorpion, 1 black beetle,

15 cont. 3B cont. 2 juv ♀ Uta
3A 1 scorpion, 1 ♂ juv. Uta
2B 2 scorpions, 1 ♀ juv Uta
2A 1 black beetle, 1 ♂ adult Uta
1 ♂ juv Uta (dead)

31 1A 8 scorpions, 1 ♂ juv. Uta
1B 2 scorpions
C 5 scorpions, ~~1 male cricket~~
3B 1 black beetle, 1 ♀ juv. Uta
3A 1 scorpion, 1 ♀ juv. Uta, 1 horned lizard
2B 2 scorpions, 1 ♀ juv Uta
2A 4 scorpions, 1 black beetle

23 1A 5 scorpions, 1 millipede
1B 1 ♂ adult Uta, 1 ♂ juv. Uta,
7 scorpions, 1 ♀ juv Uta
C 1 millipede, 1 ♀ juv Uta,
1 sand roach
3B 2 scorpions, 1 ♀ juv Uta (dead),
1 ♂ juv. Uta, 1 juv. horned lizard
3A 2 scorpions, 1 juv. ♀ Uta
2B 7 scorpions, 1 juv. ♀ Uta (dead)
11 juv ♀ Uta
2A 1 ♀ juv. Uta, 11 ♂ juv. Uta

39S 1A 1 ♂ juv. Uta, 1 ♀ juv. Uta
1B ∅
C 1 scorpion, 1 sun spider

39S C cont. 1 camel spider, 1 ♂ juv Uta, 1 ♀ juv. Uta
2B 1 ♀ juv. Uta
2A 1 ♀ juv Uta, 1 imm. alligator lizard, 1 juv horned lizard
3B 1 juv. horned lizard, 11 ♂ juv Uta
3A ∅ 1 hairy darkling

40N 1A 1 black beetle, 1 scorpion 1 ♀ juv. Uta
1B 1 scorpion, 1 juv. horned lizard
C 11 scorpions, 1 ♀ juv. Uta,
4 hairy darkling beetles
3B 2 scorpions, 1 ♀ juv. Uta,
11 ♂ juv Uta, 1 hairy darkling beetle
3A 2 scorpions 1 black beetle
2B 2 scorpions
2A 1 ♂ juv Uta

91 1A 1 scorpion, 1 camel spider
1 black beetle
1B 2 scorpions, 1 millipede
1 ♂ juv. Uta
C 5 scorpions, 1 ♂ juv. Uta,
1 millipede, 2 darkling beetles.
1 ♂ juv. Uta, 1 sand roach

7/3/00 (4)

54 cont. 2B 3 scorpions, 2 darkling beetles, 1 ♀ juv. Uta
2A 1 scorpion, 3 darkling beetles
3B 1 scorpion
3A 2 scorpions, 2 darkling beetles, 1 ♂ juv Uta, 1 ♀ juv. Uta

58.2 1A 1 black beetle, 1 hairy darkling beetle
1B 1 darkling beetl, 2 scorpions
C 2 scorpions, 2 juv. ♂ Uta, 1 adult ♂ Uta
2B 2 scorpions, Argentine ants 1 black beetles
2A 1 black beetle, 2 scorpions, 1 ♀ juv. Uta
3B 1 sun spider 1 ♂ juv Uta
3A 1 scorpion 1 darkling beetle 1 ♂ juv. Uta

7/1/00 (1)
1067-007
B Blood T Alsobrook

Summer Herp. Surveys - LAX

Weather - 70°F, high clouds 100% overcast, wind < 5 mph

Pitfall Trap Check
Subsite #

3 3A 3 scorpions, 1 ♂ juv. Uta
3B 2 scorpions, 1 ♂ juv Uta, 1 hairy darkling beetle, 1 ♀ juv Uta
C 1 darkling beetle
1B 1 darkling beetle, 3 black beetles
1A 2 darkling beetle
2B 2 scorpions, 1 ♂ juv. Uta, 1 ♀ juv. Uta
2A 1 ♀ juv. Uta, 2 corner spiders 1 ♂ juv. Uta

15 1A 1 ♂ juv. Uta,
1B 1 scorpion
C 2 ♀ juv Utas, 5 scorpi[illegible]
2B 4 scorpions, 1 ♀ juv Uta
2A 1 [illegible]

15 cont [illegible] 1 [illegible], 1 [illegible] beetle
1 [illegible] juv. Uta
3A 1 scorpion

31 1A 1 ♀ juv. Uta, 3 scorpions
1B 1 scorpion, 1 mole cricket,
1 ♀ juv. Uta
C 3 scorpions, 11 ♀ juv. Uta
3B 1 red spider
3A 1 scorpion
2B 2 scorpions, 1 ♀ juv. Uta
2A 1 scorpion, 1 millipede

23 1A 2 scorpions, 1 ♂ adult Uta
1B 11 ♀ juv. Uta, 3 scorpions, 1 millipede,
1 ♂ juv. Uta, 1 horned lizard juv.
C 1 scorpion
3B 4 scorpions, 1 ♀ juv. Uta, 1 mantid (larger abdomen)
3A 1 scorpion
2B 5 scorpions
2A 2 scorpions, 1 darkling beetle,
3 ♀ juv. Uta

39S 1A 2 scorpions, 1 ♂ adult Uta
1B 11 ♀ juv. Uta, 1 millipede
C 1 corner spider
2B Ø
2A Ø
3B 1 black beetle, 1 corner spi

39S cont 3A Ø

40N 1A 1 ♂ juv. Uta, 1 millipede
1B 1 mantid, 1 horned lizard juv
1 corner spider
C 1 corner spider, 1 darkling beetle,
1 juv. horned lizard 2 black beetle
3B 2 hairy darkling beetles, 1 sun
spider
3A 2 corner spiders, 1 ♂ juv. Uta
2 black beetles, 1 velvet ant
2B Ø
2A 1 scorpion, 1 black beetle

48 1A 1 ♂ juv. Uta
1B 1 walking stick (adult)
C 3 scorpions, 1 ♀ juv. Uta, 1
darkling beetle, 1 ♂ juv. Uta
2B 3 scorpions, 3 darkling beetles
2A 1 ♀ juv. Uta
3B Ø
3A 1 scorpion, 1 darkling beetle

58S 1A 1 black beetle, 1 ♂ juv. Uta
1B 2 scorpions
C 2 scorpions, 1 black beetle
2B 3 scorpions
2A [illegible]
3B 1 ♂ juv. Uta, Arg [illegible]
3A Ø

0-6-78
Sapphos Environmental
1067-007

B. Blood / T. Alsobrook

Summer Herpetologic Surveys.

9:30AM weather continues cool and overcast ≈ 70°F.

Tracey & I surveyed subsites 45 N + S to start.

Side blotched lizards, Adults and many young individuals seen throughout subsites.

San Diego Horned Lizard scat observed in subsite 45 N.

Subsites 25 · 26 · 27 · 28 · 29 · 30 · 31 · 32 covered next -

Side blotched Lizards were common throughout - but patchy in distribution · found in vegetated areas - not in bare areas.

San Diego Horn Lizard Scat seen at N end of subsite 26.

Few Ants seen throughout entire area surveyed.

(1)

Sapphos Environmental
1067-007
B. Blood / T. Alsobrook

Summer Herpetologic Survey,

Subsites West of VOR.

Uta seen in vegetated areas - Many young, some adults -

no ants seen except near FAA buildings and near Road to VOR.

Sapphos Environ.

1067-007

B. Blood / T. Alsob

Skies clear, Temp ≈ 70°F

Start time 10:00 AM.

Plan: lay out plywood and survey subsites where Wood is laid out.

Laid out Plywood - 4'x 4'

Subsite 17 - 2 placed ≈ 20yds off road.

Subsite 19 1 placed off Trail.

Subsite 25 1 board ≈ 50' N of Bunker.

Subsite 26 Directly S of board in SS 25

Subsite 38S - Near NE corner. 2 Boards

↓

Boards were laid out in open areas, care was taken not to crush any native vegetation. Boards were laid close to vegetation, or across lizard tracks seen in substrate.

Side blotched lizard was common.

8/13/98

Sypho Environ.

1067-007

Herpetological Surveys

6:00 AM - 10:00 AM → installed remaining 2 pitfall arrays.

subsite 44S

Utas - generally distributed

1 red ant colony.

Fresh Gopher ~~mounds~~ mounds.

Band-wing grass hopper

44N

Utas - wide spread

Gopher mounds

B.W grass hopper

Common Hairstreak

Buckeye.

45S.

Scorpian UTA

46N

So. alligator lizard

· UTA

8/13/98

1067-007

walked Transects through subsites:

46W → 35

45W → 36S

Transects walked ≈ 100' apart, through center of subsites.

Transects walked in a zig zag pattern. Observers racked under scrubs, turned over rocks, wood, and debris. diversions were made to open areas and areas with lizard tracks.

→ Side blotched lizards were common throughout these subsites

John - CLAX Gardner
reported a sighting
of 3 gopher snakes
and 1 common king
snake.
King Snake observed where
crew was working
near Imperial Hwy.

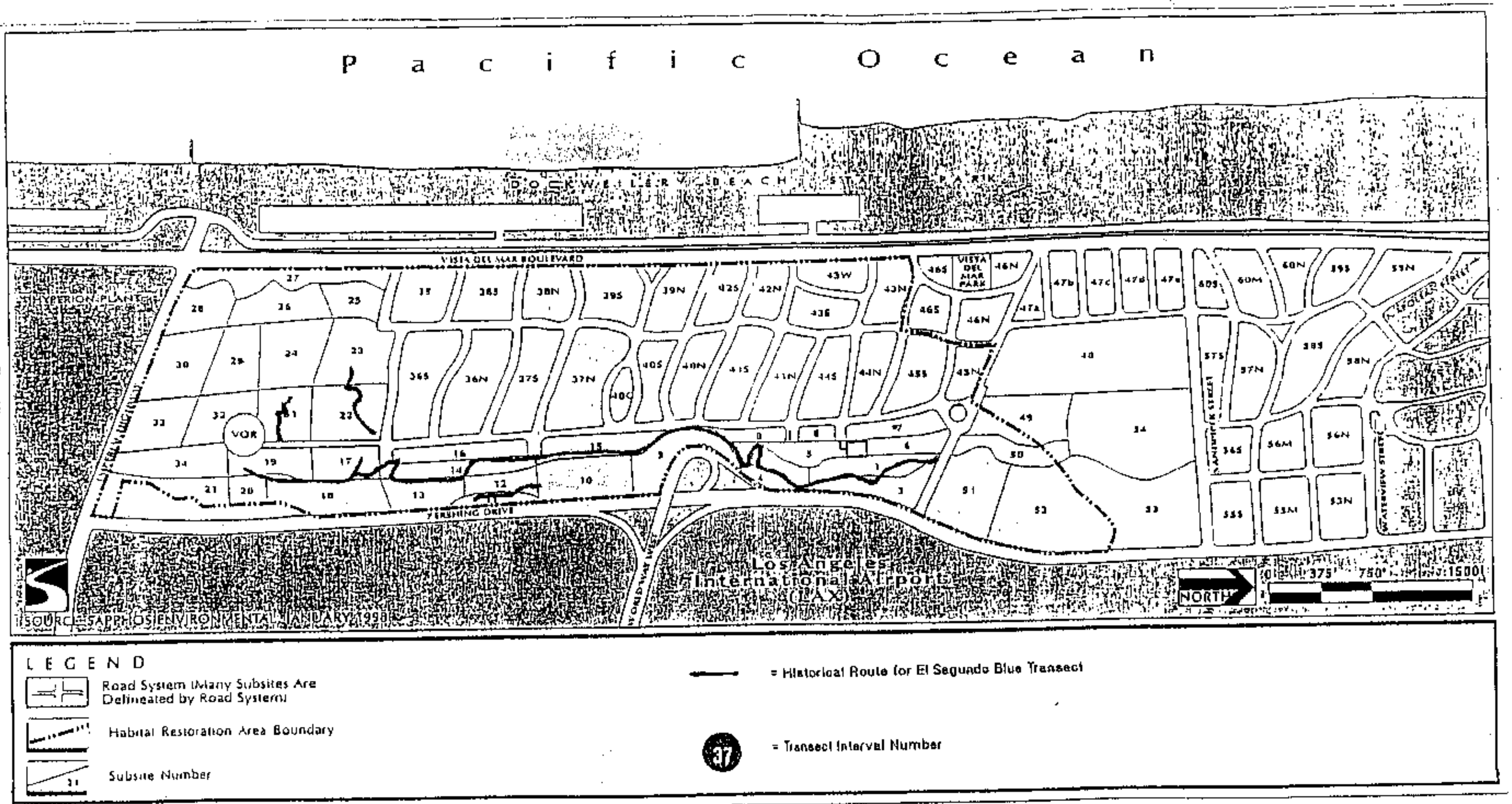
Gopher snakes were
observed while clearing
debris piles near
subsite 46S.

8/13/98
Also surveyed portions
of 48, 52, 51,
3, 1, 6, 7.
side blotched lizards
were common
throughout.

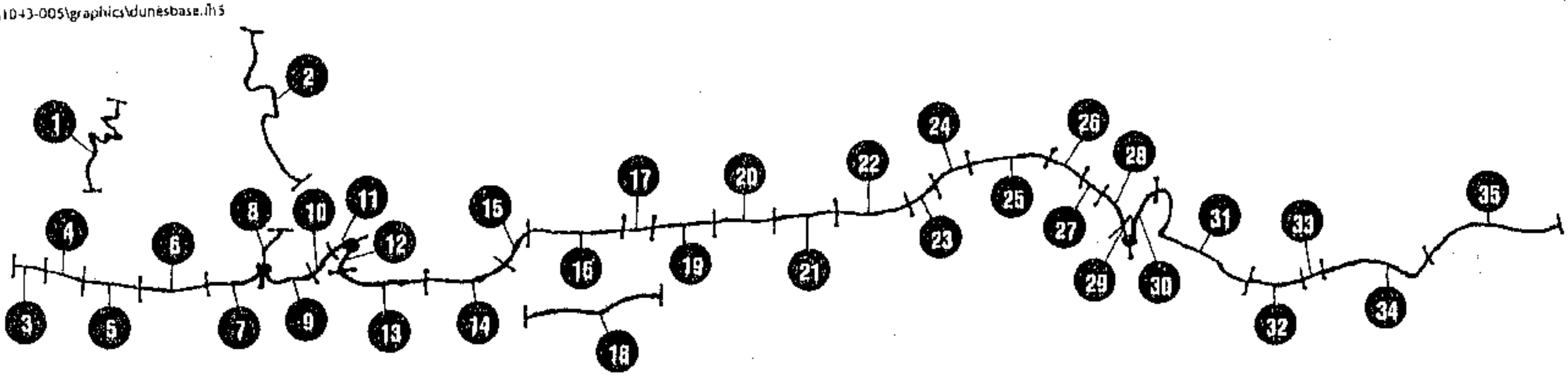
Plan for pit fall Traps -
open Traps next Tuesday
(8/18) and check for
3 consecutive mornings -
Run This for Fall end
of surveys.

ATTACHMENT 6

ESB SURVEY SITE AND HISTORICAL TRANSECT



w:\projects\1043-005\graphics\dunesbase.fh5



ATTACHMENT 6
ESB Survey Site and Historical Transect

ATTACHMENT 7
PHOTOGRAPHS OF REPRESENTATIVE SPECIES

Side-blotched Lizard, Adult Female

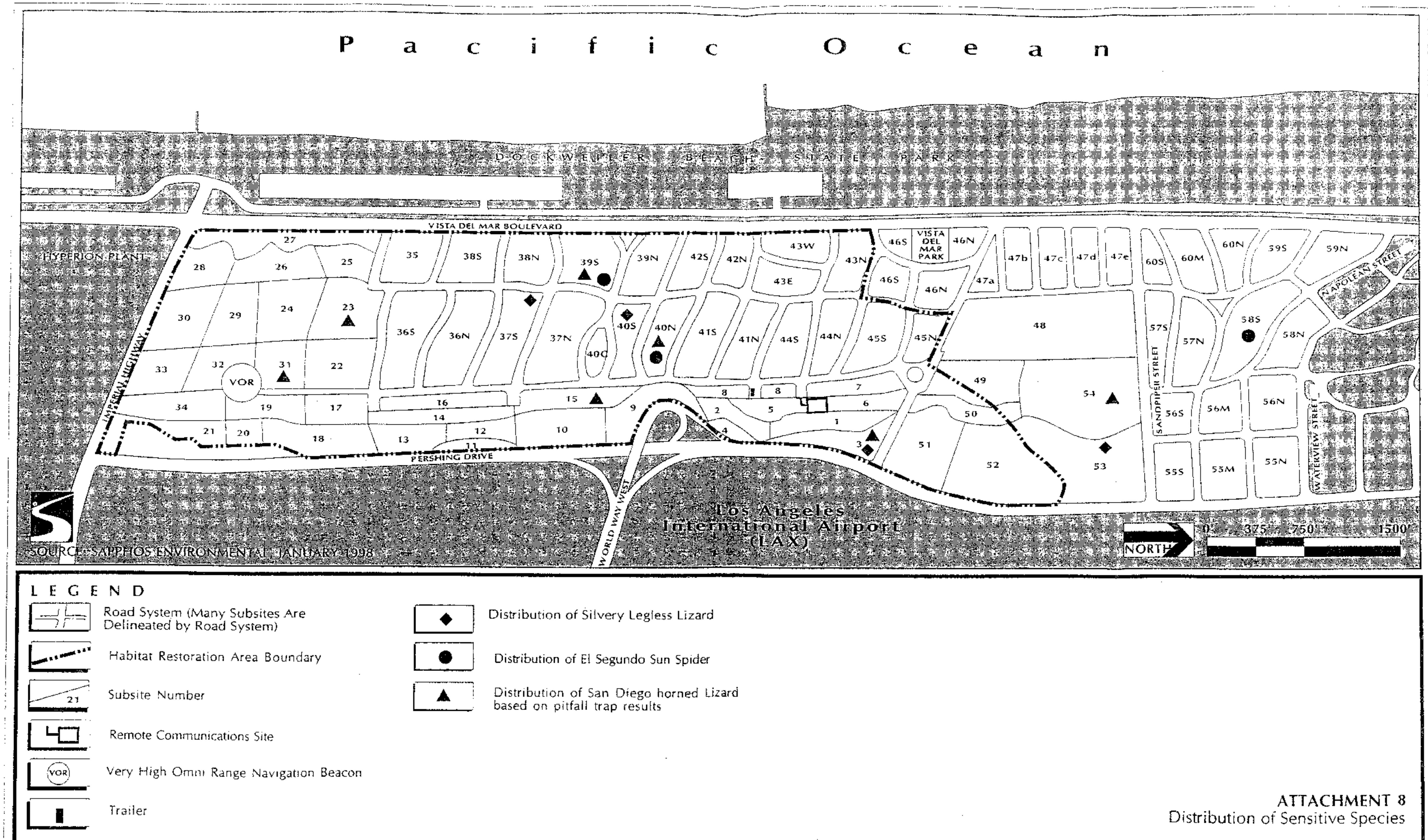
San Diego Horned Lizard, Juvenile

Silvery Legless Lizard

El Segundo Sun Spider

ATTACHMENT 8

DISTRIBUTION OF SENSITIVE SPECIES



ATTACHMENT 8
Distribution of Sensitive Species

w:\projects\1067-007\graphics\attachment3.fh5

2.6 1043-010

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

December 17, 1998

MEMORANDUM FOR THE RECORD
1043-010.M01

TO: U. S. Fish and Wildlife Service
(Mr. Doug Krofta)

Landrum & Brown
(Karen Yamamoto)

Los Angeles World Airports
Bureau of Environmental Management
(Mr. Steve Crowther)

FROM: Sapphos Environmental
(Dr. Irena Mendez)

SUBJECT: El Segundo Blue Monitoring Activities for the 1998 Flight Season at Los Angeles International Airport

ATTACHMENT: Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July, August, and September 1998

This Memorandum for the Record serves to transmit to the U. S. Fish and Wildlife Service (Service) the Annual Permit Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July, August and September 1998. In addition to the report, copies of the field data sheets are provided. Sapphos Environmental provided the Service with color photocopies of 1 inch equals 40 feet aerial photographs of dune subsites used to conduct the surveys in November 1997. All 1998 ESB monitoring activities were conducted pursuant to U. S. Fish and Wildlife Permit # TE830990-0.

The 1998 El Segundo blue butterfly (ESB) flight season commenced on June 30, 1998 and extended through September 9, 1998. During the 1998 flight season, two separate sets of surveys were conducted. Transect surveys were conducted along the historic transect route that has been surveyed since 1984 and, for the third consecutive year, the entire Habitat Restoration Area was surveyed at the height of the flight season to determine the presence or absence of ESB. The historical transect has been conducted by Sapphos Environmental since 1995 in support of on-going maintenance and monitoring activities for Los Angeles World Airports (Environmental Management Bureau). Presence/absence surveys have been conducted by Sapphos Environmental since 1996 in support of the *Los Angeles International Airport 2015 Master Plan*. The attached report provides information on the study site, methodology, and discusses monitoring results along the historical transect and presence/absence surveys across the entire Habitat Restoration Area.

Should you have any questions regarding the contents of the memorandum, please contact Irena Mendez at (626) 683-3547.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

REPORT OF EL SEGUNDO BLUE MONITORING ACTIVITIES AT THE LOS ANGELES INTERNATIONAL AIRPORT IN JULY, AUGUST, AND SEPTEMBER 1998

Conducted under USFWS Permit PRT-830990

Prepared for:
U.S. Fish & Wildlife Service
Carlsbad Field Office
2730 Loker Ave. West
Carlsbad, CA 92008

and

Irena Mendez, Ph.D.
Sapphos Environmental
50 So. DeLacey
Suite 210
Pasadena, CA 91105

Prepared by:
Richard A. Arnold, Ph.D.
Entomological Consulting Services, Ltd.
104 Mountain View Court
Pleasant Hill, CA 94523
(925) 825-3784

October 1998

INTRODUCTION

This report summarizes the findings of monitoring activities for the endangered El Segundo Blue (ESB) butterfly (*Euphilotes bernardino allyni*) that occurred in July, August, and September 1998, at the Los Angeles International Airport (LAX). All activities described in this report were conducted under the auspices of permit number PRT-830990, issued by the U.S. Fish & Wildlife Service to Sapphos Environmental (Pasadena, CA), the consulting firm that is assisting LAX with environmental issues. Entomological Consulting Services, Ltd. assisted Sapphos and LAX with issues regarding the El Segundo Blue butterfly.

During the ESB's adult flight season in 1998, the following activities were performed at LAX:

a) Dr. Richard A. Arnold presented a workshop on the El Segundo Blue butterfly;
b) counts of El Segundo Blue adults along the historical transect route; and
c) block counts of El Segundo Blue adults throughout the preserve area.

LAX hosted a workshop on the El Segundo Blue butterfly on July 16^{th}, 1998. Dr. Richard A. Arnold, President of Entomological Consulting Services, Ltd., presented the workshop, which included a lecture and field trip. Topics discussed included the classification, nomenclature, identification, distribution, life history, ecology, and population biology of the endangered El Segundo Blue. In addition, habitat restoration methods and butterfly monitoring methods were discussed. Participants were given copies of 13 publications on the butterfly and a list of 24 publications that discuss the butterfly. During a field trip to the LAX dunes, participants learned how to identify the El Segundo Blue, how to distinguish it from other butterflies that are active during the ESB's flight season, how to identify adult males and females of the ESB, and how to recognize the various adult behaviors that might be observed during monitoring surveys.

The remainder of this report describes the LAX study site, and the 1998 ESB monitoring activities and findings. The 1998 monitoring results are compared to findings of previous years.

STUDY SITE

Figure 1 illustrates the location of the LAX dunes using a portion of the Venice 7.5" USGS topographic map. In particular, Figure 1 illustrates that portion of the LAX dunes which comprises the preserve area. The preserve measures approximately 200 acres. An additional approximately 100 acres of undeveloped, degraded dunes lies immediately north of the preserve. The entire dune area measures 302 acres.

Predominant dune landforms that remain today at LAX include foredunes, backdunes, and deflation plain. Strand and bluff landforms were formerly located where Dockweiler Beach is now located. There are approximately 204 acres of foredunes, 27 acres of backdune, and 24 acres of deflation plain. The area also includes 23 acres of non-dune soil type and 24 acres of roads and buildings.

Because of the former residential neighborhood, movement of sand to uplift the current VOR site, former sand mining activities, and the construction of roads around the periphery of the dunes, most of the dunes have been disturbed to some degree. The disturbance is reflected in mixture of native plant communities and various weeds and exotics that now grow at the dunes. More recently, habitat restoration activities have resulted in the removal of various non-native plant species in portions of the dunes and plantings of native species to improve habitat quality.

Native plant communities at the LAX dunes include southern foredune, southern dune scrub, and valley needlegrass grassland. The southern foredune community is found on the foredunes, the southern dune scrub on the backdunes, and the valley needlegrass grassland on the deflation plain. Coast buckwheat, *Eriogonum parvifolium* (Polygonaceae), the sole larval and primary adult foodplant of the El Segundo Blue butterfly, grows primarily in the foredune and backdune portions of the preserve, although a few individuals can be found in portions of the valley needlegrass grassland.

The southern foredune plant community is dominated by perennials with a high proportion of shrubs and sub-shrubs. Characteristic species of the southern foredune plant community include: Coast Buckwheat (*Eriogonum parvifolium*), Bush Lupine (*Lupinus chamissonis*), Coast Goldenbush (*Ericameria ericoides*), Beach Evening Primrose (*Camissonia chieranthifolia*), Dune Wallflower (*Erysimum suffrutescens*), Beach Sand Verbena (*Abronia umbellata*), and Beach Bur (*Ambrosia chamissonis*). The southern dune scrub plant community consists of a coastal scrub community of shrubs and sub-shrubs characterized by most of the aforementioned taxa. One of the main differences between these communities is the degree of plant cover, as the southern foredune is generally characterized by sparser vegetative cover than the dense vegetative growth characteristic of southern dune scrub plant communities. The valley needlegrass grassland community is now almost completely absent at the LAX dunes due to grading for the construction of Pershing Blvd., and subsequent invasion of exotics and annual grasses that now dominate in portions of the dunes where the valley needlegrass grassland occurred. Under more natural conditions, this prairie would be dominated by bunchgrasses, primarily, Purple Needle Grass (*Nassella cernua*), a mixture of herbaceous flowers and shrubs, including California Encelia (*Encelia californica*), Lewis' Evening Primrose (*Camissonia lewisii*), Deerweed (*Lotus scoparius*), and Bush Lupine.

Figure 2 is a map of the LAX dunes and preserve that identifies the various subareas that were used for the block counts. Many of the subareas are polygons of variable size as delineated by the existing network of streets, leftover from the former residential neighborhood that was razed in the early 1970's. These subareas are also referred to as "blocks" elsewhere in this report and were used as the sampling areas for the block counts. In addition, Figure 2 illustrates the location of the historical transect route and all intervals along the route.

METHODS

Historical Transect.

Dr. Rudi Mattoni previously established a transect route for monitoring the El Segundo Blue butterfly at the airport and Sapphos Environmental has continued to use the same transect route. This transect route is referred to as the historical transect. It was walked on seven days between July 11th and September 9th, during the butterfly's flight season in 1998. Additional survey dates were July 17th and 24th, August 3rd, 11th, and 25th.

The transect route is illustrated in Figure 2. It meanders approximately 1.5 miles through a portion of the foredunes that lie immediately west of the VOR facility, and along the top and toe of the backdunes within the preserve area. It traverses sectors of the dunes where the ESB's foodplant, *Eriogonum parvifolium*, was abundant and thriving in prior years, areas where the foodplant is currently abundant and thriving, some hillside areas where natural regeneration has occurred, areas where non-natives have been removed, and portions of the dune preserve where restoration activities have occurred.

The beginning, ending, and numerous intermediate points along the historical transect route are marked by stakes in the field with unique identifying numbers or letters. The locations of all stakes were mapped on aerial photographs of this sector of the LAX dunes. The portion of the transect between two consecutive stakes is referred to as an interval. There are 35 intervals in the entire transect, which vary in length from about 50 to 700 feet (Table 1). The intervals vary in length because the beginning and ending points of each interval are located where there are changes in the vegetation, changes in topographic relief, and man-made features, all of which are used to identify the transect route in the field. Table 1 provides the length of every interval of the historical transect route and the total transect length. Interval lengths were measured to the nearest 5 feet using an aerial photograph (1 in. = 200 ft. scale, non-rectified) of the LAX dunes.

As an observer walks the transect from beginning to end (i.e., interval #1 to #35), the numbers of adult ESBs that are observed along the route within approximately 10-15 feet on either side of the centerline of the transect are counted. Tallies were recorded as males or females when diagnostic characteristics are clearly observed, and as undetermined sex when sexual characteristics cannot be observed. No ESBs are captured or otherwise handled. The locations of observed adults are noted by the transect interval between consecutive stake locations. Hand held weather instruments were used to measure air temperature and wind speed. Cloud cover was also noted during the counts. All transect counts occurred when weather conditions were suitable for ESB activity, as evidenced by ESB adults and other butterflies being active at the times of the transect counts. Dr. Richard A. Arnold and Dr. Irena Mendez conducted all transect walks during 1998.

Block Counts.

When the historical transect was initiated in the mid-1980's, the distribution of *Eriogonum parvifolium*, the ESB's foodplant, at LAX was restricted primarily to those portions of the dunes included in the transect route. However, in the early 1990's, *E. parvifolium* was

planted in many portions of the southern approximately 200 acres of the LAX dunes (i.e., the preserve), in particular in the foredunes where the former residential neighborhood was located (i.e., blocks #35 -#52). These areas were planted because the buckwheat had not naturally colonized the blocks in the approximately 20 years since the former residential neighborhood was razed. Since the historical transect route did not include most portions of the preserve where habitat restoration activities were undertaken, an alternative survey method was necessary to monitor the ESB in these areas, as well as other parts of the dunes that supported the ESB's foodplant. Thus, to assess the distribution and abundance of the ESB throughout the entire 200-acre preserve area, blocks counts were initiated during the butterfly's 1996 flight season and were repeated in 1997 and 1998. ESB counts were conducted in 61 blocks during the butterfly's 1998 flight season.

During the block counts, all blocks are visited once during the flight season within a period of a few days. The visit is timed to coincide with the approximate peak of the ESB's flight season. Using the information gathered from the counts along the historical transect route, the timing of the approximate peak of the ESB flight season can be estimated while the flight season is in progress by examining the trend in the numbers of butterflies observed on the transect counts and the sex ratio of males to females. During 1998, the block counts were conducted between July 24th and 28th, a 5-day period that coincided with the approximate peak of the ESB's 1998 flight season.

The boundaries of each block are delineated by the streets that remain from the former residential neighborhood. In other portions of the preserve where there are no streets, existing topographic and vegetation features are utilized to determine the boundaries of each "block". Every block at the LAX dunes is uniquely identified, as illustrated in Figure 2. During the 1996 monitoring activities, the location of every buckwheat plant within each block was mapped on acetate overlays of the aerial photograph for every block (scale 1 in. = 40 ft.). In the 1997 and 1998 block counts, these photos and overlays of the buckwheats were used to guide surveyors where to look for ESB adults. If new buckwheats were found, they were also mapped. Similarly, if dead buckwheats were observed, their locations were noted.

During the block count, an observer systematically surveys all portions of a particular block and visits every buckwheat plant only once, while looking for ESB adults. As adults are observed, their numbers are tallied and their locations are mapped on an acetate overlay of the aerial photograph of the dunes (scale 1 in. = 40 ft.) Tallies were recorded as males or females when diagnostic characteristics could be observed. Tallies were recorded as undetermined sex (undet. sex on the attached tables) when sexual characteristics could not be readily observed, or in a few cases, when butterflies were so abundant at a single plant that individuals could not be tracked to reliably sex all individuals. No ESBs are captured or otherwise handled. By repeating this procedure, all blocks within the preserve can be visited in approximately five days (weather permitting).

Under ideal circumstances, all 61 blocks in the preserve would be simultaneously inventoried and the counts of observed ESB adults would represent a census (i.e., a complete count of all individuals) of the butterfly population at that time. This approach would minimize the chance of counting the same individual more than once during the census, which could result in inflated census counts. Using this approach, the ESB population could be considered demographically and geographically closed, because the sampling period is short enough that no births, deaths, immigration, or emigration occurs.

Unfortunately, such a study design would require that 61 qualified surveyors were available at the peak of the butterfly's flight season to conduct the census counts. Since 61 surveyors were not available to conduct the census counts in this manner, the counts were performed over a five-day period. Because the butterflies are not marked, it is possible that some individuals were counted more than once during the census effort as the butterflies disperse from one location to another within the dunes. Similarly, because the count occurred over a 5-day period, some unknown quantity of births and deaths occurred during this period, thus the ESB population is considered open during the block counts. Also, it is possible that some unknown number of butterflies dispersed from the LAX dunes during the census period and were not detected. Despite these limitations, the block counts still provide useful information on the distribution and relative abundance of the ESB at the LAX dunes.

As during the transect surveys, hand held weather instruments were used to measure air temperature and wind speed during the block counts. All counts were conducted during portions of each survey day when weather conditions were suitable for ESB adults to be active. Surveyors for the block counts included, Dr. Richard A. Arnold, Barrett Anderson, and Dr. A. Oakley Shields of Entomological Consulting Services, Ltd., plus Tracey Alsobrook, Anne Dove, Marie Campbell, and Dr. Irena Mendez of Sapphos Environmental.

RESULTS AND DISCUSSION

The El Segundo Blue's adult flight season at LAX in 1998 began approximately two weeks later compared to its starting times in recent years, as the first adults were not observed until June 30th. The last adults were observed on September 9th, which indicates that the butterfly's flight season was at least 72 days in 1998 or approximately 10 weeks.

The later onset of the flight season was probably due to the cooler and wetter spring weather conditions, which not only delayed the start of the butterfly's flight season, but also delayed the flowering of its buckwheat foodplant. Many insects and plants use a combination of seasonal changes in daily photoperiod and degree-days (i.e., number of days above a minimal threshold temperature value) as environmental cues to trigger their emergence or flowering. Thus, the delay in emergence of the butterfly and flowering of the buckwheat is consistent with the cool and wet weather conditions that were experienced in the Los Angeles area during the spring of 1998.

<u>**Historical Transect.**</u>

A total of 2,175 adult ESBs were observed on the seven survey dates in 1998, including

1,386 males, 787 females, and 2 individuals of unknown sex. Using these data, if the transect counts had been performed at weekly intervals throughout the ESB's entire 10-week flight season during 1998, an extrapolated seasonal count of adult ESBs is estimated to range from 2,500-3,000 individuals.

The seasonal total applies to only the area of the transect belt (i.e., ca. 30 ft. x 7,880 ft. or approximately 5.4 acres), <u>not</u> to the entire dune preserve. Ideally, one would like to extrapolate the findings from the area of the transect count to the entire dune preserve, but this cannot be done for several reasons. First, the historical transect count method developed by Dr. Mattoni is a non-random sampling technique, because the location of the transect route was purposely rather than randomly selected. Thus, the counts from non-randomly selected locations cannot be used to estimate butterfly population numbers in the larger, other unsampled portions of the dunes. In other words, a misleading parameter estimate will result from non-random sampling because the selected sampling locations (i.e., the transect route) are not truly representative of the unchosen areas. In statistical terminology, this situation is referred to as selection bias. Attempting to generalize over a heterogeneous environmental (i.e., varying abundance of buckwheat in different portions of the dunes) without the proper use of inferential statistics can lead to very misleading results. The section of this report titled, **Recommendations for Future Studies,** discusses an alternative monitoring methodology that would overcome this limitation of the historical transect count technique.

Table 2 summarizes the total numbers (males + females + undetermined sex) of ESB adults observed by survey date. Tallies of the numbers of observed males, females, and individuals of undetermined sex for every transect interval and survey date are presented in Table 3. Figure 3 illustrates the numbers of butterflies observed for every transect interval and survey date. The greatest numbers of butterflies were observed in intervals #25, #31, #20, #34, and #18. Most of the butterflies were observed along the northern intervals, especially #18-#27 and #31-#35 than elsewhere along the transect route. A smaller portion of the ESB numbers were concentrated in intervals #1-#4. Throughout the ESB flight season, very few butterflies were observed on any survey date in intervals #5-#17, #28, and #29.

Comparison of ESB numbers from the transect counts in 1997 and 1998, reveal that the 1998 totals are over 17 times greater than the 126 individuals observed on four survey dates late in the 1997 flight season of the ESB. Initially, this comparison suggests that the ESB experienced a crash in 1997 and a population explosion of the ESB occurred in 1998. Indeed, more adults were observed on the first transect count date of 1998 than for the combined total of adults observed on all four count dates in 1997.

However, a closer examination of the two data sets reveals that they really are not comparable for the purpose of inferring a trend in population numbers for the two years. Since the 1997 survey counts occurred late in the butterfly's flight season, when butterfly numbers were declining after their peak, and most of the 1998 count dates occurred before or at the seasonal peak in butterfly numbers, most of the counts in 1997 and 1998 actually occurred during different periods within the respective flight seasons of the ESB. Thus, any comparison of populations numbers from these two years could lead to erroneous conclusions about population trends since the count data from these years represent different portions of the respective flight seasons.

The 1996 count data for the historical transect are more comparable to the 1998 data set since they were collected on four survey dates near the peak of the butterfly's activity period. A total of 1,455 adults were observed on the four survey dates spanning 21 days in 1996. Although the 1998 counts began early in the ESB's flight season and continued until its end, the sex ratio (i.e., ratio of males to females) observed on different count days can be used to identify comparable portions of each flight season. In 1998, similar sex ratios for three transect surveys occurred over a 17-day period (July 17 – August 3) near the ESB's peak and 1,650 adults were observed during this portion of the 1998 flight season. The closeness of the counts from 1996 (1,455 adults) and 1998 (1,650 adults) at the butterfly's peak in both years indicates that the population numbers were probably not dramatically different between the two years. However, since more butterflies were observed on three dates in 1998 versus slightly fewer butterflies on four dates in 1996, population numbers were higher in 1998 compared to 1996.

The findings of the 1998 transect counts corroborate the preliminary interpretation of the 1997 monitoring results, which concluded that the ESB population had not declined as dramatically as the 1997 transect counts suggested. Clearly, the lower butterfly numbers observed in 1997 were not the result of a real population decline: rather, they were the result of a late start of the sampling program and poor weather conditions that limited butterfly activity during the survey period near the end of the butterfly's flight season.

The historical transect counts have been performed annually since 1984, except for 1985 when no counts were undertaken. As depicted in Table 4, the number of ESB adults observed in 1998 was substantially higher than counts for any of the prior years. All but two of the butterflies observed in 1998 occurred on just five survey dates. The second highest seasonal count was in 1996, when 1,455 ESBs were observed on four survey dates. In prior years the number of survey dates ranged from 4 to 15. Since the numbers of butterflies observed in 1996 and 1998 were higher than in prior years, and the number of survey dates in 1996 and 1998 were at the low end of the range of number of survey dates in prior years, this suggests that ESB population numbers are increasing at the LAX dunes. Undoubtedly, the observed increase in butterfly numbers is the result of the on-going habitat restoration and management efforts.

Block Counts.

A total of 4,066 adult ESBs were observed during the block counts, including 2,594 males, 1,339 females, and 133 individuals of undetermined sex. Each block, as illustrated on the attached map of the LAX dunes (Figure 2), was visited only once during the period July 24th-28th. Copies of the acetate overlays (scale 1 in. = 40 ft.), which illustrate the locations of all ESB observations for each block surveyed during the block counts, are attached as an appendix to this report. Some points on the overlays represent more than one observed ESB adult.

Prior to the habitat restoration activities, the distribution of the ESB at the LAX dunes

was limited to only portions of the VOR and backdunes of the preserve, i.e., blocks #1-#34 (Figure 2). Suitable habitat for the ESB was actually restricted to portions of only 12 of these 34 blocks, namely #1, #2, #11, #12, #14, #17, #20, #22, #23, #24, #31, and #34. During the past decade, restoration activities within this portion of the dunes have been focused primarily in blocks #6, #7, #8, #9, #10, #13, and #18. Elsewhere, restoration activities have also occurred throughout other portions of the preserve, specifically blocks #35 - #52.

Table 5 summarizes the numbers of adult butterflies observed in each block during the 1998 survey. The tallies ranged from zero individuals (in 12 blocks) to 539 individuals (in block #9). In 1998, nearly 55% of the adults observed during the block counts were in blocks #35 - #52, where the buckwheat foodplant of the ESB did not grow prior to the onset of restoration activities. These findings demonstrate that the habitat restoration efforts to benefit the ESB have been very successful at the LAX dunes. Clearly, the additional acreage of restored habitat has contributed to the observed increase in ESB numbers at the LAX dunes.

Figure 4 illustrates the numbers of ESB adults observed in each of the 61 blocks during 1996, 1997, and 1998. Table 5 lists the numbers of adults observed in every block during each of the same three years. Block counts in 1996 and 1998 were both conducted at the approximate peaks of the respective flight seasons; hence counts from these two years are more comparable for the purpose of assessing the trend in population numbers of the ESB. As explained in the discussion of the historical transect counts, the block counts for 1997 were obtained late in the adult flight season rather than at its peak. During the 1996 and 1998 block counts, adult ESBs were generally found in the same blocks in both years. Blocks that exhibited higher numbers in 1996 also exhibited higher numbers in 1998.

Like the transect counts, results of the block counts indicate that ESB population numbers at the LAX dunes increased between 1996 and 1998. Counts for 37 of the 61 blocks were higher in 1998 compared to 1996 counts. Counts for nine blocks were identical in both years, while counts for 15 blocks were lower in 1998 than 1996. The total number of ESB adults observed in the 61 blocks increased to 4,066 in 1998 from 2,093 in 1996. In other words, the ESB population nearly doubled in number between 1996 and 1998. Undoubtedly, the observed increase is due to additional acreage of restored habitat and greater numbers of mature buckwheat plants at the LAX dunes.

Figure 5 is a map of the dunes that illustrates the counts of the ESB for every block in 1998. Although it is tempting to convert the block counts to a measurement of density (i.e., numbers of butterflies per unit area), such an estimate of density may be inaccurate because the ESB adults were not uniformly distributed throughout the blocks due to the variation in habitat quality within and among blocks. An alternative method for estimating density, such as the nearest neighbor method, which relies on the spatial location of the adult observations, would probably provide a more reliable estimate of density of the ESB.

Recommendations for Future Studies.

As has been noted elsewhere in this report, both the transect count and block count methods have inherent limitations that can lead to erroneous results and conclusions about the population numbers and trends of the ESB at the LAX dunes. If LAX would like the population estimates to be more accurate and a more precise assessment of population trends, I suggest that LAX consider an alternative, statistically-based approach to population monitoring of the ESB. Initially, the statistical approach could be performed as a pilot study, in conjuction with the historical transect counts and block counts to determine how comparable the results of the different monitoring methods are. The remainder of this section provides some background information on population monitoring and then describes the basic framework for a statistically-based sampling program for the population monitoring of the ESB at LAX.

Population monitoring refers to an assessment of the spatial distribution, abundance, density, or other population attributes of a species within a defined area over more than one time unit. A goal of population monitoring is to detect an important change, in both magnitude and direction, in average number of animals over a defined time period (i.e., a trend). Population monitoring can be divided into two categories, index monitoring and inferential monitoring. These two approaches differ in the degree of potential bias in their population estimates and therefore the strength of the inferences possible from collected data.

Index monitoring refers to an assessment protocol that collects data that at best are a rough guess of the true population trend. Both the historical transect counts and block counts at LAX are index methods that utilize non-random sampling techniques (i.e., the subjective choice of sampling units based on prior information, experience, convenience, or related criteria). These types of methods have no way to calculate the amount of error associated with the counts (i.e., a measure of numerical spread of observations), and mistakes or bias introduced somewhere in the sampling design or process of data collection. Without an estimate of the error due to these types of bias, the precision of the counts or population estimates cannot be determined.

To improve the ESB monitoring program at LAX, I recommend using an inferential approach, utilizing random (i.e., probability based) sampling techniques. Inferential monitoring refers to an assessment protocol that uses unbiased or nearly unbiased estimators of spatial distribution and abundance that can be validly expanded to the entire area of interest for assessing trends. This approach would provide estimates of ESB population numbers along with an estimate of their associated error (i.e., standard deviation), which will permit a more accurate assessment of population trends over time.

In order to implement such a statistically-based monitoring program, we need to more thoroughly analyze the habitat quality data that was collected in 1996. The results of this analysis will allow us to prepare a suitable sampling design for the inferential monitoring approach. Because the buckwheat foodplant of the ESB is not evenly distributed throughout the dunes, the study area should be stratified by habitat quality categories. For example, four categories might be defined as areas that lack buckwheat, plus low, medium, and high quality areas. Data from the 1996 surveys can be used to define these categories based on the abundance, age classes, flower numbers, and spatial distribution of the buckwheats. Once the habitat quality categories are defined, all portions of the LAX dunes can be classified and

polygons drawn on a site map that illustrate the locations of all habitat categories at LAX.

Using the findings of the habitat analysis, a sampling design for ESB population monitoring would be prepared. Plots or transects would be randomly placed in portions of the dunes that represent each of the habitat categories to collect data on the ESB to estimate its population parameters such as abundance and spatial distribution. Analysis of the 1996 data would also be useful to determine the size of sample units and the number of units needed to obtain accurate estimates of ESB abundance and distribution. Samples would be taken in a subset of all polygons at the dunes, based in the relative proportion to the habitat categories themselves (i.e., if 10% of the dunes is categorized as non-habitat for the ESB, 10% of the samples would occur in polygons classified as non-habitat). Data collected in this manner can be used to generate population estimates for the entire dunes by each habitat category. The population parameters estimated in this manner should have minimal bias and an accurate measure of the degree of error associated with these estimates. More accurate estimates will provide a better basis for assessing population trends and making management decisions based on the results of ESB population monitoring

Table 1. Lengths of the 35 intervals along the historical transect.

Interval Number	Interval Length (feet)
1	480
2	700
3	100
4	125
5	175
6	200
7	175
8	125
9	200
10	90
11	50
12	75
13	300
14	260
15	150
16	300
17	90
18	480
19	200
20	190
21	265
22	240
23	100
24	140
25	220
26	125
27	75
28	100
29	50
30	190
31	440
32	180
33	50
34	380
35	560
Total Length (feet)	7,880

Table 2.1998 Historical Transect Count Tallies by Survey Date

Survey Date	Numbers of Observed Adult ESBs			Daily Totals
	Males	Females	Under Sex	
vii-11	146	24	0	170
vii-17	346	140	2	488
vii-24	374	214	0	588
viii-3	344	230	0	574
viii-11	152	137	0	289
viii-25	24	39	0	63
ix-9	0	2	0	2
Seasonal Totals	1,386	787	2	2,175

Table 3. Numbers of ESB adults observed for every interval and all survey dates in 1988 of the historical transect.

Survey Date: 11-Jul-98

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	1	0	0	1
3	6	1	0	7
4	1	0	0	1
5	0	0	0	0
6	1	0	0	1
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	5	1	0	6
19	2	0	0	2
20	15	3	0	18
21	2	2	0	4
22	19	4	0	23
23	8	0	0	8
24	3	1	0	4
25	22	3	0	25
26	11	0	0	11
27	8	1	0	9
28	0	0	0	0
29	1	0	0	1
30	0	0	0	0
31	18	2	0	20
32	1	0	0	1
33	10	2	0	13
34	4	0	0	4
35	8	3	0	11
Totals	146	24	0	170

Survey Date: 17-Jul-98

Interval	Males	Females	Undetermined	Interval Total
1	2	0	0	2
2	2	1	0	3
3	13	7	0	20
4	8	2	0	10
5	1	1	0	2
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	1	0	0	1
11	1	1	0	2
12	0	0	0	0
13	5	0	0	5
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	2	0	2
18	32	12	0	44
19	0	0	0	0
20	31	10	0	41
21	11	4	0	15
22	19	8	0	27
23	15	4	2	21
24	24	6	0	30
25	37	24	0	61
26	19	6	0	25
27	20	10	0	30
28	2	1	0	3
29	3	1	0	4
30	1	1	0	2
31	29	17	0	46
32	5	0	0	5
33	8	5	0	13
34	29	7	0	36
35	28	10	0	38
Totals	346	140	2	488

Survey Date: 24-Jul-98

Interval	Males	Females	Undetermined	Interval Total
1	2	3	0	5
2	1	0	0	1
3	27	26	0	53
4	13	9	0	22
5	1	0	0	1
6	1	0	0	1
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	1	0	0	[illegible]
11	0	0	0	0
12	0	0	0	0
13	2	0	0	2
14	2	1	0	3
15	0	0	0	0
16	3	0	0	3
17	0	0	0	0
18	29	17	0	46
19	5	1	0	6
20	36	14	0	50
21	30	5	0	35
22	25	13	0	38
23	5	2	0	7
24	27	11	0	38
25	52	41	0	93
26	8	10	0	18
27	9	12	0	21
28	0	0	0	0
29	0	0	0	0
30	3	6	0	9
31	25	10	0	35
32	6	5	0	11
33	37	13	0	50
34	5	2	0	7
35	18	13	0	31
Totals	374	214	0	588

Survey Date: 03-Aug-98

Interval	Males	Females	Undetermined	Interval Total
1	2	1	0	3
2	4	0	0	4
3	33	16	0	49
4	10	6	0	16
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	3	4	0	7
12	0	0	0	0
13	0	0	0	0
14	3	2	0	5
15	0	0	0	0
16	0	0	0	0
17	2	3	0	5
18	15	17	0	32
19	1	1	0	2
20	42	22	0	64
21	7	4	0	11
22	13	9	0	22
23	15	5	0	20
24	26	17	0	43
25	44	34	0	78
26	13	9	0	22
27	6	7	0	13
28	0	0	0	0
29	0	0	0	0
30	3	2	0	5
31	46	27	0	73
32	5	1	0	6
33	6	9	0	15
34	32	29	0	60
35	13	6	0	19
Totals	344	230	0	574

Survey Date: 11-Aug-98

Interval	Males	Females	Undetermined	Interval Total
1	0	2	0	2
2	1	2	0	3
3	7	7	0	14
4	2	4	0	6
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	1	0	0	1
12	0	0	0	0
13	0	1	0	1
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	2	0	2
18	13	12	0	25
19	0	0	0	0
20	29	13	0	41
21	4	3	0	7
22	3	3	0	6
23	5	9	0	14
24	9	5	0	14
25	13	10	0	23
26	2	2	0	4
27	1	2	0	3
28	0	0	0	0
29	0	0	0	0
30	2	1	0	3
31	27	21	0	48
32	0	1	0	1
33	6	7	0	13
34	22	18	0	40
35	6	12	0	18
Totals	152	137	0	289

Survey Date: 25-Aug-98

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	0	1	0	1
3	3	2	0	5
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	1	5	0	6
19	0	0	0	0
20	3	4	0	7
21	0	0	0	0
22	4	1	0	5
23	0	0	0	0
24	0	0	0	0
25	1	4	0	5
26	0	0	0	0
27	0	1	0	1
28	0	0	0	0
29	0	0	0	0
30	1	3	0	4
31	6	12	0	18
32	0	0	0	0
33	0	0	0	0
34	5	5	0	10
35	0	1	0	1
Totals	24	39	0	63

Survey Date: 09-Sep-98

Interval	Males	Females	Undetermined	Interval Total
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	2	0	2
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
Totals	0	2	0	2

Table 4. Summary of Annual ESB Transect Counts at LAX

Year	Number of Survey Dates	Span of Survey Dates	Number of ESB Observed
1984	4	19	193
1986	5	35	258
1987	9	56	473
1988	10	61	1,049
1989	11	54	1,390
1990	10	63	1,192
1991	12	90	906
1992	15	111	1,051
1993	10	58	925
1994	8	63	500
1995	10	69	1,239
1996	4	21	1,455
1997	4	21	126
1998	6	60	2,175

Table 5. Numbers of El Segundo Blue Adults Observed During Block Counts for 1996 – 1998 at LAX

Block	1996	1997	1998	Block Total
01	107	51	95	254
02	34	25	170	229
03	0	0	14	14
04	22	1	1	24
05	26	3	10	39
06	8	1	13	22
07	23	1	8	32
08	103	9	147	259
09	221	40	539	808
10	54	18	134	206
11	14	1	0	15
12	85	55	66	206
13	152	35	113	300
14	5	3	19	27
15	55	0	108	163
16	6	0	36	42
17	3	0	1	4
18	47	26	120	193
19	10	10	16	36
20	50	75	160	284
21	11	5	37	53
22	1	0	4	5
23	1	0	0	1
24	18	0	20	38
25	3	0	4	7
26	6	0	4	10
27	0	1	0	1
28	1	0	1	2
29	2	0	0	2
30	1	0	0	1
31	2	0	6	8
32	0	0	0	0
33	0	0	0	0
34	1	0	0	1
35	25	3	40	68
36N	56	10	141	207
36S	36	1	46	83
37N	47	14	112	173
37S	59	5	76	140
38N	77	100	269	446
38S	52	6	32	90
39N	40	1	65	106
39S	29	3	74	106
40C	24	9	28	61
40N	91	26	385	502
40S	53	6	110	169

Block	1996	1997	1998	Block Total
41N	19	0	16	35
41S	88	3	88	179
42N	39	11	51	101
42S	179	86	466	731
43E	34	10	92	136
43N	27	29	45	101
43W	28	29	34	91
44N	15	0	20	35
44S	7	1	12	20
45N	0	0	1	1
45S	2	0	2	4
49	0	0	5	5
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
Totals	2093	726	4066	6885

Figure 1. Study Area for El Segundo Blue Butterfly at the Los Angeles International Airport

USGS 7.5' Venice Quadrangle from Sure! Maps Raster

LEGEND

Road System (Many Subsites Are Delineated by Road Systems)

Habitat Restoration Area Boundary

Subsite Number

= Historical Route for El Segundo Blue Transect

37 = Transect Interval Number

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Figure 3. Numbers of ESB adults observed for every transect interval and survey date in 1998

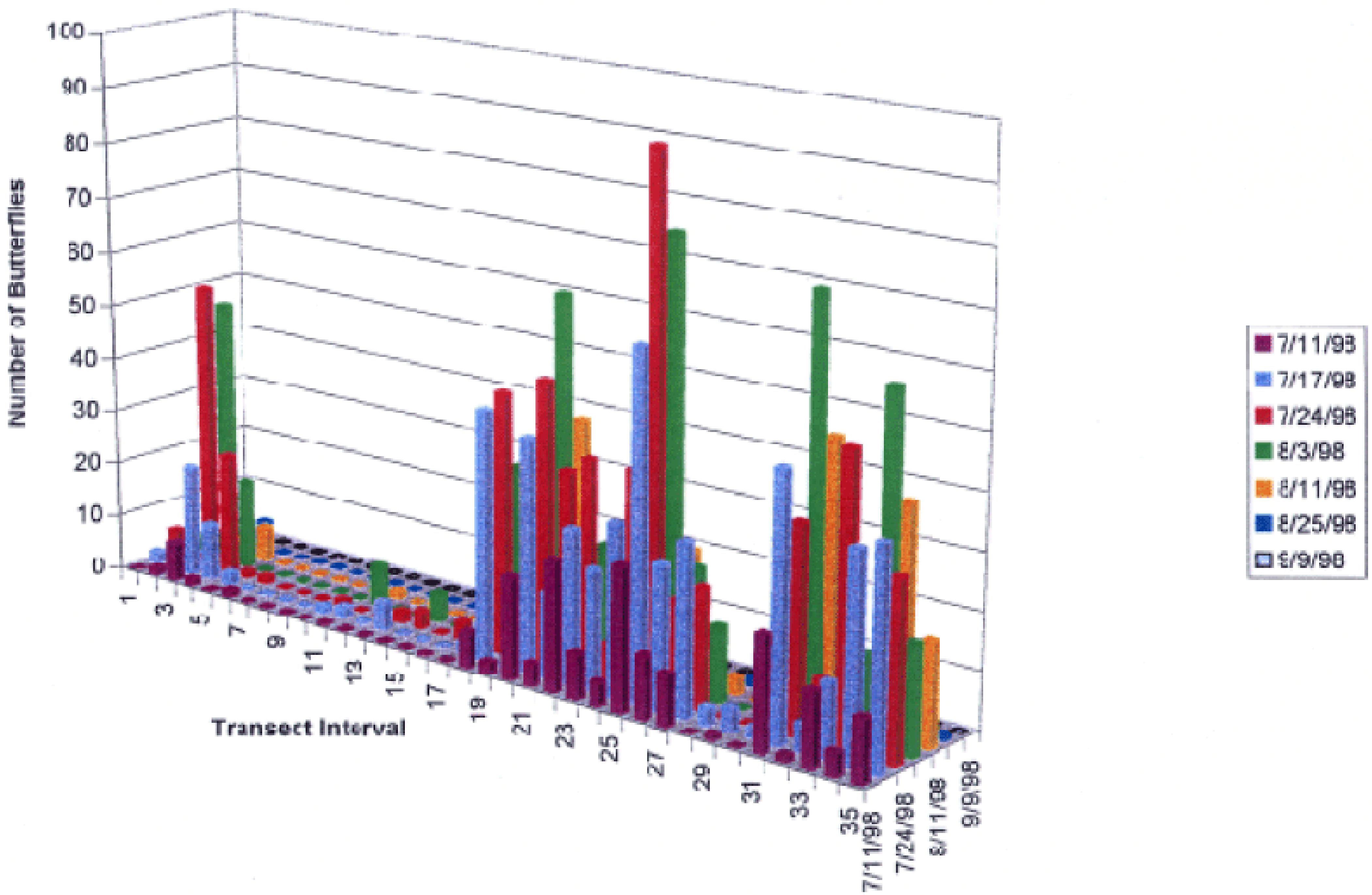
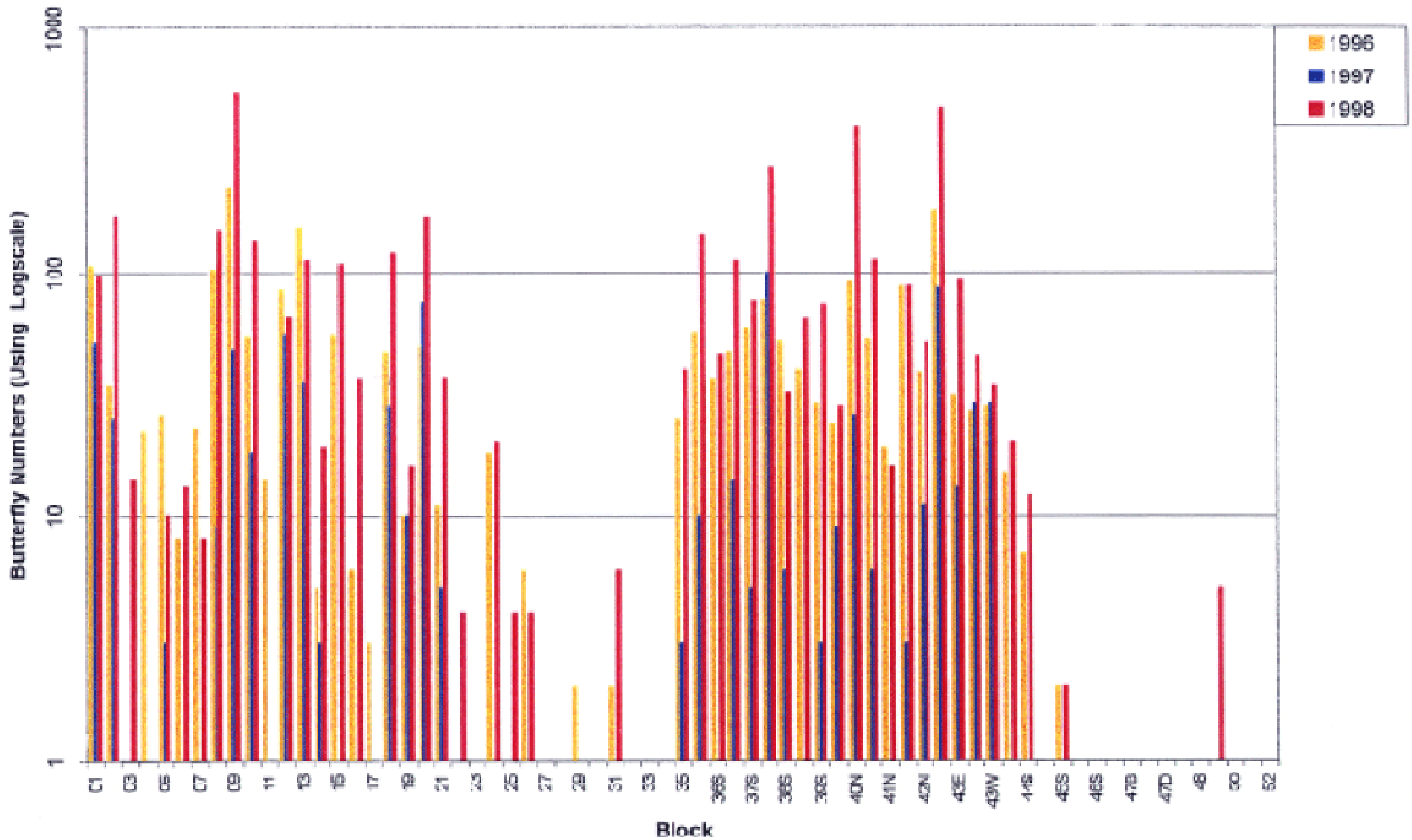


Figure 4. ESB Block Counts for 1996, 1997, and 1998



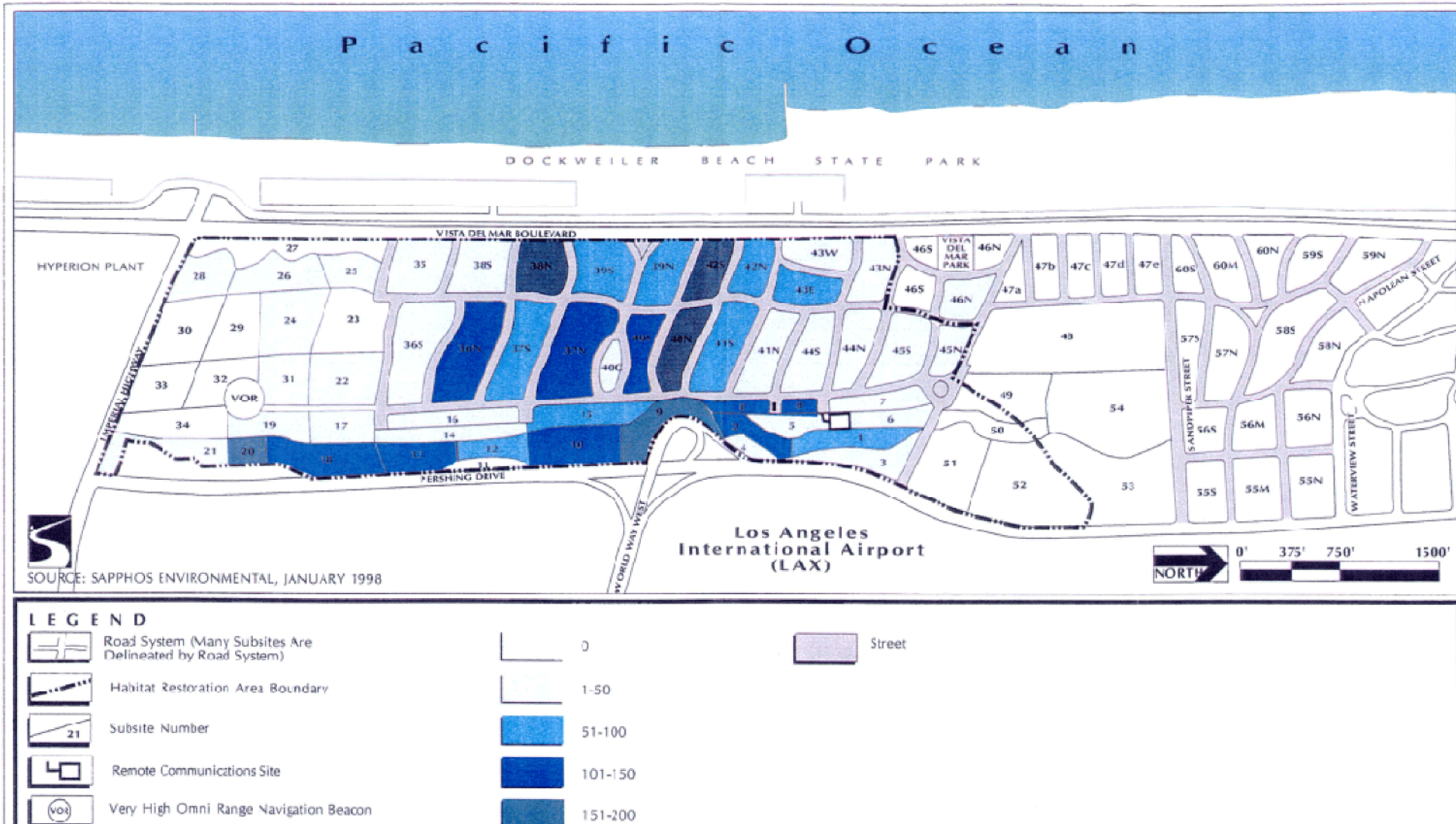


FIGURE 5
1998 ESB Block Counts

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SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

October 23, 1998

MEMORANDUM FOR THE RECORD
JN 1067-007.M17 and 1043 008.M08

TO:	Landrum & Brown (Ms. Sheila Murphy, Ms. Karen Yamamoto)
FROM:	Sapphos Environmental (Dr. Irena Mendez)
SUBJECT:	Results of Spring Surveys for Gastropods and Arthropods at Los Angeles International Airport in Support of the Los Angeles International Airport 2015 Master Plan EIR/EIS
ATTACHMENT:	1. Map of survey locations 2. Sensitive arthropod surveys, El Segundo dunes, 1996-1998 3. Report of surveys for Trask's landsnail at El Segundo dunes

This Memorandum for the Record serves to transmit to Landrum & Brown the results of spring surveys for gastropod and arthropod species undertaken at the Los Angeles International Airport (LAX) 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S, Range 15W; Township 2S, Range 14 W; Township 3S, Range 14W; Township 3S, Range 15W; located within the Sausal Redondo Land Grant Boundary).

These surveys were conducted to address comments provided by the U. S. Fish and Wildlife Service in response to the Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the *Los Angeles International Airport 2015 Expansion Master Plan*. The U. S. Fish and Wildlife Service letter of response is dated July 31, 1997.

Areas where surveys were conducted are within the Los Angeles International Airport study area and include: the El Segundo Blue Butterfly Habitat Restoration Area, designated as Area A; the open area north of the El Segundo Blue Butterfly Habitat Restoration Area, east of Vista Del Mar Boulevard, west of Pershing Drive and south of Napoleon and Waterview Streets, designated as Area B; and the open space areas to the west of north and south runways and east of Pershing Drive, designated as Area C. A map with the locations of the survey areas is provided in Attachment 1.

The principal investigator who undertook the entomological surveys was Mr. Frank Hovore. He was assisted by Mr. Ian Swift, Mr. Brad Blood, Ph. D. and Ms. Irena Mendez, Ph. D. Survey dates include: April 4, 16, 22, and 29, 1998; May 6, 20 and 29, 1998; June 3, 12, 17, and 23, 1998; and July 1, 8, 22, and 23, 1998.

Field work consisted of both diurnal and nocturnal surveys, which included visual searching, sweeping, sifting (along established transects), beating sheets, and rearing (see Attachments 2 and 3). The objective of the surveys was to establish the presence/absence, seasonal occurrence and distribution of the noted species within the study area. Specimens were taken to voucher each species, however, series were not collected and there was no attempt to generate statistical data from the material. Specimens collected as a result of these surveys were deposited at the Los Angeles County Natural History Museum. A summary of results indicates the following:

Gastropods

- Trask's snail (*Helminthoglypta traski*): present in Area A and portion of Area B located south of Sandpiper.

Insects

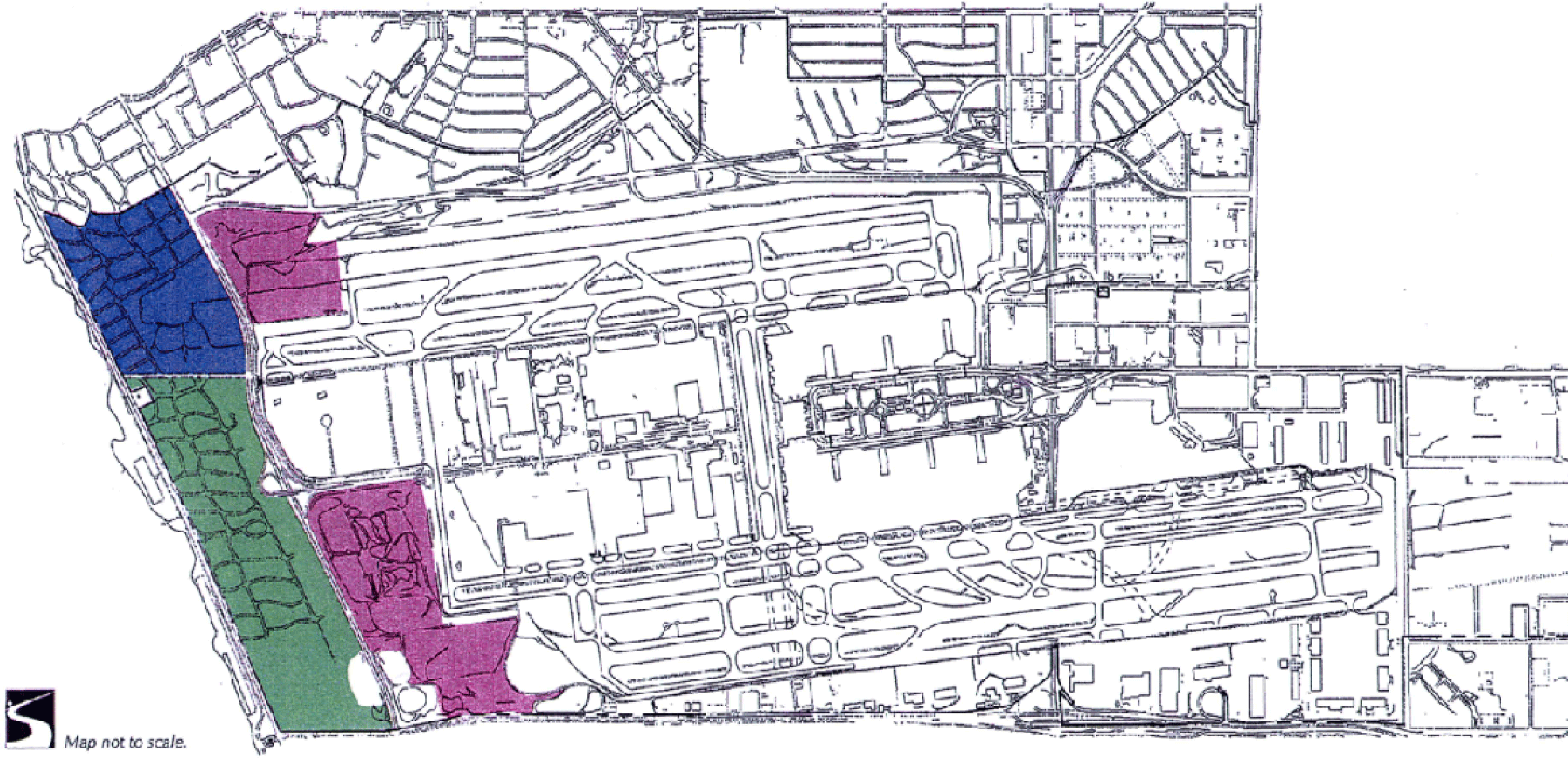
- El Segundo Jerusalem cricket (*Stenopelmatus* new species): present in Area A
- Belkin's dune fly (*Brennania belkini*): present in Area A, B and C.
- El Segundo goat moth (*Comadia intrusia*): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- Santa Monica dunes moth (*Copeblepharon sanctamonicae*): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- River's dune moth (*Euxoa riversii*): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- Ford's sand dune moth (*Psammobotys fordi*): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- El Segundo scythrid moth (*Scythris* new species): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- lesser dunes scythrid moth (*Scythris* new species): possibly present in Area A. Sustained and focused field efforts are required to confirm the presence of the species.
- dune scarab beetle (*Aegilla convexa*): Present in Area A.
- south coast dune beetle (*Psammodius macclayi*): Present in Area A.
- Lange's dune beetle (*Onychobaris langei*): Not observed.
- Dorothy's sand dune weevil (*Trigonoscuta dorothae dorothae*): Present in Area A and B.

Arachnids

- El Segundo sun spider (*Eremobates* new species): Present in Area A.
- El Segundo crab spider (*Ebo* new species): Not determined to species. Several genera and species within this spider family were present in Areas A, B and C.
- trapdoor spider (*Aptostichus simus*): Present in Area A.

Should there be any questions regarding the information contained in this memorandum, please contact Sapphos Environmental, Inc. (Dr. Irena Mendez) at (626) 683-3547.

ATTACHMENT 1
Map of Survey Locations



Legend

Master Plan Boundary

Area A

Area B

Area C

Los Angeles International Airport Master Plan

Los Angeles International Airport Master Plan Gastropod and Anthropod Study Area

Attachment 1

ATTACHMENT 2
Sensitive arthropod surveys, 2015 Master Plan Study Area, 1996-1998

FH & A

(805) 250 - 8311; 298 - 7579 fax; e-mail: fhovore@smartlink.net

Frank Hovore & Associates
14734 Sundance Place
Santa Clarita, CA 91351-1542

28 September 1998

Report of sensitive arthropod surveys,
Los Angeles International Airport
2015 Master Plan Study Area, 1996 - 1998

Introduction

Los Angeles International Airport is located within the Venice Quadrangle, USGS 7.5 minute series, T2S, R15W; T2S, R14W; T3S, R14W; and T3S, R15W; within the Sausal Redondo Land Grant boundary. Long-range expansion plans necessitate the gathering of data on potential occurrence of sensitive species of plants and animals within the proposed future development areas and on the remaining portions of the historic El Segundo (LAX) dune system. As part of the overall inventory process, a series of different census methods were employed to sample the invertebrate fauna of the site, focused upon discovery and determination of distributional parameters for agency-listed sensitive species.

Background

The El Segundo dune system and surrounding open lands within the LAX perimeter contain a mosaic of habitat and resource values for arthropods. Although the residential development and other direct disturbances which severely altered the dunes over many decades have largely been removed, substrate and vegetation disturbance effects may take much longer to completely restore (actively or passively), and elements which were extirpated have no local reservoir populations from which to readily recolonize the site. Ruderal areas (that is, those wherein the native ground-cover and shrubs have been supplanted ecologically by invasive alien grasses and shrubs) offer extremely limited biological opportunities and generally do not naturally recover habitat values or species diversity without extensive restoration. Such areas, particularly where continuously disturbed or physically isolated, generally support little in the way of native arthropod taxa, and those which do occur usually are ecological generalists, capable of surviving the direct affects of urbanization or agriculture. Species which have evolved specialized behaviors or structural attributes for natural dune habitats, or other edaphic or hydrologic conditions (such as playa lakes, beach strand, tidal marshes, or vernal pools) are the first to be restricted or eliminated by disturbance, and also are the least likely to recolonize a site unless it has been fully restored ecologically.

Invertebrate species adapted to coastal dune habitats in southern California have suffered extensive habitat losses and population fragmentation over the past century, and many dune species have been extirpated or are perilously close to extinction. In addition to the known losses, there are many "hidden" species— minute, highly seasonal, flightless, or with other attributes or habits which make them difficult to find or census—for which there is insufficient data to permit meaningful evaluation of population densities or distributions. It is probable that these more obscure species also have suffered similar rates of reduction or extinction. Species considered endemic to coastal dune habitats and their peripheral subsites, then, are considered sensitive by state and federal resource agencies, and may be regarded as "target taxa" for studies, surveys and restoration efforts.

A suite of sensitive invertebrate species has been determined by the USFWS to have occurred, or potentially occur, on the LAX dunes and their peripheral habitat areas, and this list formed the basis for survey efforts during the past 2+ years. In order to determine the status of sensitive arthropods on the dunes and airport expansion areas, focused surveys were conducted at the appropriate times of year to evaluate presence/absence. Overall, these surveys attempted to assess whether or not the species of concern have persisted on the site, have recolonized restored habitat areas, or occur within the proposed runway expansion areas on the north and south of the existing facility (east of Pershing), or within the 100 acres of yet-to-be-restored habitat at the north end of the overall dune system.

Sensitive species included on the focal effort list probably have restricted distributional ranges or narrow habitat preferences, although for many taxa there is a general lack of detailed biological data, while others simply are too infrequently encountered to permit assessment of either in-site or overall rarity. A number of taxon groups with species included in the focal list have no local or regional specialists actively studying them, and a few heretofore have received little or no taxonomic or collecting interest. None of the focal taxa currently are agency-listed as threatened or endangered, nor do they have any formal local or state protected status.

Survey timing and methodologies

The mobility and duration of adult activity among the focal species varies individually, with some taxa "available" for inventory at virtually any time of the year, and others apparently active for no more than a few days or weeks annually. Survey protocols for each species were determined in advance by reviewing existing literature and specimen records, and by consultation with recognized authorities on specific groups. Based upon aggregate data available for all species to be assessed, it was determined that intensive field surveys would be conducted throughout early Spring and Summer, with additional field efforts spotted through mid- and late Summer and early Fall. Two passive survey methods also were employed: UV light traps (3), operated throughout the Spring and Summer activity seasons; flight intercept trap (malaise), operated throughout Spring and early Summer, terminating prior to the season for El Segundo blue butterfly adult activity.

Fieldwork consisted of both diurnal and nocturnal surveys, including visual searching, sweeping, sifting (along established transects), beating sheets, and rearing, conducted periodically over 2 years, starting near end of the cool, rainy season (usually in late March) and ending in late Summer (September). Because the objectives of the various surveys were to establish presence/absence, seasonal occurrence and distribution within the overall area, specimens were taken to voucher each species, but series were not collected, and there was no attempt to generate statistical data from the material. Light traps can provide some insight into numbers and densities, but because there is no way to evaluate the distance or direction from which specimens arrived, they are best used to assess simpler values (presence, temporal abundance). Pitfalls were not employed during FH&A's surveys because they have the potential to "sample" non-target vertebrate taxa (such as horned lizards), and therefore must be closely monitored, which is too time-intensive for the purposes of our work.

Material collected was compared with material in the Los Angeles County Natural History Museum (LACM) collections by Dr. Brian Brown, Curator, Department of Entomology, identified from literature, or submitted to experts for determination; all specimens have been placed on permanent deposit in the existing El Segundo dunes collection at the LACM.

Summary of results and conclusions

The following summarizes the known status of sensitive invertebrates (except crustaceans and ESB) within the LAX dunes and peripheral potential habitat areas; conclusions regarding the distribution and restoration potential of each are included:

- Trask's snail (*Helminthoglypta traskii*) - this species is present and abundant throughout the VOR area and main dune system, occupying all terrestrial habitats except the most highly-disturbed substrates. It was not found within the 100 acre unrestored parcel or the proposed runway expansion areas. This species would appear to be a suitable candidate for re-establishment anywhere on the study area. [A separate report was submitted for this species]
- El Segundo Jerusalem cricket (*Stenopelmatus* sp. nov.) - fragments of this species were found in red fox scats throughout the southern portion of the dunes, but only one individual was located during the surveys, in the upper portion of the VOR. It likely occurs generally within the main dune area, possibly in lower numbers in the restoration areas. Adults generally are most active terrestrially during and shortly after the rainy season. These crickets frequently occur in urban landscapes where substrates are suitable, and it would be expected to colonize or occur anywhere within the study area except on the east side of Pershing Drive.
- Belkin's dune fly (*Brennania belkini*) - adults were captured or observed within the VOR, main restoration areas, including near the FAA site, and on the north runway expansion area. The mobility of adults of this species permits them to disperse into

all suitable habitat areas, and it may occur anywhere on the site. The immature stages and biological parameters are not known to us.

- sensitive moth species (general *Comadia, Copeblepharon, Euxoa, Psammobotrys, Scythris*) - A wide variety of moth specimens, including some possibly representing all of these species except *Psammobotrys*, were taken in light traps, but moths in the traps were rendered unidentifiable by the combination of alcohol and churning actions of other species. All of the moth species previously known to occur on the dunes probably persist, because all of the known larval hosts are present. For most moth species, focused light collecting would be necessary to determine presence and distribution, using dry traps or light sheets. Very large numbers of *Psammobotrys* were collected on the dunes historically (LACM collection), and it is assumed that this species is present, but is highly seasonal and difficult to collect without sustained and focused field efforts. At this point there is not way to assess the potential of any of these moths for introduction to restoration areas, but if suitable larval hosts are established, the moths would be expected to colonize new areas on their own.
- tiger beetles (*Cicindela* spp.) - no specimens of *Cicindela* were observed or collected during FH&A surveys. Particular emphasis was given to the areas in the north runways expansion zone, where open, scraped substrates have been maintained, but general habitat values appear at most marginal for tiger beetles, and soils are hard, compacted, and poorly drained. None of the sensitive playa lake or beach strand species would be expected in this area, and suitable habitats do not appear present elsewhere in the dune system; these beetles are not suitable for introduction.
- dune scarab beetles (*Aegialia convexa, Psammodius macclayi*) - larvae, pupae and adults of both of these diminutive scarab species were found in open, shallow sands in the upper 2/3 of the VOR sifting transect. These species probably are substrate-specialized to fine, friable sands, possibly also requiring drifting sands (to bury detritus for larval food resources) and specific temperature and moisture parameters. At present it is doubtful that either of these species occurs outside the less-disturbed portions of the VOR, but they may be capable of slowly colonizing suitable substrates in the adjacent restoration areas. Because they may be substrate specialists, though, introduction might not be feasible.
- globose dune tenebrionid (*Coelus globosus*) - adults of this species are relatively common in the VOR area, particularly above the portion of the site wherein non-native grasses and herbaceous plants form dense cover. Larvae were found within the moist sands beneath a number of native sub-shrubs, and appear to be detritus feeders. No specimens attributable to *C. globosus* were found outside the VOR portion of the site, suggesting that it is an obligate dune species, restricted by substrate values more than food resources. It probably could not be successfully introduced into hard-packed substrates or where substrate disturbance impacts remain unrestored. A closely-related but distinct ecological generalist, *Coelus ciliatus*, is common to abundant throughout the entire main dune system, although rare in the 100 acre site and absent from the areas east of Pershing.

- Lange's dune weevil (*Onychobaris langei*) - this tiny weevil is known from perhaps as few as 3 specimens, apparently all taken on the LAX dunes during extensive surveys conducted in the 1930's. The genus is poorly known taxonomically, and at least one (and perhaps two) other species occur locally on the LAX and Ballona dunes. FH&A collected a single specimen of *Onychobaris* on lupine in the 100 acre area, but it is definitely not *O. langei*, and appears to be identical to specimens in the LACM collection labeled as an undetermined taxon (but reported by Hawks, 1996, as *O. langei*), from Manhattan Beach, collected in the 1930's. Mattoni (1991?) reported collecting a specimen of *Onychobaris* on the Ballona dunes, but the identity of this specimen is not known to us. The two verified specimens of *O. langei* in the LACM collection were taken from dune buckwheat, and this plant was intentionally not swept or beaten, to protect larval ESB.
- Dorothy's sand dune weevil (*Trigonoscuta d. dorotheae*) - this species is common to abundant throughout the main dune area, scarce but present within the 100 acre area, and was not found in either of the proposed runway expansion areas. It appears to be an ecological generalist, at least in terms of plant usage, but may be an edaphic specialist for dune sands. It probably could be introduced anywhere on the site.
- dune arachnids (*Eremobates, Ebo, Aptostichus* species) - the dune solpugid (*Eremobates*) is common within the VOR area, present but uncommon within the restoration area, and thus far not found within the 100 acre site or runway expansion zones. It is a nomadic predator, and may wander and recolonize suitable substrates where food resources permit. The crab spider (*Ebo*) was not determined to species, and several genera and species within this spider family were present on vegetation throughout the main dune system, in the 100 acre site and north runway expansion area. It status is presumed to be extant and in normal densities. The sand trapdoor spider (*Aptostichus*) is common within the VOR area, but rare to absent elsewhere. All of these taxa appear to be substrate specialists, and probably would not be suitable for introduction into hard-packed or crusted soils.

A table of the species found, by site (but not indicating abundance or frequency), is included as an appendix to this report. This table was prepared by the LACM, based upon their identifications of deposited voucher material.

Taxon	Site
Aegialia convexa	VOR
Amphidora nigropilosa LeConte	reveg. trans.
Aphodius sp	VOR
Arenivega sp.	VOR
Arenivega sp.	reveg. trans
Bombus	reveg. trans.
Brachycistis agama (D.T.)	North FAA
Brennaria belkini	VOR
Brennana belkini	north runway
Calliopum sp.	VOR
Ceratitis capitata	FAA
Coelus ciliatus	LEE
Coelus ciliatus	VOR
Coelus ciliatus	reveg. trans.
Coelus globosus	VOR
Coenosia (Limosia) rufibasis Stein	VOR
Collops sp.	VOR
Dasymutilla californica (Radoszk.)	north runway
Ephydra sp.	FAA
Ipochus fasciatus LeConte	North FAA
Ipochus fasciatus LeConte	VOR
Ipochus fasciatus LeConte	reveg. trans.
Leucopis	VOR
Liriomyza sp.	VOR
Megaselia	VOR
Milichia sp.	VOR
Myriophora	VOR
Ophion sp.	North FAA
Ophion sp.	second unknown
Parethyce sp.	north runway
Parathyce sp.	second unknown
Parathyce sp.	unknown
Philygria sp.	VOR
Phytoliriomyza sp.	VOR
Pogonomyrmex sp.	VOR
Pogonomyrmex sp.	reveg. trans.
Psammodius mcclayi	VOR
Rhicopsis sp.	north runway
Scolopocerus uhleri Distant	VOR
Sepsis	VOR
Serica sp.	AQ MD
Serica sp.	North FAA
Serica sp.	VOR
Serica sp.	reveg. trans.
Serica sp.	second unknown
Sphaeropthalma sp.	North FAA
Sphaeropthalma sp.	VOR
Sphaeropthalma sp.	reveg. trans
Sphex ichneumonoides	north runway
Steniolia	north runway
Tetramerinx rufitibia Stein	VOR
Trichochrous sp.	North FAA
Trichochrous sp.	VOR
Trichochrous sp.	second unknown
Trigonoscuta dorothea dorothea	North FAA
Trigonoscuta dorothea dorothea	VOR
Trigonoscuta dorothea dorothea	reveg. trans.
Trixoscelis sp.	VOR
Trupanea arizonensis Malloch	VOR
Vespula	north runway
acridid	north runway
alleculic	North FAA
anobiid	second unknown
anthomyiid 1	VOR
anthomyiid 2	VOR
asilid	VOR
bombyliid 1	north runway
bombyliid 2	reveg. trans.

Taxon	Site
bombyliid 3	VOR
bombyliid 4	VOR
buprestid	VOR
buprestid	north runway
cantharid	AQ MD
cantharid	reveg. trans.
carabid	reveg. trans.
cecidomyiid	VOR
chironomid	VOR
chrysopid	VOR
cicadellid	North FAA
cicadellid	reveg. trans
cicadellid	second unknown
coccinellid 1	North FAA
coccinellid 1	VOR
coccinellid 1	second unknown
coccinellid 2	VOR
coccinellid 2	reveg. trans.
curculionid 2	VOR
curculionid 3	VOR
dermapteran	VOR
dermapteran	reveg. trans.
dermapteran	unknown
dolichopodid	VOR
elaterid	North FAA
heleomyzid	AQ MD
heleomyzid	VOR
hemerobiid	VOR
histerid 1	North FAA
histerid 2	second unknown
histerid 3	VOR
ichneumonid 1	VOR
ichneumonid 1	north runway
ichneumonid 3	VOR
ichneumonid 4	VOR
lathridiid	VOR
mirid	North FAA
mordellid	North FAA
mordellid	VOR
mordellid	second unknown
myrmeleontid	north runway
oecanthine	reveg. trans.
pentatomid	FAA
phasmid	reveg. trans.
piophilid	VOR
psychodid	VOR
ptinid	VOR
sarcophagid	North FAA
sarcophagid	VOR
sarcophagid	north runway
scarab 3	North FAA
scarab 3	VOR
scarab 4	VOR
scarab 4	unknown
scarab 5	unknown
scorpion	VOR
solpugid	VOR
sphaerocerid	North FAA
sphecid 1	north runway
sphecid 2	north runway
staphylinid 1	North FAA
staphylinid 1	VOR
staphylinid 2	VOR
syrphid 1	VOR
syrphid 2	VOR
syrphid 3	VOR
tachinid 1	VOR
tachinid 2	VOR

Taxon	Site
tachinid 3	VOR
tachinid 4	North FAA
tenebrionid 1	rest. area
tenebrionid 1	reveg. trans.
tenebrionid 3	VOR
tenebrionid 5	VOR
therevid 1	North FAA
therevid 2	VOR
tipulid 1	VOR
tipulid 2	VOR
torymid	VOR

1067-005

FH & A

(805) 250 - 8311; 298 - 7579 fax; e-mail: fthovore@smartlink.net

Frank Hovore & Associates
14734 Sundance Place
Santa Clarita, CA 91351-1542

31 July 1996

Report of 1996 surveys for sensitive arthropods at El Segundo dunes

In an effort to determine the status of a suite of sensitive arthropods in selected sites on the El Segundo ("LAX") dune system, a number of focused surveys were conducted in early Summer, 1996. The purpose of these surveys was to assess whether or not certain species have persisted or recolonized areas recently restored to more natural vegetative conditions, and to determine presence/absence of these and other species in 100 acres of unrestored habitat at the north end of the overall property.

Species investigated are all considered sensitive because of their restricted distributional ranges or narrow habitat preferences, although none currently are formally-listed as threatened or endangered. Mobility and duration of adult activity vary from species to species, with some taxa "available" for inventory virtually any time of the year, and others apparently active for no more than a few days or weeks each year. Protocols for each species were determined in advance by reviewing existing literature and specimen records, and by consultation with recognized authorities on specific groups.

Based upon aggregate data available for all species to be assessed, it was determined that surveys could be conducted in early June, and consist of a series of diurnal and nocturnal censusing methods. Survey methodologies included searching, sweeping, sifting, beating sheets, and rearing. A minimum number of specimens of some species were collected as vouchers and compared with material in the Los Angeles County Natural History Museum collections, determined from literature, or submitted to experts for identification.

As a "baseline" for selected surveys, we also walked transects of opportunity through a portion of the southernmost dunes, an area of minimal overall disturbance and relatively natural conditions. Soils in this area are generally less-consolidated and have deeper surface sands; vegetation is similar to the restoration area, but is more mature, with a greater number of established plants of dune buckwheat. In the following discussions, specimens observed there are said to have been in the "southern dune area."

Summary of the survey results and discussions by species

Belkin's dune tabanid (*Brennania belkini*) - adults of this species are active from late May to early July, and being one of the few tabanid flies which does not require a blood meal, they are usually taken on flowers. Diurnal searches throughout the 100 acre site and portions of adjacent restoration areas did not find specimens of this species, but one individual was captured and positively identified on June 14 in the southern dune area.

This species is apparently a sandy-substrate obligate, but its precise biological needs are unknown. Its larvae are probably free-living predators within loose soils, and unless the restoration areas lack some unique invertebrate component (this is doubtful), it might utilize restored habitats as natural ecological conditions mature.

Busck's gall moth (*Carolella b. busckana*) - north-south transects were walked through the 200 acre restoration area on 14 June, 1996, inspecting all *Encelia* shrubs encountered for galls of this species. Approximately 250 - 300 plants were surveyed, with three apparently different types of stems galls encountered. At present we do not know which, if any, of these represent *Carolella b. busckana* (information to be forwarded upon emergence and identification of specimens).

- the first type of gall is large and ovoid (± 10 mm wide x 25 mm long), located in the internodal portion of a stem. Only one gall of this type was found, and it had a single emergence hole (0.5 mm diameter). Positive identity could not be made.
- a single, small, spherical gall (5 mm dia.) was found in the internodal portion of a stem; this has no emergence hole, and is currently in a rearing vial. Until an adult insect emerges, it is not possible to determine the species of gall-making moth.
- numerous small, spherical galls (5 mm dia.), some with emergence holes, some without, were found originating from the nodal portions of stems, often in clusters of 2 - 3 galls per node. The average density of galls per plant was low (1 - 2 galls), and many plants lacked galls altogether. About 20 of these galls are in rearing containers at this time.
- most of the dried floral heads of *Encelia* contained lepidopteran larvae, living within and feeding upon the dried basal portions of the flower. A number of these were placed into rearing containers, and yielded specimens of a dune-obligate Cochylid moth, *Lorita scarifica* (= *abornana*), commonly referred-to as Lora Aborn's moth.

Brian Harris, LACM lepidopterist, found no preserved galls of *Carolella* in the LACM entomology collections, and so we cannot positively assign any of the galls to this taxon. It is quite possible that one or more of them may prove to be *C. busckana*, but the species was not taken during the 1987 - 88 surveys (Hawks, 1996), and Mattoni (1991?) stated that this species "is presumably extirpated" at the LAX dunes, and that the only remaining populations may be in the upper Santa Ana river drainage. Most material in the LACM collection was taken between 1922 and 1940, and bears only "L.A. County" as locality data; however, lepidopterist S. Russell of Malibu, indicates (pers. comm. to F. Hovore, 1996) that *C. busckana* is common on *Encelia californica* on the hillsides surrounding her residence, and that it comes to lights readily in January, February, April and May. Russell also noted that live specimens from her home were given to R. Mattoni for release on the LAX dunes as part of his earlier restoration program.

Whether or *Carolella b. busckana* persists naturally or was successfully re-introduced may not be determined without intensive rearing and collecting, but the ability of small moths to colonize new host resources has been amply demonstrated by *Lorita scarifica*, which is present on virtually all introduced *Encelia* shrubs. If *C. busckana* in fact does still occur in less-disturbed dune areas, or in nearby coastal sage scrub habitats, it might reasonably be expected to colonize suitable shrubs of its host throughout the habitat areas, particularly as more recently established *Encelia* shrubs mature and provide a mosaic of age and structural classes on a range of substrate exposures. It also would seem apparent, from the new data from Malibu, and from other recorded sites (San Diego, Del Mar, etc.), that the relative abundance and distributional extent of this species have been greatly underestimated.

Ford's sand dune moth (*Psammobotrys fordii*) - information at hand concerning this species is contradictory, and requires some explanation. Hawks (1996) stated that this species was not taken during recent nocturnal surveys in 1987 and 1988, but was "readily collected at the Dunes during the 1938 - 39 Pierce surveys." Mattoni (1991?, in lit.) stated that *P. fordii* is "A small, dayflying moth only known from the type series taken at the LAX dunes March 8, 1955. Apparently globally extinct, as it has not been seen since and is not known from any other localities. Nothing is known of its life history."

The species was, in fact, described in 1961, but from a lengthy series in the LACM, collected in 1955 and 1957. Having not been described until 1961, it is difficult to interpret Hawk's statement, and Brian Harris of the LACM searched in vain for specimens from the 1930's which would voucher this contention. Local specialist in "microlepidoptera," Ron Leuschner (pers. comm. to F. Hovore, 1996) collected numerous *P. fordii* near Anza, Riverside County, in April, 1973, flying diurnally in coastal sage scrub habitat. Combined with other accounts, this new information might permit us to venture that: (a) this species is active in early spring and is diurnal, and therefore would not be expected to come to lights; (b) probably has a short season of adult activity, perhaps tied to a particular plant's blooming season; (c) is not necessarily associated with coastal dunes, or any particular soil type; and (d) while apparently rarely-encountered, and possibly locally extirpated at the LAX dunes, it does not appear to be "globally extinct."

globose dune beetle (*Coelus globosus*) - This species is present in the LACM within the material taken in 1987 - 88, but these specimens carry no data as to their specific collection site. Our sifting surveys covered most slope angles and native host plant detritus zones from the lowest foredune areas to the base of the backdunes and into non-dune substrates, covering all detectably different habitat types in the 100 acre non-habitat area. Over 200 specimens of *Coelus* were found, with voucher samples taken from all areas, and all of the material proved to be the more-common *C. ciliatus*. This is interesting in light of Mattoni's one-year pitfall trapping results for the overall dunes area, in which 28 *globosus* and 88 *ciliatus* were taken. We do not know the placement of Mattoni's traps, but quite likely they covered areas of less-disturbed substrates and remnant natural areas.

Our specimens were all identified microscopically following the key to species in the genus (Doyen, 1976). The two species are distinguished primarily by minor structural differences on the front of the head, characters which are not evident without magnification and are subject to modification by abrasion, but are unequivocal in fresh specimens. We do not known how the identifications of Mattoni's specimens were made, and have not located the material. In the LACM collections, there are only 5 specimens identified as *globosus*, collected in 1978 and identified by J.T. Doyen.

According to J.T. Doyen (1976, and pers. comm. to F. Hovore, 1996), *C. globosus* is usually confined to true foredunes and coastal sand hummocks, and may be replaced ecologically by *C. ciliatus* on interior and backdunes. The adaptive relationship between the two species has not been defined, but studies (Doyen and Slobodchikoff, 1984) have shown *C. ciliatus* to be extremely adaptable, even forming distinct microgeographic races within a single dune system. In situations wherein two closely-related taxa occur in micro-sympatry, it is not unusual for one species to be an ecological generalist and the other a specialist. And, when their common habitat is disturbed or degraded, it is very often the generalist that has a competitive, and sometimes exclusionary, ecological advantage.

From our collections, it may be inferred that *C. ciliatus* maintains relatively high population densities in degraded substrates and habitats throughout the dunes, and that *C. globosus* either does not occur within the 100 acre area, or is confined to isolated microhabitats. As the dunes are restored, and historic substrate characteristics recover, *C. globosus*, being relatively long-lived and mobile, might recolonize functional foredune areas.

Lange's dune weevil (*Onychobaris langei*) - this tiny weevil is known from perhaps as few as 3 specimens, apparently all taken on the LAX dunes during extensive surveys conducted in the 1930's. The genus is poorly known taxonomically, and at least one (and perhaps two) other species occur locally on the LAX and Ballona dunes. We collected a single specimen of *Onychobaris* on lupine in the 100 acre area, but it is definitely not *O. langei*, and appears to be identical to specimens in the LACM collection labeled as an undetermined taxon (but reported by Hawks, 1996, as *O. langei*), from Manhattan Beach, collected in the 1930's. Mattoni (1991?) reported collecting a specimen of *Onychobaris* on the Ballona dunes, but the identity of this specimen is not known to us.

The two verified specimens of *O. langei* in the LACM collection were taken from dune buckwheat, which does not occur in the 100 acre site, and it may be specific to this plant.

Dorothy's dune weevil (*Trigonoscuta dorotheae*) - Specimens of this species were found beneath several different plants, including *Ambrosia chamissonis*, *Camissonia* sp., and *Lupinus* sp., and while never common, it was a consistent element in sifting samples throughout the 100 acre site. The greatest concentration of individuals was found in the least-disturbed substrates, particularly along the crest of the backdune, but a few specimens occurred in almost every type of soil sampled, and on all exposures. While apparently flightless, this species either persists in highly-disturbed ecosystems, or is able to distribute itself widely through a variety of habitat types.

Solitary ant - At the request of Irena, we collected and identified a small, solitary ant seen occasionally on consolidated sand substrates at the southern end of the dunes. This species, *Formica francoeuri* Bolton (formerly called *F. pilicornis*), is widespread and abundant, even in disturbed or developed areas, in coastal southern California. [Identification and information courtesy of R.R. Snelling, LACM]

Summary

Existing information concerning the arthropod fauna of the El Segundo/LAX dune system was reviewed to determine the spectrum of sensitive species known or expected to occur in the area overall. Specimen data and accounts in earlier reports were reconciled to the degree possible, and explanations of apparent incongruities have been provided were appropriate. Focused surveys for sensitive arthropods were conducted throughout the 100 acre non-restored habitat area at the northern end of the dunes, and for selected taxa in the restoration area as well. Results of these surveys are presented above, and may be briefly summarized as follows: sensitive species diversity within the 100 acre site is lower than in restored or original dune remnants, probably due to erosion, removal and compaction of sand substrates, and removal or degradation of native dune vegetation.

Species which yet persist within remnant areas or within the restoration area might be expected to successfully recolonize the 100 acre site should soil and vegetation recovery occur. At present it is not possible to determine absolutely whether or not Lange's dune weevil, Ford's sand dune moth and Busck's gall moth have been extirpated from the area (as stated or suggested in prior accounts). The weevil may be associated with dune buckwheat only, and the latter species may yet persist, based upon tentative determination of *Encelia* stem galls. All other species are presumed or confirmed as present on the overall El Segundo system, and would be expected to recover as habitat values are restored

To: Irena Mendez

FH & A

FAX: 2 pp.

(805) 250 - 4412; 250 - 1579 fax; e-mail: [illegible]

Frank Hovore & Associates
14734 Sundance Place
Santa Clarita, CA 91351-1542

February 1998

LAX dune transects - arthropod diversity and sensitive species inventory; preliminary report of sampling to date

Sampling rationale and protocols:

The following sampling protocol is intended to provide a seasonally-determined census of the arthropod diversity of the 200 acre habitat restoration area, with focus upon the least-disturbed portion of the site, surrounding the VOR. This area may contain remnant populations of species no longer extant within former development areas, providing a baseline of information relevant to the restoration efforts. An essential monitoring goal of restoration would be to provide habitat values for, and thereby attract and support, the most sensitive species on the site; most of these would be more likely to persist in the southern end of the dunes, where disturbance factors have been less intense.

In August, 1997, a transect of 10 numbered stakes was established from the bottom to the top of the foredune area below the VOR, and another (Lee Site 1) is staked just NE of the VOR, just above the lee crest. Each stake represents a center point for a sampling "circle," of approximately 50 meters diameter. Within each "circle," 6 samples are sifted from the sand, each sifting consisting of four complete loads into a large flour sifter, providing a total sample volume of approximately 1 cu ft X 6, per circle. One other "standard" site (not staked) is also sampled, immediately adjacent to the VOR driveway, on the foredune, in a rough circle 50m in diameter, starting ± 20 paces from the pavement; this is intended to sample the top of the dune, on the seaward aspect.

Specimens are taken subjectively of each arthropod taxon represented: adults, recognizable fragments of same, or immatures. Specimens are collected into carefully-labeled alcohol vials (date, TR(ansect)# and sample site # and returned to the lab for final curation, labeling and identification.

Sample label (4 pt type when printed):

El Segundo dunes, VOR,
L.A. County, CA TR 2, #8
12 August 1997
F.T. Hovore, coll.

All arthropods observed EXCEPT BUTTERFLIES are to be sampled or identified visually, so an aerial net is required, and all species of native shrubs should be shaken over a beating sheet, to dislodge insects and spiders thereon. Butterflies observed shall be noted in the field log, but not captured or otherwise disturbed.

Transect #A, as yet unstaked, should be established and staked using the TR-B as a scale model, and the same sampling protocols applied. The alignment can be chosen in coordination with Sapphos, and will be through the foredune within the habitat restoration area. Care must be taken to not disturb ESB buckwheat host plants. Surveyors should attempt to disturb all areas as little as possible, avoiding compacting or breaking soils; wear light shoes, not boots.

Results of first sampling run, Transect B (12 Aug 1997), by stake number:
[fragment records indicated by an asterisk - *]

1. Coelus ciliatus, Trigonoscuta dorothea*, Serica sp.*; undet. Formicidae; undet. Asilidae; 2 spp. undet. Tenebrionidae*; Arenivaga sp.
2. C. ciliatus, undet. Tenebrionidae*; T. dorothea*; undet. Formicidae; undet. Arachnid; undet. Zygentoma; undet. Melyridae.
3. C. ciliatus; T. dorothea*; undet. Curculionidae (Cleotus?); Arenivaga sp.; Crandus sp.?; undet. Solpugida.
4. C. ciliatus*; T. dorothea*; undet. Melolonthidae (Diplotaxis?)*; Eleodes sp.*.
5. C. ciliatus, Psammodius sp.?; undet. Tenebrionidae*.
6. C. ciliatus, Coelus globosus, undet. Tenebrionidae*; 2 undet. spp. Arachnid; undet. larva, prob. Curculionidae; undet. Melyridae; T. dorothea*; undet. larva, Tenebrionidae?
7. C. ciliatus, C. globosus, undet. Tenebrionidae, 2 spp.*; undet. Zygentoma; T. dorothea*.
8. C. ciliatus, C. globosus, undet. annelid?*; T. dorothea*; Arenivaga sp.; undet. Diptera puparium (Asilidae?).
9. C. ciliatus, C. globosus; T. dorothea*; Arenivaga sp.; undet. Zygentoma; undet. Diptera puparium (Asilidae?); undet. Arachnid.
10. C. ciliatus, C. globosus; T. dorothea; Arenivaga sp.; undet. Zygentoma; undet. Arachnid; undet. larva, prob. Curculionidae; Parathyce sp.*; Psammodius sp.*; undet. sp. Coccinelidae.

VOR, top of dune: C. globosus relatively common; T. dorothea.

Lee site: C. ciliatus

Of note is the fact that the uncommon dune darkling beetle, Coelus globosus, was not found in the lower, more ruderal sites on the foredune, but became relatively common in the upper portion of the transect. The only live specimens of Trigonoscuta dorothea were also found in the uppermost sites; all other sites had fragments, but not live specimens. Overall species diversity was highest in the upper portion, where habitat values appear less-disturbed. This sampling was taken in mid-summer, which probably accounts for the higher percentages of fragmentary material.

An informal transect of samples taken in July, in the restoration area, foredune, contained the following:

C. ciliatus, T. dorothea*, Arenivaga sp., fragments of two scarab genera, undet. Formicidae; undet. Asilidae; 2 - 3 spp. Tenebrionidae*. Note that no specimens of C. globosus have been found anywhere on the site except around the upper portions of the VOR, foredune.

Respectfully,

Frank T. Hovore, Principal

ATTACHMENT 3

Report for surveys for Trask's landsnail at El Segundo dunes

FH & A

(805) 250 - 8311; 298 - 7579 fax; e-mail: fhhovore@smartlink.net

Frank Hovore & Associates
14734 Sundance Place
Santa Clarita, CA 91351-1542
13 August 1998

Report of surveys for Trask's landsnail at El Segundo dunes

Trask's landsnail (*Helminthoglypta t. traski*) is one of a suite of sensitive invertebrate taxa determined within the Los Angeles International Airport 2015 Master Plan Expansion Project as potentially-occurring on the El Segundo ("LAX") dune system. This medium-sized snail is terrestrial, and generally associated with vegetated dune or terrace deposits along the southern California coastline. The species has been divided into a number of subspecies in southern California, the exact geographical parameters of which are not precisely understood, but specimens from interior foothills and canyons (primarily San Gabriel subranges) are assigned to the subspecies *H. t. pacoimensis*. material from southern coastal localities (San Diego County) has been assigned to the subspecies *H. t. coelata*, now regarded as a valid species. The type locality of *H. t. traski* is "Los Angeles," without further precision, and material considered to be nominotypical *H. traski* ranges from Ventura County (Tapo Canyon; Pt. Mugu) south along the coastline (El Segundo, Ballona Creek; Del Rey Marsh) to southern Los Angeles County (Rancho Palos Verdes; Pt. Fermin). At present, Trask's snail is not known from Orange County, but might be expected to occur there within suitable habitat types. [*Helminthoglypta* distributional data provided by B. Roth, pers. comm., August 1998]

Sensitive species generally are so-considered by state and federal resource agencies because of their restricted overall distributional ranges or narrow habitat preferences; Trask's landsnail may be restricted to specific subsites and relictual habitats along the coast, and therefore is considered sensitive within the context of the remnant LAX dune system despite not being formally-listed as threatened, endangered or a candidate taxon. It is assumed that this snail was present within the original fauna of the dunes when they were a component of the natural dune, bluff, beach, lagoon and estuary systems which formed more-or-less continuous habitat zones along the coastline. Elimination, fragmentation and degradation of nearly all of these types of systems have combined to restrict the ranges of species such as Trask's snail to suitable habitat patches, often separated by relatively vast stretches of impassable urban hardscape, roadways, channelized rivers, etc.

Surveys for Trask's snail were conducted on 07 August, 1998 (F.T. Hovore, I.P. Swift), with the following general objectives: to assess the overall distribution and abundance of *H. traski* on the LAX dunes, to determine whether or not it persisted and/or recolonized former residential areas which have been restored to more natural vegetative conditions, and to determine presence/absence within the 100 acres of unrestored habitat at the north end of the overall property, north of Sandpiper Road. Surveys consisted of visually searching from dead shells (which quickly bleach to a conspicuous white color), raking and sifting leaf debris from beneath the shade margins of shrubs and herbaceous plants, and searching within and beneath dead plant debris and trash.

Areas covered included the least-disturbed dune segment at the southern end of the overall area, around the VOR site; 4 transects through restoration areas north of the VOR; a focused search around a persistent water seep in the central portion of the site; 2 transects in the FAA area, extending to the northern boundary fence at Sandpiper Road; and intensive searches of all subsites within the 100 acre unrestored area north of Sandpiper Road. Each

transect consisted of between 8 and 15 separate substrate searches, depending upon opportunities and transect diversity. A sample of dead shells was forwarded to the F.G. Hochberg, Santa Barbara Natural History Museum, for identification confirmation; B. Roth provided peer review of this report.

Survey results

Trask's snail was present within all of the subsites surveyed within the main dune area, but was absent from the 100 acre segment north of Sandpiper Road. Within the VOR transect the species was uncommon but present at transect points 2 through 10 inclusive, missing only from the lowest point (#1), where habitat values are severely degraded by the dense thatch of invasive non-native grasses. Between 1 and a dozen or so shells or live specimens of *H. traski* were found at each sample point (#3-10) in the VOR, except the sample area at point #2, where 1 shell was found under a stack of cut *Acacia* logs, inside a bark crevice filled with a mass of hundreds of European earwigs (*Forficula auricularia*). Brown garden snail (*Helix aspersa*) was common in the lower portion of the VOR transect, including within the point #1 survey area, but was relatively rare in the upper, less-disturbed areas.

Within the restoration areas, *H. traski* appears to have found an abundance of suitable substrates and microhabitat areas, particularly where iceplant removal efforts have created dense piles of decaying plants. Clusters of various numbers and sizes of living *Helminthoglypta* were found within the central masses of dead iceplant and on the sand beneath, and they also were common within decaying vegetation masses piled on the street surfaces. Some iceplant masses contained several hundred of these snails, often with lower numbers of brown garden snails intermixed. Lesser numbers of *Helminthoglypta* were found beneath native vegetation (*Ambrosia*, *Rhus*, *Lotus*, *Eriogonum*, *Lupinus*, *Camissonia*), non-native succulents (*Opuntia*, jade-plant), and rotting palm fronds. Interestingly, while *H. traski* was moderately common under organic debris on dry substrates surrounding the area of soils dampened by leaking water, none were found on moist substrates, despite the presence of similar cover values.

Similar numbers and cluster densities of *H. traski* were encountered on both sides of the dune system below the FAA site, around the Sapphos trailer, and on the lee side of the main dune, to within approximately 50 feet of the southern margin of Sandpiper Road. the primary determinant of presence/absence appears to be the abundance and spacing of suitable microhabitat sites, such as the clumps of decaying iceplant, dense stands of cactus, or accumulations of rotting palm fronds. It appears that *H. traski* is not specialized to sand, but rather to cover and shelter values within the habitat, and its presence beneath no fewer than 6 genera of native plants suggests that it has relatively broad feeding preferences. It is possible that Trask's snail had already broadly colonized the residential areas prior to the habitat restoration efforts, but it also is clearly capable of dispersing across unnatural substrates to reach shelter sites, as evidenced by its abundance within piles of dead iceplant on the roadways.

Its complete absence within the 100 acre parcel north of Sandpiper Road is not easily explained, given the proximity and apparent ecological similarities of the two areas. It is unlikely that sampling simply failed to detect it, as the number of focused searches (± 60) in that parcel was relatively high compared to those made within the main dune area, where all but 6 of approximately 100 sites searched held *H. traski*. Sandpiper Road would not appear to represent an impassable barrier to this species, and there is abundant vegetation cover, of a similar mixture of natives and alien taxa as on the main dunes, with numerous mats of rotting iceplant (natural dieback, not clearing) and piles of palm fronds. Perhaps vegetation restoration efforts have in some way enhanced natural substrate and microhabitat values for this species south of Sandpiper Road, permitting it to disperse and re-establish widely within that area, but the unrestored areas north of the road do not offer suitable habitat opportunities. If the 100 acre site was contaminated or severely degraded in some way by prior land uses, and *H. traski* was totally extirpated from that segment of the system, then it is possible that it has not yet been able to recolonize from south of Sandpiper Road.

Although no focused searches were made in the north and south runway expansion areas, none were encountered during several general invertebrate inventories of those sites. Given that it has not persisted or re-established within the more contiguous 100 acre parcel, it is highly unlikely to occur populationally on either runway site.

Summary

Trask's snail is common to abundant throughout the main portion of the dunes, on both the seaward and lee faces of the dune, in natural habitats and substrates and beneath debris. Evidence of reproduction (shell sizes ranging from a few millimeters in diameter to mature snails) was found throughout the main dune area. Conversely, the species appears to be completely absent from the 100 acre northern area, despite the existence of apparently suitable habitat values therein. There are a number of snail predators within the general vicinity of the site, including parasitic flies and predaceous arthropods, but none of these would be likely to selectively eliminate their host from a single area.

Unless there is some evidence or information to indicate that Trask's snail was either extirpated or excluded from this area by prior land uses or contamination, it would appear that it simply has never successfully re-colonized the site (assuming that it once was present, prior to land conversion). Substrates and cover values appear suitable restoration of natural habitat values for populational use by Trask's snail, and the 100 acre area would seem to be an appropriate site for introduction of *H. traski* as part of the on-going species and habitat restoration efforts. As far as is known, this species is not considered a pest taxon, nor would its presence jeopardize any other plant or animal species, so introduction would be an ecologically beneficial, or at worst neutral, action.

2 L 1067-007

SAPPHOS ENVIRONMENTAL
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September 25, 1998

MEMORANDUM FOR THE RECORD
JN 1067-007-M16

TO: Landrum & Brown
(Ms. Sheila Murphy)

FROM: Sapphos Environmental
(Dr. Irena Mendez)

SUBJECT: 1998 ESB Numbers at LAX El Segundo Dunes

This Memorandum for the Record serves to transmit the results of surveys for the El Segundo blue butterfly (ESB) conducted during the summer of 1998 by Sapphos Environmental at the El Segundo Blue Butterfly Habitat Restoration Area (Habitat Restoration Area) at Los Angeles International Airport. The 1998 El Segundo blue butterfly flight season commenced on July 1, 1998 and extended through September 9, 1998. During the 1998 flight season, two separate sets of surveys were conducted. Transect surveys were conducted along the historic transect route that has been surveyed since 1984 and, for the third consecutive year, the entire Habitat Restoration Area was surveyed to determine the presence or absence of the ESB. The historical transect has been conducted by Sapphos Environmental since 1995 in support of on-going maintenance and monitoring activities for Los Angeles World Airports (Environmental Management Bureau). Presence/absence surveys have been conducted by Sapphos Environmental since 1996 in support of the Los Angeles International Airport 2015 Master Plan EIR/EIS. All 1998 surveys for ESB were conducted pursuant to U. S. Fish and Wildlife Permit # TE830990-0.

Surveys along the historical transect were conducted during the height of the ESB flight season, from July 17, 1998 to September 9, 1998. The transect route, laid out by Mattoni in 1984 (and modified in 1986 to be more comprehensive) was designed to sample all habitat types which were recognized during a cursory walk-through at that time (Mattoni 1990). The transect was intended to include what was considered high quality ESB habitat, indicated by the presence of coast buckwheat (*Eriogonum parvifolium*), and low quality habitat, according to anthropocentric judgement (Mattoni 1990).

Although the route has remained basically the same each year, the number of days of sampling has varied over the years. On average, the transects have been conducted approximately a week apart; some years they began earlier and stopped later than in other years. Conducting transects at one week intervals reduces the likelihood of counting the same butterfly twice, but does not preclude it. These two caveats must be kept in mind when comparing the total butterflies counted each year. Results of surveys along the historic transect are shown in Table I. Two thousand one hundred and twenty-nine (2129) ESB were observed during five transect walks in 1998. This number is significantly greater than the number of ESB observed during the 1997 season. The low number of butterflies observed in 1997 are attributed to the surveys being conducted past the peak of the flight season. This was unavoidable since surveys were conducted under U. S. Fish and Wildlife Service subpermits and these were issued during the later part of the butterflies flight season.

TABLE I
ESB OBSERVED ALONG HISTORIC TRANSECT

Year	# of samples	Span of days	# of ESB observed
1984	4	19	193
1985	no data		
1986	5	35	258
1987	9	56	473
1988	10	61	1049
1989	[illegible]	54	1390
1990	10	63	1192
1991	12	90	906
1992	15	111	1051
1993	10	58	925
1994	8	63	500
1995	10	63	1,239
1996	4	21	1453
1997	4	23	126
1998	5	[illegible]	2129

The source for 1984 through 1994 numbers is Table 13 of Mattoni's 1994 *Final Report*.

The presence/absence survey over the entire restoration area was conducted during roughly the same timespan as the transects. These surveys were conducted by a team of researchers who surveyed all subsites within the Restoration Area. Results of the presence/absence surveys since 1996 are provided in Table II. A total of 4058 ESB were observed during the whole Dunes survey.

TABLE II.
ESB OBSERVED ACROSS THE ENTIRE EL SEGUNDO BLUE BUTTERFLY HABITAT RESTORATION AREA.

YEAR	# OF MALE ESB	# OF FEMALE ESB	# OF ESB OF UNDETERMINED SEX	TOTAL
1996	1225	782	86	2093
1997	380	259	84	723
1998	2513	1416	129	4058

Some of the older plantings in the Restoration area are now 7 years old, however, the bulk of the restoration plantings were completed in 1994, making them 4 years old in 1998. These plants are just beginning to be large enough to support the ESB. Nevertheless, ESB were observed in all areas within the Habitat Restoration Area, with some areas supporting higher numbers than others. Some of the 7 year old restoration plantings now support the highest concentration of ESB.

The numbers from the transect study and the presence/absence study should not be added together because the transect area was included within the area surveyed for the presence/absence study. The transect number represents five weeks of sampling, the whole Dunes number is a one-time count. Nevertheless, it is instructive to note that the one-time survey of the whole Dunes yielded nearly twice as many ESB as had been counted over a whole season along the transect in any previous year. Though absolute numbers of ESB present at the Dunes are not known, this nevertheless indicates a dramatic increase in its population.

Should you have any questions regarding the contents of this memo, they can be forwarded to Dr. Irena Mendez at (626) 683-3547.

2.6 1043-008

SAPPHOS ENVIRONMENTAL
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September 8, 1998

MEMORANDUM FOR THE RECORD
1043 008.M06

TO: U.S. Fish and Wildlife Service
(Mr. John Bradley)

California Department of Fish and Game
(Mr. Ronald Rempel, Mr. Bill Tippets)

Los Angeles World Airports
(Mr. Steve Crowther)

Federal Aviation Administration
(Mr. David Kessler)

Landrum & Brown
(Ms. Sheila Murphy, Ms. Karen Yamamoto)

FROM: Sapphos Environmental
(Ms. Tracey Alsobrook)

SUBJECT: Results of Directed Surveys for American Peregrine Falcon, California Least Tern, Southwestern Willow Flycatcher, Least Bell's Vireo and Loggerhead Shrike at LAX/El Segundo Dunes

ATTACHMENTS:
1. Loggerhead Shrike Survey Results
2. Field Notes

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of directed surveys for American peregrine falcon (*Falco peregrinus anatum*), California least tern (*Sterna antillarum browni*), southwestern willow flycatcher (*Empidonax extimus traillii*), least Bell's vireo (*Vireo bellii pusillus*) and loggerhead shrike (*Lanius ludovicianus*) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). The results of these surveys indicate that: southwestern willow flycatcher and least Bell's vireo are not present within the Master Plan Study Area (Area) and would not be expected to occur due to lack of suitable habitat; American peregrine falcon may be visit the Area, but do not breed there; California least terns are present to the west of the Area over Dockweiler State Beach and just off shore; and loggerhead shrike breed on the El Segundo Dunes and are possibly breeding on the north and south airfield.

132 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

These surveys were conducted to address comments provided by the U. S. Fish and Wildlife Service (Service) and the California Department of Fish and Game (Department) in response to the Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The spring 1998 surveys for least Bell's vireo and southwestern willow flycatcher were conducted by a permitted biologist (Mr. Peter Bloom, Mr. John Konecny) and Sapphos Environmental (Ms. Tracey Alsobrook) on April 1, April 17, April 29, May 13, May 27, June 10 and June 24, 1998. Surveys were discontinued after June 24, 1998 as documented in Sapphos Environmental MFR dated June 11, 1998 (Sapphos Environmental 1998c).

INTRODUCTION

This Memorandum for the Record summarizes the results of directed surveys for American peregrine falcon (*Falco peregrinus anatum*), California least tern (*Sterna antillarum browni*), southwestern willow flycatcher (*Empidonax extimus traillii*), least Bell's vireo (*Vireo bellii pusillus*) and loggerhead shrike (*Lanius ludovicianus*) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). Los Angeles World Airports (LAWA) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U. S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of the endangered California least tern, endangered American peregrine falcon and loggerhead shrike (Species of Special Concern). In their letter dated August 13, 1997 the Department directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. Sapphos Environmental notified LAWA, FAA, the Department, the Service, and Landrum & Brown (Master Plan consultant) of the initiation of surveys for the presence/absence of the above-mentioned sensitive bird species by Memorandum for the Record (MFR) dated March 26, 1998 (Sapphos Environmental 1998a).

This MFR summarizes information regarding the habitat of the survey area, survey methods and results.

SURVEY AREA

Surveys for the sensitive bird species were concentrated in the most likely habitats for each species. The Los Angeles International Airport 2015 Expansion Master Plan Study Area includes seven existing biotic communities non-native grassland, disturbed, developed, southern foredune, southern dune scrub, valley needle grassland and disturbed former dune. These biotic communities have been fully described in several previous Sapphos Environmental documents including Sapphos Environmental MFR Subject: Results of Winter Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes (Sapphos Environmental 1998b).

SURVEY METHODS

Directed surveys for southwestern willow flycatcher were conducted by Mr. John Konecny (USFWS Permit Number PRT 837308) and Sapphos Environmental (Ms. Tracey Alsobrook) in disturbed areas with emergent mulefat (*Baccharis salicifolia*) and willows (*Salix* sp.) on the south airfield. Two surveys were conducted (May 27, June 10, 1998) according to survey protocol for the species as outlined in *A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol* (Sogge et al. 1997). The third survey which had been scheduled was canceled due to lack of suitable habitat after concurrence with the Service and the Department (Saphos Environmental 1998c).

Directed surveys for least Bell's vireo were conducted by Mr. Peter Bloom under his USFWS Permit Number PRT 787376 assisted by Sapphos Environmental (Ms. Tracey Alsobrook) and were conducted in accordance with the USWFS least Bell's vireo survey guidelines. Surveys were conducted in disturbed areas on the airfield with emergent mulefat (*Baccharis salicifolia*) and willows (*Salix* sp.) on the following dates: April 1, April 17, April 29, May 13, May 27 and June 10, 1998. Surveys for least Bell's vireo were discontinued after June 10, 1998 due to the lack of suitable habitat and after concurrence with the Service and the Department (Saophos Environmental 1998c).

Surveys for American peregrine falcon, California least tern and loggerhead shrike were conducted by Mr. Peter Bloom or Mr. John Konecny, and Ms. Tracey Alsobrook on April 1, April 17, April 29, May 13, May 27, June 10, and June 24, 1998. Surveys for American peregrine falcon and loggerhead shrike were conducted on the El Segundo Dunes and the LAX airfield by scanning all potential perching sites with binoculars and listening for call notes. Surveys for California least tern are on-going and the results of these surveys will be provided in a MFR describing the results of the summer bird surveys.

RESULTS

No least Bell's vireos or southwestern willow flycatchers were observed during directed surveys. Both Mr. Peter Bloom and Mr. John Konecny concur that no suitable habitat exists for these two riparian species. Least Bell's vireo require "dense, low, shrubby vegetation, generally early successional stages in riparian areas, brushy fields, young second-growth forest or woodland, scrub oak, coastal chaparral, and mesquite brushlands, often near water in arid regions" (Brown 1993) for breeding habitat. According to Brown (1993), the most critical habitat component for least Bell's vireo in California is a dense shrub layer. According to Sogge et al (1997), the southwestern willow flycatcher "breeds only in dense riparian vegetation near surface water or saturated soil". Both a dense shrub layer and dense riparian vegetation are totally absent from both the LAX airfield and the El Segundo Dunes. The permitted emergency maintenance at the Argo Ditch prior to March 30, 1998 eliminated the majority of riparian habitat from the LAX airfield. The only remaining area that supports willow consists of an approximately 1/10 acre patch of sandbar willow, Arroyo willow and mulefat adjacent to the pond in the southwest corner of the airfield. These trees are too sparse and short (the tallest are approximately 8 feet high) to provide suitable habitat for either least Bell's vireo or southwestern willow flycatcher.

No American peregrine falcons were observed during the spring directed surveys. The presence of American peregrine falcon at LAX has been documented. On October 27, 1997, an immature banded

peregrine falcon was struck by an aircraft at LAX. The bird had been banded as a nestling in Seattle Washington on May 28, 1997. The carcass was sent by USFWS Agent Tom Chisdock to the Western Foundation of Vertebrate Zoology in Camarillo, California to be archived. According to Mr. Peter Bloom the closest nesting peregrine falcons to LAX are at Long Beach Harbor and along Wilshire Boulevard. Foraging adults and juveniles from these sites could be expected in the project area during spring and summer (CDFG 1998). Migrating peregrines have the potential to pass through the project area during most of the year except spring (CDFG 1998). Unpaired adult peregrines may occur throughout the year in the LAX area. Large rock dove populations at LAX may provide a food source for the American peregrine falcon.

Loggerhead shrike observations and possible nest locations are mapped on Attachment 2. Three or four pairs of loggerhead shrikes were determined to be nesting on the El Segundo Dunes and one pair may be nesting on the north airfield and one pair may be nesting on the south airfield. Nesting was confirmed by the observation of recently fledged loggerhead shrikes. Actual nest sites were not located. The repeated observation of loggerhead shrikes throughout the spring survey period on both the north and south airfield may indicate potential nesting. Loggerhead shrikes are fairly common residents in open areas in lowland regions in Southern California, and require limited taller vegetation (Garrett and Dunn 1981).

Surveys for California least tern are on-going and the results of these surveys will be provided in a MFR describing the results of the summer bird surveys.

CONCLUSIONS

Least Bell's vireo and southwestern willow flycatcher do not occur within the Master Plan Study Area and do not have the potential to occur due to a lack of suitable habitat.

American peregrine falcons have the potential to occur at LAX as foraging, dispersing or migrating birds, but not as breeding birds. According to Mr. Peter Bloom (personal communication), the nearest nesting American peregrine falcons are at least ten miles from LAX.

Loggerhead shrikes are a resident and breeding species within the Master Plan Study Area. Breeding has been confirmed on the El Segundo Dunes and is suspected on the airfield.

Should there be any questions regarding the information contained in this memorandum, please contact Ms. Tracey Alsobrook (626) 683-3547.

REFERENCES

California Department of Fish and Game 1998. Letter to Sapphos Environmental (Mr. Rob Witthaus) from California Department of Fish and Game (Mr. Ron Jurek) Subject: Response to Query Letter regarding sensitive species within the LAX 2015 Expansion Master Plan Study Area. Dated July 30, 1998.

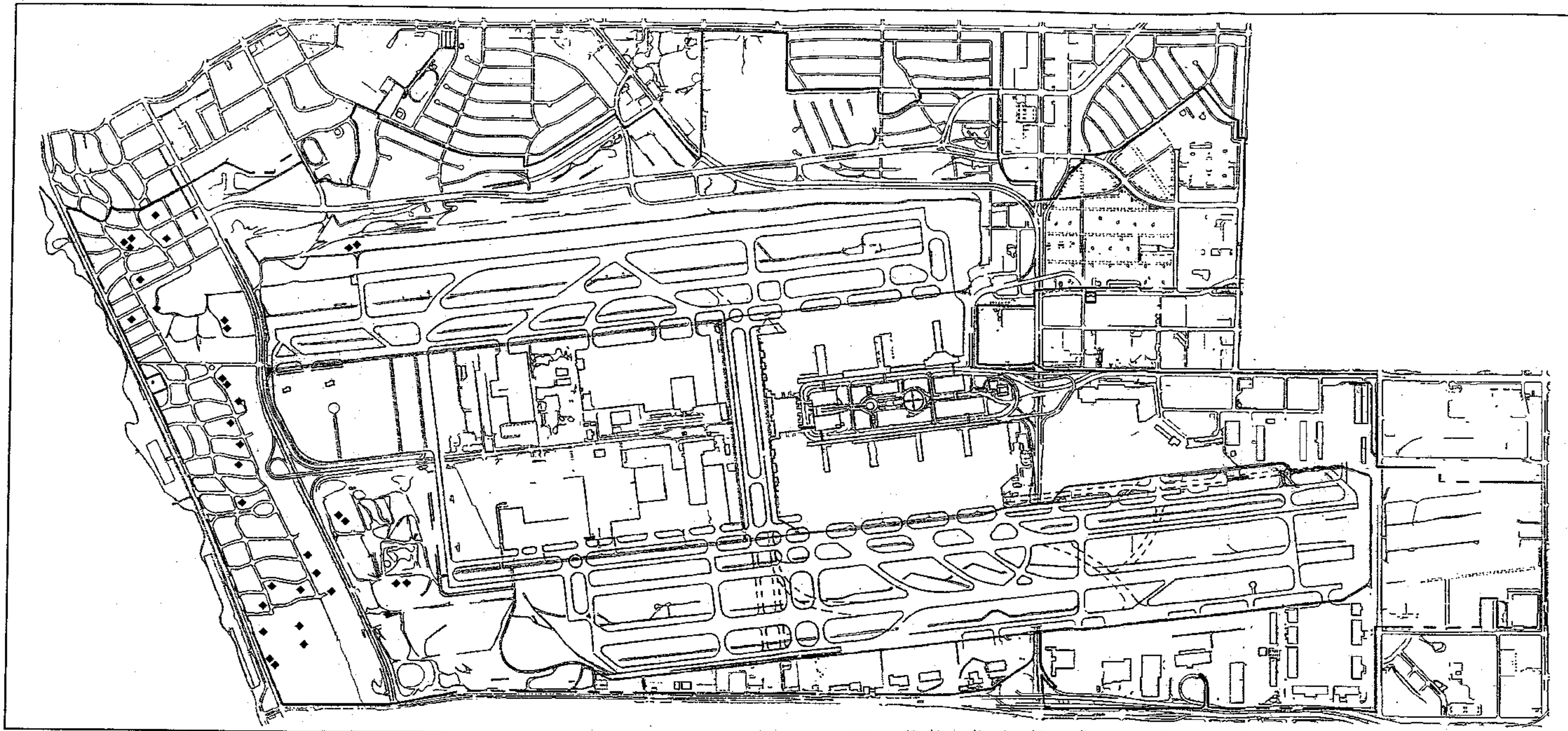
Garrett, Kimball and Jon Dunn 1981. Birds of Southern California Status and Sogge et al 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. Technical Report NPS/NAUCPRS/NRTR-97/12. Published by National Park Service, Colorado Plateau Research Station at Northern Arizona University.

Sapphos Environmental. 1998a. Memorandum for the Record JN 1067-007.M10. Subject: Notification of Initiation of Directed Surveys for American Peregrine Falcon, California Least Tern, Southwestern Willow Flycatcher, Least Bell's Vireo and Loggerhead Shrike at LAX/El Segundo Dunes. Dated March 26, 1998.

Sapphos Environmental. 1998b. Memorandum for the Record JN 1067-007.M08. Subject: Results of Winter Directed Surveys for Burrowing Owl at LAX/El Segundo

Sapphos Environmental. 1998c. Memorandum for the Record JN 1043-008.M04. Subject: Recommendation to Discontinue Remaining Sensitive Bird Species Surveys at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, June 24 - July 22, 1998. Dated June 11, 1998.

ATTACHMENT NO. 1
Loggerhead Shrike Survey Results



Legend

◆ Observations of Loggerhead Shrike (April 1 - June 24, 1998)

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ATTACHMENT 1
Spring 1998 Loggerhead Shrike Survey Results
LAX 2015 Expansion Master Plan Study Area

ATTACHMENT NO. 2
Field Notes

4/1/98 ①
1043-008
T. Alsobrook

Spring Surveys for Sensitive Bird Species within the LAX Master Plan Area

Date: Wed, April 1, 1998
Time - 8:00 a.m. -
Observers: T. Alsobrook, P. Bloom
Location - LAX - north + south airfield, El Segundo dunes
Weather Conditions - 50°F, 90% cloud cover; light, intermittent rain; wind < 5 mph

8:00 a.m. Began surveying on north airfield. Drove road just south of Argo Ditch. Argo Ditch had been cleared. No vegetation was visible from the road + within the ditch. Eucalyptus trees along road north of ditch have been trimmed. Drove road just north of Argo Ditch in easterly direction + drove back to west end of

4/1/98 ②

airfield along road adjacent to Westchester Parkway.
9:15 a.m. - Escorted to south airfield. Drove perimeter road. Stopped along the road at intervals + surveyed. No sensitive bird species were observed.
10:30 Drove to El Segundo Dunes. Weather has cleared. Sun - 10% cloud cover. Drove all roads + surveyed from the car. Parked near subsite #25 + walked parallel transects south to Imperial Highway. A pair of loggerhead shrikes were observed with a possible nest in an acacia. ~~The work crew (cutting acacia) was informed to leave a acacia~~ ~~The worth~~ The possible nest was pointed out to the LAX maintenance person in charge, + he was instructed not to cut that particular acacia. He told us he would inform myself or

4/1/98 (3)

Irena if he saw birds flying in and out of the acacias so we could determine if they were shrikes

12:00 Drove to area north of Sandpiper St. and surveyed by driving all streets. ~~No sensitive bird~~ One loggerhead shrike was seen

12:45 p.m. Departed

4/1/98 (4)
1043-008

Species list

North airfield

mourning dove ||||
American crow ~~||||~~ ~~||||~~ |
California gull |||
house finch ~~||||~~ ||
European starling 75
Northern mockingbird ||||
western meadowlark ~~||||~~ ~~||||~~
American Kestrel ||||
cliff swallow ||
rock dove |
barn swallow |||
black-billed magpie |
Anna's hummingbird ||
white-crowned sparrow |||
yellow-rumped warbler |
Ca towhee |
Brewers blackbird |

4/1/98 (5)

South Airfield

cliff swallow 50
violet green swallow II
mourning dove ~~IIII~~ I
Killdeer I
red-tailed hawk I
white-crowned sparrow II
mourning dove I
American Kestrel II
American crow II
house finch III
Annas hummingbird I
European starling ~~IIII~~ I
barn swallow I
savannah sparrow IIII
scrub jay

4/1/98 (6)

El Segundo Dunes

European starling ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~
white-crowned sparrow III
American Kestrel IIII
rock dove ~~IIII~~
loggerhead shrike ~~IIII~~ I
mourning dove III
Western Kingbird I
house finch ~~IIII~~ ~~IIII~~ +20 ~~IIII~~ I
spotted dove I
American crow I
purple martin II
brown pelican I (over the ocean)
barn swallow I

s. alligator lizard II
gopher snake (juvenile) II

4/1/98 (7)

El Segundo Dunes north of Sandpiper St.

rock dove ||||| ||||| ||||| + 30
American crow ||
western Kingbird |||
mourning dove ||||
spotted dove |||
n. mockingbird |
American Kestrel ||
European starling |||
white-crowned sparrow ||||
cliff swallow ||
loggerhead shrike |
(flew south across Sandpiper St)
Anna's hummingbird |

4/17/98 ①
T. Alsobrook
1067-007

Sensitive Bird Surveys at LAX/ El Segundo Dunes (Including Burrowing Owl)

Date - April 17, 1998

Observers - T. Alsobrook, P. Bloom, R. Witthaus

Time - 6:00 a.m. - noon

Weather Conditions - 55-65°F, clear 0% cloud cover, wind ≤ 5 mph

6:00 - Arrived. Started surveying at El Segundo Dunes. Walked entire dunes except for steep back slope.
10:00 am. Surveyed north airfield - combination of driving + walking
10:45 am. Surveyed south airfield. Combination of walking + driving. Did not survey between runways.
11:30 Surveyed area north of Sandpiper St.

4/17/98 ②

Species observed

El Segundo Dunes 6:00 am - 9:45am

American crow 15
house finch 100+
white-crowned sparrow 150+
European starling 100+
American Kestrel ||
whimbrel |||| (flying over)
Bullock's oriole |
mourning dove ≈50
spotted dove |
loggerhead shrike |||
W. Kingbird |
Ca towhee ||
N. mockingbird ||
cliff swallow 10
barn swallow 3
Ca gulls 50+
rock dove |
yellow-rumped warbler |
Anna's hummingbird |
brown pelican ||| (offshore)

4/17/98 (3)

Species observed:

North Airfield 10:00 am - 10:45 am

European starling 100+
mourning dove ll
American crow lllll lllll l
N. mockingbird lllll ll
loggerhead shrike lll
American Kestrel ll ♀
Ca gull l
Anna's hummingbird l
black-chinned hummingbird l
house sparrow lll

4/17/98 (4)

Species observed:

South Airfield 10:45 - 11:30 am

house finch l
American crow llll
N. mockingbird lll
mallard l
European starling l
mourning dove ll
Annas hummingbird ll
loggerhead shrike l

El Segundo Dunes - north of Sandpiper St 11:30 - 12:00

N. mockingbird l
mourning dove lllll # BS
American crow l
American Kestrel l
house sparrow l
spotted dove l
bushtit l
European starling 20
~~W.~~ Kingbird l
rock dove lllll lllll

4/29/98 (1)
1043-008
T. Alsobrook

Spring Bird Surveys at LAX/
El Segundo Dunes inc
Burrowing Owls

Date - Wed, April 29 1998
Time - 6:00 am - 9:00 am.
Observers - T. Alsobrook, B. Blood,
P. Bloom
Weather Conditions - visibility 100
yards (heavy fog), 55°F

6:00 am Arrived at Dunes gate.
Informed by ops that we
could not survey on airfield
and could only survey on
the Dunes from north of
VOR to entrance road, due
to inclement weather conditions.
Survey team walked transect
lines in area approved by
ops.
8:30 Surveyed area north of
Sandpiper St.

4/29/98
Species - El Segundo Dunes
mourning dove 50
European starling 60
rock dove 10
house finch 40
Cassins Kingbird ~~sp.~~ 11
Anna's hummingbird 11
white-crowned sparrow 1
black-headed grosbeak - 1
N. mockingbird - 1
loggerhead shrike - 1111
American crow - 1
red fox
silvery legless lizard
North of Sandpiper St
rock dove 15
American crow 111
American Kestrel 1
European starling
Killdeer 1
spotted dove 1
Kingbird sp. 1
house finch 111
Ca gull 1

No. 392

5/13/98 (1)
1043-008

Spring Bird Surveys - LAX/
El Segundo Dunes

Date - May. 13, 1998
Time: 6:00 am
Observers: T. Alsebrook, P. Bloom
Weather Conditions: 57°-65°F,
clear - approx. 10% cloud cover;
wind < 5 mph

6:00 am Met at Dunes gate.
Called ops. for escort onto
airfield. Drove to north
airfield. Parked and walked
along Argo Ditch then
back north of line of
eucalyptus trees. Escorted
to south airfield. Drove
loop around south airfield.
Checked emerging willows +
mulefat around large pond.
Checked perches for loggerhead
shrike.
Surveyed on Dunes. Walked
area around VOR. Walked

No. 392

5/13/98 (2)

north to Sandpiper + back.
Surveyed area north of
Sandpiper.

Species
north + south airfield
American crow
N. mockingbird
Am. Kestrel
rock dove
European starling
mourning dove
Annas hummingbird

El Segundo Dunes
mourning dove
house finch
Anna's hummingbird
European starling
American crow
American Kestrel
loggerhead shrike - III
barn swallow

red fox

No. 392

5/13/98 (3)

north of Sandpiper St.

rock dove

European Starling

mourning dove

loggerhead shrike - 11

W Kingbird

Am Kestrel

red fox

No. 392

5/27/98 ①
1013.008
T. Alsobrook

Spring Bird Surveys at LAX/
El Segundo Dunes (including
Burrowing Owl)
Date: Wednesday, May 27, 1998
Time: 6:00 am - 10:15 am
Observers: T. Alsobrook, J. Korecny
Weather Conditions: 55-67°; clear
approx. 5% cloud cover; wind
<5 mph

6:00 am. Arrived at Dunes gate
Called ops - informed that due
to AirEx event scheduled
for today (5/27/98) ops could
only allow us on the airfield
for 1 hour. Drove down
middle of south runways
escorted by ops. Scanned
grassy strip for burrowing
owls. Grassy strip had been
recently mowed. No burrowing
owls were observed. Drove
to north airfield. Drove slowly

No. 392

5/27/98 ②

along paved road south of Argo
Ditch. Drove loop through
south airfield
7:00 am Departed airfield. Started
surveys on Dunes. Walked
transects in VOR area + then
north to Sandpiper + back to
VOR area.
9:45 Surveyed area north of
Sandpiper St.
10:30 am. Departed
Species lists follow.

No. 392

5/27/98 (3)

Species observed -
south + north airfield
American crow
European starling
N. mockingbird
American Kestrel
rock dove
mourning dove

El Segundo Dunes
loggerhead shrike - ||||
mourning dove - nest with 2 eggs on ground at SE base of VOR
spotted dove
European starling
barn swallow
N. rough-winged swallow
house finch
Anna's hummingbird
red fox
N. mockingbird
American crow
American Kestrel
W. Kingbird

No. 392

5/27/98 (4)

north of Sandpiper St.
rock dove
European starling
American Kestrel
mourning dove
W. Kingbird
N. mockingbird
red fox - observed fox dens in sand banks on either side of road south of entrance road

6/10/98
①
1043-008

Spring Bird Surveys at LAX/
El Segundo Dunes

Date - Wednesday, June 10, 1998
Time: 6:00 am
Observers - T. Alsobrook, J. Konecny
Weather Conditions - 60°, 100%
overcast, wind < 5 mph

6:00 am. Met at Dunes gate.
Called ops. - informed that an
alert was underway. Waited
approx 45 mins at 437 B.
Escorted to north airfield.
Walked north side of Argo Ditch
to end of road + walked backed
to vehicle on road north of
eucalyptus trees. Escorted to south
airfield. Walked pond area over
to plastic-lined ditch on ~~south~~ west
end of south airfield, and back
to vehicle. Drove perimeter
road adjacent to Imperial
Hwy. Escorted from Airfield
8:00-10:30 am. Surveyed El Segundo Dunes.

6/10/98 ②

Species observed:
north airfield
red-tailed hawk 1
n. rough-winged swallow 1
American crow ~~IIII~~ ~~IIII~~ IIII
mourning dove ~~IIII~~ IIII
N. mockingbird IIII
Ca towhee III
European starling 75
American Kestrel II (in Argo Ditch)
red fox 1
white-throated swift II
house finch ~~IIII~~ ~~IIII~~ IIII
mallard II (in Argo Ditch)
Killdeer 1
Annas hummingbird 1
W. gull II
English sparrow 1
cliff swallow 1

South airfield
mourning dove II
Killdeer 1
American crow 1
n. mockingbird 1

6/10/98 3

El Segundo Dunes

mourning dove ||||
American crow |
W. Kingbird |
N. mockingbird ||
Ca towhee |
Am. Kestrel
red fox ||

north of Sandpiper
N. mockingbird ||
Am. crow ||||
Am Kestrel ||
mourning dove ||
European starling ~~||||~~ ~~||||~~

No. 392

6/24/98 (1)
1043-008
T. Alsobrook

Spring Bird Survey - LAX/El Segundo Dunes - Concentrating on Loggerhead Shrikes
Date - Wed. June 24, 1998
Time - 7:00 am - 11:15 am
Observers - T. Alsobrook, P. Bloom
Weather Conditions - 59° - 78°; 100% overcast, wind < 5 mph

6:30 am. Arrived at Dunes gate. Discussed survey. Called cops.
7:00 am Began survey on north airfield. Parked at west end of Argo Ditch & walked along the Ditch to end of road (on north side of Ditch) & walked back north of line of eucalyptus trees. Observed 3 fledgling American Kestrels. Nest is believed to be in a palm tree on the north airfield. Two loggerhead shrikes were observed. They flew from the Ditch (west end) to a eucalyptus tree

No. 392

(2)

on the airfield and across Westchester Parkway towards the Northside Development Project. Two juvenile red-tailed hawks were seen perching at the west end of the northernmost runway on airport equipment (landing lights?). These birds may be young fledged from nest in palm tree on Northside Dev. Project.
8:00 am - 9:00 am: Escorted to south airfield. Parked near pond. Walked area to south and east of pond where majority of suitable nesting habitat for shrikes is. One loggerhead shrike was seen perched on the perimeter fence. This bird flew east ~~too~~ out of sight
9:15 am - 10:45 am Surveyed El Segundo Dunes. Drove all roads. Walked VOR area. One loggerhead shrike was observed at west end of subsite 36N.
10:45 - 11:15 am Surveyed area north of Sandpiper St. A total of

No. 392

(3)

4 shrikes were seen including 2 adults + 2 juveniles (determined by plumage)

No. 392

(4)

Species

north airfield - 7:00 am - 8:00 am

red-tailed hawk ||| (1 adult, 2 juveniles)

American Kestrel ||| (3 fledglings)

American crow ~~||||~~ ≈ 60

European starling 200 +

loggerhead shrike ||

mourning dove |||

Cassins Kingbird |||

house finch 100 +

spotted dove |||

Ca towhee ||||

n. mockingbird ~~||||~~

mallard 1 (in standing water in ditch)

cliff swallow |||

Bullock's oriole 1 ♀

South airfield 8:00 am - 9:00 am

black-tailed jack rabbit - || (1 juvenile)

loggerhead shrike - 1

mourning dove - ~~||||~~ 1

n. mockingbird - |||

American crow - 1

Killdeer - 1

American Kestrel - 1

European starling IIII
Ca. towhee II
house finch III

El Segundo Dunes 9:15-10:45 am
American Kestrel HHT III
American crow III
European starling HHT +30
n. mockingbird IIII
loggerhead shrike I
rock dove HHT
mourning dove HHT II
house ~~finches~~ HHT HHT HHT I
Cassins Kingbird II
hooded oriole II
barn swallow IIII

El Segundo Dunes north of Sandpiper St. 10:45-11:15am
gopher snake - (4')
rock dove 40
mourning dove HHT I
American crow II
red-tailed hawk III (1 adult, 2 juves).
loggerhead shrike - IIII (2 juveniles)

n. mockingbird II
house finch I
European starling III
American Kestrel I
scrub jay I

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

July 29, 1998

MEMORANDUM FOR THE RECORD
1043-008.M05

TO: U.S. Fish and Wildlife Service
(Mr. John Bradley)

California Department of Fish and Game
(Mr. Ray Ally)

Los Angeles World Airports
(Ms. Jane Benefield, Mr. Steve Crowther)

Federal Aviation Administration
(Mr. David Kessler)

Landrum & Brown
(Ms. Sheila Murphy, Ms. Karen Yamamoto)

FROM: Sapphos Environmental
(Ms. Tracey Alsobrook, Dr. Brad Blood)

SUBJECT: Results of Spring Directed Surveys for Western Spadefoot Toad at LAX/El Segundo Dunes in Support of the LAX 2015 Expansion Master Plan Project.

ATTACHMENTS:
1. Existing Biotic Communities Map
2. Locations of Western Spadefoot Toad on LAX Airfield
3. Field Notes

REFERENCE: Sapphos Environmental, 1996. Memorandum for the Record JN 1067-001.M23, dated May 23, 1996. *1996 Herpetofauna Surveys at the Los Angeles International Airport.*

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of directed surveys for western spadefoot toad *(Scaphiopus hammondi)* undertaken at the Los Angeles International Airport (LAX) 2015 Expansion *Master Plan* Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). The results of this survey indicate that a substantial population of western spadefoot toad is breeding on the southwest airfield within the proposed LAX 2015 Expansion Master Plan Project Area.

Los Angeles World Airports (LAWA) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of western spadefoot toad, a California Department of Fish and Game "Species of Special Concern". In their letter dated August 13, 1997, the California Department of Fish and Game (Department) directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. The winter season surveys were conducted by Sapphos Environmental (Ms. Tracey Alsobrook and Dr. Brad Blood) on January 9, February 17, February 24, March 10, and March 19,1998.

INTRODUCTION

This Memorandum for the Record transmits the results of directed surveys to assess the presence or absence of western spadefoot toad *(Scaphiopus hammondi)*, a California "Species of Special Concern" at the LAX 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). Los Angeles World Airports ([LAWA] formerly known as the City of Los Angeles Department of Airports) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of western spadefoot toad which is a California Department of Fish and Game (Department) "Species of Special Concern". In their letter dated August 13, 1997, the Department directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. Sapphos Environmental notified LAWA, FAA, the Department, the Service, and Landrum & Brown (Master Plan consultant) of the initiation of directed surveys for the presence/absence of western spadefoot toad by Memorandum for the Record (MFR) dated, February 11, 1998.

This MFR summarizes information regarding the western spadefoot toad natural history, describes the habitat of the survey area, survey methods and results.

WESTERN SPADEFOOT TOAD NATURAL HISTORY

There are six species of *Scaphiopus* distributed transcontinentally within North America, including southern Canada and north to central Mexico (Stebbins 1985). They differ in morphological characteristics, as well as in size and coloration. The western spadefoot toad, *Scaphiopus hammondii*, has by far the most restricted distribution of all members of the genus (Stebbins 1985). It is endemic to California and ranges mostly along the coastal regions, with some extension into the Central Valley and bordering foothills (Stebbins 1985, Ziener et. al 1988). Elevational distribution is from sea level to 1000 m (Stebbins 1985).

The western spadefoot toad is dusky gray or green dorsally, occasionally with four irregular and light-colored stripes (Tanner 1940, Stebbins 1985). Unlike the true frogs (genus *Bufo*), the pupils of spadefoots are vertical instead of horizontal and lend a "catlike" appearance, especially with the gold iris color (Stebbins 1985). The common name of *Scaphiopus* is derived from the black, sharp-edged

"spade" located on each of their hind feet (Tanner 1940, Stebbins 1985). Body size among western spadefoot toads varies from 3.7 to 6.2 cm (Tanner 1940, Bragg 1945, Stebbins 1985). The skin secretions may emit an odor like "roasted peanuts" when the toad is handled, and many people experience allergic reactions upon contact with it (Blair 1947, Stebbins 1985).
'Like many anurans, spadefoots have loud voices that help attract and orient potential mates (Kellogg 1932, Blair 1947, Stebbins 1985). Their call have been described as similar to "someone cutting wood with a handsaw" or to the "squawk of some animal when severely injured" (Kellogg 1932, Tanner 1940).

Spadefoots are primarily a lowland species, inhabiting open chaparral, foothills, and grasslands, and occasionally woodlands (Tanner 1940; Stebbins 1985). Within such regions toads are most commonly found in areas such as washes, alluvial fans, playas, or even alkali flats (Tanner 1940; Pearson 1955; Wasserman 1968, 1970; Stebbins 1985). Open habitats with short grass and sandy or gravelly substrates are much preferred and facilitate the construction of burrows (Pearson 1955; Stebbins 1985).

Density estimates for Scaphiopus are generally lacking in the literature because of the sporadic and somewhat secretive ecology of the species. One exception is the 5-year study of the eastern spadefoot toad in Florida by Pearson (1955, 1957). He calculated that as many as 500 individuals inhabited a hectare. Numbers were seasonally variable. In the same study Pearson (1955, 1957) was able to estimate the mean home range utilized by toads and found that it averaged 10 m^2. There was no difference between the sexes (Pearson 1955). Interestingly, most movements were within 1 to 2 meters of the burrow (Pearson 1955). Even after 5 years, half of all captures had occurred less than 10 meters from the initial site (Pearson 1957). There was also considerable spatial stability among toads. Pearson (1957), for example, found many toads routinely use the same home range for periods of up to 4 years.

Spadefoot toads are well adapted to the semi-xeric regions they inhabit (Kellogg 1932; Tanner 1940; Bragg 1944, 1945). They are fossorial and remain holed up during dry periods inside burrows (Kellogg 1932; Bragg 1944, 1945; Pearson 1955; Stebbins 1985). Pearson (1955), for example, estimated that spadefoot toads in his study area were active for only 8% of the year. That is a total activity period of only 36 days. Activity levels were significantly related to both temperature and precipitation and were generally higher during the spring and fall months (Pearson 1955). Burrows are often constructed by the toad using the "spades" on the hind feet but may also be appropriated from a subterranean rodent such as a gopher or mole (Kellogg 1932; Bragg 1944, 1945; Pearson 1955; Wasserman 1958; Stebbins 1985). The burrow depth appears to be correlated with soil moisture and is deeper under drier conditions (Bragg 1944).

Spadefoots generally breed during the winter and spring months in ephemeral pools that form after heavy rains (Kellogg 1932, Tanner 1940, Bragg 1945, Blair 1947, Pearson 1955, Semlitsch and Caldwell 1982, Stebbins 1985). They may also use slow-moving waterways such as streams, irrigation ditches, reservoirs, or even roadside ponds (Bragg 1944, Blair 1947, Hovingh et al. 1985, Stebbins 1985). The transient nature of many breeding ponds, however, necessitates a flexible and abbreviated reproductive cycle (Kellogg 1932, Tanner 1940, Bragg 1945, Semlitsch and Caldwell 1982). There is no definite breeding season, and reproduction may be curtailed or even suspended under adverse environmental conditions (Tanner 1940, Bragg 1945, Hansen 1958). In fact, the low-frequency sounds made by rain falling on the ground appear to be the main stimulus for spadefoots to emerge and begin

reproducing.

The timing of reproduction is highly unpredictable (Tanner 1940, Bragg 1945, Stebbins 1985). The duration of egg laying, hatching, growth, and metamorphosis of the young is exceedingly rapid and may occur in as short a period as 30 days (Kellogg 1932; Bragg 1944, 1945; Pearson 1955; Semlitsch and Caldwell 1982). Tadpoles are light to medium grey or brown and about 55 mm in length (Bragg 1944, 1945). The growth of the young is influenced by both temperature and density (Bragg 1945, Semlitsch and Caldwell 1982). As the population of a pool increases, for example, the growth rate of tadpoles declines exponentially (Semlitsch and Caldwell 1982).

Spadefoots are nocturnal foragers and are relatively indiscriminate in their food searching (Kellogg 1932; Bragg 1944, 1945). They consume various sorts of arthropods, including flies, moths, beetles, spiders; and especially hymenoptera (Bragg 1944, Pearson 1955). Diet changes seasonally and may indicate relative prey abundance as opposed to preference (Pearson 1955).

Tadpoles are more omnivorous and tend to feed on suspended particulates in the water (Bragg 1944, 1945, 1964). In sympatric populations they may prey on other *Scaphiopus* or scavenge dead tadpoles regardless of species (Bragg 1964). Bragg (1944, 1945, 1964) has reported numerous instances of cannibalism.

The western spadefoot toad is currently extinct throughout much of southern California, presumably because of the loss of ephemeral breeding sites (Stebbins 1985). Not all aquatic locations are equally suitable. The most workable breeding sites lacked a littoral zone of plants.

SURVEY AREA

AIRFIELD

Topography

The west LAX airfield consists of both developed and open space areas. The terrain of the northwest airfield open space is generally flat with only the slight relief of some small depressions and irregularities. This area is vegetated with disturbed and non-native grassland. Portions of this area fall within the FAA safety areas and hence are mowed and occasionally disced (Attachment 1). The southwest airfield open space is also generally level, but with greater relief in the form of moderate hills and depression of fill material and former construction staging areas. Abandoned borrow and fill mounds, as well as, asphalt and graded dirt roadways are scattered throughout this area (Attachment 1). The open space of the southwest airfield is also vegetated with disturbed and non-native grassland communities. Prior to construction of LAX this area was a continuation of the deflation plain eastward from the El Segundo Dunes and was vegetated with a Valley needle grassland community. The developed area consists of concrete runways, taxiways, roadways, airline terminals, and associated structures (hangers, warehouses, etc.).

Plant Communities

Non-native Grassland (CNDDB Element Code 42220/ruderal): This community consists of the open space between the runways and taxiways on the airfield and is under regular operations maintenance. Non-native grassland is characterized by a dense to sparse cover of annual grasses up to one meter in height. Usually associated with the grasses are species of annual forbs. Some plant growth occurs in winter, but most growth and flowering occurs in the spring. Plants die in the summer and persist as seeds in the uppermost layers of the soil. Non-native species found to be present include: slender wild oat (*Avena barbata*), wild oat (*A. fatua*), ripgut grass (*Bromus diandus*), felty softchess (*B. hordaceus*), foxtail chess (*B. madritensis*), and fountain grass (*Pennistum setaceum*). Interspersed with annual grasses, non-native forbs present are: storksbill (*Erodium* sp.), black mustard (*Brassica nigra*), common sow thistle (*Sonchus oleaceus*), California burclover (*Medicago polymorpha*), sour clover (*Melilotus indica*), radish (*Raphanus sativa*), and crown daisy (*Chrysanthemum coronarium*).

Disturbed: Vegetation characteristic of disturbed areas can be seen in the large open space area west of the runways and east of Pershing Drive. Plant species known to be present are: castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), black mustard, tocalote (*Centaurea melitensis*), Russian thistle (*Salsola tragus*), cheeseweed (*Malva parviflora*), filaree (*Erodium* sp.), ripgut grass, and wild oats. A few native species are found in particular spots, such as: deerweed (*Lotus scoparus*), bush lupine (*Lupinus chamissonis*), and mulefat (*Baccharis salicifolia*). Portions of these disturbed areas have been continuously scraped and are bare due to vehicle use.

Developed: The developed areas within the LAX 2015 Expansion Master Plan Study Area includes approximately 1,663.4 acres of terminals, parking lots, roadways (improved and unimproved), and support facilities.

SURVEY METHODS

Five surveys took place after dark or during the early evening hour. Surveys were performed on January 9, February 17, 24, March 10, and 19. All surveys were performed by personnel of Sapphos Environmental who hold a current State of California Scientific Collecting Permits. All suitable habitat at the LAX airfield was walked or driven. Ponded areas which developed after the heavy El Nino rains and consequently mapped for a survey of vernal pool associated species were targeted. Sites where spadefoot toads had previously been observed (Sapphos Environmental, 1996) were also investigated. Surveyors walked a potential site and listened for the distinctive call of the male spadefoot toad. If toads were heard an attempt was made to estimate the numbers of calling individuals. The early evening surveys were conducted in order to confirm the presence or absence of tadpoles. The presence of tadpoles indicates that the toads are successfully breeding. Identification of a tadpole as being that of a western spadefoot was made by capture and examination of the hindfoot (looking for the distinctive black spade).

The weather conditions during surveys was as follows; temperatures varied between 50° F and 60 °F and cloud cover varied between 0 and 20%; and wind speed varied between 0 miles per hour and 5 miles per hour.

RESULTS

The survey conducted on January 9, 1998 established that western spadefoot toads had not bred prior to that date, as no tadpoles were observed in any of the ponded areas inspected. Western spadefoot toads were first heard on the survey conducted on the evening of February 17, 1998. Adults were observed on all subsequent surveys which terminated on March 19, 1998. Western spadefoot toad tadpoles were observed as present at several localities (see below) up until May 29, 1998.

Adult western spadefoot toads were observed at three localities on the LAX airfield (Attachment 2). Adults were heard calling at two of the three areas. All sites were located on the south airfield. The three sites were the large man-made drainage basin near the hot-drill site, a road-side ditch along the perimeter road which parallels Imperial Highway just east of the electric power step-down station, and the plastic-lined ditch which parallels the perimeter road east of Pershing Drive. Tadpoles were also observed in all three areas. Additional observations of spadefoot toad tadpoles were made by Sapphos Environmental biologists performing wet season fairy shrimp surveys. Tadpoles were seen at a large man-made basin at the base of a gravel scrape just to the north and west of the plastic-lined drainage ditch (Attachment 2). No western spadefoot toads were heard calling in the vicinity of the plastic-lined ditch. The road-side ditch next to Imperial Highway was a known locality for the western spadefoot toad (Sapphos Environmental, 1996). Based upon auditory input, the estimated number of calling adult spadefoot toads is approximately 50 to 100 at the large man-made drainage basin, 50 at the road-side ditch next to Imperial Highway. Since only males call, this implies that the population is at least twice the number of calling individuals. A large number of tadpoles were observed on several occasions. The total number was not estimated, but on the March 19 survey date over 200 were observed in the plastic-lined ditch location. The tadpoles observed were of various sizes and at various stages of development. The large man-made drainage pond may have contained over one-thousand

(Sapphos Environmental, personal observation).

Sapphos Environmental first head adult toads calling on February 17, 1998. Western spadefoot toad tadpoles were first observed prior to the third survey on March 10, 1998 and were last observed on May 29, 1998.

CONCLUSIONS

- Breeding western spadefoot toads utilize the existing open space on the southwest airfield. This area is currently under consideration for construction as part of the LAX 2015 Expansion Master Plan.
- Western spadefoot toads have been confirmed as utilizing at least four seasonal ponds on the south airfield at LAX.
- Breeding has been confirmed by the presence of tadpoles.
- Western spadefoot toads were active at a minimum from February 17 to March 19, and most likely longer.
- The unusually heavy seasonal rains may have provided increased habitat and a longer breeding season than is normal for this population.
- The high numbers of tadpoles observed infers that a large population is potentially present for the next breeding season (winter/spring of 1998-1999).

RECOMMENDATIONS

- Recommend continued monitoring over the next winter and breeding season to track this population.

REFERENCES

Blair, A. P. 1947. Field observations on spadefoot toads. Copeia:67.

Bragg, A. N. 1944. The spadefoot toads in Oklahoma with a summary of our knowledge of the group. American Naturalist, 78:517-533.

Bragg, A.N. 1945. The spadefoot toads in Oklahoma with a summary of our knowledge of the group II. American Naturalist, 79:52-77.

Hansen, K.L. 1958. Breeding pattern of eastern spadefoot toads. Herpetologica, 14:57-67.

Kellogg, R. 1932. Notes on the spadefoot in the western plains (*Scaphiopus hammondii*). Herpetologica, 1:36.

Pearson, P.G. 1955. Population ecology of the spadefoot toad, *Scaphiopus h. holbrooki* (Harlan). Ecological Monographs, 25:233-267.

Pearson, P.G. 1957. Further notes on the population ecology of the spadefoot toad. Ecology, 38: 580-586.

Semlitsch, R.D. and J.P. Caldwell. 1982. Effects of density on growth, metamorphosis, and survivorship in tadpoles of *Scaphiopus holbrooki*. Ecology, 63:905-911.

Stebbins, R.C. 1985. *A field guide to western reptiles and amphibians, 2 nd ed., revised*. Houghton Mifflin, Boston.

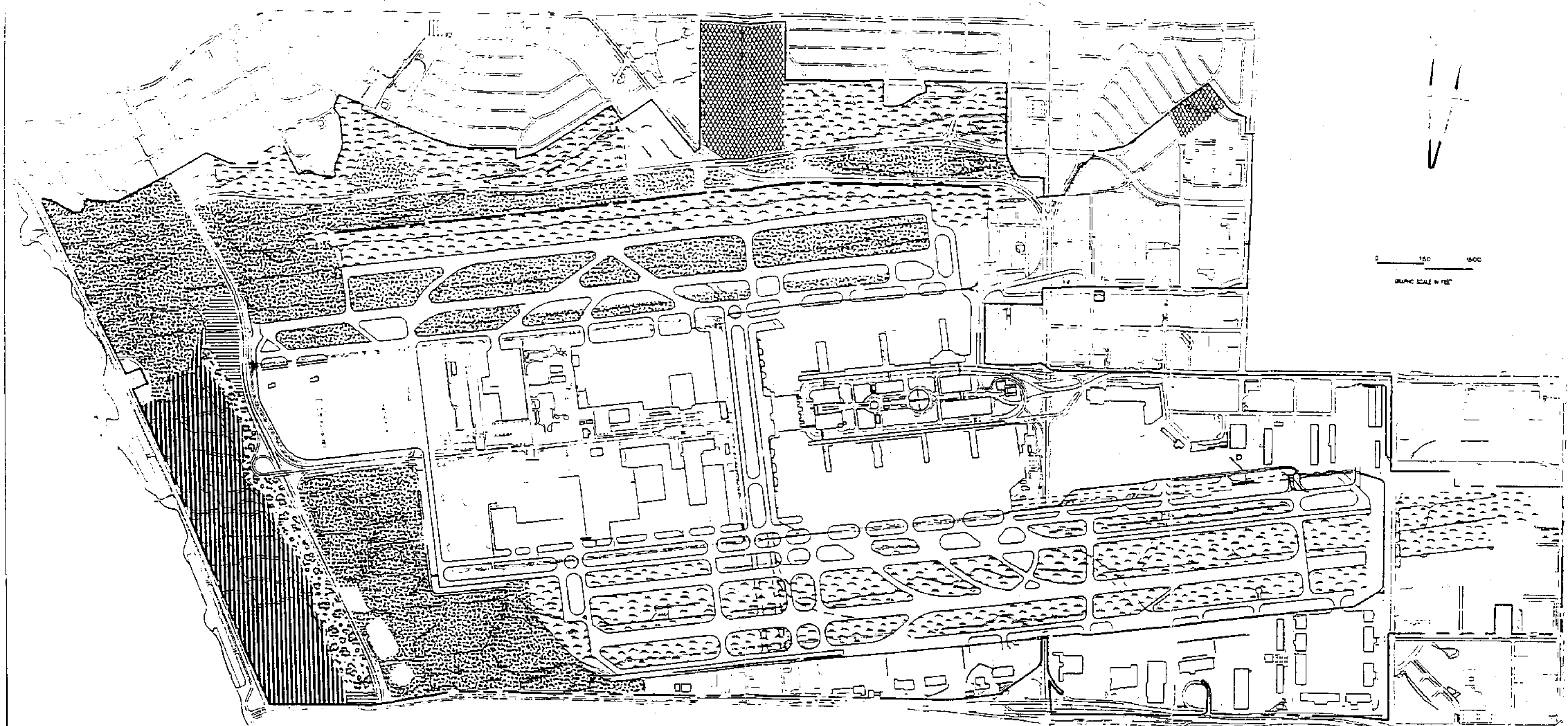
Tanner, V.M. 1940. A study of the genus *Scaphiopus*. Great Basin Naturalist, 1:3-19.

Wasserman, A.O. 1968. *Scaphiopus holbrooki*. Catalog of American Amphibians and Reptiles, 70.1-70.4

Wasserman, A.O. 1970. *Scaphiopus couchii*. Catalog of American Amphibians and Reptiles, 85.1-85.3.

Zeiner, D.C, W.F. Laudenslayer,Jr., and K.E. Mayer. 1988. *California's Wildlife, Vol. 1: Amphibians and Reptiles*. State of California, The Resources Agency, Department of Fish and Game, Sacramento.

ATTACHMENT 1
EXISTING BIOTIC COMMUNITIES



LEGEND

Non-Native Grassland/Ruderal

Disturbed

Southern Dune Scrub

Airport Boundary

Landscaped

Valley Needlegrass Grassland

Southern Foredune

Drainage Ditch

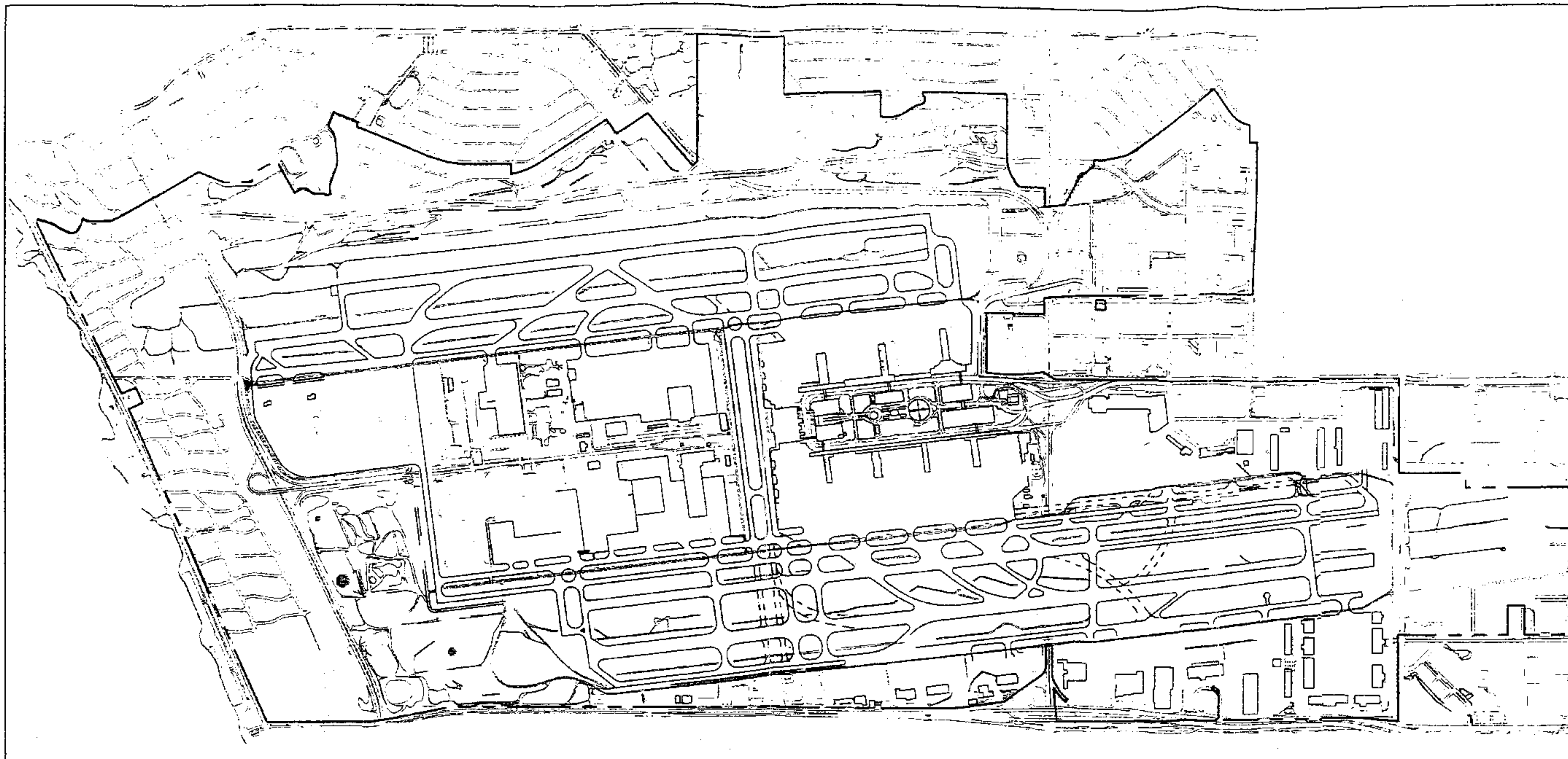
Los Angeles International Airport Master Plan

Plant Communities of the LAX Master Plan Area

FIGURE

ATTACHMENT 2

DIRECTED SURVEY LOCATIONS OF WESTERN SPADEFOOT TOAD



Legend

Spadefoot Toad Locations

Map not to scale.

SAPPHOS ENVIRONMENTAL
environmental compliance
resource planning

ATTACHMENT
Location of Western Spadefoot Toad, Adults and Tadpoles
Los Angeles International Aiport Master Plan

ATTACHMENT 3
FIELD NOTES

No. 392

Jan 9 1998
Sapphos Environ.
B. Blood
R. Williams
T. Alsobrook
1067-006/007

Preliminary Spadefoot toad Survey

Weather: 55°, windy, Rain - on/off
heavy at times.
Arrived at gate 4B7B and met
operations who escorted us
to the south airfield.
While conducting a survey
for vernal pools, we also
surveyed area for Spadefoot
toad. Previous surveys
by Sapphos had pin-pointed
two localites. 1 locality
in ditch by Imperial Hwy,
and a second up on the
pleateu of fill material.
We walked the entire
perimeter road from the
power-Transfer station on Imperial
to its far end at Site 39

No. 392

1/9/98

This road site ditch is flooded.
no Tadpoles observed.

We next surveyed the pleatau
area up on the area E of the
Hot Drill site.
Many ponded areas, saw no
Toads or tadpoles.

No. 392

2/17/98 ①
T. Alsobrook
1067-007

Western Spadefoot Toad Surveys
LAX - South Airfield

Date - February 17, 1998
Time - 7:00 p.m. - 9:00 pm
Observers - T. Alsobrook, B. Blood
Location - LAX, south airfield
Conditions - 58°-63°F wind ≤ 5mph

7:00 pm - Escorted by airport ops to south airfield. Drove to largest pond (just south of large piles of old fill material). Heard numerous spadefoots calling from the pond. Walked down to, & along edge of pond. Could not visually locate any toads using high-powered flashlight, but from calling ~~was~~ estimated about 50-100 toads. Continued to listen for several minutes. Toads stopped calling as aircraft flew over and then continued several seconds after aircraft ~~k~~noise had subsided.

2/17/98 ②

8:00 p.m. Drove to ditch that runs parallel to Imperial along north side of airfield perimeter road. This was a known location for spadefoot toads from March, 1996. We heard toads calling from water in ditch alongside road. Walked length of ditch. Toads were calling along length of ditch except for east end of ditch near intersection with road to north. Toads were visible in the ditch. They were clinging to the edge of the ditch. Ditch is approx. 3' wide and 500' long. Perimeter road appeared to have been recently regraded & widened slightly.

8:45 pm. Drove to stop sign near taxiway AA to wait for ops escort. Listened for spadefoots while driving around south airfield to this location.
9:00 p.m. Departed LAX airfield.

2/24/98 (1)

T. Alsobrook

1067-007

Western Spadefoot Toad Surveys
LAX Airfield

Date: February 24, 1998
Time: 7:00 pm - 8:45 pm
Observers: T. Alsobrook, B. Blood
Location: LAX south airfield
Conditions: cool, 56° F; wind < 5mph, clear

7:00 p.m. Escorted by airfield ops. to south airfield. Drove to largest ponded area where we heard spadefoot toads calling last week. Spadefoot toads were calling at this location. We tape recorded the spadefoot toads calling at the large pond on the south airfield. Used high intensity flashlight to look for toads clinging to vegetation in the pond or along the pond's edge, but could not locate any. Substantial rain had

2/24/98 (2)

fallen in the previous week + the pond was larger in surface area + deeper than the previous week.

7:45 Drove along perimeter road to ditch north of ~~along~~ Imperial Highway. The entire roadway was under water for a stretch of 100'. Water was estimated to be up to 3' deep. Spadefoot toads were heard calling at this location. B. Blood + myself walked slowly through the water. Several adults were located. One was captured and released for positive identification.

8:45 Escorted by ops. to Gate 437-B + departed.

No. 392

March 10 1998

Sapphos Environmental

1067-007

Spadefoot Toad Surveys

LAX: South Airfield

Time: 5:30 - 7:30 PM.

Personnel: B. Blood, T. ALSOBROOK

Temp. 65°F, wind < 5 mph.

5:30 pm Met escort from Airport operations at Gate 437B. We were escorted to the construction site access road near taxiway AA. We drove to plastic lined ditch. and walked along ditch.

Spadefoot toad tadpoles very numerous > 300 visible in ditch. Tadpoles were of various sizes but ~~???~~ no tadpoles were observed with free forearms.

Next we surveyed the large pond (Drainage basin). Here we saw some tadpoles, but it was ~~too~~ late to observe many as it was dark. We walked

①

No. 392

3/10/98

1067-007

the perimeter of the pond. when evening hit - we waited and were able to hear adults spadefoot toads calling. The number was difficult to estimate ≈ 25-50.

Next we inspected the drainage ditch next to Imperial Hwy. It was just damp with little water in it. No adults were observed or heard at this site. No Tadpoles were present.

We re-examined the large pond area using flash lights, but couldn't spot toads.

Surveys ended at 7:30 PM.

②

No. 392

3/19/98
Sapphos Environmental
1067-007

Spadefoot toad surveys
2AX: South Airfield
Personnel: T. Alsobrook, B. Blood
Time: 6:00 PM - 8:30PM
Temp: 60-63°F light wind

6:00 PM: Met escort from operations at gate 437B, and drove to south airfield. We first stopped at the Plastic-lined ditch next to perimeter road running // with Pershing Dr. we looked for tadpoles. We found over 200 spadefoot toad tadpoles, photographed one. Tadpoles were easily identified by the black spade on the hind foot.

We then proceeded to the large drainage basin and observed tadpoles there. We next went to Imperial Hwy location, ie drainage ditch along side perimeter

No. 392

1067-007 3/19/98

road // to Imperial. No Toads or Tadpoles present. Too dry.

After Dark we walked and drove the areas around the large Drainage basin and plastic lined ditch we heard adults calling at both localities.

Surveys ended at 8:30PM

2.6 1067-007

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

June 30, 1998

MEMORANDUM FOR THE RECORD
JN 1067-006.M03

TO: Landrum and Brown
(Ms. Sheila Murphy and Ms. Karen Yamamoto)

Los Angeles World Airports
(Ms. Jane Benefield and Ms. Adriana Renteria)

Federal Aviation Administration
(Mr. David Kessler)

FROM: Sapphos Environmental
(Dr. Brad Blood)

SUBJECT: Preliminary Results of Dry and Wet Season Surveys for Vernal Pool Associated Endangered Species in Support of the Los Angeles International Airport Master Plan EIR/EIS (Fairy Shrimp)

ATTACHMENTS:

1. Draft Report on Results of Dry Season and Wet Season Directed Surveys for listed vernal branchiopods (fairy shrimp), prepared by RECON, (Mr. Cam Patterson), San Diego, CA.

2. Report on Results of Dry Season Sampling, prepared by the University of San Diego, Department of Biology (Mr. Jacob Moorad)

3. Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods

This Memorandum for the Record transmits the draft report on results of dry season and wet season directed surveys for listed vernal pool branchiopods (fairy shrimp) in support of the Los Angeles International Airport Master Plan Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) (Attachment 1).

In response to comments received by the Federal Aviation Administration from the U. S. Fish and Wildlife Service (Service) in letters dated July 31, 1997 and August 29, 1997 on the Notice of Preparation for a joint EIS/EIR in support of the proposed Los Angeles International Airport Master Plan, Sapphos Environmental was directed to conduct surveys for Riverside fairy shrimp (*Stretocephalus woottoni*) and San Diego fairy shrimp (*Branchinecta sandiegonensis*). Dry season sampling was conducted on September 18, 1997 by Jacob Moorad from the University of San Diego, Department of Biology (Attachment 3). Areas sampled included two sites observed to contain ostracod shells and labeled VP02 and VP14 on the map of the study area provided in Enclosure 2. Analysis of the soils samples collected at these two sites revealed the presence of *Branchinecta lindahli*, a common fairy shrimp found throughout the western United States.

Dry season sampling was also conducted on November 6, 1997 by RECON (Mr. Cam Patterson). Dry season soil sample were collected from 10 locations and sent to Jones and Stokes (Mr. Christopher Rogers) for analysis. Surveys were conducted according to the protocol developed by the Service (U.S.F.W.S., 1996; Attachment 3). Dry season soil analyses revealed the presence of large numbers of cysts for the common fairy shrimp, *Branchinecta lindahli*, and very low numbers of the listed Riverside fairy shrimp (*Streptocephalus woottoni*). The analysis prepared by Jones and Stokes (included in Attachment 1) reveals that numbers of Riverside fairy shrimp cysts were orders of magnitude less than those if the common fairy shrimp *B. lindahli*. Wet season surveys resulted in finding only adults of the common fairy shrimp *B. lindahli*.

The draft report (Attachment 1) concludes "ephemeral aquatic habitat remaining at LAX is of very poor quality, and does not appear to support any listed endangered or threatened vernal pool anostracans. The dry season sample results which contained *S. woottoni* (Riverside fairy shrimp) cysts, indicate that vernal pool habitat which was formerly extensive on the western part of the airport property, did support this species in the past. Based on the condition and quality of habitat presently on the airport, we consider it likely that the species has been extirpated from the site."

This draft report is provided for review and comment. A final report will be prepared within two weeks of receipt of comments. If there are any questions concerning this Memorandum for the Record, please contact Dr. Brad Blood at (626) 683-3547.

ATTACHMENT 1
Draft Report on Results of Dry Season and Wet Season Directed Surveys for listed vernal branchiopods (fairy shrimp), prepared by RECON, (Mr. Cam Patterson), San Diego, CA.

DRAFT

Introduction

RECON was contracted by Sapphos Environmental to conduct directed surveys for listed vernal pool branchiopods (fairy shrimp) at Los Angeles International Airport in areas of vernal pool habitat. These surveys were conducted according to the protocol developed by the U.S. Fish and Wildlife Service (USFWS 1996) for studying listed vernal pool branchiopods, which included dry-phase soil sampling of the vernal pools and biweekly site visits during the wet season. RECON used global positioning systems (GPS) hardware and software to map the boundaries of the vernal pools, and incorporated these data into a geographic information system (GIS). This report describes the survey methods and presents the results of the surveys.

Physical Setting

Los Angeles International Airport (LAX) is located within Los Angeles County, California, north of the city of El Segundo. The vernal pool area surveyed for this project is situated at the northwestern end of LAX, just east of the El Segundo Dunes (Figure 1).

The lands within the LAX boundary have largely been developed to support airport operations. The open area around the runway where the vernal pools are located is disked and/or mowed regularly to remove vegetation for safety purposes. The routine disturbance of the soils and vegetation in and around the vernal pools has altered the pools boundaries and reduced or eliminated the flora normally associated with vernal pools.

Fairy Shrimp

Fairy shrimp are freshwater crustaceans of the Order Anostraca. They inhabit temporary bodies of water (vernal pools), and are able to hatch, attain maturity, and reproduce within the short period of time the pools are inundated. Habitat loss has resulted in the decline of many species of fairy shrimp, resulting in their need for listing and protection under the federal Endangered Species Act (ESA) of 1973, as amended. There are four species of fairy shrimp found in California that are listed as endangered under the provisions of the ESA: Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*B. longiantenna*), San Diego fairy shrimp (*B. sandiegonensis*), and Riverside fairy shrimp (*Streptocephalus woottoni*). Vernal pool fairy shrimp (*B. lynchi*) are listed as threatened. Conservancy fairy shrimp and longhorn fairy shrimp are known from California's Central Valley, while San Diego fairy shrimp, vernal pool fairy shrimp, and Riverside fairy shrimp are known to occur in Southern California. Versatile fairy shrimp (*B. lindahli*) are commonly found in southern California vernal pools and are not listed for protection under the ESA.

Methods

DRAFT

Vernal Pool Mapping

RECON biologists, along with Dr. Irena Mendez of Sapphos Environmental, located vernal pools on the project site during fall 1997 based on field reconnaissance. Using a GPS receiver, the geographic coordinates of each pool perimeter were mapped by surveying a number of points around the edge of each pool basin adequate to record the size and location of the basin. The raw location data from the GPS were post-processed to sub-meter accuracy. These data were incorporated into the RECON GIS and processed to construct data layers of pool basin locations and fairy shrimp presence using the State Plane Coordinate System, North American Datum 1983 (NAD83). During the course of the 1998 wet season surveys, several additional pools were located and mapped with the GPS receiver.

Fairy Shrimp Surveys

USFWS guidelines (1996) for conducting fairy shrimp surveys specify that two years' data must be collected to determine the presence/absence of fairy shrimp species within vernal pools. In lieu of two separate years of wet season sampling, one season of dry soil sampling was substituted.

Dry season soil sampling for the presence of fairy shrimp cysts was conducted in conjunction with mapping the vernal pools at LAX, in accordance with RECON's USFWS endangered species permit and the survey guidelines for vernal pool branchiopods (USFWS 1996). Samples of soil were collected from at least 10 locations within each pool basin and sent to Christopher Rogers of Jones and Stokes Associates, Inc. in Sacramento, California, for examination and cyst identification.

El Niño-influenced rainfall occurred early within the wet season of 1997-98, and resulted in the ponding of water for periods of sufficient duration to allow for the hatching of fairy shrimp in the vernal pools within LAX. RECON biologists visited each vernal pool and conducted sampling to determine the presence of fairy shrimp within the pools a number of times during the wet phase of the vernal pools (Table 1).

DRAFT

TABLE 1
SURVEY DETAILS
LAX

Date	Personnel	Type of Survey
11/06/97	Cam Patterson, Terri Ayers	Dry season soil sampling
12/19/97	Cam Patterson, Terri Ayers	Wet season fairy shrimp survey
01/08/98	Cam Patterson	Wet season fairy shrimp survey
01/23/98	Cam Patterson	Wet season fairy shrimp survey
03/05/98	Cam Patterson	Wet season fairy shrimp survey
03/26/98	Cam Patterson	Wet season fairy shrimp survey
04/16/98	Cam Patterson	Wet season fairy shrimp survey

Within five to seven days of rain events, personnel from Sapphos Environmental were contacted by phone to ascertain if rainfall amounts were sufficient to fill the pool basins. If pools remained inundated for at least 10 days, fairy shrimp sampling was conducted by RECON personnel. All fairy shrimp surveys were conducted by personnel authorized under USFWS permit PRT-797665. Sampling was accomplished by sweeping either a hand-held net or a pole-mounted net through the water column in the pool and examining the net for invertebrates. Mature fairy shrimp species were identified to the species level. Survey visits were timed to correspond with observed hatching of fairy shrimp at other sites throughout Southern California being concurrently surveyed by RECON, (March Air Reserve Base, Hemet, Camp Pendleton Marine Base, Marine Corps Air Station Miramar, and Otay Mesa).

Results

Vernal Pool Mapping

Sixteen vernal pools were located and mapped at MARB in fall 1997. Four additional pools were identified mid-way through the wet season surveys. Table 2 lists the dimensions and areas of these pool basins. All pools are illustrated in Figures 2 and 3.

TABLE 2
VERNAL POOL DIMENSIONS
LOS ANGELES INTERNATIONAL AIRPORT

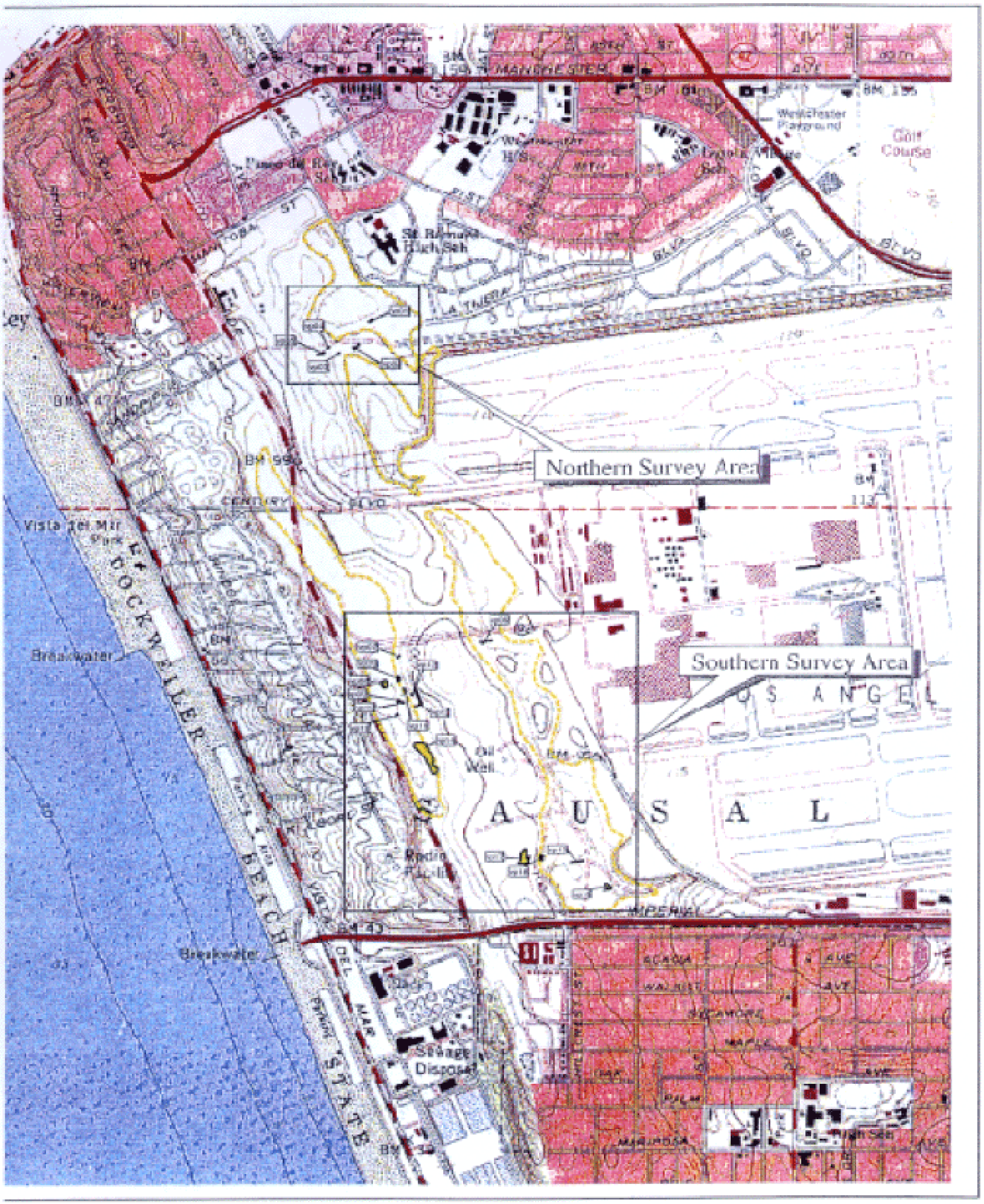
Pool Number	Approximate Length and Width (ft.)	Approximate Area (ft^2)
1	55 X 13	123
2	97 X 12	292
3	23 X 12	74
4	30 X 15	95
5	82 X 28	212
6	177 X 20	1,438
7	46 X 10	275
8	98 X 82	5,706
9	33 X 26	577
10	27 X 19	312
11	64 X 18	809
12	34 X 22	548
13	208 X 84	4,808
14	454 X 130	39,199
15	165 X 15	2,086
16	96 X 94	3,936
17	201 X 130	13,719
18	63 X 42	1,659
19	53 X 28	807
20	53 X 51	1,691

Dry Season Soil Samples

A copy of the report prepared by C. Rogers of Jones and Stokes Associates detailing the results of the dry season vernal pool soil analysis is included as Appendix A. Cysts from the genus *Branchinecta* were found in the soils samples from pools numbered 1, 2, 6, 8, 14, 15 and 16. Cysts from the genus *Streptocephalus* were found in the soil samples from pools numbered 1, 2, 6, 9, and 12 through 16. As described in Roger's report, *Branchinecta* cysts are identifiable only to the genus level because of the overlapping characteristics of cysts from the various species. Cysts from *Streptocephalus woottoni* may resemble the cysts of other species of *Streptocephalus*, but no other species occur in the area, therefore it was assumed that the cysts were those of *S. woottoni*.

Wet Season Fairy Shrimp Surveys

Versatile fairy shrimp (*B. lindahli*) were observed in pools numbered 1, 2, 8, and 12 through 19 (see Figure 1). This was the only species of fairy shrimp observed in the pools at LAX during the 1997-98 wet season. Pools numbered 3, 4, and 5 did not pool water at any time during the wet season for long enough to allow fairy shrimp cysts to hatch if they were present in the soil. Table 3 lists the combined results of the dry season soil sampling and wet season surveys.



Vernal pools
Historic Depressions

N

800 0 800 1600 2400 Feet

FIGURE 1

Regional Location of Ephemeral Aquatic Habitat at Los Angeles International Airport

RECON

TABLE 3
FAIRY SHRIMP SURVEY RESULTS
LOS ANGELES INTERNATIONAL AIRPORT

Pool Number	Dry Season Soil Samping	Wet Season Surveys
1	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
2	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
3		Water did not pond
4		Water did not pond
5		Water did not pond
6	*Branchinecta* sp. *Streptocephalus woottoni*	none
7		
8	*Branchinecta* sp.	*Branchinecta lindahli*
9	*Streptocephalus woottoni*	*Branchinecta lindahli*
10		*Branchinecta lindahli*
11		*Branchinecta lindahli*
12	*Streptocephalus woottoni*	*Branchinecta lindahli*
13	*Streptocephalus woottoni*	*Branchinecta lindahli*
14	*Branchinecta* sp *Streptocephalus woottoni*	*Branchinecta lindahli*
15	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
16	*Branchinecta* sp *Streptocephalus woottoni*	*Branchinecta lindahli*
17	Not sampled	*Branchinecta lindahli*
18	Not sampled	*Branchinecta lindahli*
19	Not sampled	*Branchinecta lindahli*
20	Not sampled	none

Discussion

Vernal pool habitat observed on the LAX survey area consists entirely of non-natural manmade depressions in highly disturbed soil conditions. A review of historical topographic maps and aerial photographs indicate that natural vernal pools and back dune ponds were present on the airport property in the past. However, none of the ephemeral aquatic (temporarily ponded) sites observed during the course of the current survey were natural habitat. No typical vernal pool plant community exists in any of the habitat surveyed. Of the plant species present, all are typical of roadside ditches and disturbed wetlands and none were vernal pool endemics.

In the northern survey area (Figure 2), the surveyed ponded areas were tire ruts in heavy soil. As shown on the USGS topographic map, this area was near the edge of a large depression that formerly existed near the western end of the northern runways 20 or more years ago. The dry samples in this area had low levels of Riverside fairy shrimp cysts, which probably indicates that this species formerly occupied these large ponds which are now filled. No habitat with water durations long enough (6-8 weeks minimum) to support Riverside fairy shrimp currently exists in this area. The only live fairy shrimp observed during the wet season surveys in this area were versatile fairy shrimp, a common and widespread species of all kinds of ephemeral aquatic water bodies including natural vernal pools and highly disturbed sites.

In the southern survey area (Figure 3), the surveyed ponded areas included road ruts and roadside ditches, compacted gravel road surfaces, a hazardous materials runoff containment pond, depressions on old artificial fill, and a earthen-bottom flood control basin. All of these areas were considered potential fairy shrimp habitat because of potentially appropriate hydrologic conditions. As for the northern survey area, these sites are all on non-natural substrate with ponding caused by manmade factors. As shown on Figure 1 these areas were also formerly within a large system of depressions and temporary ponding located between the runway complex and the dunes to the west. Although Riverside fairy shrimp cysts were observed in dry season samples from several of these ponds, no live animals of this species were observed during intensive sampling of the habitat over the season. Only one location (pool no. 14) had appropriate water duration characteristics for this species. This pond had an intensive *B. lindahli* hatch, with animal densities throughout the large pond exceeding 100 animals per cubic meter early in the season. By late January, when *S. woottoni* were appearing in monitored pools elsewhere in Southern California, no anostracans at all were caught in Pool 14. Spadefoot toads were observed in pool 8, 14, and 18.

The results of the 1998 surveys indicate that the epemeral aquatic habitat remaining at LAX is of very poor quality, and does not appear to support any listed endangered or threatened vernal pool anostracans. The dry season sample results, which contained *S.*

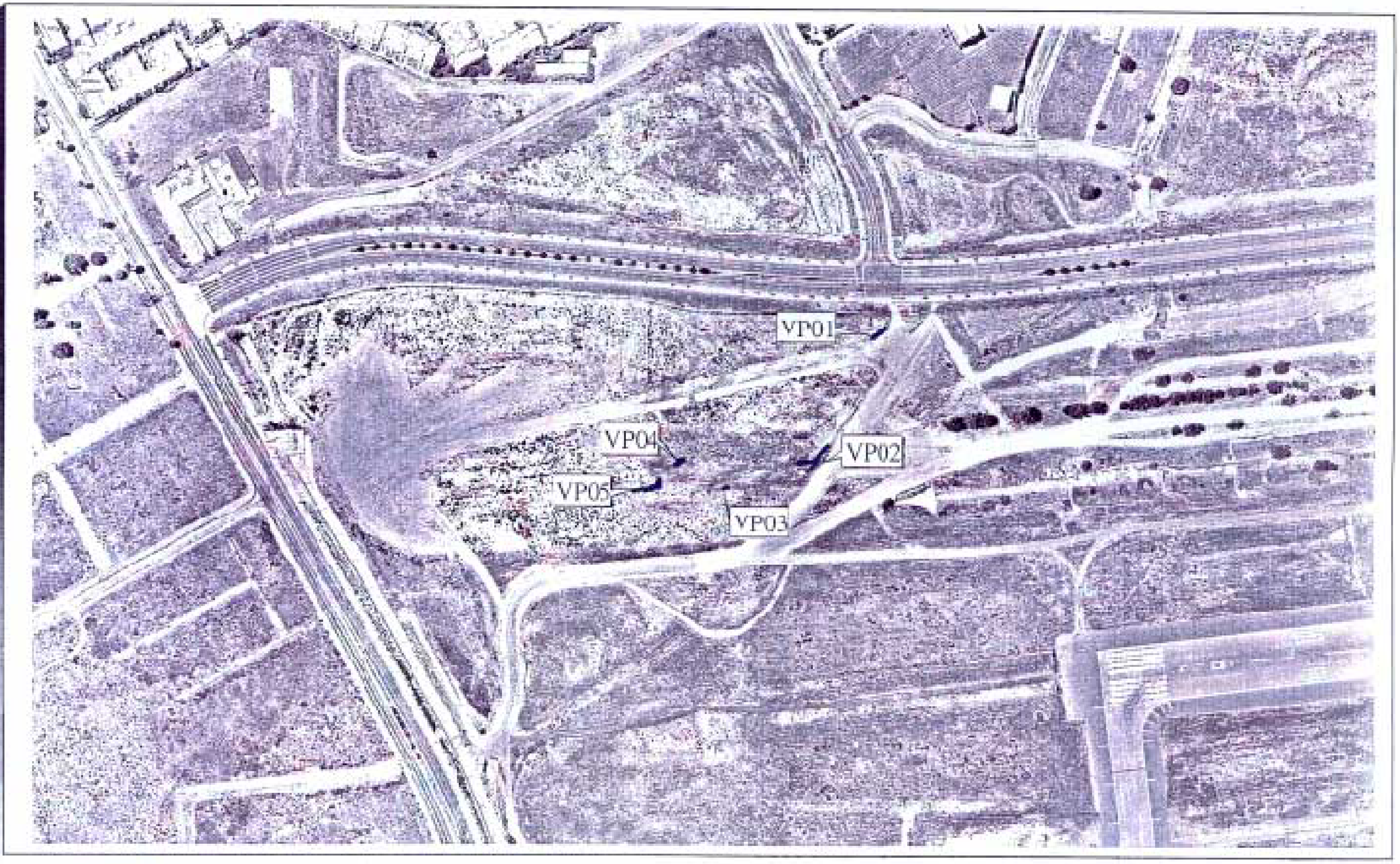


FIGURE 2

Ephemeral Aquatic Habitat at Los Angeles International Airport - Northern Survey Area

RECON

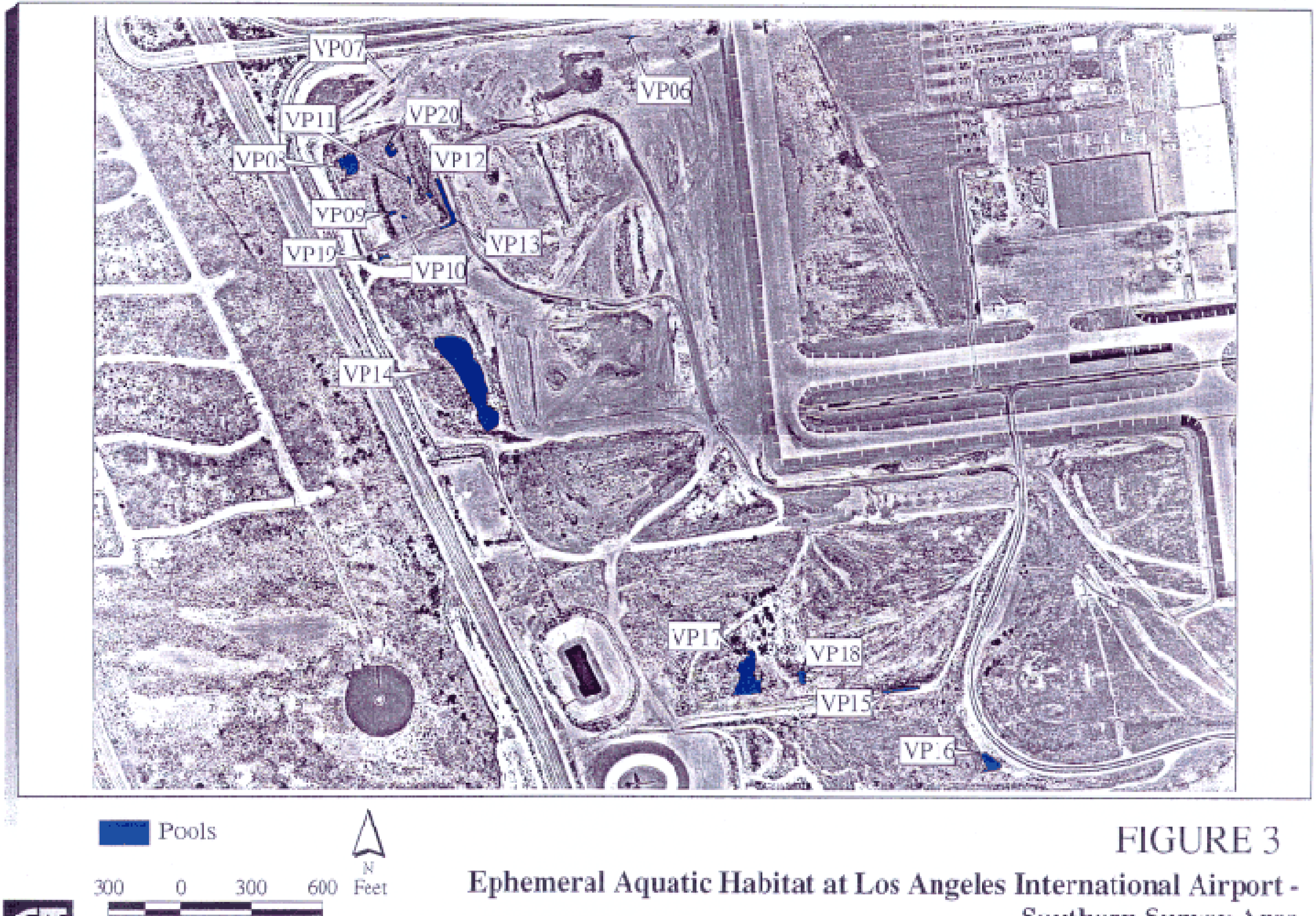


FIGURE 3

Ephemeral Aquatic Habitat at Los Angeles International Airport - Southern Survey Area

RECON

woottoni (Riverside fairy shrimp) cysts, indicate that vernal pool habitat which was formerly extensive on the western part of the airport property, did support this species in the past. Based on the condition and quality of habitat presently on the airport, we consider it likely that the species has been extirpated from the site.

If future impacts to these poor-quality ephemeral aquatic wetlands result in mitigation requirements, we recommend that the feasibility of a vernal pool habitat restoration program be considered. Although habitat restoration on the airport property is probably infeasible due to the attractiveness of wetlands to waterfowl and shorebirds, there may be other former vernal pool sites within Los Angeles County (such as in the Santa Clara River Valley) which may be appropriate.

References Cited

U.S. Fish and Wildlife Service (USFWS)

1996 Interim survey guidelines to permittees for recovery permits under Section 10 (a)(1)(A) of the Endangered Species Act for the listed vernal pool branchiopods. Carlsbad Field Office, Carlsbad, California.

RECEIVED
JUN 1[illegible] 1998
RECON

June 11, 1998

Cameron Patterson
RECON
4241 Jutland Drive, Suite 201
San Diego, CA 92117-3653

SUBJECT: Analysis of Vernal Pool Soils from LAX to Determine the Potential Presence of Special-Status Shrimp Species.

Dear Cameron Patterson:

Jones & Stokes Associates conducted an analysis of 80 soil samples for RECON to determine the presence of special-status shrimp at LAX, Los Angeles County, California. The soil samples were collected by RECON, and were received by Jones & Stokes Associates on April 30, 1998. Jones & Stokes Associates assumes that RECON will submit this report and all other pertinent materials and information to the U.S. Fish and Wildlife Service (USFWS), the Natural History Museum of Los Angeles County and the California Department of Fish and Game, as required by the USFWS guidelines for a protocol-level survey.

DEFINITIONS

For the purpose of this report, special-status shrimp are defined to include shrimp species in the following categories:

- shrimp listed as threatened or endangered under the federal Endangered Species Act (50 CFR 17.11 for listed animals and various Federal Register notices for proposed species),
- other shrimp species meeting the definition of rare or endangered species under the California Environmental Quality Act (CEQA) (State CEQA Guidelines, Section 15380).

METHODS

Soil samples were prepared for examination in the laboratory by dissolving the clumps of soil in water and sieving the material through 500-, and 150-um pore-size screens. The small size of these screens ensured that the eggs from the shrimp species would be retained. The portion of each sample retained in the screens was dissolved in a brine solution to separate the organic material from the inorganic material. The organic fraction was then examined under a microscope.

Scanning electron micrographs and reference specimens were used to identify shrimp cysts to the lowest justifiable taxon. Cysts from the genus *Branchinecta* were identifiable only to genus level, because of the overlapping characters of the cysts among species, and the potential for two species, *B. lindahli* and *B. sandiegonensis*, to occur in this region. *B. lindahli* is a common species with no regulatory status, and *B. sandiegonensis* is federally listed as endangered (62 CFR 4925). *Streptocephalus woottoni* cysts may resemble those of other species of *Streptocephalus*; however, no other species of *Streptocephalus* occur in the survey region.

RESULTS

Shrimp cysts were identified in 35 of 80 samples. Cysts for the federally listed endangered species *Streptocephalus woottoni* were identified in 21 of the samples, and the cysts for the genus *Branchinecta* were identified in 32 of the samples. It cannot be determined from observation of the cysts if these samples contain *B. sandiegonensis*. Adult shrimp must be observed to make this determination. The specific findings are in Table 1.

If you have any questions please call me at (916)737-3000

Sincerely,

D. Christopher Rogers
Invertebrate Ecologist

DCR/CR/elm

Table 1 Specific Findings

Pool Number	Branchinecta (cysts/liter)	Streptocephalus (cysts/liter)	Pool Number	Branchinecta (cysts/liter)	Streptocephalus (cysts/liter)
1-3	2,378	30	9-3	0	0
1-5	2,579	24	9-4	0	0
1-6	3,293	16	9-5	0	0
1-8	106	14	9-6	0	0
1-9	97	112	9-7	0	32
2-5	105	0	10-2	0	0
2-6	36	0	10-5	0	0
2-7	36	0	10-8	0	0
2-8	200	23	10-9	0	0
2-10	82	0	10-10	0	0
3-5	0	0	11-2	0	0
3-6	0	0	11-5	0	0
3-7	0	0	11-8	0	0
3-9	0	0	11-9	0	0
3-10	0	0	11-10	0	0
4-1	0	0	12-1	0	32
4-5	0	0	12-2	0	0
4-7	0	0	12-3	0	0
4-9	0	0	12-4	0	0
4-10	0	0	12-7	0	0
5-3	0	0	13-3	0	0
5-5	0	0	13-5	0	64
5-6	0	0	13-8	0	0
5-7	0	0	13-9	0	32
5-9	0	0	13-10	0	0
6-2	0	0	14-1	433	2
6-3	0	0	14-2	342	4
6-4	0	0	14-3	483	0
6-8	1	0	14-4	1,062	1
6-10	15	3	14-10	1,326	0
7-3	0	0	15-4	39	42
7-4	0	0	15-5	12	4
7-5	0	0	15-6	4	1
7-7	0	0	15-7	14	9
7-9	0	0	15-10	63	3
8-2	934	0	16-2	485	32
8-3	466	0	16-3	316	0
8-4	404	0	16-8	388	1
8-6	305	0	16-9	87	0
8-7	72	0	16-10	230	0

ATTACHMENT 2
Report on Results of Dry Season Sampling, prepared by the University of San Diego, Department of Biology (Mr. Jacob Moorad)

University of San Diego
Department of Biology

October 31, 1997

Irana Mendez
Sapphos Environmental
50 South DeLacey,
Suite 210
Pasadena, CA 91105

Dear Dr. Mendez

Analysis of the soil samples from the LAX pools #1 and #2 (September 18, 1997) has revealed the presence of anostracan encysted embryos (cysts).

Methodology

- One of us (Jacob Moorad) was met on September 18, 1997 by Sapphos Environmental representative Irena Mendez
- Two pools observed to contain ostracod shells were selected for analysis
- The top 1-2 inches of soil was collected by hand with trowels from several places within pools
- Collected soil was washed through two stacked sieves (500 µm and 180 um).
- Sediment collected between these sieves was observed under 6X magnification.
- Cysts were observed under 50X magnification and general morphology was noted.
- Cysts were identified as branchinectids based on tertiary envelope characteristics.
- Sample soil was hydrated with dH_2O and incubated for 10^0C for 4 days at which time the temperature was raised to 15^0C.
- After hatched shrimp had matured (10 days later), they were removed from the cultures and preserved in a 70% ethanol solution.
- Vouchered specimens were later identified by general morphology to be *Branchinecta lindahli*.

Comments

Branchinecta lindahli is a common fairy shrimp found throughout the western US states. This species is often associated with disturbed vernal pool habitats. Despite the low apparent quality of the LAX site pools, cyst densities in some samples were quite high, which compared well with those

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USD
University of San Diego
Department of Biology

October 31, 1997

more pristine populations of anostracans found elsewhere in coastal Southern California. In addition, the presence of ostracod shells at the site indicates the presence of at least two types of vernal pool crustaceans and, by extension, the existance of temporary aquatic communities on the site.

If wet sampling is to attempted, we would recommend doing so within 3 weeks into a hydration. *B. lindahli* is quickly maturing shrimp and may easily pass though its life-cycle and die within a month after hatching.

Sincerely,

Jacob Moored

Jacob Moored
Branchiopod Research Group
Department of Biology
University of San Diego

5998 Alcalá Park, San Diego, California 92110-2492 619/260-4729

ATTACHMENT 3
Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

April 19, 1996

Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods

The endangered Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), and the threatened vernal pool fairy shrimp (*Branchinecta lynchi*) were listed on September 19, 1994, under the Endangered Species Act of 1973, as amended (Act) (59 Federal Register 48136). These species are endemic to vernal pools in the Central Valley, coast ranges, and a limited number of sites in the Transverse Range and Riverside County, California. The endangered Riverside fairy shrimp (*Streptocephalus woottoni*) was listed under the Act on August 3, 1993 (58 Federal Register 41391). This species inhabits Riverside, Orange and San Diego Counties, California, and northern Baja California, Mexico. These five species, hereafter referred to as vernal pool branchiopods, are fully protected under the Act. The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is a proposed endangered species. Surveys for all these species should follow the methodologies described in these interim Survey Guidelines (Guidelines). It is expected that the Guidelines will be revised in the future as additional information becomes available.

These Guidelines are issued as guidance to section 10(a)(1)(A) permittees. Because taking (killing, injuring, harming or harassing) endangered species is strictly prohibited under the Act, a section 10(a)(1)(A) recovery permit must be obtained prior to initiating any surveys or studies that might result in the take of endangered or threatened branchiopods. Failure to obtain this permit may result in violation(s) of section 9 of the Endangered Species Act. Additionally, violation(s) of a section 10(a)(1)(A) permit may result in its non-renewal, suspension or revocation.

For the purposes of these Guidelines, vernal pools and swales are defined as follows:

> Vernal pools and swales are ephemeral wetlands that form in areas of California with Mediterranean climates that have shallow depressions underlain by a substrate of hardpan, clay, or basalt near the surface that restricts the percolation of water. They may be characterized by a barrier to overland flow that causes water to collect and pond. Vernal pools/swales may occur singly, but more typically occur in vernal pool/swale complexes, due to the local hydrology, geology, and topography. Initially, the dry soil in vernal pools/swales becomes wet and starts to saturate during the fall and early winter rains. The second stage in a typical vernal pool cycle is characterized by peak rainfall and inundation of the vernal pools/swales. Vernal pools may remain inundated until spring or early summer, sometimes filling and

> emptying numerous times during the wet season. The vernal pools gradually dry down during the spring, quite often forming the unique "bathtub ring" of flowers from endemic vernal pool plants blooming profusely at the pool margins. This drying down stage is typified by the production of seeds in the endemic plants and the dispersal of animals from the vernal pools. These pools eventually dry down totally, with the onset of drought conditions. During this final stage, early season and shallow-rooted plants turn brown, and the soil dries and may crack. With average rainfall patterns, vernal pools are typically characterized by a predominantly annual plant community dominated by wetland species.

Note: At this time, vernal pool-associated activities not directed toward the listed species, such as botanical surveys and wetland delineations, are not considered to require a permit. However, persons conducting such activities should minimize any potential impact on the vernal pool branchiopods or plants by reducing the amount of walking through vernal pools to the lowest extent practical. Persons conducting projects that require permits (e.g., branchiopod or amphibian surveys) should also minimize walking through the pools.

I. Survey Approval

Unless otherwise authorized by the U.S. Fish and Wildlife Service (Service) in writing, these Guidelines shall be utilized for all surveys conducted for the listed vernal pool branchiopods. Any deviations from the methods prescribed by these Guidelines must be approved by the Service before surveys are conducted. The permittee shall provide the appropriate Service Field Office (see XI, Service Contact section) with all of the following information in writing for each project site at least 10 working days prior to the anticipated start date of survey work:

a. The precise location of the project site clearly delineated on either an original or high quality copy of a U.S. Geological Survey topographic map (exact scale, 7.5 minute, 1"=2,000 ft.). The map should contain the project name, type of project by category [the categories are: development, mitigation banking, or other (specify)], the estimated area (acreage) of the project site and an estimated number or area (acreage) of pool/swales on the site, quad name, and county name;

b. Names of all vernal pool biologists and associated personnel with reference to their section 10(a)(1)(A) permit number; and

c. A written request to commence wet season or dry season sampling for each project to be surveyed for the listed vernal pool branchiopods.

II. Sampling Survey Completion

a. Once initiated, surveys conducted pursuant to these Guidelines may be suspended prior to completion if:

1. the presence of one or more of the five listed branchiopods on the subject site is determined through identification at any point within the wet season survey cycle; or

2. it is agreed that one or more of the listed vernal pool branchiopods are present on the subject site.

b. Permission to dry season survey for the listed vernal pool branchiopods requires the completion of both the full wet season survey and the dry season survey, including the complete analysis of all dry soil samples (see V).

c. A complete survey consists of sampling for either:

1. two full wet season surveys done within a 5-year period; or

2. two consecutive seasons of one full wet season survey and one dry season survey (or one dry season survey and one full wet season survey).

d. Each vernal pool/swale in a vernal pool/swale complex shall be surveyed as per these Guidelines. However, in the case of a large vernal pool/swale complex, the Service may authorize a representative portion or portions of the vernal pool/swale complex to be surveyed as per these Guidelines.

III. Notification of Presence

Should the permittee determine that any of the five listed vernal pool branchiopods are present at a site, the appropriate Service Field Office (see XI. Service Contact section) shall be notified within 10 working days by letter or telephone.

IV. Wet Season Surveys

Wet season survey sampling shall not be conducted at any project site unless the permittee receives prior permission from the Service (see I (c)).

a. Survey Initiation, Frequency, and Termination

1. Surveyors should visit sites after initial storm events to determine when pools/swales have been inundated. A pool/swale is considered to be inundated when it holds greater than 3 cm of standing water 24 hours after a rain event.

2. Pools/swales shall be adequately sampled once every two weeks, beginning no

later than two weeks after their initial inundation and continuing until they are no longer inundated, or until they have experienced 120 days of continuous inundation.

3. In cases where the pools/swales dry and then refill in the same wet season, sampling shall be reinitiated within eight days of refilling every time they meet the 3 cm of standing water criteria and shall continue until they have experienced 120 days of continuous inundation, or until they are no longer inundated.

4. If a vernal pool/swale has already experienced 120 days of continuous inundation, but then dries down and subsequently refills in the same wet season, surveys must be re-initiated in accordance with IV(a)(3) above, each time the vernal pool/swale refills and meets the 3 cm of standing water criteria.

5. Once initiated, surveys conducted pursuant to these Guidelines may be suspended prior to completion if the presence of one or more of the five listed branchiopods on the subject site is determined through identification at any point within the wet season survey cycle

b. Survey Sampling

At each wet season visit, representative portions of the pool/swale bottom, edges, and vertical water column shall be adequately sampled using a seine, dip net or aquarium net appropriate for the size of the pool or swale. Net mesh size shall not be larger than (1/8) inch. Seines shall be examined and emptied of material at least once every five linear meters.

c. Voucher Specimens

1. Voucher specimens shall be collected only once for each individual vernal pool/swale and shall be accessioned to either the California Academy of Sciences (CAS) or the Natural History Museum of Los Angeles County (LACM) (see VIII).

2. Voucher specimens of all listed vernal pool branchiopods captured shall be collected and all other specimens shall be returned in good condition to the vernal pool/swale where they were found as quickly as possible.

3. No more than 20 specimens of each species of listed vernal pool branchiopods from each pool/swale, or less than 10% of the subpopulation present in the pool/swale, whichever is the lesser amount, shall be retained and preserved as voucher specimens.

4. Only sexually mature, adult branchiopods shall be used for purposes of voucher specimens for species identification. The Service will not accept species identifications made using immature specimens.

5. The sample of 20 voucher specimens shall include no less than three specimens of either sex.

V. Dry Season Surveys

Dry season soil sampling shall not be conducted at any project site unless the permittee receives prior written permission from the Service (see I (c)).

a. Soil Collection

Soil shall be collected when it is dry to avoid damaging or destroying cysts which are more fragile when wet. A hand trowel or similar instrument shall be used to collect approximately one liter volume sample per pool/swale of the top 1-3 cm of pool sediment. Whenever possible, soil samples shall be collected in chunks. The trowel shall be used to pry up intact chunks of sediment, rather than loosening the soil by raking and shoveling which can damage cysts.

In southern California there are a number of federally listed plant species (*Orcuttia californica*, *Pogogyne abramsii*, and *Pogogyne nudiscula*) that often co-occur with the fairy shrimp. Removal of soil could damage populations of these plants by inadvertently removing seed. Dry sampling should be minimized or avoided within those vernal pools/swales that are known to, or may, contain these species. The permittee shall contact the Carlsbad Field Office (see XI, Service Contact section) regarding the distribution of these listed plants species prior to conducting dry sampling in Los Angeles, Orange, Riverside and other southern California counties.

b. Soil Sample Volume

Each soil sample from the 10 soil sample locations shall be labeled, stored, and analyzed individually.

1. A total of 10 soil samples of approximately 100 ml each shall be taken from each pool/swale, for a total soil sample volume of approximately one liter per pool/swale.

2. In the case of a very large playa, dry lake, or vernal pool, the Service may authorize the removal of more than one liter of soil.

3. If a pool has a diameter of less than three meters, the total soil sample taken shall not exceed ½ liter in volume per pool, and the 10 soil samples shall be approximately 50 ml each in volume.

c. Soil Sample Locations

A total of 10 soil samples shall be collected from the following locations within each pool/swale sampled:

1. Starting with one soil sample taken from the edge of the pool/swale, at least four soil samples shall be taken from equidistant points along the longest transect of the pool/swale.

2. Starting with one soil sample taken from the edge of the pool/swale, at least four soil samples shall be taken from equidistant points along the widest transect of the pool/swale.

3. If neither the longest or the widest transect encompasses the deepest part (or parts) of the pool/swale, then at least two soil samples shall be taken from the deepest part (or parts) of the pool/swale..

d. Soil Storage

1. The soil samples from each soil sample location shall be stored in separate bags, labeled with the specific location within the pool/swale from where each soil sample was taken. A sketch of the pool/swale showing the specific location of each soil sample shall be included in the 90-day report.

2. Soil samples containing any residual moisture initially shall be adequately ventilated and allowed to air dry thoroughly before storage of the sample. The bags containing the soil samples shall be kept out of direct sunlight in order to avoid excessively heating the sample.

3. All soil samples shall be retained and stored as directed in V(d)(1) and V(d)(2) above until the Service is able to provide direction in species-level identification of the cysts of all the aforementioned branchiopod species.

e. Soil Sieving

1. The soil samples shall not be ground, crushed, or otherwise manipulated in order to expedite the sieving process. A relatively short period of pre-soaking the soil sample may be helpful/necessary in order to facilitate the sieving process. Small aliquots (approximately 50 ml in volume) of soil shall be gently

washed with water through a graded series of U.S. standard eight inch soil sieves ending in mesh sizes 300 micron (um), and 150 micron (um).

2. Sieves must be thoroughly rinsed and visually inspected for any cysts adhered to the sieves prior to the start of sieving. This process must be repeated for each individual soil sample location. Sieves shall also be rinsed and thoroughly inspected upon completion of sieving soil samples.

f. Soil Examination

1. Washed and sieved soil fractions from the 300 um and 150 um sieves shall be examined under a dissecting microscope for tadpole shrimp and fairy shrimp cysts. The process shall be repeated until all individual soil samples have been examined. All sieved material shall be processed and dried as quickly as possible, preferably within one hour from the initial wetting.

   Note: Do not return soil to survey sampling site.

2. All fairy shrimp and tadpole shrimp cysts shall be removed from the soil, separated by cyst type into labeled vials, allowed to air-dry, and then stored dry.

g. Cyst Density

Cyst density information for each soil sample location shall be calculated by dividing the total number of cysts recovered by the total amount of soil from the individual aliquots from that soil sample location. Total cyst density information for each soil sample location shall be reported for each species in terms of: none; 1-25 cysts/100 ml soil; 26-50 cysts/100 ml soil; 51-100 cysts/100 ml soil; 101-199 cysts/100 ml soil; or more than 200 cysts/100 ml soil.

h. Cyst Identification

Each fairy shrimp and tadpole shrimp cyst type shall be identified to genus by a qualified biologist. The Service may require an independent review by a crustacean biologist(s) of any vernal pool branchiopod or cyst identification.

There are two options when a branchiopod cyst identification is made to genus:

1. the survey, pursuant to these Guidelines, may be suspended if it is agreed one or more of the listed species are present on the project site; or

2. one subsequent complete wet season sampling survey shall be conducted to complete survey requirements.

VI. Cyst Voucher Specimens

A representative sample of each cyst type from each pool/swale shall be accessioned to either CAS or LACM (see VIII).

VII. 90-Day Reports

a. U.S. Fish & Wildlife Service

The permittee shall provide the appropriate Service Field Office (listed in the Service Contact section) with all of the following information in writing, using the appropriate Vernal Pool Data Sheet where applicable as the reporting form, no more than 90 calendar days after completing the last field visit of the season at each project site:

1. The location of the project site clearly delineated on an original or high quality copy of a U.S. Geological Survey topographic map (exact scale, 7.5 minute, 1"=2,000 ft.). The location of the listed vernal pool branchiopods is to be included on the 7.5 minute maps in as precise a manner as possible (e.g., lat/long or location within a section).

2. Five color photographic 35mm slides and/or 3" x 5" photographs of each project site taken during sampling in the wet season; this is to include two slides and/or photographs taken from standing position that portray the general landscape of the site [i.e., two photos from an opposing axis of the site (e.g., north and south compass headings)]; and three slides and/or photographs of representative vernal pools, swales, and other areas within the site sampled for the five listed vernal pool branchiopod species. The following information shall be legibly written on each slide/photograph with permanent ink: precise location of the project site, direction from which photograph was taken, date of photograph, initials of photographer, and initials of the scientific names of any of the five listed vernal pool branchiopod species that were found at the depicted site.

   Note: Slides and/or photographs only need to be submitted once per project site.

3. The estimated number of individuals of any of the listed vernal pool branchiopods observed in each pool/swale shall be reported in terms of an order of magnitude (e.g., 10's, 100's, 1000's).

   (Refer to the Vernal Pool Data Sheet)

4. The number of individuals of any of the listed vernal pool branchiopods or cysts preserved from each pool/swale and the name of the institution in which they are accessioned.

   (Refer to the Vernal Pool Data Sheet)

5. A qualitative description of the vernal pool/swale community. A general list of amphibian species and non-listed vernal pool crustacean species (by common and/or scientific name) encountered at the project site is desirable. For purposes of this permit a full survey for these species is not required. However, if more detailed information is collected, it shall be included in the Vernal Pool Data Sheet.
(Refer to the Vernal Pool Data Sheet)

6. Data collected during each field visit, including: date, air temperature, water temperature, weather conditions (e.g., sunny, overcast), maximum depth of each pool/swale, and size (area in square meters) of each pool/swale.
(Refer to the Vernal Pool Data Sheet).

7. (Optional) water chemistry data collected during each field visit, including: alkalinity (total: ppm or mg/l), conductivity (uMHO), dissolved oxygen (ppm or mg/l), dissolved NH_4 (ppm or mg/l), pH, salinity (ppt), total dissolved solids (TDS, ppm), and turbidity.
(Refer to the Vernal Pool Data Sheet)

b. California Department of Fish & Game

1. The permittee should consult with the California Department of Fish and Game (916/653-4875) to determine his/her responsibilities under the California Endangered Species Act and the California Fish and Game Code.

2. The permittee shall supply the California Department of Fish and Game (Natural Diversity Data Base, Staff Zoologist, California Department of Fish and Game, 1416 9th Street, Sacramento, California 95814; telephone 916/322-2494) with completed California Native Species Field Survey Forms, no more than 90 calendar days after completing the last field visit of the season at each project site.

VIII. Accessioning Voucher Specimens

a. All vernal pool branchiopod voucher specimens (including individuals collected and cysts) shall be accessioned into either the California Academy of Sciences (CAS) or the Natural History Museum of Los Angeles County (LACM). All specimens shall be preserved according to the accession standards of the repository which will accession and maintain the specimens. The October 1995 CAS and September 1995 LACM standards are attached to these Interim Survey Guidelines.

b. All vernal pool branchiopod voucher specimens (including individuals collected and cysts), along with a copy of the Vernal Pool Data Sheet containing all of the items

listed in VII (a), shall be permanently deposited in the CAS or LACM within 90 calendar days of the completion of the field survey and the Service shall be supplied with the CAS or LACM catalog numbers given to the specimens.

c. The permittee shall supply the CAS or LACM with a photocopy of their section 10(a)(1)(A) permit to validate that the specimens supplied to them were taken pursuant to a permit. The Service will likely consider refusal by the CAS or LACM to accession any listed branchiopod specimens to be a violation by the permittee of their section 10(a)(1)(A) permit (e.g., if due to improper preservation/storage).

California Academy of Sciences (CAS)
Department of Invertebrate Zoology and Geology, Golden Gate Park,
San Francisco, California 94118; telephone (415) 750-7082

Natural History Museum of Los Angeles County (LACM)
Crustacea Section, Invertebrate Zoology, 900 Exposition Boulevard,
Los Angeles, California 90007; telephone (213) 744-3450

IX. Additional information, limitations, and caveats with respect to these Guidelines are as follows:

a. From time to time, specific circumstances may justify or necessitate revision of these Guidelines, on a case-by-case basis. At the discretion of the Service, such a variance may be allowable under these Guidelines if:

1. the permittee explains to the Service in writing why the variance to the Guidelines is needed and justified; and

2. the Service concurs, in writing, with the variance requested by the permittee.

b. The Service reserves the right to reject vernal pool branchiopod surveys conducted under these protocols as inadequate if:

1. survey methods used are inconsistent with these Guidelines, unless prior written permission (see I, Survey Approval) has been obtained; or

2. other information indicates that the survey is inadequate as determined by the Service.

X. Permit Infractions

The Service may consider any of these actions to be a violation by the permittee of their section 10(a)(1)(A) permit

a. falsification of any reporting or information;

b. failure to follow the stated Guidelines sampling methodologies;

c. failure to obtain prior permission to commence wet season surveys or failure to obtain written permission to commence dry season surveys (see section I (c));

d. failure to notify the Service within 10 days of a determination of presence of one or more of the listed vernal pool branchiopods on a survey site;

e. failure to accession voucher specimens or improperly accessioned voucher specimens;

f. failure to file completed 90-day reports with the Service within 90 calendar days after completing the last field visit of the season at each project site; or

g. failure to file completed Natural Diversity Data Base forms with the California Department of Fish and Game within 90 calendar days after completing the last field visit of the season at each project site.

Violation(s) of a section 10(a)(1)(A) permit may result in its non renewal, suspension or revocation.

XI. Service Contact

For the Central Valley hydrographic basin and the coast ranges north of the Santa Cruz County line, the Sacramento Field Office (2800 Cottage Way Room E-1803, Sacramento, California 95825; telephone 916/979-2728) should be contacted regarding vernal pool branchiopod issues.

For areas from Santa Cruz County south to Ventura County, contact the Ventura Field Office (2493 Portola Road - Suite B, Ventura, California 93003; telephone 805/644-1766).

For areas from Los Angeles County south to the U.S.- Mexico border, contact the Carlsbad Field Office (2730 Loker Avenue West, Carlsbad, California 92008; telephone 619/431-9440).

U.S. Fish and Wildlife Service Vernal Pool Data Sheet
Dry Season Survey

Note: Please fill out the required information completely for each site visit.

This form is being submitted to serve as part of the 90-day report: ______ no ______ yes

Required color slides and/or photographs for the project site are included: _____ no _____ yes

Date: ___/___/___ Time: ________ County: ____________ Quad: ____________

Collector(s): ________________ ________________ Permit #: ______________

Site/Project Name: ________________________________ Pool #: ____________

Township: ________ Range: _______ Section: _________ ______lat. ______ long.

Habitat Condition: (circle where appropriate)

- undisturbed disturbed: tire tracks garbage discing/plowing

- ungrazed grazed: cattle horses sheep other___________
  light moderate heavy

- land use of habitat:

Pool Bottom Surface: (circle where appropriate)
hardpan claypan cobbly/rocky lava flow other_______________

Pool Depth: _____cm (estimated maximum) Surface Area: ______m² (estimated maximum)

Sketch of pool and transects showing:
- scale
- indication of North
- sampling locations

USFWS rev.4/96

U.S Fish and Wildlife Service Vernal Pool Data Sheet
Dry Season Survey
Soil Analysis

Note: Please fill out the required information completely for each site visit.

Sample ID	Sample Volume(ml)	Genus (/species)	# Cysts (or None)	Cyst Density (#/100ml)

Voucher Specimens
Cysts shall be stored dry and shall be preserved according to the standards of the institution in which they will be accessioned.

Genus (/species)	# Cysts	Catalog/Accession #	Pool #

Wet Season Survey

Note: Please fill out the required information completely for each site visit.

This form is being submitted to serve as part of the 90-day report: ____ no ____ yes

Required color slides and/or photographs for the project site are included: ____ no ____ yes

Date: ___/___/___ Time: ________ County: ______________ Quad: ________

Collector(s): ______________________________ Permit #: ______________

Site/Project Name: ______________________________ Pool #: __________

Township: ________ Range: ________ Section: ________ ______lat. ______long.

Temperature: Water: ________ °C Air: ________ °C

Pool Depth:
at time of sampling: _____cm
estimated maximum: _____cm

Surface Area:
at time of sampling: _____m x _____m
estimated maximum: _____m x _____m

Habitat Condition: (circle where appropriate)

- undisturbed — disturbed: tire tracks garbage discing/plowing
- ungrazed — grazed: cattle horses sheep other________ ; light moderate heavy
- land use of habitat

(Optional) Water Chemistry Data

Alkalinity (total): ______ppm or mg/l Conductivity: _____uMHO

Dissolved NH_4: _____ppt or ppm Dissolved Oxygen: _____ppm or mg/l

pH: ______ Turbidity: (secchi disc depth)_____cm or: clear to bottom _____

Salinity: _____ppt or ppm Total Dissolved Solids (TDS): ____ppm

Notes:

U. Fish and Wildlife Service Vern[illegible] Data Sheet
Wet Season Survey

Note: Please fill out the required information completely for each site visit.

Species Observed: state none or estimate # of individuals present in terms of an order of magnitude (e.g., 10's, 100's, 1000's)

Anostracans:
(note reproductive status)

Notostracans:
(note reproductive status)

(Optional) Species Observations:

Cladocerans:	yes	no
Conchostracans:	yes	no
Copepods:	yes	no
Ostracods	yes	no
Fish	yes	no
Frogs	yes	no
Salamanders	yes	no
Waterfowl	yes	no
Other (specify) ______		

Insects: (adult or larvae)

Anisoptera:	yes	no
Zygoptera:	yes	no
Hydrophilidae:	yes	no
Dytiscidae:	yes	no
Corixidae:	yes	no
Notonectidae:	yes	no
Belostomatidae:	yes	no
Other (specify) ______		

Voucher Specimens

Specimens shall be preserved according to the standards of the institution in which they will be accessioned.

Species	# Individuals	Accession/Catalog #	Pool #

TOTAL P.[illegible]

3(1067-00L
RECON Report

FAIRY SHRIMP SURVEYS AT LOS ANGELES INTERNATIONAL AIRPORT

Prepared for

SAPPHOS ENVIRONMENTAL
50 SOUTH DELACEY, SUITE 210
PASADENA, CA 91105

Prepared by

CAM PATTERSON
BIOLOGIST

TERRI L. AYERS
BIOLOGIST

RECON NUMBER 2964C
JULY 1, 1998

RECON

4241 Jutland Drive, Suite 201
San Diego, CA 92117-3653
619 / 270-5066 fax 270-5414

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Introduction

RECON was contracted by Sapphos Environmental to conduct directed surveys for listed vernal pool branchiopods (fairy shrimp) at Los Angeles International Airport in areas of vernal pool or other ephemeral aquatic habitat. These surveys were conducted according to the protocol developed by the U.S. Fish and Wildlife Service (USFWS 1996) for studying listed vernal pool branchiopods, which included dry-phase soil sampling of the pools and biweekly site visits during the wet season. RECON used global positioning systems (GPS) hardware and software to map the boundaries of the pools, and incorporated these data into a geographic information system (GIS). This report describes the survey methods and presents the results of the surveys.

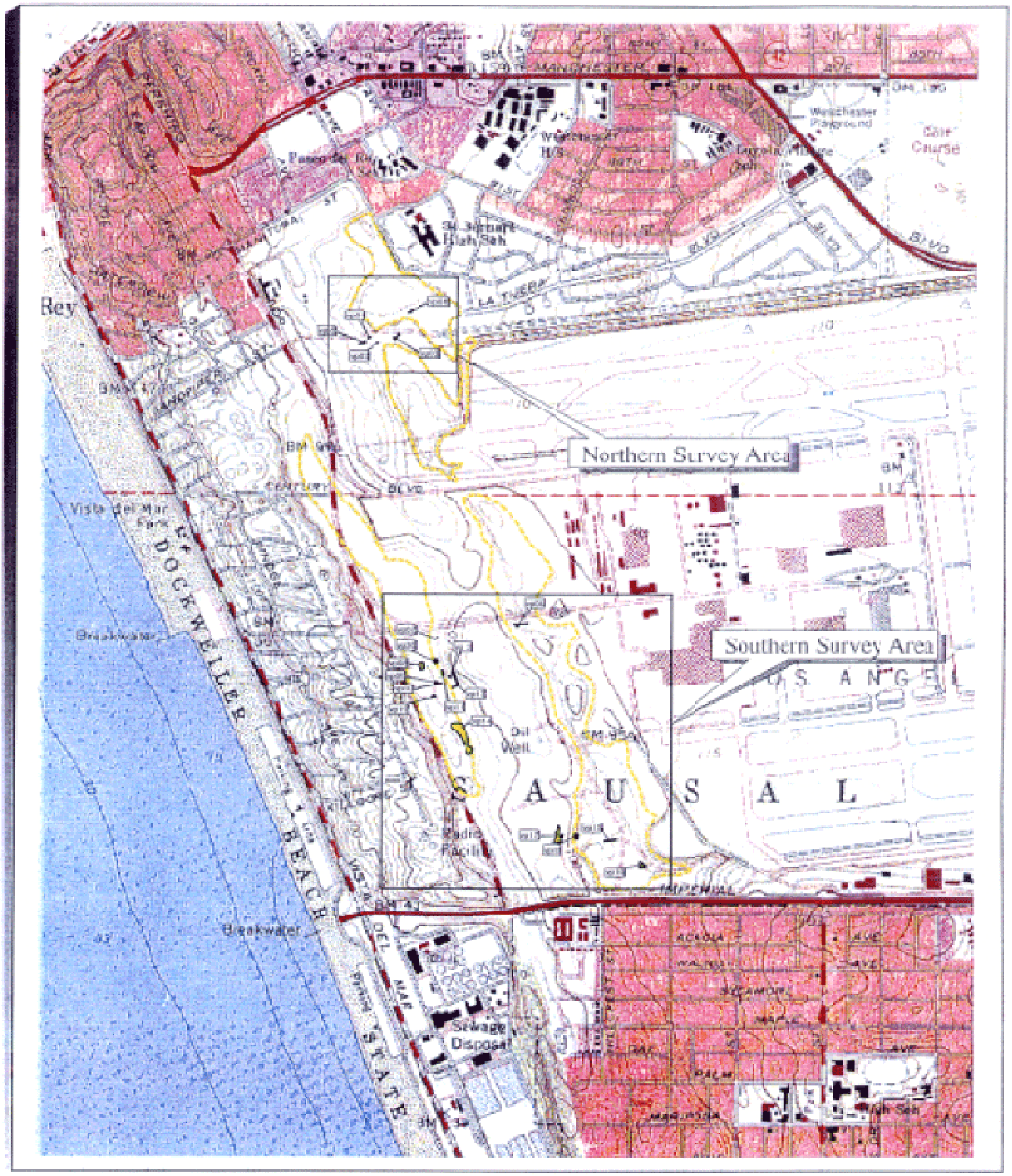
A. Physical Setting

Los Angeles International Airport (LAX) is located within Los Angeles County, California, north of the city of El Segundo. The area surveyed for this project is situated at the northwestern end of LAX, just east of the El Segundo Dunes (Figure 1).

The lands within the LAX boundary have largely been developed to support airport operations. During the course of the wet season surveys, it was apparent that no vernal pool species associations occur in the study area. Therefore, this report refers to the habitats surveyed as "ephemeral aquatic pools." The open area around the runway where the pools are located was filled many years ago to eliminate topographic relief, and is currently disked and/or mowed regularly to remove vegetation for safety purposes. The routine disturbance of the soils and vegetation in and around the pools has altered the remnant pools' boundaries and reduced or eliminated the flora normally associated with vernal pools.

B. Fairy Shrimp

Fairy shrimp are freshwater crustaceans of the Order Anostraca. They inhabit temporary bodies of water (vernal pools), and are able to hatch, attain maturity, and reproduce within the short period of time the pools are inundated. Habitat loss has resulted in the decline of many species of fairy shrimp, resulting in their need for listing and protection under the federal Endangered Species Act (ESA) of 1973, as amended. There are four species of fairy shrimp found in California that are listed as endangered under the provisions of the ESA: Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*B. longiantenna*), San Diego fairy shrimp (*B. sandiegonensis*), and Riverside fairy shrimp (*Streptocephalus woottoni*). Vernal pool fairy shrimp (*B. lynchi*) are listed as threatened. Conservancy fairy shrimp and longhorn fairy shrimp are known from California's Central Valley, while San Diego fairy shrimp, vernal pool fairy shrimp,



Vernal pools

Historic Depressions

N

800 0 800 1600 2400 Feet

FIGURE 1

Regional Location of Ephemeral Aquatic Habitat at Los Angeles International Airport

RECON

and Riverside fairy shrimp are known to occur in southern California. Versatile fairy shrimp (*B. lindahli*) are commonly found in southern California vernal pools and are not listed for protection under the ESA.

Methods

A. Vernal Pool Mapping

RECON biologists, along with Dr. Irena Mendez of Sapphos Environmental, located potential vernal pools on the project site during fall 1997 based on field reconnaissance. Using a GPS receiver, the geographic coordinates of each pool perimeter were mapped by surveying a number of points around the edge of each pool basin adequate to record the size and location of the basin. The raw location data from the GPS were post-processed to submeter accuracy. These data were incorporated into the RECON GIS and processed to construct data layers of pool basin locations using the State Plane Coordinate System, North American Datum 1983 (NAD83). During the course of the 1998 wet season surveys for fairy shrimp, several additional pools were located and mapped with the GPS receiver.

B. Fairy Shrimp Surveys

USFWS guidelines (1996) for conducting fairy shrimp surveys specify that two years' data must be collected to determine the presence/absence of fairy shrimp species within vernal pools. In lieu of two separate years of wet season sampling, one season of dry soil sampling was substituted.

Dry season soil sampling for the presence of fairy shrimp cysts was conducted in conjunction with mapping the pools at LAX, in accordance with RECON's USFWS endangered species permit and the survey guidelines for vernal pool branchiopods (USFWS 1996). Samples of soil were collected from at least 10 locations within each pool basin and sent to Christopher Rogers of Jones and Stokes Associates, Inc. in Sacramento, California, for examination and cyst identification.

El Niño-influenced rainfall occurred early within the wet season of 1997-98, and resulted in the ponding of water for periods of sufficient duration to allow for the hatching of fairy shrimp in the pools at LAX. RECON biologists visited each pool and conducted sampling to determine the presence of fairy shrimp within the pools a number of times during the wet phase of the pools (Table 1).

TABLE 1
SURVEY DETAILS
LOS ANGELES INTERNATIONAL AIRPORT

Date	Personnel	Type of Survey
11/06/97	Cam Patterson, Terri Ayers	Dry season soil sampling
12/19/97	Cam Patterson, Terri Ayers	Wet season fairy shrimp survey
01/08/98	Cam Patterson	Wet season fairy shrimp survey
01/23/98	Cam Patterson	Wet season fairy shrimp survey
03/05/98	Cam Patterson	Wet season fairy shrimp survey
03/26/98	Cam Patterson	Wet season fairy shrimp survey
04/16/98	Cam Patterson	Wet season fairy shrimp survey

Within five to seven days of rain events, personnel from Sapphos Environmental were contacted by phone to ascertain if rainfall amounts were sufficient to fill the pool basins. If pools remained inundated for at least 10 days, fairy shrimp sampling was conducted by RECON personnel. All fairy shrimp surveys were conducted by personnel authorized under USFWS permit PRT-797665. Fairy shrimp were sampled by sweeping either a hand-held net or a pole-mounted net through the water column in the pool and examining the net for invertebrates. Mature fairy shrimp species were identified to the species level. Survey visits were timed to correspond with observed hatching of fairy shrimp at other sites throughout southern California being concurrently surveyed by RECON (March Air Reserve Base, Hemet, Camp Pendleton Marine Base, Marine Corps Air Station Miramar, and Otay Mesa).

Results

A. Pool Mapping

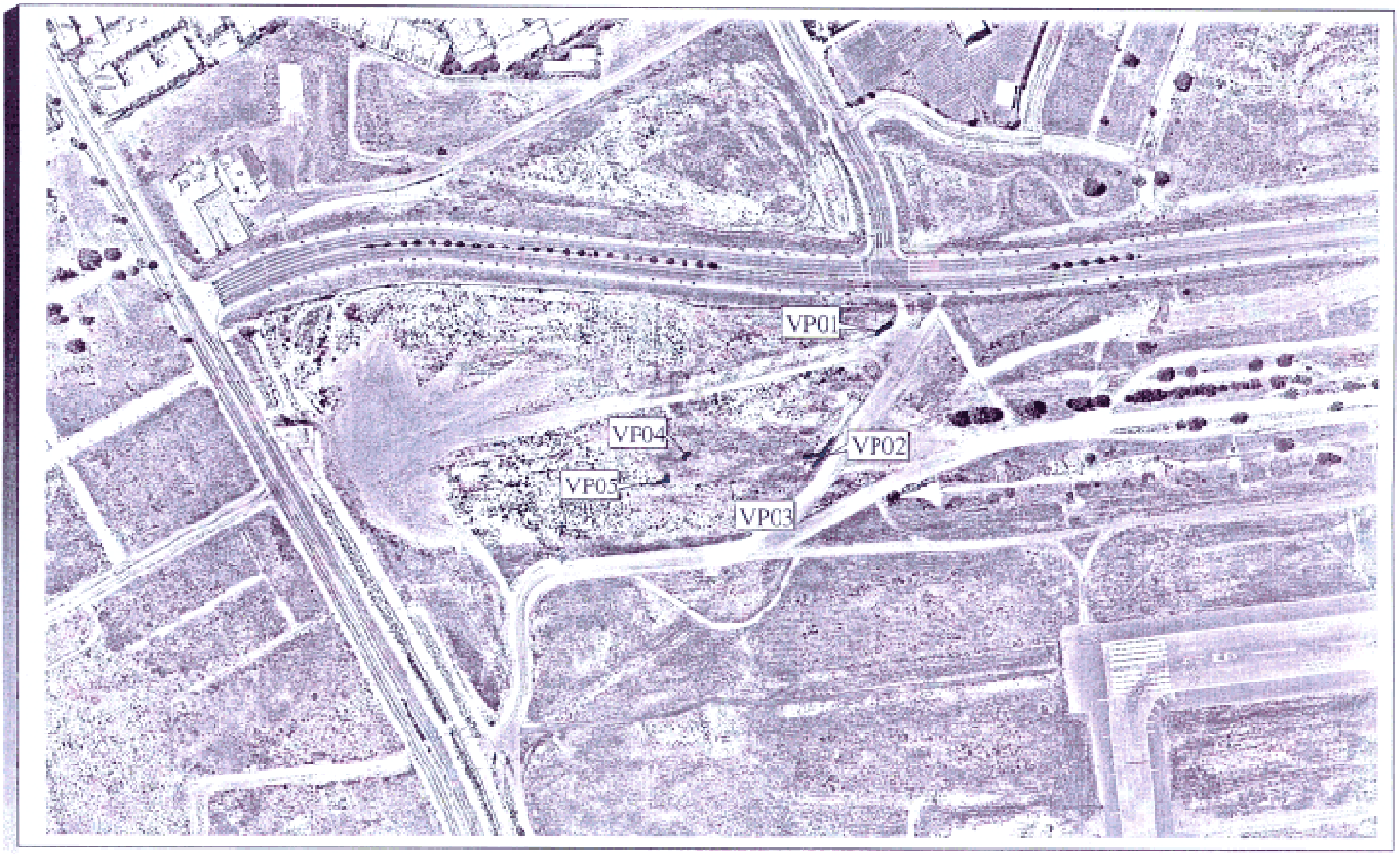
Sixteen ephemeral aquatic pools were located and mapped at LAX in the fall of 1997. Four additional pools were identified mid-way through the wet season surveys. Table 2 lists the dimensions and areas of these pool basins. All pools are illustrated in Figures 2 and 3.

B. Dry Season Soil Samples

A copy of the report prepared by C. Rogers of Jones and Stokes Associates detailing the results of the dry season vernal pool soil analysis is included as Attachment 1. Cysts from the genus *Branchinecta* were found in the soils samples from pools numbered 1, 2, 6, 8,

TABLE 2
POOL DIMENSIONS
LOS ANGELES INTERNATIONAL AIRPORT

Pool Number	Approximate Length and Width (feet)	Approximate Area (feet^2)
1	55 X 13	123
2	97 X 12	292
3	23 X 12	74
4	30 X 15	95
5	82 X 28	212
6	177 X 20	1,438
7	46 X 10	275
8	98 X 82	5,706
9	33 X 26	577
10	27 X 19	312
11	64 X 18	809
12	34 X 22	548
13	208 X 84	4,808
14	454 X 130	39,199
15	165 X 15	2,086
16	96 X 94	3,936
17	201 X 130	13,719
18	63 X 42	1,659
19	53 X 28	807
20	63 X 51	1,691



Pools

N

200 0 200 400 Feet

FIGURE 2

Ephemeral Aquatic Habitat at Los Angeles International Airport - Northern Survey Area

FIGURE 3

Ephemeral Aquatic Habitat at Los Angeles International Airport - Southern Survey Area

RECON

14, 15, and 16. Cysts from the genus *Streptocephalus* were found in the soil samples from pools numbered 1, 2, 6, 9, and 12 through 16. As described in Roger's report, *Branchinecta* cysts are identifiable only to the genus level because of the overlapping characteristics of cysts from the various species. Cysts from *Streptocephalus woottoni* may resemble the cysts of other species of *Streptocephalus*, but no other species occur in the area; therefore, it was assumed that the cysts were those of *S. woottoni*.

C. Wet Season Fairy Shrimp Surveys

Versatile fairy shrimp (*B. lindahli*) were observed in pools numbered 1, 2, 8, and 12 through 19 (see Figure 1). This was the only species of fairy shrimp observed in the pools at LAX during the 1997-98 wet season. Pools numbered 3, 4, and 5 did not pool water at any time during the wet season for long enough to allow fairy shrimp cysts to hatch if they were present in the soil. Table 3 lists the combined results of the dry season soil sampling and wet season surveys.

Discussion

Ephemeral aquatic pools observed on the LAX survey area consist entirely of non-natural man-made depressions in highly disturbed soil conditions. A review of historical topographic maps and aerial photographs indicate that natural vernal pools and back-dune ponds were present on the airport property in the past. However, none of the ephemeral aquatic (temporarily ponded) sites observed during the course of the current survey were natural habitat. No typical vernal pool plant community exists in any of the habitat surveyed. Of the plant species present, all are typical of roadside ditches and disturbed wetlands and none were vernal pool endemics.

In the northern survey area (see Figure 2), the surveyed ponded areas were tire ruts in heavy soil. As shown on the USGS topographic map, this area was near the edge of a large depression that formerly existed near the western end of the northern runways 20 or more years ago. The dry samples in this area had low levels of Riverside fairy shrimp cysts, which probably indicates that this species formerly occupied these large ponds which are now filled. No habitat with water durations long enough (six to eight weeks minimum) to support Riverside fairy shrimp currently exists in this area. The only live fairy shrimp observed during the wet season surveys in this area were versatile fairy shrimp, a common and widespread species of all kinds of ephemeral aquatic water bodies including natural vernal pools and highly disturbed sites.

In the southern survey area (see Figure 3; Photograph Sheets 1-3), the surveyed ponded areas included road ruts and roadside ditches, compacted gravel road surfaces, a hazardous materials runoff containment pond, depressions on old artificial fill, and a earthen-bottom flood control basin. All of these areas were considered potential fairy

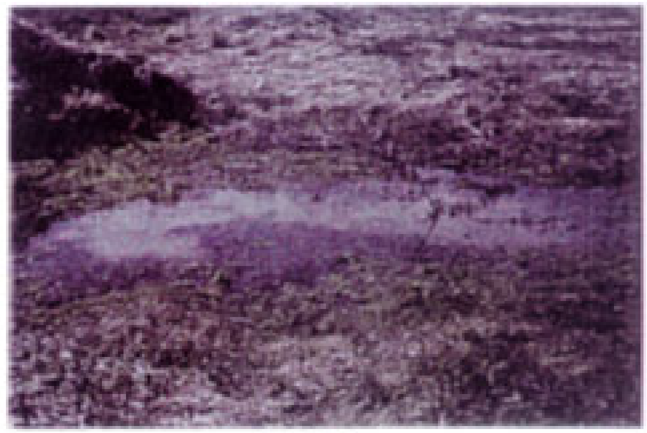
TABLE 3
FAIRY SHRIMP SURVEY RESULTS
LOS ANGELES INTERNATIONAL AIRPORT

Pool Number	Dry Season Soil Sampling	Wet Season Surveys
1	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
2	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
3		Water did not pond
4		Water did not pond
5		Water did not pond
6	*Branchinecta* sp. *Streptocephalus woottoni*	none
7		
8	*Branchinecta* sp.	*Branchinecta lindahli*
9	*Streptocephalus woottoni*	*Branchinecta lindahli*
10		*Branchinecta lindahli*
11		*Branchinecta lindahli*
12	*Streptocephalus woottoni*	*Branchinecta lindahli*
13	*Streptocephalus woottoni*	*Branchinecta lindahli*
14	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
15	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
16	*Branchinecta* sp. *Streptocephalus woottoni*	*Branchinecta lindahli*
17	Not sampled	*Branchinecta lindahli*
18	Not sampled	*Branchinecta lindahli*
19	Not sampled	*Branchinecta lindahli*
20	Not sampled	none

Pool 8

Pool 10

Pool 11



Pool 12

Pool 13

Photographs, Sheet 1

Vernal Pool Photographs

RECON

Pool 14

Pool 15

Pool 17

Pool 16

Photographs, Sheet 2

Vernal Pool Photographs

Pool 18

Pool 20

Pool 19

Photographs, Sheet 3

Vernal Pool Photographs

shrimp habitat because of potentially appropriate hydrologic conditions. As for the northern survey area, these sites are all on non-natural substrate with ponding caused by man-made factors. As shown on Figure 1, these areas were also formerly within a large system of depressions and temporary ponding located between the runway complex and the dunes to the west. Although Riverside fairy shrimp cysts were observed in dry season samples from several of these ponds, no live animals of this species were observed during intensive sampling of the habitat over the season. Only one location (pool 14) had appropriate water duration characteristics for this species. This pond had an intensive *B. lindahli* hatch, with animal densities throughout the large pond exceeding 100 animals per cubic meter early in the season. By late January, when *S. woottoni* were appearing in monitored pools elsewhere in southern California, no anostracans were present in pool 14. Spadefoot toads were observed in pools 8, 14, and 18.

The results of the 1998 surveys indicate that the ephemeral aquatic habitat remaining at LAX is of very poor quality, and does not appear to support any listed endangered or threatened vernal pool anostracans. The dry season sample results, which contained *S. woottoni* (Riverside fairy shrimp) cysts, indicate that vernal pool habitat which was formerly extensive on the western part of the airport property, did support this species in the past. Based on the condition and quality of habitat presently on the airport, and the favorable survey conditions during the 1998 season, we consider it likely that *S. woottoni* has been extirpated from the site (with the possible exception of pool 14). Because of the very favorable hydrologic conditions present during the survey season, we also consider it to be unlikely that either of the two potentially present listed branchinectids, *Branchinecta sandiegonensis*, or *B. lynchii* are present at LAX, but were missed during the survey. Both of these species were easily detected at other locations where they are present during surveys conducted on the same schedule.

If future impacts to these poor-quality ephemeral aquatic wetlands result in mitigation requirements, we recommend that the feasibility of a vernal pool habitat restoration program be considered. Although habitat restoration on the airport property is probably infeasible due to the attractiveness of wetlands to waterfowl and shorebirds, there may be other former vernal pool sites within Los Angeles County (such as in the Santa Clara River valley) which may be appropriate.

Reference Cited

U.S. Fish and Wildlife Service (USFWS)
1996 Interim survey guidelines to permittees for recovery permits under Section 10 (a)(1)(A) of the Endangered Species Act for the listed vernal pool branchiopods. Carlsbad Field Office, Carlsbad, California.

ATTACHMENT 1

RECEIVED

JUN 15 1998

RECON

June 11, 1998

Cameron Patterson
RECON
4241 Jutland Drive, Suite 201
San Diego, CA 92117-3653

SUBJECT: Analysis of Vernal Pool Soils from LAX to Determine the Potential Presence of Special-Status Shrimp Species.

Dear Cameron Patterson:

Jones & Stokes Associates conducted an analysis of 80 soil samples for RECON to determine the presence of special-status shrimp at LAX, Los Angeles County, California. The soil samples were collected by RECON, and were received by Jones & Stokes Associates on April 30, 1998. Jones & Stokes Associates assumes that RECON will submit this report and all other pertinent materials and information to the U.S. Fish and Wildlife Service (USFWS), the Natural History Museum of Los Angeles County and the California Department of Fish and Game, as required by the USFWS guidelines for a protocol-level survey.

DEFINITIONS

For the purpose of this report, special-status shrimp are defined to include shrimp species in the following categories:

- shrimp listed as threatened or endangered under the federal Endangered Species Act (50 CFR 17.11 for listed animals and various Federal Register notices for proposed species),
- other shrimp species meeting the definition of rare or endangered species under the California Environmental Quality Act (CEQA) (State CEQA Guidelines, Section 15380).

METHODS

Soil samples were prepared for examination in the laboratory by dissolving the clumps of soil in water and sieving the material through 500-, and 150-μm pore-size screens. The small size of

these screens ensured that the eggs from the shrimp species would be retained. The portion of each sample retained in the screens was dissolved in a brine solution to separate the organic material from the inorganic material. The organic fraction was then examined under a microscope.

Scanning electron micrographs and reference specimens were used to identify shrimp cysts to the lowest justifiable taxon. Cysts from the genus *Branchinecta* were identifiable only to genus level, because of the overlapping characters of the cysts among species, and the potential for two species, *B. lindahli* and *B. sandiegonensis*, to occur in this region. *B. lindahli* is a common species with no regulatory status, and *B. sandiegonensis* is federally listed as endangered (62 CFR 4925). *Streptocephalus wootoni* cysts may resemble those of other species of *Streptocephalus*; however, no other species of *Streptocephalus* occur in the survey region.

RESULTS

Shrimp cysts were identified in 35 of 80 samples. Cysts for the federally listed endangered species *Streptocephalus wootoni* were identified in 21 of the samples, and the cysts for the genus *Branchinecta* were identified in 32 of the samples. It cannot be determined from observation of the cysts if these samples contain *B. sandiegonensis*. Adult shrimp must be observed to make this determination. The specific findings are in Table 1.

If you have any questions please call me at (916)737-3000.

Sincerely,

D. Christopher Rogers

D. Christopher Rogers
Invertebrate Ecologist

DCR/CR/clm

Table 1. Specific Findings

Pool Number	Branchinecta (cysts/liter)	Streptocephalus (cysts/liter)	Pool Number	Branchinecta (cysts/liter)	Streptocephalus (cysts/liter)
1-3	2,378	30	9-3	0	0
1-5	2,579	24	9-4	0	0
1-6	3,293	16	9-5	0	0
1-8	106	14	9-6	0	0
1-9	97	112	9-7	0	32
2-5	105	0	10-2	0	0
2-6	36	0	10-5	0	0
2-7	36	0	10-8	0	0
2-8	200	23	10-9	0	0
2-10	82	0	10-10	0	0
3-5	0	0	11-2	0	0
3-6	0	0	11-5	0	0
3-7	0	0	11-8	0	0
3-9	0	0	11-9	0	0
3-10	0	0	11-10	0	0
4-1	0	0	12-1	0	32
4-5	0	0	12-2	0	0
4-7	0	0	12-3	0	0
4-9	0	0	12-4	0	0
4-10	0	0	12-7	0	0
5-3	0	0	13-3	0	0
5-5	0	0	13-5	0	64
5-6	0	0	13-8	0	0
5-7	0	0	13-9	0	32
5-9	0	0	13-10	0	0
6-2	0	0	14-1	433	2
6-3	0	0	14-2	342	4
6-4	0	0	14-3	483	0
6-8	1	0	14-4	1,062	1
6-10	15	3	14-10	1,326	0
7-3	0	0	15-4	39	42
7-4	0	0	15-5	12	4
7-5	0	0	15-6	4	1
7-7	0	0	15-7	14	9
7-9	0	0	15-10	63	3
8-2	934	0	16-2	485	32
8-3	466	0	16-3	316	0
8-4	404	0	16-8	388	1
8-6	305	0	16-9	87	0
8-7	72	0	16-10	270	0

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

June 15, 1998

MEMORANDUM FOR THE RECORD
1043-008.M02

TO: U.S. Fish and Wildlife Service
(Mr. Robert James)

California Department of Fish and Game
(Mr. Ronald Rempel, Mr. Kevin Hunting)

Los Angeles World Airports
(Ms. Sheila Murphy, Mr. Steve Crowther)

Federal Aviation Administration
(Mr. David Kessler)

Landrum & Brown
(Ms. Karen Yamamoto)

FROM: Sapphos Environmental
(Ms. Tracey Alsobrook, Dr. Brad Blood)

SUBJECT: Results of Spring Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, April 17 - May 27, 1998

ATTACHMENTS:
1. Existing Biotic Communities Map
2. Directed Surveys for Breeding Burrowing Owls - Transect Lines
3. Field Notes

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of directed surveys for burrowing owl (*Athene cunicularia*) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion *Master Plan* Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). The results of this survey indicate that no breeding burrowing owls are present on the El Segundo Dunes or within the existing or proposed LAX airfield.

Los Angeles World Airports (LAWA) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of the burrowing owl which is a California Department of Fish and Game "Species of Special Concern". In their letter dated August 13, 1997, the California Department of Fish and Game (Department) directed LAWA and FAA to conduct directed

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683 3548

surveys for all state designated sensitive species. During winter season surveys three burrowing owls were observed on the El Segundo Dunes. No wintering burrowing owls were observed on the LAX airfield. The breeding season surveys (spring) were conducted by Sapphos Environmental (Ms. Tracey Alsobrook, Mr. Peter Bloom, Dr. Brad Blood, Mr. Rob Witthaus) on April 17, April 24, April 29 and May 6, 1998. An additional survey was conducted on May 27, by Ms. Tracey Alsobrook and Mr. John Konecny. Surveys were conducted according to burrowing owl and burrow survey guidelines as outlined in the California Department of Fish and Game *Staff Report on Burrowing Owl Mitigation* and the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by The California Burrowing Owl Consortium (1993).

All surveys took place either several hours after sunrise or several hours before sunset. All suitable habitat at the LAX airfield and the El Segundo Dunes was walked or driven following transects spaced to allow 100 percent visual coverage of the terrain. This written report contains the information specified by the Department in their *Staff Report on Burrowing Owl Mitigation* to be prepared upon completion of surveys and will be submitted to the Department, Service, LAWA, FAA, and Landrum and Brown.

INTRODUCTION

This Memorandum for the Record transmits the results of directed surveys to assess the presence or absence of breeding burrowing owls (*Athene cunicularia*), a California "Species of Special Concern" at the LAX 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). Los Angeles World Airports ([LAWA] formerly known as the City of Los Angeles Department of Airports) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of the burrowing owl which is a California Department of Fish and Game (Department) "Species of Special Concern". In their letter dated August 13, 1997, the Department directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. Sapphos Environmental notified LAWA, FAA, the Department, the Service, and Landrum & Brown (Master Plan consultant) of the initiation of directed surveys for the presence/absence of burrowing owl by Memorandum for the Record (MFR 1067-007.M04) dated January 26, 1998.

This Memorandum for the Record summarizes information regarding the burrowing owl natural history, describes the habitat of the survey area and its suitability for burrowing owls and suitable burrows; spring survey methods and results.

BURROWING OWL NATURAL HISTORY

Burrowing owl (*Athene cunicularia*) are small, ground-inhabiting, long-legged owls (DeSante, 1992). Burrowing owls are found from southern Canada to southern South America (Johnsgard, 1988). They are resident largely throughout the southern United States, with several populations of burrowing owls on the gulf coast of Louisiana and the Florida panhandle (Johnsgard, 1988). In southern California burrowing owls are common in the Imperial Valley, rather common in agricultural areas within the Colorado River district and generally scarce and decreasing elsewhere (Garrett, 1981). Along coastal southern California the burrowing owl distribution is greatly reduced and localized. They occur primarily in agricultural and grassland areas of interior and coastal valleys, and in fewer numbers on bluffs along the immediate coast, but are resident on the Channel Islands (Garrett, 1981). Burrowing owls from more northerly areas occasionally migrate into southern and coastal regions of southern California during the winter (Garrett, 1981). Preliminary data from the Los Angeles County Breeding Bird Atlas (Los Angeles Audubon Society, unpublished) indicates records of several breeding pairs of burrowing owl in the Antelope Valley, but no breeding has been documented on the coastal slope of Los Angeles County for records between 1995 and 1997 (Weimer, Per. Comm.).

Characteristic habitats preferred by burrowing owls are grasslands, deserts, and arid scrublands. These habitats are open and relatively treeless landscapes and are home to populations of small burrowing mammals, such as pocket gophers and ground squirrels. These habitats also support the primary prey items for burrowing owls: insects and small mammals. In California, California ground squirrel (*Spermophilus beechii*) is known to be the primary source of burrows utilized by burrowing owls. Burrowing owls, however; may use abandoned burrows made by other mammals. A typical burrow utilized by a burrowing owl is slightly elevated above the surrounding ground and surrounded by piles of earth. Usually the immediate area about the burrow is barren and devoid of vegetation.

Burrowing owls that move into an abandoned burrow will modify it to suit their needs (Collins and Landry, 1977). Modifications involve widening the entrance, and passageways and the creation or modification of a nesting cavity.

Populations of burrowing owls throughout the United States, particularly in California have been in serious decline for the last several decades (California Burrowing Owl Consortium, 1983; California Department of Fish and Game, 1995; Collins and Landry, 1977). The decline has been especially precipitous during the last 5 to 10 years in California due to habitat loss because of urban expansion and development in outlying areas. Additionally, rodent control through poisoning in the expansion areas has eliminated large numbers of ground squirrels, and with them the primary source of suitable burrows (Institute for Bird Populations, 1982). Once common in Los Angeles County and along the coast, burrowing owls are only numerous in the Imperial Valley of southeastern California (Garrett, 1981).

SURVEY AREA

The LAX 2015 Master Plan Study Area comprises a total area of approximately 3700 acres. Of that total acreage approximately 900 acres were determined to be potentially suitable burrowing owl habitat. Therefore, directed surveys were initiated and performed across those areas (Attachment 1; Attachment 2). The open space between the runways and taxiways were also surveyed on May 6, 1998 although these areas are routinely mowed and disced by LAX operations and maintenance. The directed survey area for burrowing owl includes the open space of the LAX airfield west of the runways and along the north perimeter (south of Westchester Parkway) and the El Segundo Dunes (including the El Segundo Blue Butterfly Habitat Restoration Area and the adjacent open space to the north.

As recommended in the burrowing owl and burrow survey guidelines as outlined in the Department's Staff report on Burrowing Owl Survey Protocol and Mitigation Guidelines (CDFG, 1995), the following section describes the topography and habitats within the directed survey area.

AIRFIELD

Topography

The west LAX airfield consists of both developed and open space areas. The terrain of the northwest airfield open space is generally flat with only the slight relief of some small depressions and irregularities. This area is vegetated with disturbed and non-native grassland. Portions of this area fall within the FAA safety areas and hence are mowed and occasionally disced (Attachment 1). The southwest airfield open space is also generally level, but with greater relief in the form of moderate hills and depression of fill material and former construction staging areas. Abandoned borrow and fill mounds, as well as, asphalt and graded dirt roadways are scattered throughout this area (Attachment 1). The open space of the southwest airfield is also vegetated with disturbed and non-native grassland communities. Prior to construction of LAX this area was a continuation of the deflation plain eastward from the El Segundo Dunes and was vegetated with a Valley needle grassland community. The developed area consists of concrete runways, taxiways, roadways, airline terminals, and associated structures (hangers, warehouses, etc.).

Plant Communities

Non-native Grassland (CNDDB Element Code 42220/ruderal): This community consists of the open space between the runways and taxiways on the airfield and is under regular operations maintenance. Non-native grassland is characterized by a dense to sparse cover of annual grasses up to one meter in height. Usually associated with the grasses are species of annual forbs. Some plant growth occurs in winter, but most growth and flowering occurs in the spring. Plants die in the summer and persist as seeds in the uppermost layers of the soil. Non-native species found to be present include: slender wild oat (*Avena barbata*), wild oat (*A. fatua*), ripgut grass (*Bromus diandus*), felty soft chess (*B. hordaceus*), foxtail chess (*B. madritensis*), and fountain grass (*Pennistum setaceum*). Interspersed with annual grasses, non-native forbs present are: storksbill (*Erodium* sp.), black mustard (*Brassica nigra*), common sow thistle (*Sonchus oleaceus*), California burclover (*Medicago polymorpha*), sour clover (*Melilotus indica*), radish (*Raphanus sativa*), and crown daisy (*Chrysanthemum coronarium*). This community does not support potential burrowing owl habitat due to ongoing maintenance operations.

Disturbed: Vegetation characteristic of disturbed areas can be seen in the large open space area west of the runways and east of Pershing Drive. Plant species known to be present are: castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), black mustard, tocalote (*Centaurea melitensis*), Russian thistle (*Salsola tragus*), cheeseweed (*Malva parviflora*), filaree (*Erodium* sp.), ripgut grass, and wild oats. A few native species are found in particular spots, such as: deerweed (*Lotus scoparius*), bush lupine (*Lupinus chamissonis*), and mulefat (*Baccharis salicifolia*). Portions of these disturbed areas have been continuously scraped and are bare due to vehicle use. This community does support potential burrowing owl habitat.

Developed: The developed areas within the LAX 2015 Expansion Master Plan Study Area includes approximately 1,663.4 acres of terminals, parking lots, roadways (improved and unimproved), and support facilities. These areas do not support potential burrowing owl habitat.

DUNES

The 307 acre Dunes is a remnant of a once more extensive complex of coastal dune and coastal strand habitat fringing the Santa Monica Bay. The Dunes were relatively undisturbed until the early 1900's when the City of Redondo Beach and the community of Venice were developed. Following residential construction, construction of a power plant, refinery and the Hyperion Wastewater Treatment Plant, approximately 345 acres of the dune system remained including the Dunes site. Between 1966 and 1972, the City of Los Angeles Department of Airports purchased and cleared 822 residences from land located seaward of the airport in order to avoid exposing residents to unhealthy noise levels. The net result of this action by the City of Los Angeles Department of Airports was the conservation of approximately 300 acres of open space within the largely built-out region of western Los Angeles. LAWA currently manages and maintains approximately 200 acres within the open space areas as the El Segundo Blue Butterfly Habitat Restoration Area for the federally-listed endangered El Segundo blue butterfly.

Topography

Sand dune systems result from a dynamic interplay between the high-energy processes of the ocean and the protected inland areas of the coastal plain that are outside the direct influence of ocean water, salt spray, and sand. Dune system plant communities typically form a continuum in response to topography and proximity to the ocean. Four main landforms associated with dunes systems are present at El Segundo: strand and bluff (adjacent to the ocean), followed by the foredune, backdune and deflation plain as one moves inland.

Strand and Bluff: Strand is defined as the expanse of sandy substrate between the mean tide line and the beginning of the foredune. At the Dunes, a narrow 100 to 150 foot wide strand formerly extended from the mean tide line to the base of a 10- to 15-foot bluff. The present day strand has artificially been widened to form Dockweiler Beach and an extensive parking lot has been placed on top of the bluff. Regular sand sweeping activities prevent strand vegetation from becoming established. This area does not support potential burrowing owl habitat.

Foredune: Historically the foredune extended from the bluff just above the strand to the point of drop off which forms the backdune. With the construction of Vista Del Mar Boulevard, the foredune was relocated approximately 150 to the east of its historical seaward border. This area does support potential burrowing owl habitat.

Backdune: The steeply sloping aspect of the backdune is formed as sand-laden winds experience a sharp drop in velocity after crossing the crest of the dunes, and deposit most of their sand load there. The steepness of the backdune renders it highly susceptible to erosion upon removal of the dense plant cover. This area does not support potential burrowing owl habitat because of the steep slopes and loose soils. However, at the interface of this land form and the eastern deflation plain there is potential burrowing owl habitat at the toe of the backdune slope.

Deflation Plain: Deflation plains form at the base of backdunes as a layer of sand is deposited over non-dunes related substrates. The deflation plain at the Dunes once extended eastward past Pershing Drive and onto LAX proper. An older dune system in which the sand grains have fused to become weakly-cemented sandstone is found at the base of the present dunes and underlies the deflation plain. This land form does support potential burrowing owl habitat.

Subsite Numbers

In 1987-1988 the entire 302-acre property at the Dunes was subdivided into 60 subsites to serve as a reference for all restoration activities. The subsites were primarily divided by extant streets within the Dunes and serve as useful location reference points for restoration, monitoring and survey activities.

Plant Communities

The Dunes are characterized by five plant communities (Attachment 1). The El Segundo Blue Butterfly Habitat Restoration Area within the Dunes supports three distinct natural plant communities. Associated with the foredune is southern foredune (California Natural Diversity Data Base Element Code 21230); associated with the backdune is southern dune scrub (CNDDB Element Code 21330); and associated with the deflation plain is valley needlegrass grassland (CNDDB Element Code 42110). To the north of the Habitat Restoration Area, north of Sandpiper Street, are approximately 100 acres of open space characterized by disturbed former dune and a disturbed area. The Southern Foredune, Valley Needlegrass Grassland, disturbed areas to the north of the El Segundo Blue Butterfly Habitat Restoration Area may also provide suitable habitat for the burrowing owl. The Southern Dune Scrub does not provide suitable wintering habitat for burrowing owl due to the extreme steepness of the slope, the instability of the soil and its inability to support burrows.

Developed: Two areas of the Dunes can be considered developed. The VOR and the bunker. The VOR sits on top of a large sand dune. The hill was built up by pushing sand up from surrounding dunes. The top of the VOR is stabilized with asphalt and concrete. The bunker is a concrete structure left over from World War II. The top and entrance are exposed and visible. This bunker is made entirely of concrete.

Southern Foredune (CNDDB Element Code 21230): The foredune area is a single gradual slope, rising to a maximum of approximately 70 meters; average width is approximately 800 meters. The substrate is fine-grained sand except in small depressions and gullies on the north- and east-facing slopes where organic debris accumulates from plant growth. Southern foredune plant communities are typically dominated by perennial species with a high proportion of suffruescent (i.e., shrubby but not very woody) plants up to 30 cm tall. The 204 acres of southern foredune comprises the main body of the Dunes. Of the 204 acres, 35 acres are considered to be relatively undisturbed and 29 acres were sand mined. One hundred forty acres were revegetated with southern foredune plant species during 1987-1994 restoration efforts. The foredune supports coast buckwheat (*Eriogonum parvifolium*), bush lupine, coast golden bush (*Ericameria ericoides*), beach evening primrose (*Camissonia chieranthifolia*), dune wallflower (*Erysimum suffrutescens*), beach sand verbena (*Abronia umbellata*), beach bur (*Ambrosia chamissonis*), morning glory (*Calystegia macrostegia*), and Russian thistle. Two non-native weedy pest species, acacia (*Acacia* sp.) and iceplant (*Carpobrotus* sp.), are particularly pernicious in the foredune area and are currently being aggressively managed by LAWA. This plant community does support potential burrowing owl habitat.

Southern Dune Scrub (CNDDB Element Code 21330): The steep slope of the backdune is formed as wind-transported sand is deposited at the dune crest due to a rapid decrease in wind velocity on the backside of the Dunes. Because it is steep, the backdune slope is also unstable; sand falls easily except where stabilized by plant growth. At the Dunes, the backdune area comprises 27 acres of more-or-less stabilized ridges, flats, and backdune slopes. In these areas southern dune scrub (CNDDB:21330) vegetation can be found. Southern dune scrub typically consists of a dense coastal scrub community of scattered shrubs, sub-shrubs, and herbs, generally less than 3 ft. tall. This community typically develops considerable cover, and is typically more dense than the foredune community. The plant diversity of the backdune area is also typically higher than that of the foredune, because the backdune is subject to lower thermal stress and wind dehydration. The richest biota of the entire dune complex occurs along the toe of the backdune slope. This community does support potential burrowing owl habitat.

Valley needlegrass grassland (CNDDB Element Code 42110) and Vernal Pools: The deflation plain east of the backdune consists of loosely consolidated (incipient) sandstone covered to variable depths with aeolian (wind-transported) sand. The Los Angeles coastal prairie that was historically described as occurring on the deflation plain has been significantly altered and degraded by development activities. The plant community typically associated with this prairie was dominated by the native perennial, bunch grass, nodding needlegrass (*Nassella* [*Stipa*] *cernua*), along with a rich mix of herbaceous flowering plants. The valley needlegrass grassland community is now almost completely absent due to extensive grading and paving, and the invasion of exotic annual grasses. This community does support potential burrowing owl habitat.

Disturbed Former Dune: Active restoration of native plant communities has not been undertaken in the 100 acres of open space to the north of the Habitat Restoration Area, including all of the Dunes property north of Sandpiper Street. Highly degraded versions of southern foredune and southern foredune scrub can be found within this site. Vegetation north of the El Segundo Blue Butterfly Habitat Restoration Area is dominated by iceplant. There are portions of this community which does support potential burrowing owl habitat.

Disturbed: Close to forty acres located in the northeast corner of the Dunes site is composed of a soil substrate unrelated geologically to the Dunes. The soil consists of sandy loam which is believed to be derived from past land uses including intensive farming activities. The characteristic vegetation includes a dense cover of exotic annual grasses and other weedy species interspersed with a few recolonizing native species. Several ornamental trees and agricultural tree species are also present. This community does support potential burrowing owl habitat.

SURVEY METHODS

Directed surveys for breeding burrowing were conducted according to burrowing owl and burrow survey guidelines as outlined in the Department's *Staff Report on Burrowing Owl Survey Protocol and Mitigation Guidelines* (CDFG 1995).

A series of five surveys were conducted on the following dates; April 17 (dawn survey), April 24 (dawn survey), April 29 (dawn survey), May 6 (dusk survey) and May 27 (down survey), 1998. Dawn surveys began at first light (0600 to 0616 hr) and continued for approximately three to four hours. Dusk surveys began approximately three hours prior to sunset and concluded at dusk. The weather conditions during the surveys was as follows; temperatures varied between 55° F and 68° F; cloud cover varied between 0 and 20%; and wind speed varied between 0 miles per hour and 5 miles per hour. On one survey date, April 29 1998 heavy fog early in the morning limited the amount of the survey area that could be covered due to restrictions imposed by airport operations. Field team members from Sapphos Environmental included Ms. Tracey Alsobrook, Dr. Brad Blood, Mr. Rob Witthaus , Mr. Peter Bloom and Mr. John Konecny.

The northwest and southwest airfield at LAX was surveyed by foot and by car. Due to the large size of the area to be covered, the areas providing the most suitable habitat were walked and those providing marginal or less suitable habitat were driven. The northwest corner of the airfield, where ground squirrel burrows had been observed, was walked during four of the surveys. The remainder of the north airfield was surveyed by car driving at a slow rate of speed. The southwest airfield was covered using the same procedure used for the northwest airfield. The car survey dedicated one individual to drive and one individual as the observer. Additionally on May 6 and May 27, Sapphos Environmental, accompanied by personnel from airfield operations, surveyed the open space between and along the south runways.

The area of the Dunes north of Sandpiper Street was surveyed by foot and by car. The El Segundo Blue Butterfly Habitat Restoration Area and adjoining open space was walked on transect lines spaced approximately 100 feet apart.

RESULTS

No breeding burrowing owls were observed as a result of directed surveys in all potentially suitable habitat.

Within the LAX Master Plan Study Area, two areas offer potential habitat for burrowing owls: the northwest corner of the north airfield and the Dunes. The northwest corner of the LAX airfield has a small extant population of ground squirrels, and hence the presence of potentially suitable burrows. This area also supports a small population of red fox. The red fox dens when abandoned may also become suitable burrowing owl burrow sites. The vegetation which occurs at the northwest corner of the north airfield has grown extensively this spring due to the heavy rains, and there is very little bare ground left exposed. Historically, this area was part of a larger Valley needlegrass grassland, but now is considered disturbed. Both the northwest corner of the LAX airfield and the Dunes support suitable insect populations which could provide an abundant food resource for burrowing owls.

The Dunes does not currently support an extant population of California ground squirrels. California ground squirrels live in self-excavated burrows. In California, the primary source of potential wintering sites and breeding sites for burrowing owls are abandoned California ground squirrel burrows. Burrowing owls are known to use burrows made by other animals and even readily adapt to artificial burrows (Collins and Landry, 1977). There are potential burrow sites available at the Dunes as there is a population of active pocket gophers and abandoned red fox dens. Burrowing owls are not known to use pocket gopher burrows as they exist, because they are too small, but may use them if they are enlarged by rain-water.

The habitat potential of the Dunes to support populations of burrowing owl is good. Although ground squirrels are not currently resident, red fox and pocket gophers do provide potentially suitable burrow sites. However, the red fox is an efficient predator, and has been implicated in the extirpation of the native small mammals once resident on the Dunes (Sapphos Environmental, MFR JN 1067-005.M04, dated January 13, 1998). This non-native predator is a threat to wintering and potentially to breeding burrowing owls.

DISCUSSION

No breeding burrowing owls were observed during the spring surveys. The three burrowing owls that had been observed during the winter surveys were no longer present. One of these owls had been observed utilizing the dug-out entrance to an abandoned World War II concrete bunker (southern foredune plant community) and the two other burrowing owls which were observed only once, were found just north of the entrance road to the Dunes (southern dune scrub community) . There were no burrows found in association with these owls.

CONCLUSION

- Breeding burrowing owls do not utilize the existing or proposed operations area of the LAX airfield as habitat
- Breeding burrowing owls do not utilize the Dunes as habitat
- Lack of California ground squirrel burrows may be a limiting factor in the number of burrowing owls which the Dunes can support as breeding habitat
- The Dunes provides suitable prey species and potential burrow sites for burrowing owls
- Red fox populations may be a limiting factor relative to burrowing owl usage in the LAX 2015 Expansion Master Plan Study Area.

REFERENCES

The California Burrowing Owl Consortium. 1993. Burrowing owl survey protocol and mitigation guidelines. Technical report Burrowing Owl Consortium, Alviso, California

California Department of Fish and Game. 1995. Memorandum to Division Chiefs and Regional Managers of California Department of Fish and Game, Subject: Staff Report on Burrowing Owl Mitigation, from C. F. Raysbrook, California Department of Fish and Game

California Department of Fish and Game. 1997. Letter to Mr. Jack Graham, City of Los Angeles Department of Airports, Subject: Notice of Preparation of Draft Environmental Impact Report Los Angeles International Airport Master Plan Los Angeles County, from Patricia Wolf, California Department of Fish and Game, Region 5, 330 Golden Shore, Suite 50, Long Beach, California 90802

Collins, C.T. and R.E. Landry. 1977. Artificial nest burrows fro Burrowing Owls. North American Bird Bander Oct.-Dec. 1977.

DeSante, David F. 1992. Instructions and guidelines for observers participating in a census of burrowing owl in California. The Institute for Bird Populations, P.O. Box 1346, Point Reyes Station, California 94956-1346

Garrett, Kimball and Jon Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, 7377 Santa Monica Boulevard, Los Angeles, California 90046

Johnsgard, Paul A. 1988. North American Owls: Biology and Natural History. Smithsonian Institution Press, Washington.

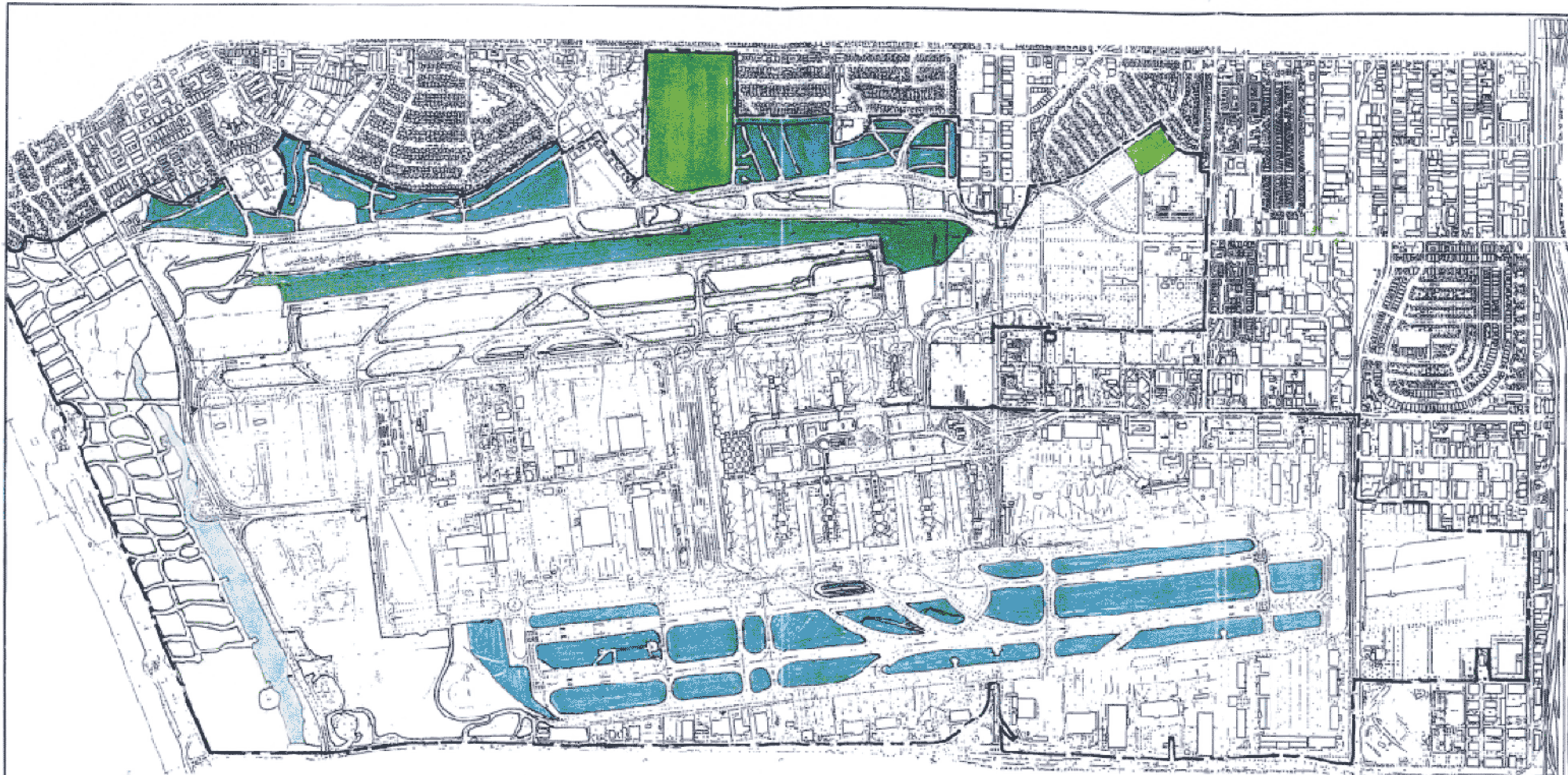
Sapphos Environmental. 1998. Memorandum for the Record JN 1067-005.M04. Subject: Final report of the Pacific Pocket Mouse Survey at LAX/El Segundo Dunes in support of the LAX 2015 Master Plan project, September 1 to 26, 1997. Dated January 13, 1998.

Sapphos Environmental. 1998. Memorandum for the Record JN 1067-007.M04. Subject: Notification of Initiation of Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes. Dated January 27, 1998

United States Fish and Wildlife Service. Letter to Mr. David Kessler, Federal Aviation Administration, Subject:: Notice of Preparation for Los Angeles International Airport Master Plan from Mr. Gail Kobetich, U.S. Fish and Wildlife Service, Ecological Services, Carlsbad Field Office, 2730 Loker Avenue West, Carlsbad, California 92008

Weirner, Mark. February, 1998. Personal communication with Mr. Mark Weirner, coordinator, Los Angeles Breeding Bird Atlas.

ATTACHMENT 1
EXISTING BIOTIC COMMUNITIES MAP



Legend

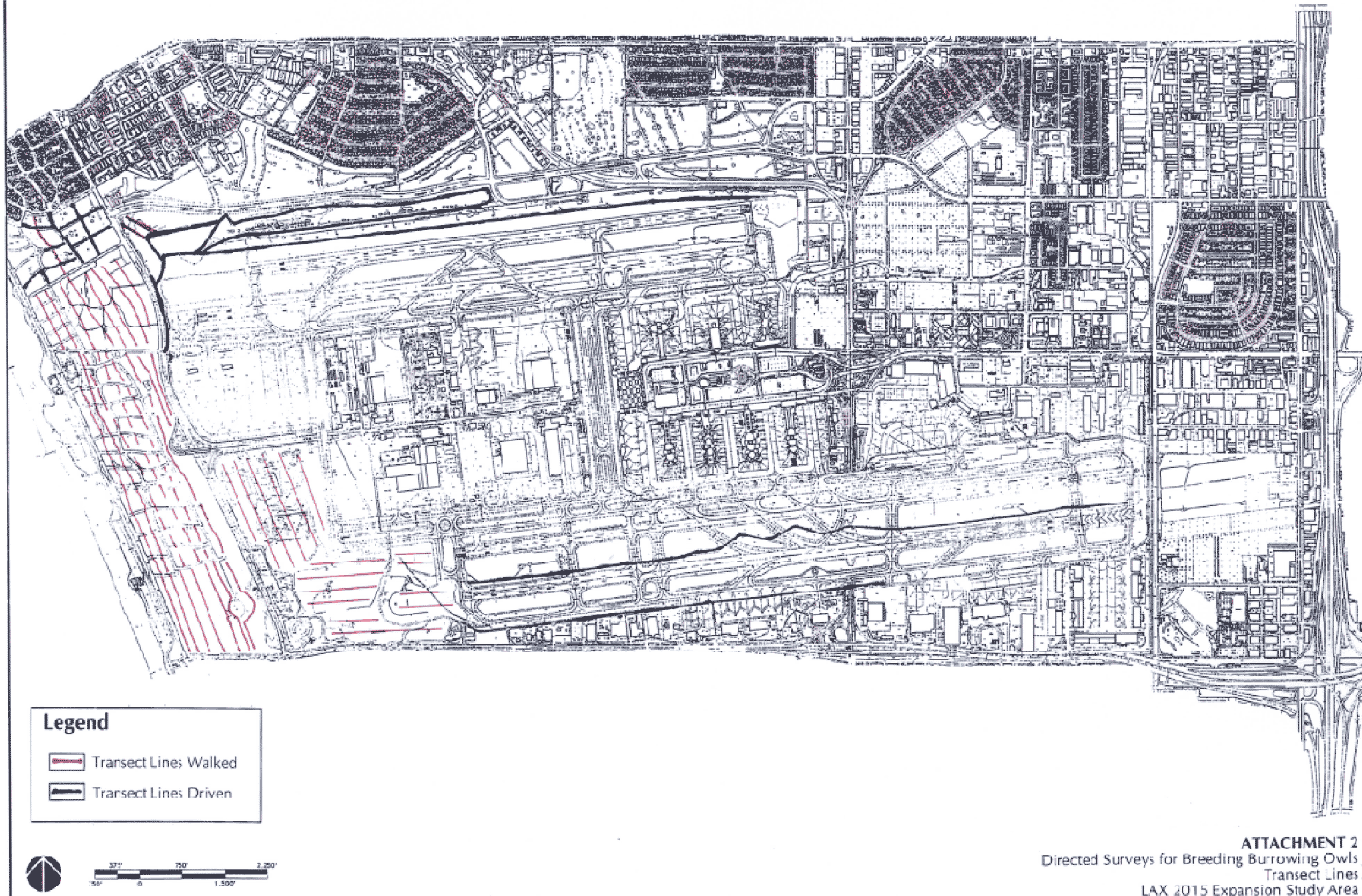
Southern Foredune	Valley Needlegrass Grassland
Southern Dune Scrub	Non-Native Grassland/ Ruderal
Disturbed	Developed
Landscaped	2015 Expansion Study Area

Prepared by: Sapphos Environmental
Draft, March 6, 1998

Los Angeles International Airport Master Plan	**Existing Biotic Communities**	Attachment 1

ATTACHMENT 2

DIRECTED SURVEYS FOR BREEDING BURROWING OWLS - TRANSECT LINES



ATTACHMENT 2
Directed Surveys for Breeding Burrowing Owls
Transect Lines
LAX 2015 Expansion Study Area

ATTACHMENT 3
FIELD NOTES

4/17/98 ①
T. Alsabrook
1067-007

Sensitive Bird Surveys at LAX/
El Segundo Dunes (Including
Burrowing Owl)
Date - April 17, 1998
Observers - T. Alsabrook, P. Bloom,
R. Witthaus
Time - 6:00 am - noon
Weather Conditions - 55-65°F, clear
0% cloud cover, wind < 5 mph

6:00 - Arrived. Started surveying
at El Segundo Dunes. Walked entire
dunes except for steep back slope.
10:00 am Surveyed north airfield:
combination of driving + walking
10:45 am Surveyed south airfield.
Combination of walking + driving
Did not survey between runways
11:30 Surveyed area north of
Sandpiper St.

4/17/98 ②
Species observed
El Segundo Dunes 6:00 am - 9:45 am
American crow 15
house finch 100+
white-crowned sparrow 150+
European starling 100+
American Kestrel 11
whimbrel 1111 (flying over)
Bullock's oriole 1
mourning dove ≈50
spotted dove 1
loggerhead shrike 111
W. Kingbird 1
Ca towhee 11
N. mockingbird 11
cliff swallow 10
barn swallow 3
Ca gulls 50+
rock dove 1
yellow-rumped warbler 1
Anna's hummingbird 1
brown pelican 111 (offshore)

4/17/98 (3)

Species observed:
North Airfield 10:00 am - 10:45 am
European starling 100+
mourning dove ||
American crow ~~||||~~ ~~||||~~ |
N. mockingbird ~~||||~~ , ||
loggerhead shrike |||
American Kestrel || ♀
Ca gull |
Anna's hummingbird |
black-chinned hummingbird |
house sparrow |||

4/17/98 (4)

Species observed:
South Airfield 10:45 - 11:30 am
house finch |
American crow ||||
N. mockingbird |||
mallard |
European starling |
mourning dove ||
Annas hummingbird ||
loggerhead shrike |

El Segundo Dunes - north of
Sanpiper St. 11:30 - 12:00
N. mockingbird |
mourning dove ~~||||~~ # 35
American crow |
American Kestrel |
house sparrow |
spotted dove |
bushtit ||
European starling 20
~~W.~~ Kingbird |
rock dove ~~||||~~ ~~||||~~

4/24/98 (1)
T. Alsobrook
1043-008

Burrowing Owl Survey at
LAX / El Segundo Dunes

Time: 6:00 am - 11:00 am
Date: Friday, April 24 1998
Observers: T. Alsobrook, B. Blood,
P. Bloom
Weather Conditions - 55° - 62°F, cloud
cover 10%, wind < 5 mph

6:00 am Arrived at Dunes gate.
Met by airport ops. at Gate
437 B. T. Alsobrook & P.
Bloom surveyed n. airfield
B. Blood surveyed s. airfield
LAX ops. did not have anyone
available to escort B. Blood
onto airfield to survey grassy
areas between runways.
7:30 am. Surveyed Dunes. Walked
transects in potential habitat
areas. Drove to other areas, walked
into areas & scanned area w/
binoculars.
10:30 Surveyed north of Sandpiper St.

4/24/98 (2)
Species observed
North airfield
European starling 20 +
American crow 𝍸 1
N. mockingbird 𝍸 1
American Kestrel 11
house finch 𝍸 𝍸 11
Anna's hummingbird 1
loggerhead shrike 11
black-billed magpie 1
house sparrow 𝍸 11

4/24/98 (3)

Species list
El Segundo Dunes
starling
house finch
gray flycatcher - 1 (near trailer)
merlin - 1 adult ♂ (on pole
near trailer eating a house
finch)
barn swallow - 2
loggerhead shrike - 1
American crow
mourning dove
spotted dove ||
alligator lizard
brown pelican ~~||||~~ |||| (over w.
edge of Dunes)
American kestrel ||
legless lizard |
side-blotched lizard |
Anna's hummingbird ||

4/24/98 (4)

Species list
North of Sandpiper St.
rock dove ~~||||~~ ~~||||~~
starling |||
mourning dove ~~||||~~ ~~||||~~ ~~||||~~ ||
American crow ||
N. mockingbird |
American kestrel |

No. 392

4/29/98 (1)
1043-008
T. Alsobrook

Spring Bird Surveys at LAX/
El Segundo Dunes Inc.
Burrowing Owls

Date - Wed, April 29 1998
Time - 6:00 a.m - 9:00 a.m.
Observers - T. Alsobrook, B. Blood,
P. Bloom
Weather Conditions - visibility 100
yards (heavy fog), 55°F

6:00 am Arrived at Dunes gate.
Informed by ops that we
could not survey on airfield
and could only survey on
the Dunes from north of
VOR to entrance road, due
to inclement weather conditions.
Survey team walked transect
lines in area approved by
ops.
8:30 Surveyed area north of
Sandpiper St.

No. 392

4/29/98
Species - El Segundo Dunes
mourning dove 50
European starling 60
rock dove 10
house finch 40
Cassins Kingbird ~~sp.~~ 11
Anna's hummingbird 11
white-crowned sparrow 1
black-headed grosbeak - 1
N. mockingbird - 1
loggerhead shrike - 1111
American crow - 1
red fox
silvery legless lizard
North of Sandpiper St.
rock dove 15
American crow 111
American Kestrel 1
European starling
Killdeer 1
spotted dove 1
Kingbird sp. 1
house finch 111
Ca gull 1

5/6/98 ①
1043-008
T. Alsobrook

Burrowing Owl Survey at LAX/
El Segundo Dunes

Date: Wednesday, May 6, 1998
Time: 3:30 pm - 7:30 pm
Observers - T. Alsobrook, P. Bloom,
B. Blood
Weather Conditions: 67°F, 20%
cloud cover, wind < 5mph

3:30 pm. Arrived at Dunes gate. T. Alsobrook + P. Bloom surveyed n. airfield - combination of driving and walking. B. Blood surveyed south airfield. Accompanied by ops drove length of south runways & surveyed grassy strip between Runways 25R + 25L.
4:30 Surveyed El Segundo Dunes driving + walking.
7:00 pm. Surveyed area north of Sandpiper St.

②

Species observed North airfield
European starling 14 + 5
mourning dove III
American crow II
American Kestrel I
N mockingbird ~~IIII~~ I
Anna's hummingbird I
red-tailed hawk I
house finch ~~IIII~~ ~~IIII~~
Ca towhee II
English sparrow ~~IIII~~

Species observed
El Segundo Dunes
loggerhead shrike - II
house finch ~~IIII~~
mourning dove ~~IIII~~ III
European starling ~~IIII~~ +
Anna's hummingbird I
whimbrel I
American Kestrel II
English sparrow ~~IIII~~
red-tailed hawk II
spotted dove II

5/6/98 3

Species observed

Dunes north of Sandpiper St.

red fox I

E. starling ~~IIII~~ II

American Kestrel II

house finch ~~IIII~~ ~~IIII~~ III

spotted dove II

mourning dove ~~IIII~~ II

loggerhead shrike: II

No. 392

5/27/98 ①
1013-008
T. Alsobrook

Spring Bird Surveys at LAX/
El Segundo Dunes (including
Burrowing Owl)
Date: Wednesday, May 27, 1998
Time: 6:00 am - 10:15 am.
Observers: T. Alsobrook, J. Konecny
Weather Conditions: 55°-67°; clear -
approx. 5% cloud cover; wind
< 5 mph

6:00 am. Arrived at Dunes gate.
Called ops. - informed that due
to AirEx event scheduled
for today (5/27/98) ops. could
only allow us on the airfield
for 1 hour. Drove down
middle of south runways
escorted by ops. Scanned
grassy strip for burrowing
owls. Grassy strip had been
recently mowed. No burrowing
owls were observed. Drove
to north airfield. Drove slowly

No. 392

5/27/98 ②
along paved road south of Argo
Ditch. Drove loop through
south airfield
7:00 am Departed airfield. Started
surveys on Dunes. Walked
transects in VOR area + then
north to Sandpiper + back to
VOR area.
9:45 Surveyed area north of
Sandpiper St.
10:30 am. Departed.
Species lists follow.

No. 392

5/27/98 (3)

Species observed:
south + north airfield
American crow
European starling
N. mockingbird
American Kestrel
rock dove
mourning dove

El Segundo Dunes
loggerhead shrike - IIII
mourning dove - nest with 2 eggs on ground at SE base of VOR
spotted dove
European starling
barn swallow
N. rough-winged swallow
house finch
Anna's hummingbird
red fox
N. mockingbird
American crow
American Kestrel
W. Kingbird

No. 392

5/27/98 (4)

north of Sandpiper St.
rock dove
European starling
American Kestrel
mourning dove
W. Kingbird
N. mockingbird
red fox - observed fox dens in sand banks on either side of road south of entrance road

2.4 1067-007

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

March 19, 1998
April 9, 1998 (revised)

MEMORANDUM FOR THE RECORD
1067-007.M08

TO: U.S. Fish and Wildlife Service
(Mr. Robert James)

California Department of Fish and Game
(Mr. Ronald Rempel, Mr. Kevin Hunting)

Los Angeles World Airports
(Ms. Sheila Murphy, Mr. Steve Crowther)

Federal Aviation Administration
(Mr. David Kessler)

Landrum & Brown
(Ms. Karen Yamamoto)

FROM: Sapphos Environmental
(Ms. Tracey Alsobrook, Dr. Brad Blood)

SUBJECT: Results of Winter Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, February 5 to 25, 1998

ATTACHMENTS:
1. Existing Biotic Communities Map
2. Site Map with Transect Lines Demarcated
3. Wintering Burrowing Owl Survey Results
4. Field Notes

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-1548

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of directed surveys for burrowing owl (*Athene cunicularia*) undertaken at the Los Angeles International Airport (LAX) 2015 Expansion *Master Plan* Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle: Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). The results of this survey indicate that three wintering burrowing owls are present on the El Segundo Dunes and they are not present within the existing or proposed LAX airfield. Directed surveys for nesting burrowing owls will be completed during the spring of 1998.

Los Angeles World Airports (LAWA) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of the burrowing owl which is a California Department of Fish and Game "Species of Special Concern". In their letter dated August 13, 1997, the California Department of Fish and Game (Department) directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. Surveys were conducted by Sapphos Environmental (Ms. Tracey Alsobrook, Mr. Peter Bloom, Dr. Brad Blood, Mr. Eric Wilson) on February 5, February 9, February 17 and February 25, 1998. Surveys were conducted according to burrowing owl and burrow survey guidelines as outlined in the California Department of Fish and Game *Staff Report on Burrowing Owl Mitigation* and the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by The California Burrowing Owl Consortium (1993).

The spring nesting season surveys will be conducted on April 16, April 23, April 30 and May 7, 1998. All surveys will take place either one hour before sunrise to two hours after sunrise, or two hours before sunset to one hour after sunset. All suitable habitat at the LAX airfield and the El Segundo Dunes will be walked following transects spaced to allow 100 percent visual coverage of the terrain. Written reports containing the information specified by the Department in their *Staff Report on Burrowing Owl Mitigation* will be prepared upon completion of the winter season surveys and the nesting season surveys and submitted to the Department, Service, LAWA, FAA, and Landrum and Brown.

INTRODUCTION

This Memorandum for the Record transmits the results of directed surveys to assess the presence or absence of the burrowing owl (*Athene cunicularia*), a California "Species of Special Concern" at the LAX 2015 Expansion Master Plan Study Area (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary). Los Angeles World Airports ([LAWA] formerly known as the City of Los Angeles Department of Airports) and the Federal Aviation Administration (FAA) concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in support of the Los Angeles International Airport 2015 Expansion Master Plan. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997. The letter from the Service indicated the need to conduct directed surveys to assess the presence or absence of the burrowing owl which is a California Department of Fish and Game (Department) "Species of Special Concern". In their letter dated August 13, 1997, the Department directed LAWA and FAA to conduct directed surveys for all state designated sensitive species. Sapphos Environmental notified LAWA, FAA, the Department, the Service, and Landrum & Brown (Master Plan consultant) of the initiation of directed surveys for the presence/absence of burrowing owl by Memorandum for the Record (MFR 1067-007.M04) dated January 26, 1998.

This Memorandum for the Record summarizes information regarding the burrowing owl natural history, describes the habitat of the survey area and its suitability for burrowing owls and suitable burrows; survey methods and results.

BURROWING OWL NATURAL HISTORY

Burrowing owl (*Athene cunicularia*) are small, ground-inhabiting, long-legged owls (DeSante, 1992). Burrowing owls are found from southern Canada to southern South America (Johnsgard, 1988). They are resident largely throughout the southern United States, with several populations of burrowing owls on the gulf coast of Louisiana and the Florida panhandle (Johnsgard, 1988). In southern California burrowing owls are common in the Imperial Valley, rather common in agricultural areas within the Colorado River district and generally scarce and decreasing elsewhere (Garrett, 1981). Along coastal southern California the burrowing owl distribution is greatly reduced and localized. They occur primarily in agricultural and grassland areas of interior and coastal valleys, and in fewer numbers on bluffs along the immediate coast, but are resident on the Channel Islands (Garrett, 1981). Burrowing owls from more northerly areas occasionally migrate into southern and coastal regions of southern California during the winter (Garrett, 1981). Preliminary data from the Los Angeles County Breeding Bird Atlas (Los Angeles Audubon Society, unpublished) indicates records of several breeding pairs of burrowing owl in the Antelope Valley, but no breeding has been documented on the coastal slope of Los Angeles County for records between 1995 and 1997 (Weimer, Per. Comm.).

Characteristic habitats preferred by burrowing owls are grasslands, deserts, and arid scrub lands. These habitats are open and relatively treeless landscapes and are home to populations of small burrowing mammals, such as pocket gophers and ground squirrels. These habitats also support the primary prey items for burrowing owls: insects and small mammals. In California, California ground squirrel

(*Spermophilus beechii*) is known to be the primary source of burrows utilized by burrowing owls. Burrowing owls, however; may use abandoned burrows made by other mammals. A typical burrow utilized by a burrowing owl is slightly elevated above the surrounding ground and surrounded by piles of earth. Usually the immediate area about the burrow is barren and devoid of vegetation.

Burrowing owls that move into an abandoned burrow will modify it to suit their needs (Collins and Landry, 1977). Modifications involve widening the entrance, and passageways and the creation or modification of a nesting cavity.

Populations of burrowing owls throughout the United States, particularly in California have been in serious decline for the last several decades (California Burrowing Owl Consortium, 1983; California Department of Fish and Game, 1995; Collins and Landry, 1977). The decline has been especially precipitous during the last 5 to 10 years in California due to habitat loss because of urban expansion and development in outlying areas. Additionally, rodent control through poisoning in the expansion areas has eliminated large numbers of ground squirrels, and with them the primary source of suitable burrows (Institute for Bird Populations, 1982). Once common in Los Angeles County and along the coast burrowing owls are only numerous in the Imperial Valley of southeastern California (Garrett, 1981).

SURVEY AREA

The LAX 2015 Master Plan Study Area comprises a total area of approximately 3700 acres. Of that total acreage approximately 900 acres were determined to be potentially suitable burrowing owl habitat. Therefore, directed surveys were initiated and performed across those areas (Attachment 1; Attachment 2). The open space between the runways and taxiways were not considered potential habitat as these areas are routinely mowed and disced by LAX operations and maintenance. The directed survey area for burrowing owl includes the open space of the LAX airfield west of the runways and along the north perimeter (south of Westchester Parkway) and the El Segundo Dunes (including the El Segundo Blue Butterfly habitat Restoration Area and the adjacent open space to the north.

As recommended in the burrowing owl and burrow survey guidelines as outlined in the Department's Staff report on Burrowing Owl Survey Protocol and Mitigation Guidelines (CDFG, 1995), the following section describes the topography and habitats within the directed survey area.

AIRFIELD

Topography

The west LAX airfield consists of both developed and open space areas. The terrain of the northwest airfield open space is generally flat with only the slight relief of some small depressions and irregularities. This area is vegetated with disturbed and non-native grassland. Portions of this area fall within the FAA safety areas and hence are mowed and occasionally disced (Attachment 1). The southwest airfield open space is also generally level, but with greater relief in the form of moderate hills and depression of fill material and former construction staging areas. Abandoned borrow and fill mounds, as well as, asphalt and graded dirt roadways are scattered throughout this area (Attachment 1). The open space of the southwest airfield is also vegetated with disturbed and non-native grassland communities. Prior to construction of LAX this area was a continuation of the deflation plain eastward from the El Segundo Dunes and was vegetated with a Valley needle grassland community. The developed area consists of concrete runways, taxiways, roadways, airline terminals, and associated structures (hangers, warehouses, etc.).

Plant Communities

Non-native Grassland (CNDDB Element Code 42220/ruderal): This community consists of the open space between the runways and taxiways on the airfield and is under regular operations maintenance. Non-native grassland is characterized by a dense to sparse cover of annual grasses up to one meter in height. Usually associated with the grasses are species of annual forbs. Some plant growth occurs in winter, but most growth and flowering occurs in the spring. Plants die in the summer and persist as seeds in the uppermost layers of the soil. Non-native species found to be present include: slender wild oat (*Avena barbata*), wild oat (*A. fatua*), ripgut grass (*Bromus diandus*), felty softchess (*B. hordaceus*), foxtail chess (*B. madritensis*), and fountain grass (*Pennisetum setaceum*). Interspersed with annual grasses, non-native forbs present are: storksbill (*Erodium* sp.), black mustard (*Brassica nigra*), common sow thistle (*Sonchus oleaceus*), California burclover (*Medicago polymorpha*), sour clover (*Melilotus indica*), radish (*Raphanus sativa*), and crown daisy (*Chrysanthemum coronarium*). This community does not support potential burrowing owl habitat.

Disturbed: Vegetation characteristic of disturbed areas can be seen in the large open space area west of the runways and east of Pershing Drive. Plant species known to be present are: castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), black mustard, tocalote (*Centaurea melitensis*), Russian thistle (*Salsola tragus*), cheeseweed (*Malva parviflora*), filaree (*Erodium* sp.), ripgut grass, and wild oats. A few native species are found in particular spots, such as: deerweed (*Lotus scoparus*), bush lupine (*Lupinus chamissonis*), and mulefat (*Baccharis salicifolia*). Portions of these disturbed areas have been continuously scraped and are bare due to vehicle use. This community does support potential burrowing owl habitat.

Developed: The developed areas within the LAX 2015 Expansion Master Plan Study Area includes approximately 1,663.4 acres of terminals, parking lots, roadways (improved and unimproved), and support facilities. These areas do not support potential burrowing owl habitat.

DUNES

The 307 acre Dunes is a remnant of a once more extensive complex of coastal dune and coastal strand habitat fringing the Santa Monica Bay. The Dunes were relatively undisturbed until the early 1900's when the City of Redondo Beach and the community of Venice were developed. Following residential construction, construction of a power plant, refinery and the Hyperion Wastewater Treatment Plant, approximately 345 acres of the dune system remained including the Dunes site. Between 1966 and 1972, the City of Los Angeles Department of Airports purchased and cleared 822 residences from land located seaward of the airport in order to avoid exposing residents to unhealthy noise levels. The net result of this action by the City of Los Angeles Department of Airports was the conservation of approximately 300 acres of open space within the largely built-out region of western Los Angeles. LAWA currently manages and maintains approximately 200 acres within the open space areas as the El Segundo Blue Butterfly Habitat Restoration Area for the federally-listed endangered El Segundo blue butterfly.

Topography

Sand dune systems result from a dynamic interplay between the high-energy processes of the ocean and the protected inland areas of the coastal plain that are outside the direct influence of ocean water, salt spray, and sand. Dune system plant communities typically form a continuum in response to topography and proximity to the ocean. Four main landforms associated with dunes systems are present at El Segundo: strand and bluff (adjacent to the ocean), followed by the foredune, backdune and deflation plain as one moves inland.

Strand and Bluff: Strand is defined as the expanse of sandy substrate between the mean tide line and the beginning of the foredune. At the Dunes, a narrow 100- to 150 foot wide strand formerly extended from the mean tide line to the base of a 10- to 15-foot bluff. The present day strand has artificially been widened to form Dockweiler Beach and an extensive parking lot has been placed on top of the bluff. Regular sand sweeping activities prevent strand vegetation from becoming established. This area does not support potential burrowing owl habitat.

Foredune: Historically the foredune extended from the bluff just above the strand to the point of drop off which forms the backdune. With the construction of Vista Del Mar Boulevard, the foredune was relocated approximately 150 to the east of its historical seaward border. This area does support potential burrowing owl habitat.

Backdune: The steeply sloping aspect of the backdune is formed as sand-laden winds experience a sharp drop in velocity after crossing the crest of the dunes, and deposit most of their sand load there. The steepness of the backdune renders it highly susceptible to erosion upon removal of the dense plant cover. This area does not support potential burrowing owl habitat because of the steep slopes and loose soils. However, at the interface of this land form and the eastern deflation plain there is potential burrowing owl habitat at the toe of the backdune slope.

Deflation Plain: Deflation plains form at the base of backdunes as a layer of sand is deposited over non-dunes related substrates. The deflation plain at the Dunes once extended eastward past Pershing Drive and onto LAX proper. An older dune system in which the sand grains have fused to become weakly-cemented sandstone is found at the base of the present dunes and underlies the deflation plain. This land form does support potential burrowing owl habitat.

Subsite Numbers

In 1987-1988 the entire 302-acre property at the Dunes was subdivided into 60 subsites to serve as a reference for all restoration activities. The subsites were primarily divided by extant streets within the Dunes and serve as useful location reference points for restoration, monitoring and survey activities (Attachment 3).

Plant Communities

The Dunes are characterized by five plant communities (Attachment 1). The El Segundo Blue Butterfly Habitat Restoration Area within the Dunes supports three distinct natural plant communities. Associated with the foredune is southern foredune (California Natural Diversity Data Base Element Code 21230); associated with the backdune is southern dune scrub (CNDDB Element Code 21330); and associated with the deflation plain is valley needlegrass grassland (CNDDB Element Code 42110). To the north of the Habitat Restoration Area, north of Sandpiper Street, are approximately 100 acres of open space characterized by disturbed former dune and a disturbed area. The Southern Foredune, Valley Needlegrass Grassland, disturbed areas to the north of the El Segundo Blue Butterfly Habitat Restoration Area may also provide suitable habitat for the burrowing owl. The Southern Dune Scrub does not provide suitable wintering habitat for burrowing owl due to the extreme steepness of the slope, the instability of the soil and its inability to support burrows.

Developed: Two areas of the Dunes can be considered developed. The VOR and the bunker. The VOR sits on top of a large sand dune. The hill was built up by pushing sand up from surrounding dunes. The top of the VOR is stabilized with asphalt and concrete. The bunker is a concrete structure left over from World War II. The top and entrance are exposed and visible. This bunker is made entirely of concrete.

Southern Foredune (CNDDB Element Code 21230): The foredune area is a single gradual slope, rising to a maximum of approximately 70 meters; average width is approximately 800 meters. The substrate is fine-grained sand except in small depressions and gullies on the north- and east-facing slopes where organic debris accumulates from plant growth. Southern foredune plant communities are typically dominated by perennial species with a high proportion of suffruescent (i.e., shrubby but not very woody) plants up to 30 cm tall. The 204 acres of southern foredune comprises the main body of the Dunes. Of the 204 acres, 35 acres are considered to be relatively undisturbed and 29 acres were sand mined. One hundred forty acres were revegetated with southern foredune plant species during 1987-1994 restoration efforts. The foredune supports coast buckwheat (*Eriogonum parvifolium*), bush lupine, coast golden bush (*Ericameria ericoides*), beach evening primrose (*Camissonia chieranthifolia*), dune

wallflower (*Erysimum suffrutescens*), beach sand verbena (*Abronia umbellata*), beach bur (*Ambrosia chamissonis*), morning glory (*Calystegia macrostegia*), and Russian thistle. Two non-native weedy pest species, acacia (*Acacia* sp.) and iceplant (*Carpobrotus* sp.), are particularly pernicious in the foredune area and are aggressively managed by LAWA. This plant community does support potential burrowing owl habitat.

Southern Dune Scrub (CNDDB Element Code 21330): The steep slope of the backdune is formed as wind-transported sand is deposited at the dune crest due to a rapid decrease in wind velocity on the backside of the Dunes. Because it is steep, the backdune slope is also unstable; sand falls easily except where stabilized by plant growth. At the Dunes, the backdune area comprises 27 acres of more-or-less stabilized ridges, flats, and backdune slopes. In these areas southern dune scrub (CNDDB:21330) vegetation can be found. Southern dune scrub typically consists of a dense coastal scrub community of scattered shrubs, sub-shrubs, and herbs, generally less than 3 ft. tall. This community typically develops considerable cover, and is typically more dense than the foredune community. The plant diversity of the backdune area is also typically higher than that of the foredune, because the backdune is subject to lower thermal stress and wind dehydration. The richest biota of the entire dune complex occurs along the toe of the backdune slope. This community does support potential burrowing owl habitat.

Valley needlegrass grassland (CNDDB Element Code 42110) and Vernal Pools: The deflation plain east of the backdune consists of loosely consolidated (incipient) sandstone covered to variable depths with aeolian (wind-transported) sand. The Los Angeles coastal prairie that was historically described as occurring on the deflation plain has been significantly altered and degraded by development activities. The plant community typically associated with this prairie was dominated by the native perennial, bunch grass, nodding needlegrass (*Nassella* [*Stipa*] *cernua*), along with a rich mix of herbaceous flowering plants. The valley needlegrass grassland community is now almost completely absent due to extensive grading and paving, and the invasion of exotic annual grasses. This community does support potential burrowing owl habitat.

Disturbed Former Dune: Active restoration of native plant communities has not been undertaken in the 100 acres of open space to the north of the Habitat Restoration Area, including all of the Dunes property north of Sandpiper Street. Highly degraded versions of southern foredune and southern foredune scrub can be found within this site. Vegetation north of the El Segundo Blue Butterfly Habitat Restoration Area is dominated by iceplant. There are portions of this community which does support potential burrowing owl habitat.

Disturbed: Close to forty acres located in the northeast corner of the Dunes site is composed of a soil substrate unrelated geologically to the Dunes. The soil consists of sandy loam which is believed to be derived from past land uses including intensive farming activities. The characteristic vegetation includes a dense cover of exotic annual grasses and other weedy species interspersed with a few recolonizing native species. Several ornamental trees and agricultural tree species are also present. This community does support potential burrowing owl habitat.

SURVEY METHODS

Directed surveys for wintering burrowing were conducted according to burrowing owl and burrow survey guidelines as outlined in the Department's *Staff Report on Burrowing Owl Survey Protocol and Mitigation Guidelines* (CDFG 1995). A preliminary burrow survey was conducted of all potentially suitable habitat on January 15, 1998 in conjunction with a winter bird count at the Dunes. During this survey, the El Segundo Blue Butterfly Habitat Restoration Area and the adjoining open space to the north was covered by foot and the area north of Sandpiper Street was covered by a combination of driving and walking. The survey was initiated at 7:00 a.m. and was completed at 11:30 a.m. Weather conditions during the survey hours were as follows: temperatures varying between 45° F to 52° F; cloud cover was 100 percent with occasional misty rain, and wind speed was less than 5 miles per hour. No burrowing owls, burrowing owl burrows or sign of burrowing owl were observed. No California ground squirrels were observed directly although California ground squirrel burrows were observed in the northwest corner of the LAX airfield.

A series of four surveys were conducted on the following dates; February 5 (dawn survey), February 9 (dusk survey), February 17 (dusk survey) and February 25 (dawn survey), 1998. Dawn surveys began at first light (0600 to 0616 hr) and continued for approximately three hours. Dusk surveys began approximately three hours prior to sunset and concluded at dusk. The weather conditions during the surveys was as follows; temperatures varied between 52° F and 62° F, cloud cover varied between 0 and 50%; and wind speed varied between 7 miles per hour and gusts up to 30 miles per hour. Field team members from Sapphos Environmental included Ms. Tracey Alsobrook, Dr. Brad Blood, Mr. Eric Wilson and Mr. Peter Bloom.

The northwest and southwest airfield at LAX was surveyed by foot and by car. Due to the large size of the area to be covered, the areas providing the most suitable habitat were walked and those providing marginal or less suitable habitat were driven. The northwest corner of the airfield, where ground squirrel burrows had been observed, was walked during each survey. The westerly 1,000 feet of the Argo Ditch was also walked. The remainder of the north airfield was surveyed by car driving at a slow rate of speed. The southwest airfield was covered using the same procedure used for the northwest airfield. The car survey dedicated one individual to drive and one individual as the observer.

The area of the Dunes north of Sandpiper Street was surveyed by foot and by car. The El Segundo Blue Butterfly Habitat Restoration Area and adjoining open space was walked on transect lines spaced approximately 100 feet apart.

RESULTS

A total of three wintering burrowing owls were observed as a result of directed surveys in all potentially suitable habitat. All wintering burrowing owls observed were seen within the El Segundo Blue Butterfly Habitat Restoration Area. A single burrowing owl was observed on February 5, February 9 and February 25, 1998. The burrowing owl was flushed from a concrete bunker on Subsite No. 25 on two occasions. During another survey the burrowing owl was seen perched under a shrub near the entrance to the bunker. When flushed from the bunker the burrowing owl flew a short distance

(approximately 12 feet) and landed. When the observer moved away from the bunker area, the burrowing owl flew back to the bunker and perched outside the entrance on a mound of dead iceplant. The entrance to the bunker has been partially buried in sand leaving an opening approximately two feet wide by two feet long. The plant community at this subsite is Southern Foredune.

Two burrowing owls were observed on February 17, 1998. The first bird was flushed from under a shrub on Subsite No. 51. The second bird was flushed while completing the walking of the transect line approximately 20 feet from the original position of the first bird. This subsite, which is just north of the entrance road to the Dunes and adjacent to Pershing Drive, consists of Valley needlegrass grassland.

Within the LAX Master Plan Study Area, two areas offer potential habitat for burrowing owls: the northwest corner of the north airfield and the Dunes. The northwest corner of the LAX airfield has a small extant population of ground squirrels, and hence the presence of potentially suitable burrows. This area also supports a small population of red fox. The red fox dens when abandoned may also become suitable burrowing owl burrow sites. The vegetation which occurs at the northwest corner of the north airfield is low and uniformly scrubby, with small expanses of bare ground. Historically, this area was part of a larger Valley needlegrass grassland, but now is considered disturbed. Both the northwest corner of the LAX airfield and the Dunes support suitable insect populations which could provide an abundant food resource for burrowing owls.

The Dunes does not currently support an extant population of California ground squirrels. California ground squirrels live in self excavated burrows. In California, the primary source of potential wintering sites and breeding sites for burrowing owls are abandoned California ground squirrel burrows. Burrowing owls are known to use burrows made by other animals and even readily adapt to artificial burrows (Collins and Landry, 1977). There are potential burrow sites available at the Dunes as there is a population of active pocket gophers and abandoned red fox dens.

The habitat potential of the Dunes to support populations of burrowing owl is good. Although ground squirrels are not currently resident, red fox and pocket gophers do provide potentially suitable burrow sites. However, the red fox is an efficient predator, and has been implicated in the extirpation of the native small mammals once resident on the Dunes (Sapphos Environmental, MFR JN 1067-005.M04, dated January 13, 1998). This non-native predator is a threat to wintering and to breeding burrowing owls.

DISCUSSION

Three burrowing owls were observed during this survey (Attachment 3). A single burrowing owl was observed on three separate occasions and two burrowing owls (possibly a pair) were observed only once. The single burrowing owl was observed utilizing the dug-out entrance to an abandoned World War II concrete bunker. This owl was only observed at this sight during the survey period. This sight is found in the southern foredune plant community. The vegetative cover surrounding this sight is patchy, with some areas covered 100% to others with less than 10% cover, to bare expanses of sand. The sight of the bunker is in an area of greater than 50% cover, but the immediate area surrounding the bunker entrance is clear of vegetation. There was a small mound of dead ice plant at the entrance and the burrowing owl was seen to stand on this mound and also to hide behind it when watching the approach of a monitor. The two burrowing owls which were observed only once, were found beneath some short scrubs in the southern dune scrub community. They were located not far to the north of the entrance road to the Dunes. There were no burrows found in association with these owls.

CONCLUSION

- Wintering burrowing owls do not utilize the existing or proposed operations area of the LAX airfield as wintering habitat
- Wintering burrowing owls utilize the Dunes as wintering habitat
- Lack of California ground squirrel burrows may be a limiting factor in the number of burrowing owls which the Dunes can support as wintering habitat
- The Dunes provides suitable prey species and potential burrow sites for burrowing owls
- Red fox populations may be a limiting factor relative to burrowing owl usage in the LAX 2015 Expansion Master Plan Study Area.

REFERENCES

The California Burrowing Owl Consortium. 1993. Burrowing owl survey protocol and mitigation guidelines. Technical report Burrowing Owl Consortium, Alviso, California

California Department of Fish and Game. 1995. Memorandum to Division Chiefs and Regional Managers of California Department of Fish and Game, Subject: Staff Report on Burrowing Owl Mitigation, from C. F. Raysbrook, California Department of Fish and Game

California Department of Fish and Game. 1997. Letter to Mr. Jack Graham, City of Los Angeles Department of Airports, Subject: Notice of Preparation of Draft Environmental Impact Report Los Angeles International Airport Master Plan Los Angeles County, from Patricia Wolf, California Department of Fish and Game, Region 5, 330 Golden Shore, Suite 50, Long Beach, California 90802

Collins, C.T. and R.E. Landry. 1977. Artificial nest burrows fro Burrowing Owls. North American Bird Bander Oct.-Dec. 1977.

DeSante, David F. 1992. Instructions and guidelines for observers participating in a census of burrowing owl in California. The Institute for Bird Populations, P.O. Box 1346, Point Reyes Station, California 94956-1346

Garrett, Kimball and Jon Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, 7377 Santa Monica Boulevard, Los Angeles, California 90046

Johnsgard, Paul A. 1988. North American Owls: Biology and Natural History. Smithsonian Institution Press, Washington.

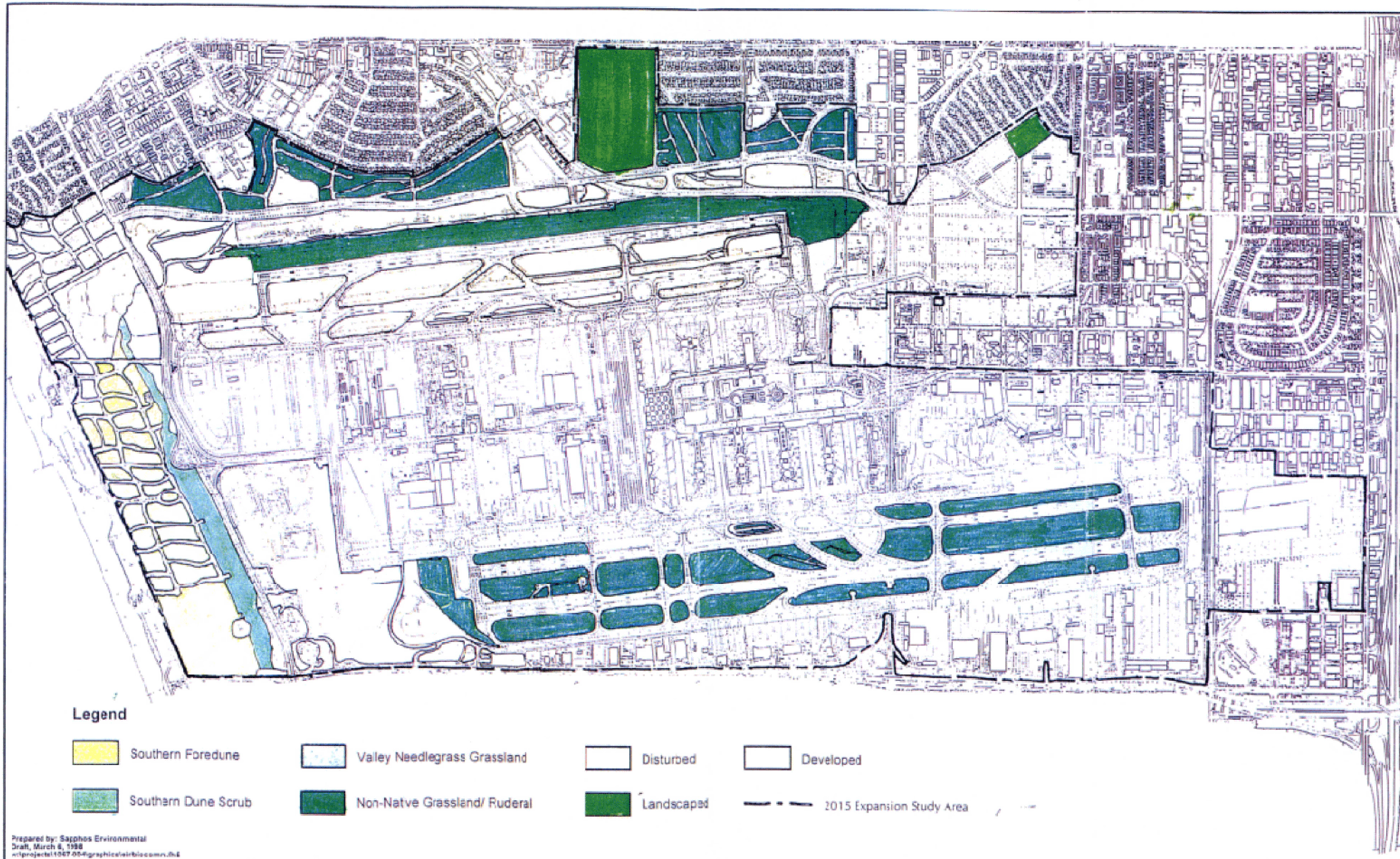
Sapphos Environmental. 1998. Memorandum for the Record JN 1067-005.M04. Subject: Final report of the Pacific Pocket Mouse Survey at LAX/El Segundo Dunes in support of the LAX 2015 Master Plan project, September 1 to 26, 1997. Dated January 13, 1998.

Sapphos Environmental. 1998. Memorandum for the Record JN 1067-007.M04. Subject: Notification of Initiation of Directed Surveys for Burrowing Owl at LAX/El Segundo Dunes. Dated January 27, 1998

United States Fish and Wildlife Service. Letter to Mr. David Kessler, Federal Aviation Administration, Subject:: Notice of Preparation for Los Angeles International Airport Master Plan from Mr. Gail Kobetich, U.S. Fish and Wildlife Service, Ecological Services, Carlsbad Field Office, 2730 Loker Avenue West, Carlsbad, California 92008

Weimer, Mark. February, 1998. Personal communication with Mr. Mark Weimer, coordinator, Los Angeles Breeding Bird Atlas

ATTACHMENT 1
EXISTING BIOTIC COMMUNITIES

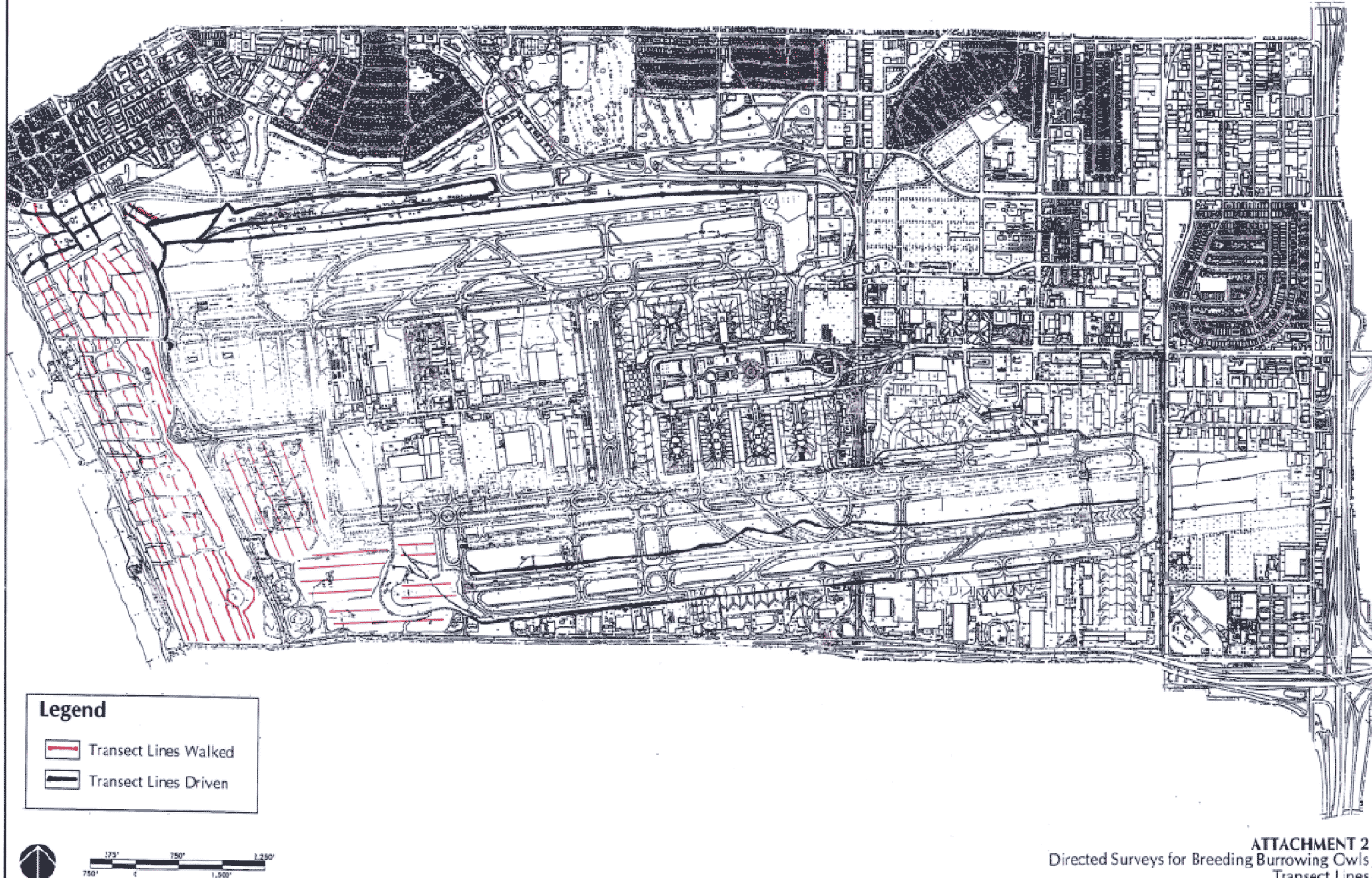


Los Angeles International Airport Master Plan

Existing Biotic Communities

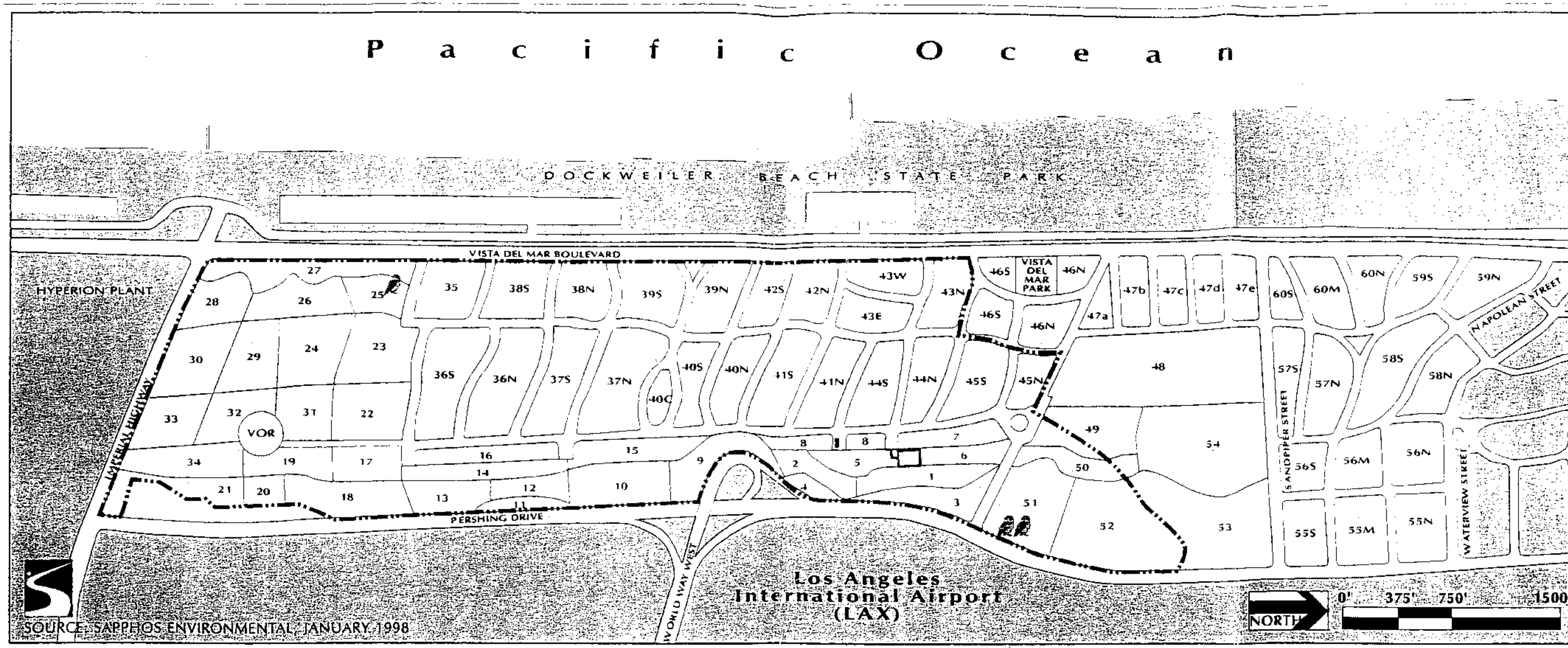
Attachment 1

ATTACHMENT 2
DIRECTED SURVEYS FOR WINTERING BURROWING OWLS



ATTACHMENT 2
Directed Surveys for Breeding Burrowing Owls
Transect Lines
LAX 2015 Expansion Study Area

ATTACHMENT 3
WINTERING BURROWING OWL SURVEY RESULTS



LEGEND

Road System (Many Subsites Are Delineated by Road System)

Habitat Restoration Area Boundary

Subsite Number

Remote Communications Site

Very High Omni Range Navigation Beacon

Trailer

RESULTS

Wintering Burrowing Owl (*Athene cunicularia*)

Attachment 3
Wintering Burrowing Owl Survey Results
LAX 2015 Expansion Study Area

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ATTACHMENT 4
FIELD NOTES

2/5/98 ①
1067-007
T. Alsobrook

Burrowing Owl Survey at
LAX/El Segundo Dunes

Date - February 5, 1998
Time - 0630 - 1015; south airfield 1015-1100 am
Location - LAX North Airfield 0630-0740
El Segundo Dunes - 0740 - 1015
Weather Conditions - 52° - 60°F; wind
gusts to ≈ 7 mph; high clouds;
approx. 50% cover
Observers - T. Alsobrook, P. Bloom,
B. Blood, E. Wilson

0630 - 0740 - All observers conducting survey on north airfield of LAX. Entire length of Argo Ditch was driven + both sides of road were scanned with binoculars. One observer walked the western portion (approx. 1,000 ft) of the Argo Ditch. The northwest corner of the airfield was walked extensively. All ground squirrel burrows were checked

2/5/98 ②

for sign of burrowing owl - none was observed.

0740 - 1015 - Observers walked transect lines at El Segundo Dunes. At 0745 one burrowing owl was observed. It was flushed from the concrete bunker at subsite #25 and perched at edge of bunker on pile of iceplant. Dunes were walked in lines from south of Sandpiper St. to Imperial Highway. All areas were walked except for the backdune, which was considered too steep for burrowing owl habitat.

1015 - 1100 - Returned to LAX airfield to survey south airfield. All roads were driven. Areas containing suitable habitat were walked. No burrowing owls were observed.

2/5/98 (3)

Species observed - N. Airfield
white-crowned sparrow
mourning dove
western meadowlark
American crow
red-tailed hawk
American Kestrel
Say's phoebe
yellow-rumped warbler
red fox
Anna's hummingbird
black-billed magpie
E. starling
red fox

South airfield
white-crowned sparrow
mourning dove
European starling
rock dove
loggerhead shrike
American crow

2/5/98 (4)

Dunes
* burrowing owl - 1
red-tailed hawk
house finch
western meadowlark
Am. Kestrel
Am crow
gulls
juvenile gopher snake
white-crowned sparrow
Uta stansburiana (side-blotched lizard)
black phoebe
Say's phoebe
Anna's hummingbird
Ca gull
ring-billed gull
E. starling
red fox
rock dove
silvery legless lizard - 1 adult (breeding) + 1 juvenile

2/9/98 1
1067-007
T. Alsobrook

Burrowing Owl Survey at
LAX/El Segundo Dunes

Date: February 9, 1998
Time: 1500 - 1745
Location: LAX - N. Airfield
El Segundo Dunes - inc.
north of Sandpiper
Observers: T. Alsobrook, B. Blood,
P. Bloom, E. Wilson
Weather Conditions - 62°F, 20% cloud
cover; breezy; gusts to 8 mph

3:00 pm 5:45pm: Arrived at Dunes
gate. T. Alsobrook & E. Wilson
survey on north airfield.
P. Bloom & B. Blood begin
surveying on Dunes. Observers
on north airfield drive length of
Argo Ditch scanning both sides
of road. The road to the
north of the Argo Ditch is
driven eastward, road adjacent
to Westchester Parkway is

2/9/98 2

driven back westward. No
ground squirrels are observed
in the area north or south
of the Argo Ditch. The
northwest corner of the
airfield is walked. No sign
of burrowing owl is observed.
The area north of Sandpiper
Street is covered via a
combination of driving and
walking across some of the
areas with better quality burrowing
owl habitat i.e. lower growing
vegetation. T. Alsobrook &
E. Wilson drive to ~~area~~ Dunes
area south of Sandpiper St.
Walk transect lines ~~for~~ starting
at entrance road south to last
road (by VOR) & towards Vista del
Mar.

P. Bloom & B. Blood have walked
transect lines around VOR and
east side of Dunes. One
burrowing owl was observed at
the bunker where it was seen
on 2/5/98.

(3)

Species Observed

North Airfield LAX

American crow
American Kestrel
W. meadowlark
European starling
mourning dove
white-crowned sparrow

El Segundo Dunes - north of Sandpiper St.

rock dove
European starling
American Kestrel
American crow
gull species
N. mockingbird

El Segundo Dunes

European starling
white-crowned sparrow
house finch
red-tailed hawk
Say's phoebe
rock dove
ring-billed gull

2/9/95 (4)

California towhee
American Kestrel
western meadowlark
side-blotched lizard - 2
southern alligator lizard - 1
* burrowing owl - 1

2/17/98 (1)
1067-007
T. Alsobrook

Burrowing Owl Survey at
LAX/El Segundo Dunes

Date: February 17, 1998
Time: 1430-1715, s. airfield 1715-1800
Location: LAX north airfield,
El Segundo Dunes, Inc.
north of Sandpiper
Observers - T. Alsobrook, B. Blood,
P. Bloom, E. Wilson
Conditions - 55°F, clear, wind gusts
to approx. 30 mph.
sustained winds of 10-15 mph.

T. Alsobrook + E. Wilson drove to north airfield of LAX. Drove length of Argo Ditch scanning both sides of the road. The roads to the north of the Argo Ditch were not driven due to work being conducted along the Ditch + truck traffic back + forth. B. Blood + P. Bloom walk

(2)

transect lines at Dunes. T. Alsobrook + E. Wilson walk + drive portion of Dunes north of Sandpiper St. then complete walking transect lines on Dunes south of Sandpiper St. P. Bloom + B. Blood walk transect lines at east portion of Dunes adjacent to Pershing Dr. At 4:55 pm. P. Bloom flushes one burrowing owl from area just north (approx 500') of entrance road into Dunes + approx. 50' from Pershing Dr. A second burrowing owl is flushed approx. 20' east of where the first owl landed. The owls were flushed while roosting under low shrubs - mostly buckwheat. No obvious burrows. The area is not thoroughly investigated for burrows to avoid disturbing the owls any further. No sign of ground squirrels in this area.

Burrowing owls (2) observed on subsite # 51.

③

1715 - T. Alsobrook + E. Wilson return to airfield + survey south side. All roads are driven (south of runways) + areas with potential suitable habitat are walked.

Species observed
south airfield
American crow
Killdeer
white-crowned sparrow
house finch
European starling

2/17/98 ④

Species observed -
north airfield
American Kestrel
W. meadowlark
E. starling
American crow
yellow-rumped warbler
4 Beechey ground squirrels (Spermophilus beecheyi) - seen in NW corner of airfield; actively using burrows

Dunes north of Sandpiper St.
rock dove
European Starling
American Kestrel
American crow
Anna's hummingbird
N. mockingbird

2/17/98 (5)

El Segundo Dunes

gull sp.
American crow
American Kestrel
western meadowlark
house finch
white-crowned sparrow
Anna's hummingbird
Ca towhee
silvery legless lizard - 2
side-blotched lizard 3
southern alligator lizard - 1
red fox
Say's phoebe
* burrowing owl - 2

2/25/98 ①
T. Alsobrook
1067-007

Burrowing Owl Survey at
LAX / El Segundo Dunes

Date - February 25, 1998
Time - 0645 - 0930, s airfield 0930-1030
Observers - T. Alsobrook, B. Blood,
P. Bloom, E. Wilson
Weather - 52°F, cloud cover approx.
25%; wind < 10 mph
Location: LAX - north airfield, El
Segundo Dunes inc. north of
Sandpiper St

T. Alsobrook & E. Wilson drove to LAX north airfield. Drove length of Argo Ditch slowly scanning both side of road for any sign of burrowing owl. The road to the north of the Argo Ditch was driven eastward & the road just south of Westchester Parkway is driven back westward. The northwest corner of the airfield is walked. The Dunes area

2/25/98 ②

north of Sandpiper St. was driven & subsite was walked. No burrowing owl or sign of burrowing owl was observed. No ground squirrels have been observed on the Dunes. T. Alsobrook & E. Wilson join P. Bloom & B. Blood walking the transect lines on the Dunes south of Sandpiper. One burrowing owl was observed at the concrete bunker where ~~an~~ owl was seen previously.
0930 - 1030 Returned to ~~south~~ LAX airfield & surveyed on the south side. All roads south of the runways were driven & suitable habitat areas were walked. No burrowing owls were observed.

2/25/98 (3)

North Airfield - species observed

2 mallards
American crow
mourning dove
European starling
Kestrel
black-billed magpie
Say's phoebe
N. mockingbird
Killdeer
willet - flew into small "pond"
west of west end of
Argo Ditch

El Segundo Dunes - north of
Sandpiper
rock dove
Kestrel
N. mockingbird
American crow
ring-billed gull

2/25/98 (4)

El Segundo Dunes - south
of Sandpiper St

American Kestrel
European starling
house finch
* burrowing owl - 1
ring-billed gull
Anna's hummingbird
spotted dove
mourning dove
white-crowned sparrow

2 6 1067-007

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

February 23, 1998

MEMORANDUM FOR THE RECORD
1067-007.M07

TO: Los Angeles World Airports
(Mr. Steve Crowther, Ms. Sheila Murphy, Mr. Ray Ilgunas)

Federal Aviation Administration
(Mr. David Kessler)

Landrum & Brown
(Mr. Rich Macias and Ms. Karen Yamamoto)

Cutler & Stanfield
(Ms. Katherine Andrus)

Hall & Associates
(Mr. Carlyle W. Hall Jr.)

Mr. Jim Geocaris, Esq.

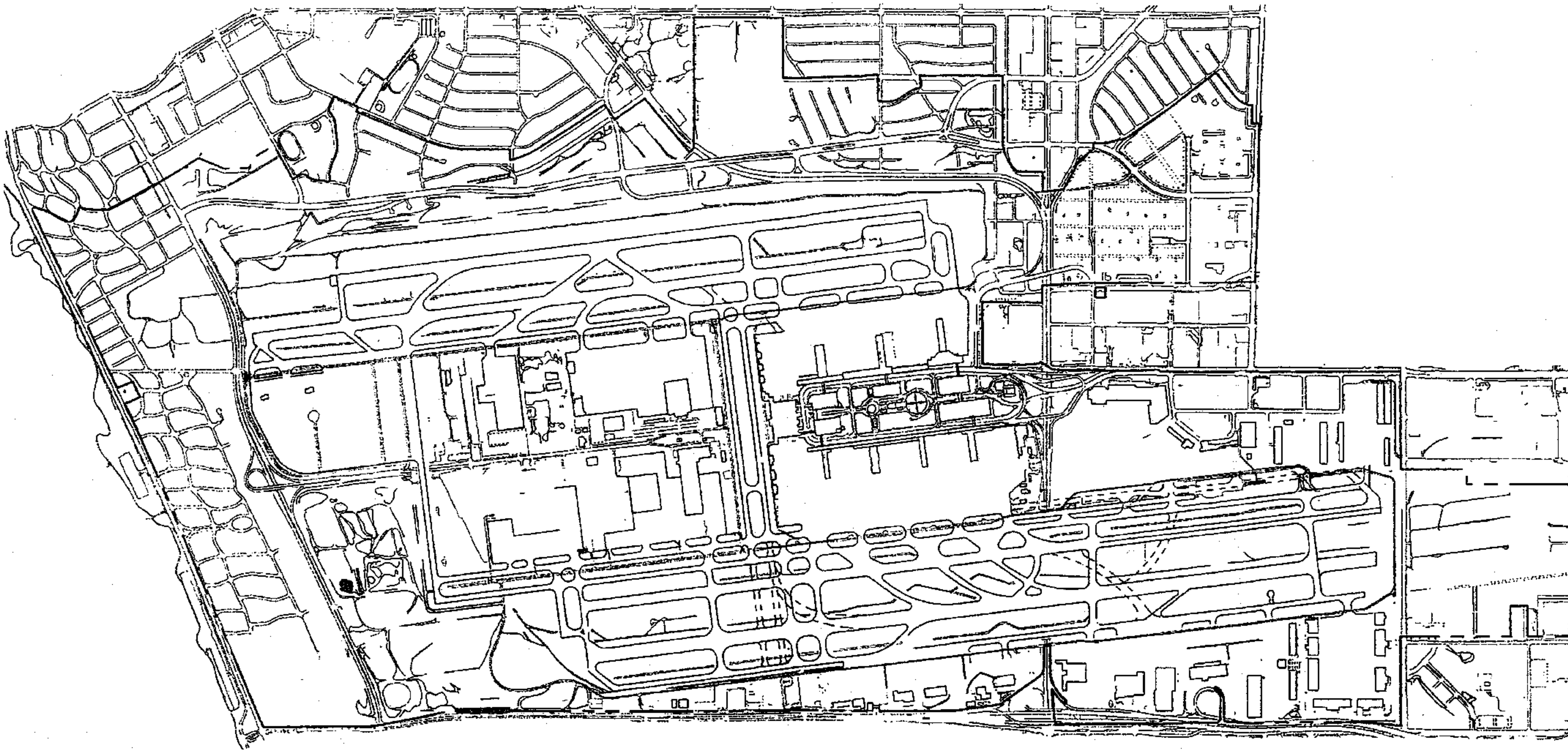
FROM: Sapphos Environmental
(Ms. Tracey Alsobrook, Dr. Brad Blood)

SUBJECT: Western Spadefoot Toad at LAX

ATTACHMENT: Known Locations of Western Spadefoot Toad at LAX as of 2/17/98

This Memorandum for the Record transmits notification to Los Angeles World Airports that directed surveys for western spadefoot toad *(Scaphiopus hammondii)* which began on February 17, 1998 at the Los Angeles International Airport airfield detected adult western spadefoot toads in two locations on the airfield. Western spadefoot toads were heard calling from the large permanent pond in the southwest corner of the airfield and were heard and observed in standing water just north of the perimeter road adjacent to Imperial Highway (see Figure). Western spadefoot toads are a California Department of Fish and Game "Species of Special Concern". Impacts to the western spadefoot toads are likely to result from the implementation of the Los Angeles International Airport 2015 Expansion Master Plan, including the no-build alternative. Mitigation for these impacts is recommended. Sapphos Environmental is recommending off-site mitigation to avoid creating an "attractive nuisance" in the form of open standing water on airport property. Sapphos Environmental proposes to contact the California Department of Fish and Game and the United States Fish and Wildlife Service for information on the relocation of this species and possible nearby relocation sites.

Should there be any questions regarding the information contained in this memorandum, please contact Ms. Tracey Alsobrook or Dr. Brad Blood at (626) 683-3547.



LEGEND

Known locations of western spadefoot toads as of 2/17/98

Los Angeles International Airport Master Plan

FIGURE

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SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

February 6, 1998

MEMORANDUM FOR THE RECORD
JN 1067-007.M02

TO:	Los Angeles World Airports (Mr. Steven Crowther, Ms. Sheila Murphy, Mr. Phillip Ewbank, Mr. Michael Corlett) Federal Aviation Administration (Mr. David Kessler) Landrum & Brown (Mr. Rich Macias, Ms. Karen Yamamoto)
FROM:	Sapphos Environmental (Ms. Tracey Alsobrook)
SUBJECT:	Aircraft Bird Strike Literature Review
ATTACHMENT:	Bird Strike Data 1989-1997, Los Angeles International Airport

EXECUTIVE SUMMARY

This Memorandum for the Record transmits information gathered by Sapphos Environmental regarding bird strikes to aircraft which will serve as the basis for addressing potential impacts on biological resources in support of the *Los Angeles International Airport 2015 Expansion Master Plan (Master Plan)*. The location of the airfield within the Pacific flyway and near the Pacific Ocean creates a potential for air strikes to aircraft to occur. In addition to native resident and migratory birds, the control of non-native pest birds such as pigeons and starlings is a maintenance problem shared by airports throughout the world.

Approximately 189 aircraft reported air strikes with birds at Los Angeles International Airport between 1989 and October 21, 1997. Of the 189 aircraft reporting bird strikes, twenty-four (13%) reported that the encounter effected the flight. An additional 13 (7%) reported that the encounter caused them to abort take-off or take other precautionary measures. Sixty (32%) of the incidents occurred on the ground, fifty (26%) are unknown as to when the encounter occurred. Of the 189 incidents, fifty (27%) occurred during take-off or climb, 115 (60%) occurred during approach and landing, and the balance are unknown. The 189 aircraft experiencing encounters reported striking approximately 381 birds. Of the recorded bird strikes, 177 (46%) were unknown; ninety-eight (26%) are pigeons and doves; and sixty-four (17%) are gulls. Although twenty-seven types of aircraft reported avian air strikes, the greatest number, fifty-six (30%) occurred in conjunction with B-737(-500,-400,-300, and -200) aircraft.

Short-term and long-term avian control measures provide an opportunity to minimize risk of bird air strikes to aircraft. Conversion of existing temporal habitats to developed components of the airfield will result in impacts on native resident and migratory birds which will likely require mitigation. Use of short-term and long-term avian control measures for non-native pest birds must appropriately be considered as an element of the project description.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

INTRODUCTION

This Memorandum for the Record (MFR) transmits information gathered by Sapphos Environmental regarding bird strikes to aircraft which will serve as the basis for addressing potential impacts on biological resources in support of the *Los Angeles International Airport 2015 Expansion Master Plan (Master Plan)*. The Los Angeles International Airport is located in the City of Los Angeles, approximately .5 miles east of the Pacific Ocean (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15 W, located within the Sausal Redondo I and Grant Boundary). This research was undertaken to respond to scoping comments received by the Los Angeles World Airports and the Federal Aviation Administration from the California Coastal Commission and the U.S. Fish and Wildlife Service in response to the Notice of Intent and Notice of Preparation to create a joint Environmental Impact Statement and Environmental Impact Report (EIS/EIR) in support of the *Los Angeles International Airport 2015 Expansion Master Plan (Master Plan)* regarding the potential for increased air traffic to increase the potential for air strikes to birds. The location of the airfield within the Pacific flyway and near the Pacific Ocean creates a potential for bird air strikes to aircraft to occur. In addition to native resident and migratory birds, the control of non-native and pest birds such as pigeons and starlings is a common maintenance problem shared by airports throughout the world. Increased air traffic resulting from the proposed expansion has the potential to increase the probability for air strikes to occur.

The *Master Plan* shall consider the incorporation of long-term measures to modify or remove avian attractants such as food, water, and shelter in the immediate vicinity at the Los Angeles International Airport airfield to minimize the risk of bird strikes. This MFR provides general bird strike information, a summary of bird strike information for LAX, information on control measures, and relevant information related to management of adjacent land uses.

GENERAL BIRD STRIKE INFORMATION

Bird strikes to civilian aircraft have been a serious economic and safety issue since the beginning of aviation history. The first recorded fatality resulting from a bird strike occurred in California in 1912 when Cal Rodgers, the first man to fly across the United States, lost control of his plane and crashed when a gull became ensnared in the exposed control cables of his light aircraft (Blokpoel, 1976; Solman, 1973). In 1960, sixty-four of the seventy-two passengers and crew aboard an Electra 188 were killed in Boston, Massachusetts after the aircraft ingested starlings into three of its four engines (Curtis, 1997).

As air traffic volume increases and planes fly faster the potential for bird strikes has also increased, especially at airports near major bird migration routes or favorable habitats. For the five-year period between 1992-1996, 11,571 (average of 2,314 per year) wildlife strikes (including mammals, reptiles etc.) to civil aircraft were reported to the Federal Aviation Administration (U.S. Department of Transportation, 1997). Birds accounted for 97% of the reported strikes for the years 1992-1996, while mammals accounted for only 3% and reptiles less than 1% (U.S. Department of Transportation, 1997). Commercial aircraft were involved in approximately 75% of these strikes, with the remainder involving business, private and miscellaneous aircraft (U.S. Department of Transportation, 1997). Bird strike data has been compiled from all fifty states for the years 1992-1996 and California has the highest total number of bird strikes for that period (U.S. Department of Transportation, 1997). The data compiled by the U.S. Department of Transportation (1997) for the years 1992-1996 shows that the majority of bird strikes (51%) occurred between July and October and the fewest occurred between December and February (13%). At Point Mugu Naval Air Station in Point Mugu, California records indicate that the greatest number of bird strikes occur during the months of May, June and October (personal communication with Tom Keeney, 1997). The phase of aircraft flight during which most bird strikes occur is important knowledge for the planning of bird control programs at airports. Based on data compiled by the U.S. Department of Transportation (1997) for the years 1992-1996, 34% of bird strikes occurred when the aircraft was on approach, 21% occurred during take-off and 15% occurred during climb. Reports show that 55% of bird strikes occurred at altitudes of less than 100 feet above ground level (AGL), 79% occurred under 900 feet AGL, and 88% occurred under 2,000 feet AGL (U.S. Department of Transportation, 1997). The highest ever recorded bird strike was at 37,000 feet (Curtis, 1997).

Types of birds most commonly involved in strikes include gulls, blackbirds, waterfowl, doves and raptors (USDT, 1997). Keeney (Tom Keeney, personal communication, 1997) states that records from Point Mugu Naval Air Station show no reported strikes of endangered species, including California least tern *(Sterna antillarum)*, peregrine falcon *(Falco peregrinus)* and brown pelican *(Pelicanus occidentalis)* Most North American bird strikes involve birds weighing 4 pounds or less (Curtis, 1997). Strikes that result in damage to civil aircraft in the United States usually involve the following types of birds: gulls, waterfowl, raptors, doves, vultures, blackbirds/starlings, corvids (crows etc.) and wading birds (FAA, 1997). Of the bird strikes to civil aircraft reported between 1992 and 1996, 14% resulted in a negative effect on the aircraft flight and 16% resulted in damage to the aircraft (USDT, 1997). According to the Civil Aviation Organization and the Civil Aviation Administration of the United Kingdom, about 6 to 7% percent of all bird strikes result in damage to aircraft (Curtis, 1997).

Analysis by U.S. Department of Transportation (1997) of strike reports from three major US airports indicated that less than 20% of all wildlife strikes occurring at these airports were reported to the FAA U.S. Department of Transportation (1997). Based on this 20% reporting rate, the U.S. Department of Transportation (1997) estimates the direct cost of wildlife strikes to civil aircraft at $216 million per year.

SUMMARY OF BIRD STRIKE INFORMATION FOR LAX

The FAA monitors LAWA's conformance with Wildlife Hazard Management requirements pursuant to Section 139.337 if 14 CFR Part 139. In October, 1997 LAWA reported an increased number of bird strikes to aircraft (letter from Mr. Leigh Hatayama to Mr. Charles Sipple, October 22, 1997) at LAX. The FAA, in their letter dated November 20, 1997 cited the recent series of bird strikes to commercial

carrier aircraft at LAX and required that the airport prepare an ecological study. LAWA responded to the FAA in a letter dated December 9, 1997 stating that LAWA had taken immediate action to mitigate the bird strike problem and that they have retained the U.S. Department of Agriculture, Animal Damage Control Unit to conduct an emergency assessment followed by a twelve-month ecological study.

LAWA provided Sapphos Environmental with bird strike data for the six year period between 1989 and October 21, 1997 (LAWA 1998). A variety of data is recorded for each aircraft reporting an air strike including: date, time, aircraft type, runway, altitude, speed, phase of flight, effort on flight, weather conditions, bird species, number of birds seen, and number of birds struck. The data was entered into an EXCEL spreadsheet to facilitate analysis (Attachment 1).

Data was reviewed to assess the number of bird strikes recorded at LAX between 1989 and 1997, the number and type of birds involved in bird strikes, altitude at which incidents occurred, types of aircraft involved in incidents, and the effects on flight. Approximately 189 aircraft reported air strikes with birds at LAX between 1989 and October 21, 1997.

TABLE 1
EFFECTS OF AVIAN AIR STRIKES ON AIRCRAFT REPORTED AT LAX
(1989 - 1997)

ALTITUDE (feet)	EFFECTS ON FLIGHT				TOTAL
	YES	Aborted Take Off	None	Unknown	
0	10	11	31	14	60
1-10	0	0	3	2	5
11-100	1	0	15	1	17
101-1000	4	0	20	1	25
1001-10,000	3	0	20	6	29
> 10,000	0	0	0	1	1
Unknown	6	20	5	37	50
TOTAL	**24**	**13**	**94**	**58**	**189**

Of the 189 aircraft reporting bird strikes, twenty-four (13%) indicated that the encounter effected the flight. An additional 13 (7%) indicated that take off was aborted or other precautionary measures were undertaken as a result of observing a bird or birds. Sixty (32%) of the reported incidents occurred on the ground prior to takeoff or after landing, fifty (26%) of the reports indicated that it was unknown when the encounter had occurred.

TABLE 2
PHASE OF FLIGHT FOR REPORTED AVIAN AIR STRIKES
(1989 - 1997)

PHASE OF FLIGHT	NUMBER	PERCENT OF TOTAL
Approach	56	29%
Landing	59	31%
Take-Off	28	15%
Climb	22	12%
Unknown	24	13%
TOTAL	**189**	**100%**

Of the 189 reported incidents, 115 (60%) occurred during approach or landing, sixty (27%) during take-off or climb, and twenty-four are unknown as to when they occurred. Again this data indicates at least half of the avian bird strikes occur within the limits of the airfield.

TABLE 3
TYPE OF AIRCRAFT REPORTING AVIAN BIRD STRIKES AT LAX
(1989 - 1997)

AIRCRAFT TYPE	NUMBER OF INCIDENTS REPORTED (EFFECTS ON FLIGHT)				TOTAL
	YES	Aborted Take Off	None	Unknown	
SW-30			1	1	2
SAAB-340 (B) +	1		1		2
SA 226			1		1
PA-23			1		[illegible]
MD-88				1	[illegible]
MD-82			2		2
MD-80		1	3	1	5
L-1011(-1)		2	1		3
EMB+20			4	1	5
DMC7			1		1
DC-9			1		1
DC-10(-10, -40)*	1	1	9	1	12
DA-20		1			1
DA-10			1		1
C-9			3		3
BE-1900				2	2
BAE-31				1	1
BA-31		1	7		8
BA-146-100			2		2
BA-767(-300, -200)	1	1	11	4	17
B-757 (-200)		2	6	3	11
B-747(-400, -100)		1	5	6	12
B-737 ‡ (-500, -400, -300, -200)	11	4	30	11	56
B-727 (-100)*	4		3	4	11
B-67-30				1	1
A-320			2		2
A-300			1		1
Unknown	2		3	15	20

Legend: + = Runway Closed * = Engine Shut Down ‡ = Blades Damaged

Avian bird strikes were reported in conjunction with twenty-seven different types of aircraft. Avian bird strikes were reported as having effected flights in five types of aircraft: SAAB-340 (B); DC-10 (-10, and

-40); BA-767(-300, and -200); B-737 (-500, -400, -300, and -200); and B-727 (-100). B-737 (-500, -400, -300, and -200) accounted for the greatest number of incidents.

TABLE 4
MONTH OF REPORTED OF AVIAN AIR STRIKES ON AIRCRAFT AT LAX
(1989 - 1997)

MONTH	NUMBER OF REPORTED OF AVIAN AIR STRIKES ON AIRCRAFT AT LAX (1989 - 1997)									AVERAGE
	89'	90'	91'	92'	93'	94'	95'	96'	97'	
JANUARY	2	0	1	1	0	1	2	2	2	1.2
FEBRUARY	2	0	0	0	0	1	1	2	0	.7
MARCH	0	0	0	2	0	4	2	1	2	1.2
APRIL	4	0	4	3	0	1	0	4	1	1.9
MAY	1	0	3	0	1	2	3	4	1	1.7
JUNE	0	0	0	0	1	1	4	3	1	1.1
JULY	0	4	2	4	3	1	3	2	5	2.7
AUGUST	4	3	0	1	1	2	8	4	1	2.8
SEPTEMBER	3	7	2	2	4	1	2	3	4	2.9
OCTOBER	0	1	0	2	2	1	4	3	5	2
NOVEMBER	4	3	2	1	1	2	4	0	0	1.9
DECEMBER	0	0	0	0	2	2	3	1	1	1
TOTAL BY YR	**20**	**18**	**14**	**16**	**15**	**19**	**36**	**29**	**23**	**21.1**
TOTAL	**190**									

During the nine years of records, reports of bird strikes have ranged from a low of 14 in 1991 to a high of 36 in 1995. An average of 21.1 bird strikes per year was calculated for the nine years of record. The greatest number of birds strikes occur in late summer and early fall.

Due to the proximity of LAX to the Pacific Ocean and the suitability of urban environments for supporting a variety of non-native pest birds, bird strikes are expected to be an ongoing issue at the airport. LAWA is currently preparing to undertake an ecological study at LAX which will provide the site specific information necessary to prepare a Wildlife Management Program. The primary goal of

a Wildlife Management Program is aviation safety. A Wildlife Management Program would consist of short-term and long-term control measures of birds. Short-term control measures would include dispersal methods, exclusion methods and removal methods. Long-term control measures include modifying or removing attractants such as food sources, standing water, perching areas, resting areas and nesting areas and being aware of land uses in the vicinity of the airport (ed. MacKinnon, 1994). Sapphos Environmental has provided the following preliminary suggestions for the elements of a Wildlife Control Program.

AVIAN CONTROL MEASURES
Short-Term

<u>*Dispersal Methods*</u>

Dispersal methods are the most common and least expensive form of wildlife control on airfields. These methods may be acoustic, visual or a combination of acoustic and visual. Loud noises, and especially non-natural sounds, however, are not very effective in scaring away birds (Blokpoel, 1976). Scare tactics based on the broadcasting of natural sounds, for instance bird distress calls, may be somewhat more effective, although birds quickly become habituated to these sounds thereby decreasing their effectiveness. Bird species respond in varying ways to broadcast bird distress and alarm calls. For instance pigeons have a strong territorial sense and do not react as readily to noise as do other bird species (Clark, 1986; Timm, 1983). Studies should be conducted when utilizing broadcast bird calls to determine the following factors: the problem species (including the time of year, time of day and under what conditions the species are present); the quality of the broadcast calls and the rate of broadcast; the use of the most effective additional scare tactics; and ways to prevent habituation (Blokpoel, 1976). Visual scare techniques alone, such as bird corpses and bird models are not successful (Blokpoel, 1976). Combined visual and acoustical scaring methods may be somewhat more effective although habituation remains a problem. A study of bird scaring methods at British Airports concluded that exploders are not successful in deterring birds from runway areas (Salmon, 1991). Resident birds, such as gulls and rock doves (pigeons) become accustomed to scaring devices more readily than migratory birds. Unfortunately, these resident birds are the species most often involved in bird strikes at LAX. One possible way to reduce habituation is to make the control measures random and unexpected. Control measures are most successful when conducted early in the morning when birds are arriving and before they have settled into a routine (Transport Canada, 1994).

The use of dispersal methods is generally considered of variable success, mainly due to habituation (Blokpoel, 1976; Transport Canada, 1994). Scare tactics and dispersal methods are most successful when used for transient and migratory species that cause only temporary problems on or near airfields. These methods are most effective when used in conjunction with more long-term solutions such as habitat modification.

LAWA is currently using an electronic bird scaring device called the Phoenix Wailer (personal communication with Ms. Flora Margheritis, November 11, 1997) at LAX. This device produces sounds of the most common bird species at LAX and the sounds are changed weekly to reduce habituation. The results of the effectiveness of the Phoenix Wailer will be evaluated after one year. According to Transport Canada (1994), birds tend not to habituate readily to the random combination of sounds which confuse many species. Other advantages of this system are that it is environmentally friendly, the output is controllable for use near urban areas and it is low-maintenance. The results of use of the Phoenix Wailer as a bird deterrent in Canada indicate that, for the most part, it is very effective. LAWA Operations also shoots off screamers randomly on an as-needed basis (personal communication with Mr. Philip Ewbank, October 22, 1997) at LAX.

Exclusion Methods

Exclusion methods are used mainly to keep pigeons from roosting or nesting in hangars and other airport buildings. Blocking or covering all holes and crevices with screening, concrete or brickwork reduces the ability of pigeons to use these areas for roosting or nesting. Various materials and methods are available to deter or prevent birds from perching on antennae, overhead wires and inside hangars. Roosting on ledges can be discouraged by changing angles to 45 degrees or more (Timm [ed]. 1983). Undergrounding of utilities such as electrical and communications lines greatly reduces perching sites for flocking birds such as starlings. Porcupine wire, metal prongs with sharp points extending outward at all angles may also be used to discourage roosting. At LAX it is the responsibility of the various air carriers to handle any problems with pest species (primarily pigeons) in hangars.

Removal Methods (including Behavioral Repellents)

Bird removal methods include chemical control, live-trapping with relocation or trapping and dispatching. Chemical control methods, primarily bird repellents, are used most successfully at airports in dealing with urban birds such as pigeons and starlings, which are both present in large numbers at LAX.

Avitrol, a chemically treated bait, is the most common behavioral repellent. It is used as a chemical frightening agent to remove pest birds from a given location. Avitrol is currently registered with the Environmental Protection Agency for use as a repellent in the control of pigeons, sparrow, crows, gulls, starlings, grackles, cowbirds and blackbirds (Avitrol Corporation, 1997). Avitrol is composed of the bird management chemical 4-aminopyridine impregnated into different bird foods depending upon the target bird species. In the case of pigeons, whole corn is the preferred bait. Treated bait is usually diluted with untreated bait so that relatively few birds ingest the treated bait. Affected birds emit distress calls and perform aerial distress displays that frighten the other birds in the flock, causing them to leave the sight. Birds that do ingest the treated bait and react, usually die. According to the Agricultural Commissioners Office (personal communication, Mr. Mark Adams, 1997) and literature published by the Avitrol Corporation, the makers of Avitrol, it is possible that if an animal were to eat undigested bait from a deceased bird's digestive tract that animal may be affected. The Agricultural Commissioners Office and Avitrol Corporation recommend that dead and dying birds be picked up promptly and disposed of according to local regulations.

Because Avitrol is toxic to all vertebrate species that ingest the chemical it is very important that the proper use procedures are followed. The Avitrol Corporation lists a number of factors which must be evaluated in order to determine the proper use procedures including: approximate numbers of species of birds; whether the birds are resident or migratory; approximate flight pattern of the flock(s); where the flock(s) are feeding and roosting; what foods are readily available to the birds and where; what are the most logical places and times for feeding/baiting; what other precautions may be necessary to protect other species of birds, wildlife, pets and people from hazards which may arise from using Avitrol. There is the possibility that non-target species, such as mourning doves which are protected pursuant to the Migratory Bird Treaty Act, may ingest the treated bait and die if the product is not used properly.

Avitrol is a restricted use pesticide. It is for sale to, and use by, Certified Applicators or persons under their direct supervision. This product is not for sale to the general public. The federal government does not require permits for the use of Avitrol for the control of any birds for which it is currently registered except for gulls. The label does require that the applicator check to see if any state or local government regulations apply. According to the Agricultural Commissioners Office (personal communication with Mr. Mark Adams, 1997), a permit <u>may</u> be required from their office depending on where the chemical is to be used. Use of Avitrol on structures (for example bait pans on rooftops for pigeons) does not require a permit, use in agricultural areas does require a permit. Avitrol is currently being used to remove pigeons from the airfield. The majority of bird strikes at LAX involve pigeons which may indicate that a more extensive and consistent control program is required to control pigeons which are common throughout the urbanized and coastal areas of Los Angeles County.

Blokpoel (1976) states that the use of chemicals should generally be discouraged because of the "problem of getting the right dose into the right bird at the right time". In addition, poisoning may affect or kill non-target species and killing birds is only a temporary measure and new birds will soon move in.

Perhaps, a more effective short-term method to remove pigeons from LAX would be to initiate a trapping and removal program. This would involve placing traps containing pigeon decoys at sites where pigeons congregate. Traps would be checked at regular intervals each day that traps were in operation. In addition to traps, capture in mesh netting (mist netting) could be implemented. The pigeons that are trapped are then dispatched in a humane manner. A long-term solution may involve looking at ways to reduce attractants to pigeons at LAX. It has been noted that people have been putting out birdseed for pigeons (and other seed-eating birds) in at least one location near the airfield. People should be discouraged from feeding the pigeons either through education (posting signs alerting people to the potential danger attracting birds to the airport may pose) or through legislation. The City of Los Angeles currently has an ordinance (Sec. 53.43. Of the Municipal Code: Pigeons - Feeding - Restricted Area) which prohibits the feeding of pigeons on any public street or sidewalk or in any public park in a defined geographic area within the City of Los Angeles.

AVIAN CONTROL MEASURES
Long-Term

Habitat Modification

Birds are attracted to airports because of the habitat they provide. This habitat can be modified to make the airport less attractive to both the number and species of birds. The main attractants at airports are food, water, and shelter (resting, nesting, roosting and safety) locations. Modifying or removing these attractants is the most effective long-term solution for reducing the number of bird strikes at airports. Blokpoel (1976: page 129) states "As long as an airport retains the features that make it attractive to birds, scaring and killing will remain necessary, because the birds will always come back or other birds will move in. When the attractions are removed, bird numbers will decrease permanently and bird strikes will occur less frequently."

The first step in developing habitat modification plans as part of a larger Wildlife Management Program is an ecological study. As mentioned previously LAX has already contracted with the U.S. Department of Agriculture, Animal Damage Control Unit to conduct an ecological study. The necessary components of this study as required by the FAA (letter dated November 20, 1997) include the following:

- An analysis of the event which prompted the study
- Identification of the species, numbers, locations, local movements, and daily and seasonal occurrences of wildlife observed
- Identification and location of features on and near the airport that attract wildlife
- Description of the wildlife hazard to air carrier aircraft

This study will be carried out year-round to account for daily, nightly, and seasonal bird movements. The results of this study, along with the *Advisory Circular: Hazardous Wildlife Attractants on or Near Airports* (FAA, 1997) will provide valuable information for the preparation of a Wildlife Monitoring Program. Sapphos Environmental provides the following preliminary suggestions for possible areas of habitat modification; according to the availability of food, open water, and shelter at the airport.

Food - Airports may harbor a variety of food sources for birds such as fruit or berry producing trees and shrubs, seed producing vegetation, green weeds, small mammals and small birds. Removing or reducing any of these attractants will help to reduce the number of birds at airports. Special attention should be paid to the food items of birds that pose a particular hazard at airports. Landscaping around airport buildings should avoid plants that provide a food source. Ground squirrel and pocket gopher populations that are food for large predators such as red-tailed hawks should be controlled. The actions of humans may also inadvertently attract birds to airports. Garbage disposal methods should be reviewed to insure that there are no uncovered trash cans attracting birds and small mammals. Trash should be picked up as often as possible. As stated earlier the feeding of pigeons by local residents is a major attractant of birds to the area. Some recommendations for handling this issue were discussed in the section Removal Methods. It may be advisable for LAWA to seek the cooperation of surrounding

public and private entities that may contribute to attracting birds through unsecured trash disposal facilities.

Open Water - Surface water is particularly attractive to birds as a food-foraging area and as a shelter area. All standing water on airports should be removed to the greatest extent feasible. Any depression should be drained or filled, and blocked waterways should be cleared. The banks of water bodies should be graded to a 4-in-1 or 5 in-1 slope (Transport Canada, 1994). This will discourage birds from using the water body, because they will be unable to see predators. According to the Los Angeles County West Vector Control (1997), 22,000 square yards of ponded water were created by improperly graded storm drains, runoff channels, and sumps on property owned by LAX that must be routinely treated for mosquitoes. That same 4 to 5 acres of wetted habitat (located predominantly in the western portions of the airfield) provides resting and foraging habitat for numerous resident and migratory bird species. In addition, the Argo Ditch, a non-man-made earthen storm drain channel located on the LAX airfield north of Runway 24R, has developed aquatic, riparian, and wetland habitats as a result of failure to conduct routine channel maintenance during the last twenty years.

Shelter (Resting/Nesting/Roosting/Safety) Areas - Airports provide a relatively safe haven for birds. The general absence of predators and lack of human disturbance over large areas encourage birds to congregate. Removing habitat such as trees and bushes will reduce the tendency for birds to congregate. Perching sites such as posts or signs should be removed or lowered. Sharp spikes can be attached to runway approach lights to discourage perching.

During a wildlife survey of the Argo Ditch conducted by Sapphos Environmental in October, 1997 twenty-two species of birds were observed in or near the Ditch (Sapphos Environmental, 1997). LAWA has been authorized to complete emergency channel maintenance activities at the Argo Ditch pursuant to Nationwide Permit No. 31 by the U.S. Army Corps of Engineers. LAWA will develop and implement a mitigation plan to compensate for the permanent loss of habitat that has developed within the Argo Ditch at an offsite location. In their scoping comments responding to the Notice of Intent and Notice of Preparation for a joint Environmental Impact Statement and Environmental Impact Report, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency commented regarding the possibility of extant vernal pools in the western portion of the airfield. Sapphos Environmental (1997) has reviewed historic topographic maps and aerial photographs which indicate that most of the western portion of the airfield has been used for borrow, fill, or construction staging activities. Therefore, it is unlikely that extant vernal pools are present at the airfield. However, the underlying consolidated sand bedrock inhibits water percolation and allows ponds to readily form in association with nature or man-made depressions. These wetted areas provide suitable resting and foraging habitat for a variety of avian species. The alternatives being evaluated in the *Los Angeles International Airport 2015 Expansion Master Plan EIS/EIR* would convert these open space areas to developed components of the airport. The conversion of these open space areas is likely to constitute a significant impact requiring mitigation.

ADJACENT LAND USES

Adjacent land uses are also an important consideration when evaluating the *Master Plan* and must also be considered when developing a Wildlife Management Plan. The *Advisory Circular: Hazardous Wildlife Attractants On Or Near Airports* (FAA, 1997) lists land uses that are incompatible and land uses that may be compatible with safe airport operations. One land use that is cited as being incompatible with safe airport operations is a wastewater treatment facility. Hyperion Wastewater Treatment Plant is located directly adjacent to LAX along Imperial Highway. There are presently 16 circular 150 foot diameter uncovered clarifying tanks at Hyperion with another 20 tanks yet to be installed. These uncovered tanks are currently attracting birds, mainly gulls (personal communication with Mr. Hassan Rad, 1998) which enter the tanks and are sometimes trapped. Section 2-3.b. (Existing wastewater treatment facilities) of the FAA Advisory Circular (1997) states,

> "FAA recommends correcting any wildlife hazards arising from existing wastewater treatment facilities located on or near airports without delay, using appropriate wildlife hazard mitigation techniques. Accordingly, measures to minimize hazardous wildlife attraction should be developed in consultation with a wildlife damage management biologist. FAA recommends that wastewater treatment facility operators incorporate appropriate wildlife hazard mitigation techniques into their operating procedures. Airport operators also should encourage those operators to incorporate these mitigation techniques in their operating practices."

At this time, according to Mr. Hassan Rad, process engineer at Hyperion Wastewater Treatment Plant, there are no plans to cover the tanks and no wildlife hazard mitigation techniques are used at the facility.

The primary wastewater discharge from Hyperion Wastewater Treatment Plant is located 5 miles offshore in the Pacific Ocean (personal communication with Ms. Melinda Bartlett and Mr. Hassan Rad, 1998). There is a small (24" diameter) sludge outfall 7 miles offshore which has been shut down since 1985 and a small emergency outfall at 1 mile out (personal communication with Ms. Melinda Bartlett, 1998). The FAA (1997) recommends separating incompatible land uses that attract wildlife and an airport's aircraft movement areas, loading ramps, or aircraft parking areas by a distance of 5 statute miles if the wildlife attractant may cause hazardous movement into or across the approach or departure airspace. The main outfall from Hyperion complies with this recommendation.

<u>Approach</u>

At LAX, during 1989-1997, the majority of bird strikes (60%) occurred on approach and landing versus climb and take-off (27%) as determined from preliminary analysis by Sapphos Environmental of bird strike data provided by LAWA (LAWA, 1997). Most of the strikes happening during approach and landing involve three bird groups: gulls, pigeons and sparrows. This indicates that knowledge of existing land uses in Inglewood, which lies directly under the approach path, is a very important component of a Wildlife Management Program. Two facilities in Inglewood that may be attracting birds to the area are Hollywood Park and Inglewood Park Cemetery. Both of these facilities have open-

space and shelter (trees and bushes) that may be attracting birds. In addition, Hollywood Park has a large water feature which may be causing birds to congregate there. The issue of land uses under the approach path to LAX warrants further study.

Another possible reason for the greater occurrence of strikes on approach and landing than on take-off may be due to differences in the flight characteristics of the aircraft during these varying phases of flight. On approach aircraft are throttled back (and consequently quieter), and have more exposed surface area with flaps, landing-gear and spoilers deployed. On take-off planes are using full-power (and consequently very loud) and have a slimmer profile than on approach. Burger (1983), in a study at J. F. Kennedy International Airport, found that wide-bodied planes had significantly more bird strikes than the narrow-bodied aircraft, indicating that birds have less warning of approaching wide -bodied aircraft than narrow-bodied aircraft. Burger (1983) suggests that this higher strike rate may be due to greater frontal area, greater intake area and higher air intake per time than the engines on older model aircraft. This higher strike rate may also be explained by the fact that since wide-bodied aircraft and aircraft on approach are quieter than narrow-bodied aircraft and planes taking off, birds have less acoustic warning and less opportunity to move out of the way.

<u>Take-Off</u>

During normal flight patterns, aircraft departing from LAX take-off and climb out over the El Segundo Dunes and turn over the Pacific Ocean. Twenty-seven percent of bird strikes at LAX between 1989 and 1997 occurred during this phase of flight (LAX, 1997). The El Segundo Dunes provides relatively few attractants to birds which may partially account for the significantly lower percentage of strikes occurring over this area than over the approach area. The El Segundo Dunes naturally supports very few trees- the only trees present are non-native trees that have been planted, and there is no standing water. Native annual and perennial plant species do provide a food source for seed-eating birds, but there is a general lack of cover to provide safety and nesting areas for birds.

During a winter bird survey conducted by Sapphos Environmental (Sapphos Environmental, 1997) in January 1998 a total of 17 bird species were observed either on the Dunes or flying directly over the Dunes. Of these 17 species most are low-flying species such as white-crowned sparrow, California towhee, loggerhead shrike, western meadowlark and house finch. According to the LAX bird strike data, the birds involved in strikes most frequently during climb and take-off are gulls (8 records) and pigeons (9 records). However, it appears that in general, aircraft departing LAX over the Dunes are of sufficient altitude to be above the ordinary flight pattern of the majority of bird species inhabiting the Dunes.

The California Coastal Commission(1997), in written comments responding to the Notice of Intent to Prepare an Environmental Impact Statement for the Los Angeles International Airport Master Plan, state their concerns that locating a runway closer to the coast may increase the potential for bird strikes. The *Master Plan* alternative which included a runway through the northern segment of the Dunes has been dropped from consideration. However, the remaining alternatives do propose to extend existing and new runways towards the Dunes. As stated above, the Dunes does not support a large resident bird population.

A species that is of particular concern to the California Coastal Commission is the federally endangered California least tern. In the past a California least tern nesting colony site was established on Dockweiler State Beach directly west of the Dunes, but was removed when the airport objected. California least tern colonies that are situated within airport operations areas can result in a very constraining situation for airport operations (personal communication with Melissa Mailander, 1997). Ms. Mailander oversees a California least tern nesting colony of over 100 adults and chicks at San Diego International - Lindbergh Field in San Diego, California.

The least tern nesting colony at Lindbergh Field has been used off and on over approximately the last twenty years. The terns reestablished the nesting site six years ago and have been increasing in number ever since then. The nesting colony is located within operation ovals near a taxiway used by smaller aircraft, and near take-off and approach patterns. There is chick fencing around the colony to keep tern chicks from straying onto the taxiways. Once fledged and able to fly short distances, the terns sit on the taxiway causing an operational hazard and forcing the closure of the taxiway. Young birds have been killed sitting on the taxiway - however, there are no documented reports of airstrikes involving least terns at Lindbergh Field. According to Ms. Mailander (1997), the U.S. Fish and Wildlife Service considers least terns too small to cause a bird strike problem.

An additional concern related to the nesting of the least terns at Lindbergh Field is that the colony tends to act as a magnet for avian predators such as American kestrels *(Falco sparverius)*, common ravens *(Corvus corax)* and federally endangered peregrine falcons that feed on the terns (personal communication with Ms. Mailander, 1997). The attraction of these birds to the area increases the potential for bird strikes.

As mentioned previously in this document, there have been no documented strikes of endangered species at Point Mugu Naval Air Station in Point Mugu including the California least tern (personal communication with Mr. Tom Keeney, 1997). There is an established least tern colony at Point Mugu Naval Air Station and the birds do fly back and forth across the main runway to feeding areas. It is presumed that the least terns are flying at heights lower than the aircraft on take-off and/or approach and thus are not in the aircraft's direct flight path.

Another airport with an established California least tern nesting colony is Nimitz Field, the airfield at the former Alameda Naval Air Station on San Francisco Bay. The base has been decommissioned and there is currently a proposal to convert the base to civilian use as a National Wildlife Refuge. The U.S. Fish and Wildlife Service is seriously considering allowing an active airfield on the proposed 900 acre refuge (Baldwin, 1997). The limited-use airfield would accommodate less than 30 flights per day of small corporate jets. The major reason cited for allowing the airfield is that the tern colony, which is situated between the runway and the ramp, flourished under the Navy's supervision of the airfield (Baldwin, 1997). As evidenced by the above mentioned examples, the issue of least tern nesting colonies at, or adjacent to airfields is a complex one.

It is recommended that the EIS/EIR include appropriate short-term and long-term avian control measures or the requirement to prepare and implement a Wildlife Hazard Management Program prior to implementation of elements of the *Los Angeles International Airport 2015 Expansion Master Plan* that are likely to generate increased flights. The accuracy of the Bird Strike Data maintained by LAWA may be greatly enhanced through a training program for operations staff in the recovery and documentation of avian bird strikes to aircraft. A manual illustrating the most common birds involved in air strikes may also enhance the quality and accuracy of recorded data.

ATTACHMENT 1

BIRD STRIKE DATA 1989-1997,

LOS ANGELES INTERNATIONAL AIRPORT

BIRD STRIKE DATA 1989 - 1997, Los Angeles International Airport

1/2/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Climb		Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach		Yes	Overcast	Seagulls	Unk.	N/A
2/20/89	Unk.	B-737-300	Unk.	100	130	Landing		Yes	Overcast	Crows	Unk.	1
2/20/89	Unk.	B-737	Unk.	200	145	Take off		Yes	Overcast	Sparrows	11 to 100	1
4/18/89	Unk.	B-737	Unk.	4000	170	Approach		Yes	Overcast	Sparrows	Unk.	1
4/18/89	Unk.	B-727-200	Unk.	0	0	Landing		Yes	No cloud	Seagulls	Unk.	1
4/28/89	Unk.	B-737	Unk.	500	Unk.	Take off		Yes	No cloud	Seagulls	2 to 10	1
4/30/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Unk.		Yes	No cloud	Sparrows	Unk.	1
5/5/89	Unk.	B-727-200	Unk.	0	0	Landing		Yes	No cloud	Sparrows	Unk.	1
8/2/89	Unk.	B-737	Unk.	0	0	Landing		Yes	Overcast	Sparrows	Unk.	2 to 10
8/8/89	Unk.	Unk.	Unk.	300	140	Landing		Yes	No cloud	Sparrows	Unk.	1
8/9/89	Unk.	B-737	Unk.	0	120	Take off		Yes	No cloud	Pigeons/Grouse	2 to 10	2 to 10
8/22/89	Unk.	B-737	Unk.	0	0	Take off		Yes	No cloud	Great Blue Heron	Unk.	Unk.
9/8/89	Unk.	B-727-200	Unk.	1200	130	Landing		Yes	No cloud	Sparrows	Unk.	1
9/13/89	Unk.	B-737	Unk.	100	160	Climb		None	No cloud	Pigeons/Grouse	Unk.	1
9/27/89	Unk.	B-767-200	Unk.	0	0	Approach		Yes	No cloud	Seagulls	1	1
11/5/89	Unk.	B-767-200	Unk.	Unk.	Unk.	Landing		Yes	No cloud	Seagulls	Unk.	2 to 10
11/6/89	Unk.	B-737	Unk.	5000	210	Approach		Yes	Some cloud	American Robin	Unk.	1
11/9/89	Unk.	Unk.	Unk.	150	135	Landing		Yes	Some cloud	Pigeons/Grouse	Unk.	1
11/26/89	Day	B-767-200	Rwy 25L	0	Unk.	Landing		None	Some cloud	Rock Dove	2 to 10	Unk.
7/13/90	Day	DC-10	Unk.	0	125	Landing		None	Some cloud	Hawks	1	Unk.
7/26/90	Day	Unk.	Unk.	0	Unk.	Take off		None	Some cloud	Sandpipers	Unk.	1
7/27/90	Day	Unk.	Unk.	0	130	Landing		None	Overcast	Terns	1	2 to 10
7/30/90	Day	B-757-200	Unk.	300	Unk.	Climb	Precautionary		No cloud	Western Gull	1	2 to 10
8/9/90	Day	B-737-300	Unk.	200	165	Climb		None	Some cloud	Unk.	1	1
8/10/90	Night	C-9	Rwy 24R	2200	180	Approach		None	No cloud	Unk.	1	1
8/17/90	Night	C-9	Unk.	Unk.	Unk.	Approach		None	Unk.	Unk.	Unk.	Unk.
9/5/90	Day	BA-146-100	Unk.	10	110	Approach		None	No cloud	Rock Dove	11-100	1
9/6/90	Day	C-9	Unk.	Unk.	Unk.	Unk.		None	Unk.	Unk.	Unk.	Unk.
9/8/90	Day	PA-23	Unk.	0	100	Landing		None	Some cloud	Rock Dove	1	1
9/16/90	Day	B-737-200	Unk.	12500	320	Climb		None	No cloud	Unk.	Unk.	1
9/20/90	Day	B-737-300	Unk.	0	90	Landing		None	Some cloud	Doves	2 to 10	1
9/21/90	Day	B-737	Unk.	0	100	Landing		None	No cloud	Sparrows	2 to 10	Unk.

1/2/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Climb	Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach	Yes	Overcast	Seagulls	Unk.	N/A
9/21/90	Day	B-727-100	Rwy 24R	0	120	Landing	None	Overcast	Doves	2 to 10	1
10/19/90	Night	BA-146-100	Rwy 24L	6500	200	Climb	None	No cloud	Unk.	Unk.	Unk.
11/3/90	Day	B-737	Unk.	50	Unk.	Climb	None	No cloud	Rock Dove	Unk	1
11/7/90	Day	DA-10	Rwy 25L	0	Unk.	Take off	None	No cloud	Unk.	Unk.	Unk.
11/21/90	Day	B-757-200	Unk.	Unk.	Unk.	Take off	None	No cloud	Unk.	2 to 10	2 to 10
1/5/91	Day	B-737-200	Unk.	0	170	Take off	None	Some cloud	Ducks	Unk.	2 to 10
4/4/91	Night	DC-10	Unk.	150	147	Approach	None	No cloud	Unk.	Unk.	1
4/7/91	Day	Unk.	Unk.	400	140	Approach	None	No cloud	Unk.	2 to 10	Unk.
4/7/91	Day	SA-226	Unk.	700	130	Climb	None	No cloud	Unk.	Unk.	Unk.
4/10/91	Night	DC-10	Unk.	0	120	Take off	None	No cloud	Larks	Unk.	Unk.
5/2/91	Night	B-737-200	Unk.	120	100	Approach	None	No cloud	Rock Dove	1	1
5/5/91	Day	B-737	Unk.	1200	140	Approach	None	Some cloud	Seagulls	2 to 10	2 to 10
5/5/91	Day	DMC7	Unk.	4000	220	Climb	None	No cloud	Unk.	1	1
7/6/91	Day	A-300	Unk.	0	125	Take off	None	Some cloud	Hawks	1	11 to 100
7/20/91	Dawn	B-767	Unk.	400	140	Approach	None	Overcast	Rock Dove	Unk.	2 to 10
9/8/91	Day	B-737-300	Rwy 24R	500	138	Approach	None	Overcast	Unk.	2 to 10	2 to 10
9/13/91	Day	B-737-300	Rwy 25L	50	130	Approach	None	No cloud	Rock Dove	1	Unk.
11/6/91	Unk.	B-757-200	Unk.	0	140	Landing	Nunk.	No cloud	Rock Dove	2 to 10	1
11/26/91	Day	B-767-200	Rwy 24L	0	110	Take off	Aborted take off	Some cloud	Seagulls	Unk.	1
1/29/92	Day	DC-10-40	Unk.	0	120	Take off	Aborted take off	No cloud	Rock Dove	2 to 10	Unk.
3/18/92	Day	B-737-300	Unk.	1500	140	Approach	None	No cloud	Seagulls	1	2 to 10
3/24/92	Night	L-1011-1	Unk.	Unk.	235	Approach	None	No cloud	Unk.	Unk.	Unk.
4/16/92	Night	B-767	Unk.	Unk.	Unk.	None	Unk.	Unk.	Unk.	Unk.	1
4/21/92	Day	MD-80	Rwy 24R	7000	250	Approach	No Cloud	Unk.	Unk.	1	1
4/25/92	Night	DC-10-10	Rwy 25R	10000	250	Approach	None	Some cloud	Unk.	Unk.	1
7/14/92	Day	B-737	Rwy 25R	0	Unk.	Take off	Aborted take off	No cloud	American Kestrel	Unk.	2 to 10
7/15/92	Day	B-737-500	Unk.	0	150	Landing	None	Overcast	Unk.	Unk.	1
7/16/92	Day	EMB-120	Rwy 25L	100	130	Approach	None	No cloud	Rock Dove	Unk.	Unk.
7/25/92	Day	B-737	Unk.	10	130	Approach	Unk.	Some cloud	Unk.	2 to 10	1
8/3/92	Day	BE-1900	Unk.	500	Unk.	Climb	Unk.	Unk.	Unk.	Unk.	1
9/10/92	Day	BE-1900	Unk.	2000	180	Approach	Unk.	Overcast	Seagulls	Unk	1
9/20/92	Day	SAAB-340B	Rwy 24R	0	90	Landing	None	No cloud	Seagulls	11-100	1
10/6/92	Day	B-727	Unk.	0	135	Landing	Unk.	No cloud	Doves	2 to 10	1

1/2/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Climb	Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach	Yes	Overcast	Seagulls	Unk.	N/A
10/20/92	Unk.	EMB-120	Unk.	100	130	Approach	Unk.	No cloud	Seagulls	Unk.	Unk.
11/21/92	Day	MD-88	Unk.	1000	150	Approach	Unk.	No cloud	Seagulls	2 to 10	Unk.
5/20/93	Day	B-737-300	Rwy 24L	50	140	Approach	None	No cloud	Unk.	2 to 10	10
6/20/93	Day	B-737-500	Unk.	0	120	Landing	None	No cloud	Blackbirds	1	Unk.
7/3/93	Day	B-727-200	Unk.	0	110	Landing	None	Some cloud	Rock Dove	2 to 10	Unk.
7/13/93	Day	B-737-300	Unk.	0	90	Take off	Unk.	Overcast	Unk.	Unk.	1
7/24/93	Day	MD-80	Unk.	0	125	Landing	None	No cloud	Unk.	Unk.	1
8/4/93	Night	DA-20	Rwy 25R	0	15	Take off	Aborted take off	Some cloud	Red Tailed Hawk	Unk.	Unk.
9/4/93	Day	MD-82	Rwy 25R	3000	250	Climb	None	No cloud	Unk.	1	1
9/8/93	Night	B-757-200	Rwy 25R	3000	200	Climb	None	No cloud	Unk.	Unk.	1
9/21/93	Day	B-767-200	Rwy 25L	400	130	Approach	None	Some cloud	Unk	Unk.	1
9/24/93	Night	B-737-300	Unk.	1500	210	Climb	None	No cloud	Swallows	Unk.	1
10/22/93	Day	B-737	Rwy 24L	400	170	Take off	Precautionary	No cloud	Seagulls	Unk.	2 to 10
10/26/93	Night	DC-10	Rwy 25L	1500	150	Approach	None	No cloud	Seagulls	1	1
11/16/93	Day	B-737-200	Unk.	50	120	Approach	None	No cloud	Unk	2 to 10	2 to 10
12/1/93	Day	B-767	Unk.	0	Unk.	Landing	None	No cloud	Unk	Unk.	1
12/26/93	Day	EMB-120	Unk.	0	100	Landing	None	Some cloud	Hawks	1	1
1/16/94	Day	B-747-400	Rwy 25L	400	155	Approach	None	Unk.	Unk	Seagulls	1-Jan
2/6/94	Day	SW-3	Unk.	1000	140	Approach	None	Some cloud	Pigeons/Doves	Unk.	2 to 10
3/3/94	Day	DC-10	Unk.	900	140	Approach	None	No cloud	Seagulls	2 to 10	Numerous
3/5/94	Day	BA-31	Unk.	30	100	Approach	None	Overcast	Seagulls	Unk.	1
3/7/94	Day	SW-3	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.
3/18/94	Day	DC-10	Rwy 25L	0	150	Landing	None	No cloud	Seagulls	1	2 to 10
4/27/94	Dawn	A-320	Rwy 24R	50	150	Climb	None	Some cloud	Seagulls	1	2 to 10
5/2/94	Day	MD-80	Unk.	2500	Unk.	Approach	None	Some cloud	Seagulls	Unk	2 to 10
5/15/94	Day	BA-31	Unk.	0	90	Landing	None	Overcast	Rock Dove	2 to 10	Unk.
6/4/94	Day	B-737	Unk.	10	135	Approach	None	Unk.	American Robin	1	2 to 10
7/18/94	Dusk	B-737-400	Rwy 24R	1100	150	Approach	None	Some cloud	Unk.	2 to 10	2 to 10
8/3/94	Night	B-737-300	Rwy 24L	5000	230	Approach	None	No cloud	Seagulls	1	1
8/14/94	Day	B-747	Rwy 25R	10	160	Approach	None	No cloud	Unk.	2 to 10	1
9/26/94	Night	B-757-200	Rwy 25R	1000	180	Approach	None	No cloud	Unk.	Unk.	4
10/17/94	Day	B-727-100	Unk.	Unk.	Unk.	Unk.	Engine shut down	Unk.	Unk.	Unk.	Flock
11/6/94	Day	B-737-300	Unk.	500	140	Approach	None	No cloud	Seagulls	2 to 10	1

1/2/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Climb	Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach	Yes	Overcast	Seagulls	Unk.	N/A
11/14/94	Day	B-747-400	Rwy 25L	100	145	Approach	None	No cloud	Unk.	2 to 10	Unk.
12/8/94	Night	B-737-300	Unk.	Unk.	Unk.	Unk.	Unk.	No cloud	Unk.	Unk.	Unk.
12/25/94	Day	BA-31	Rwy 25L	900	135	Approach	None	No cloud	Unk.	Unk.	1
1/8/95	7:15	Unk	Rwy 25L	Unk.	Unk.	Landing	Unk.	Unk.	Seagull	1	1
1/14/95	Day	BA-31	Rwy 25L	0	Unk.	Landing	None	Overcast	Red Tailed Hawk	1	1
2/23/95	Unk.	B-737-300	Unk.	Unk.	Unk.	Approach	Unk.	Unk.	Unk.	Unk.	1
3/4/95	10:40	B 747	Rwy 24L	Unk.	Unk.	Take off	Unk.	Unk.	Unk	Unk.	1
3/31/95	Unk.	B-737-300	Unk.	Unk.	Unk.	Approach	Unk.	Unk.	Unk.	Unk.	1
5/17/95	Night	B-737	Unk.	3900	250	Climb	Unk.	No cloud	Seagulls	2 to 10	1
5/22/95	Dusk	B-737	Rwy 25R	0	Unk.	Take off	None	Some cloud	Unk.	1	1
5/23/95	Day	B-737-300	Rwy 24R	0	Unk.	Landing	None	No cloud	Unk.	2 to 10	Unk.
6/4/95	Day	B-737-200	Rwy 24R	0	Unk.	Landing	None	Overcast	Unk.	1	2 to 10
6/13/95	13:35	BAE 31	Rwy 26L	Unk.	Unk.	Landing	Unk.	Unk.	Red Tailed Hawk	1	1
6/22/95	Dusk	B-767	Rwy 24R	0	Unk.	Landing	None	Overcast	Unk	1	1
6/22/95	19:52	B 767	Rwy 24R	Unk.	Unk.	Landing	Unk.	Unk.	Unk	Unk.	1
7/5/95	Day	BA-31	Rwy 25R	0	25	Take off	Aborted take off	Overcast	Unk.	1	2 to 10
7/15/95	Night	A-320	Rwy 25L	0	Unk.	Landing	None	Unk.	Unk.	Unk.	2 to 10
7/23/95	Day	B-737-300	Unk.	50	140	Approach	None	No cloud	Unk	1	2 to 10
8/2/95	Day	B-747	Rwy 25L	0	Unk.	Landing	None	Overcast	Rock Dove	2 to 10	1
8/2/95	8:00	B 747	Rwy 25L	Unk.	Unk.	Landing	Unk.	Unk.	Pigeons	Flock	2 to 10
8/3/95	8:45	B 757	Rwy 24L	Unk.	Unk.	Landing	Unk.	Unk.	Pigeons	Unk.	1
8/4/95	15:40	Unk.	Rwy 24R	Unk.	Unk.	Unk.	Unk.	Unk.	Hawk	Unk.	2 to 10
8/10/95	Day	B-767	Rwy 24L	100	130	Approach	None	No cloud	Rock Dove	2 to 10	10
8/22/95	12:05	Unk.	Rwy 24L	Unk.	Unk.	Unk.	Unk.	Unk.	Pigeons	Unk.	1
8/29/95	Day	B-757-200	Rwy 24R	0	Unk.	Landing	None	No cloud	American Kestrel	1	1
8/29/95	17:45	B 727	Rwy 24R	Unk.	Unk.	Landing	Unk.	Unk.	Pigeons	Unk.	Unk.
9/6/95	Unk.	B-747-400	Unk.	0	150	Take off	Unk	Unk.	Rock Dove	Unk.	Unk.
9/21/95	Day	B-737	Rwy 24L	100	Unk.	Take off	None	No cloud	Rock Dove	Unk	Unk.
10/7/95	11:00	Unk.	Rwy 25L	Unk.	Unk.	Landing	Unk.	Unk.	Unk.	Unk.	1
10/16/95	Night	B-767-200	Rwy 25L	5800	230	Approach	None	No cloud	Unk.	1	1
10/27/95	Night	DC-10	y 25R 25R	1800	200	Climb	None	No cloud	Unk.	Unk.	1
10/28/95	Day	B-737-500	Rwy 24R	0	130	Landing	Other	Some cloud	Sparrows	2 to 10	1

1/2/89	Unk.	B 737-300	Unk.	Unk.	Unk.	Climb	Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach	Yes	Overcast	Seagulls	Unk.	N/A
11/1/95	Day	EMB-120	Rwy 25L	0	Unk.	Landing	None	Overcast	Rock Dove	2 to 10	1
11/1/95	9:10	Unk.	Rwy 25L	Unk.	Unk.	Landing	Unk.	Unk.	Pigeons	Flock	2 to 10
11/9/95	Night	DC-10	Unk.	Unk.	Unk.	Climb	None	Unk.	Unk.	Unk	1
11/21/95	12:33	Unk	Rwy 25L	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	1
12/20/95	Day	L-1011-1	Rwy 25R	0	90	Take off	Aborted take off	No cloud	Rock Dove	11-100	2 to 10
12/20/95	12:40	L 1011	Rwy 25R	Unk.	Unk.	Take off	Aborted	Unk.	Unk.	Unk.	Unk.
12/24/95	11.30	B 757	Rwy 26L	Unk.	Unk.	Unk.	Unk.	Unk.	Pigeon	Unk.	1
1/12/96	Day	B-737	Rwy 24R	350	140	Approach	None	No cloud	Seagulls	2 to 10	1
1/22/96	Unk.	B-767-300	Unk.	Unk.	Unk	Unk.	Unk.	Unk.	Unk.	Unk.	Flock
2/7/96	Unk.	B-767	Unk.	Unk.	Unk.	Unk.	Other	Unk.	Unk.	Unk.	1
2/9/96	Night	B-767-300	Rwy 24R	5000	180	Approach	None	No cloud	Unk.	Unk.	1
3/9/96	Day	B-737	Rwy 24R	0	Unk.	Take off	Aborted take off	Unk.	Unk	Unk.	Unk.
4/9/96	Day	B-747	Unk.	0	Unk.	Landing	Aborted take off	Unk.	Rock Dove	Unk.	1
4/10/96	Day	B-757-200	Rwy 24R	300	120	Approach	None	Cloud/Fog	Unk.	Unk.	2 to 10
4/10/96	Day	B-737-300	Rwy 24L	0	80	Take off	Aborted take off	Cloud/Fog	Rock Dove	2 to 10	1
4/23/96	Day	BA-31	Rwy 24L	1200	140	Approach	None	No cloud	Sparrows	1	Unk.
5/19/96	Day	MD-82	Rwy 24R	100	125	Approach	None	No cloud	Unk.	Unk.	1
5/20/96	9:40	MD 80	Rwy 25L	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	1	Unk.
5/25/96	Day	BA-31	Rwy 6L	200	110	Approach	None	Overcast	Unk.	1	1
5/27/96	Day	B-727-100	Rwy 24L	150	160	Climb	None	Overcast	Unk.	1	2 to 10
6/22/96	Unk.	B 737-300	Unk.	0	Unk.	Unk.	Unk.	Unk.	American Kestrel	Unk.	1
6/24/96	Day	B-747-100	24L	3000	250	Climb	None	Overcast	Unk.	Unk.	1
6/24/96	7:50	Unk.	Twy K Btn	Unk.	Unk	Unk.	Unk.	Unk.	Hawk	Unk.	1
7/7/96	22:30	B 747	Rwy 24R	Unk.	Unk.	Landing	Unk.	Unk.	Unk.	Unk.	1
7/29/96	Night	B-737-300	Unk.	1900	180	Approach	Unk.	No cloud	Unk	Unk.	1
8/4/96	17:10	Unk.	Rwy 25R	Unk.	Unk.	Landing	Unk.	Unk	Unk.	Unk.	Unk.
8/19/96	Day	B-767	Rwy 25L	0	Unk.	Landing	None	Some cloud	Rock Dove	Unk.	1
8/19/96	10:25	B 767	Rwy 25L	Unk.	Unk.	Landing	Unk.	Unk.	Pigeon	Unk.	1
8/29/96	Day	EMB-120	Rwy 24R	0	100	Landing	None	No cloud	Unk.	15 to 100	Unk.
9/14/96	14:15	B 67-30	Rwy 24R	Unk.	Unk.	Landing	Unk.	Unk.	Pigeons	Flock	1
9/14/96	Unk.	B-767-300	Unk.	0	Unk.	Landing	Unk.	Unk.	Unk.	Unk	1
9/27/96	10:30	Unk.	Rwy 25R	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	3
10/9/96	Day	DC-9	Rwy 24R	0	100	Landing	None	No cloud	Rock Dove	1	2 to 10

1/2/89	Unk.	B-737-300	Unk.	Unk.	Unk.	Climb	Yes	No cloud	Seagulls	1	1
1/23/89	Unk.	B-737-300	Unk.	0	0	Approach	Yes	Overcast	Seagulls	Unk.	N/A
10/20/96	Night	B-737-500	Unk.	2000	175	Approach	Unk.	No cloud	Unk.	Unk.	2 to 10
10/22/96	Day	B-767-300	Rwy 24L	50	145	Climb	None	No cloud	Unk.	1	Unk
12/7/96	Day	B-737-300	Unk.	10	130	Approach	Unk	No cloud	Unk.	1	1
1/27/97	Day	DC-10	Rwy 24L	Unk.	Unk.	Climb	Engine shut down	Unk.	Seagulls	Unk.	1
1/28/97	16:45	B 747	Rwy 24L	Unk.	Unk.	Take off	Unk	Unk.	Unk	Unk.	1
3/14/97	10:06	Unk.	Rwy 25L	Unk.	Unk.	Unk	Unk	Unk.	Seagull	Unk.	Unk.
3/21/97	Dusk	B-737-300	Rwy 24R	Unk.	Unk.	Climb	None	Some cloud	Unk.	1	1
4/4/97	Night	BA-31	Unk.	3000	180	Descent	None	Overcast	Unk.	Unk.	1
5/23/97	6:59	MD 80	Rwy 24L	Unk.	Unk.	Take off	Return	Unk.	Seagull	Unk	1
6/16/97	10:40	Unk.	Rwy 25l	2000	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	1
7/9/97	19:40	Unk.	Rwy 25L	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	1
7/13/97	7:20	SAA8 340	Rwy 24R	Unk.	Unk.	Landing	Rnwy closed	Unk.	Pigeons	10	1
7/16/97	11:45	Unk.	Rwy 25R	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	8
7/20/97	14:15	B 737	Rwy 24L	Unk.	Unk.	Landing	Unk.	Unk.	Unk.	Unk.	2 to 10
7/24/97	9:15	Unk.	Rwy 25L	Unk.	Unk.	Unk.	Unk.	Unk.	Pigeons	Unk.	Unk.
8/9/97	14:30	B 737	Rwy 24R	Unk.	Unk.	Landing	Damaged blades	Unk.	Unk.	Unk.	Unk.
9/5/97	Unk.	B-727-100	Unk.	5400	145	Approach	Unk.	Some cloud	Unk.	Unk.	2 to 10
9/8/97	7:40	B 727	Rwy 24L	Unk.	Unk.	Unk.	Unk.	Unk.	Sparrow Hawk	1	1
9/23/97	8:25	Unk.	Rwy 25R	Unk.	Unk.	Unk.	Unk.	Unk.	Pigeons	Unk.	12
9/30/97	16:30	B 767	Rwy 25R	Unk.	Unk.	In flight	None	Unk.	Pigeons	Unk.	1
10/4/97	13:55	B 747	Rwy 24R	N/A	Unk.	Landing	Unk.	Unk.	Pigeons	Unk.	1
10/15/97	14:50	B 757	Rwy 25R	N/A	Unk.	Take off	Aborted	Unk.	Pigeons	Unk.	2 to 10
10/16/97	16:25	DC 10	Rwy 25R	Unk	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.
10/17/97	13:55	B 757	Rwy 24R	N/A	Unk.	Landing	Unk.	Unk	Pigeons	Unk.	Unk.
10/21/97	15:02	Unk.	Rwy 25L	N/A	Unk.	Unk.	Unk.	Unk.	Pigeons	Unk.	Unk.
Date	**Time**	**Aircraft Type**	**Runway**	**Altitude (feet)**	**Speed**	**Phase of Flight**	**Effect on Flight**	**Weather Conditions**	**Bird Species**	**Number Birds seen**	**Number Birds struck**

2.6 1067 007

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

January 29, 1998

MEMORANDUM FOR THE RECORD
JN 1067-007.M01

TO:	Los Angeles World Airports (Mr. Steve Crowther)
FROM:	Sapphos Environmental (Ms. Tracey Alsobrook, Dr. Brad Blood)
SUBJECT:	Winter Bird Count at El Segundo Dunes
ENCLOSURE:	1. Field Notes of Winter Bird Count on 01/15/98

This Memorandum for the Record transmits the results of the Winter Bird Count which took place on January 15, 1998 at the El Segundo Dunes (Dunes), ESB Habitat Restoration Area and the portion of the Dunes north of Sandpiper Street. This Survey was performed in support of ongoing maintenance and monitoring of the ESB Habitat Restoration Area (Los Angeles International Airport, U.S.G.S. 7.5 minute Venice Quadrangle, Range 15 West, Township 2 South, lies within the Sausal Redondo Land Grant Boundary). The survey was initiated at 7:00 AM and was completed at 11:30 AM on January 15, 1998. The Survey was conducted by personnel from Sapphos Environmental (Dr. Brad Blood, Ms. Tracey Alsobrook). Weather conditions during the survey hours were as follows: temperatures varying between 45° F to 52° F; cloud cover was 100 percent with occasional misty rain, and wind speed was less than 5 miles per hour.

The ESB Habitat Restoration Area was covered by foot, and all other areas, including the acreage north of Sandpiper Street were also covered. The survey route is described in the attached field notes. All birds observed were counted and recorded in the field notes. A total of seventeen species of birds were observed on, or flying directly over the Dunes. An additional five species were observed either on Dockweiler State Beach, flying over the open ocean or on the open water. The three most abundant species on the Dunes were European starling *(Sturnus vulgaris)*, rock dove *(Columba livia)* or pigeon and house finch *(Carpodacus mexicanus)*. These are all species which do well in urban areas. There was an especially large concentration of rock doves perched on the wires near the entrance gate into the northern Dunes area on Waterview Street. These birds are attracted to the area because of habitual public feeding at this location.

No state or federally listed rare, threatened or endangered species were observed on the Dunes. A total of five loggerhead shrikes (*Lanius ludovicianus*), a California Department of Fish and Game "Species of Special Concern" were observed. One species observed flying out over the open ocean the California brown pelican *(Pelecanus occidentalis californicus)* is listed as a state and federally endangered species. The majority of birds on the Dunes were observed either in the vicinity of the VOR or the acreage north of Sandpiper Street where there are more trees.

If you have any questions concerning this Memorandum For the Record please contact Dr. Brad R. Blood or Ms. Tracey Alsobrook at (626) 683-3547.

(1) Sapphos Environmental
Jan 15 1998
JN 1043·005

X-MAS BIRD COUNT AT LAX/
EL SEGUNDO DUNES.

TRACEY ALSOBROOK
BRAD BLOOD

Weather: temp. varied from 45°F to 52°F, cloud cover at 100%, with occassional misty rains. winds calm, < 5 mph.

START: 7 AM.

Observations began with subsites west and about VOR. Both observers walked down from gate leading to VOR toward Vista Del Mar, then south along subsite next to Vista Del Mar then east along mid dip next to Imperial Hwy. observers walked to edge of Mesa then turn and walked back along edge of VOR and around western edge of VOR back to GATE.

(2)
1/15/98

observers then drove vehicle to subsite 45 and surveyed subsites out of ESB H.C. Area. then split up and walked toward VOR, 1 on high road, one on low road and surveyed subsites on walk back to the vehicle, zig-zagging along way to cover all AREAS. Then observers covered subsites below Old buildings. Lastly the observers surveyed the AREAS south of Sandpiper Street. Please see Field Map for routes.

Weather remained overcast and cold during survey.

(3)

1/15/98

Species observed SS [illegible] Sandpiper

Mourning Dove 𝍸 𝍸 |||
American Crow 𝍸 | SS 𝍸
White-crowned Sparrows 30 + 15 SS
Ring-billed Gull 𝍸 + 15 SS |||
Loggerhead Shrike |||| SS |
Brown Pelicans 𝍸 𝍸 ||| — [illegible] flying over ocean
Rock Dove ||| + 15 + 16 SS 85
Western Gull 50 + ||| seen near Roads
Heermann's Gull 28 seen on Beach
West. Meadowlark 32.
Starling 27 + 10 + 3 SS 18
Red-tailed Hawk ||
Calif. Towhee |||
Anna's Hummingbird |||| SS |||
House Finch 22 + 8 + 5
Common Raven |
American Kestrel || SS |||
Say's Phoebe || SS ||
W. Scrub Jay SS |||
N. Mockingbird SS ||

= observed in ocean across from Dunes
Surf Scoters 𝍸 𝍸 ||
W. Grebe 𝍸 𝍸 𝍸 ||

(4)

1/15/98

Several species were counted, but were not seen on the Dunes - western Gulls, Heermann's gulls were observed on the beach across from the Dunes. Brown Pelicans were also observed flying over the ocean, Surf Scoters and W. Grebes were seen in the ocean. They were noted because they could potentially fly across the dunes to the cornfield. Some Gulls were observed flying across the dunes.

Scrub Jays and Mockingbirds were only observed in the areas N. of Sandpiper Street, in the areas of the large trees.

The observers felt the poor weather conditions affected the observability of the species present

1/15/98

(5)

Observers kept a special attention for burrowing owls, or possible habitat areas which could attract some. Many normally bare areas were thickly vegetated with new growth. In the bare sandy areas no suitable burrows were observed. No nesting sites were seen as of Sandpiper. However, several suitable burrows and bare areas were observed around Parking in the N.W corner of the air field next to the fence.

environmental compliance
resource management planning

January 19, 1998

MEMORANDUM FOR THE RECORD
JN 1067-004.M28

TO:	Landrum & Brown (Mr. Richard Macias and Ms. Karen Yamamoto) City of Los Angeles Department of Airports (Ms. Sheila Murphy) Federal Aviation Administration (Mr. Dave Kessler)
FROM:	Sapphos Environmental (Dr. Irena Mendez, Dr. Steve Patterson, and Ms. Marie Campbell)
SUBJECT:	El Segundo Blue Butterfly Habitat Quality Evaluation at the Los Angeles/El Segundo Dunes
ATTACHMENTS:	1. Background on El Segundo Blue Butterfly Survey Methods 2. Coast buckwheat Survey and Mapping Methods 3. Method for Estimating Percent Cover by Non-native Species
REFERENCE:	Sapphos Environmental Memorandum for the Record (1067 004.M23) dated November 1, 1997 [Subject: Habitat Quality Evaluation of the Los Angeles/El Segundo Dunes]

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

EXECUTIVE SUMMARY

This Memorandum for the Record serves to transmit the preliminary assessment of habitat quality for the El Segundo blue butterfly at the Los Angeles El Segundo Dunes (Dunes). This work has been completed by Sapphos Environmental in conformance with Task 3-2.6.3.3 of Sapphos Environmental contract with Landrum & Brown executed June 3, 1997. Landrum & Brown, Inc. is the principal consultant responsible for assisting the Federal Aviation Administration and the City of Los Angeles Department of Airports in the preparation of a joint environmental impact statement and environmental impact report in support of the *Los Angeles International Airport 2015 Master Plan Expansion Project*. Sapphos Environmental is responsible for providing input to the joint environmental impact statement and environmental impact report related to Biotic Communities, Threatened and Endangered Species, and Wetlands.

The preliminary assessment of habitat quality indicates that high habitat values (Rank 5, where Rank 6 is the optimal habitat quality index value) are representative of 71.8 of the 307 acres of extant Los Angeles/El Segundo Dunes. An additional

The Habitat Quality Index was completed as a means of quantitatively describing the habitat quality provided by discrete areas of the extant portions of the Los Angeles El Segundo Dunes which is owned and operated by the City of Los Angeles Department of Airports at the western terminus of the Los Angeles International Airport airfield. The quantitative evaluation of habitat characteristics will serve as important component of the evaluation of the potential for impacts on native biotic communities with the Dunes and the potential and occupied habitat they provide for the federally endangered El Segundo blue butterfly. The preliminary assessment of habitat quality is based on the extent and density of occupied habitat; density of coast buckwheat (*Eriogonum parvifolium*) flowerheads, the host plant for the El Segundo blue butterfly; percentage of non-native weedy species; and presence of native dune sand substrate. This memorandum updates and expands upon information provided in a previous memorandum (MFR 1067-004.M23, November 1, 1997). Included with this memorandum are an updated habitat quality evaluation matrix, an explanation of the components of the matrix, and a set of maps depicting spatial patterns of the major matrix components. The habitat quality index and accompanying map highlight and emphasize the differing physical properties across the entire 307 acre site, providing a planning tool that can help in: (1) avoiding impacts to high quality habitat, (2) identifying areas of lesser quality if impacts are necessary, (3) identifying areas most suitable for future restoration or enhancement, and, (4) if mitigation for impacts is required, provide a basis for assessment of mitigation ratios relative to existing habitat values of areas to be impacted.

Purposes of the Habitat Quality Evaluation

The primary purpose of Habitat Quality Evaluation (Habitat Quality Evaluation) efforts is to provide a detailed and accurate assessment of the relative ability, under existing conditions, for different portions of the Dunes to support the El Segundo blue butterfly. The physical properties of the Dunes vary across the 307 acre site, as does the quality of existing habitat for the El Segundo blue butterfly. The habitat quality index and accompanying map highlight and emphasize those differences, providing a planning tool that can help in: (1) avoiding impacts to high quality habitat, (2) identifying areas of lesser quality if impacts are necessary, (3) identifying areas most suitable for future restoration or enhancement, and, (4) if mitigation for impacts is required, provide a basis for assessment of mitigation ratios relative to existing habitat values of areas to be impacted.

Background

The Dunes are located at the western end of the *Los Angeles International Airport 2015 Master Plan* study area (Figure 1, Oversize). The approximately 307 acre site (269 acres of vegetated habitat, 36 acres of paved streets, and 2.5 acres of developed area) is bounded on the north by Napoleon and Waterview Streets, on the east by Pershing Drive, on the south by Imperial Highway and on the west by Vista del Mar Boulevard. The portion of the Dunes designated as the El Segundo Blue Butterfly Habitat Restoration Area (Restoration Area) occupies approximately 203 acres (including vegetated habitat, streets, and developed) north of Imperial Highway and south of Sandpiper Street.

Since 1987, ecological restoration within the Restoration Area has continually increased potential habitat for the El Segundo blue butterfly through planting and maintenance of its host plant, coast buckwheat (*Eriogonum parvifolium*). The last major restoration plantings were completed at the end of 1994. A qualitative survey of the Restoration Area conducted in 1995 identified coast buckwheat in 56 subsites of the Restoration Area (Sapphos Environmental 1995). The distribution of coast buckwheat is not uniform within the Restoration Area and no coast buckwheat are found at the Dunes outside of the Restoration Area (Sapphos Environmental 1996b). El Segundo blue butterfly surveys conducted in 1995 confirmed not only that historically occupied habitat continued to be occupied (Pratt 1995), but that some recently restored sites adjacent to known occupied sites also supported El Segundo blue butterfly (Hawks 1995). By 1996, surveys for El Segundo blue butterfly revealed the presence of the butterfly in all areas of the Restoration Area where coast buckwheat was present (Sapphos 1996a). 1997 surveys, conducted after the optimum survey window, showed lower El Segundo blue butterfly numbers than in 1996, but with a similar distribution pattern (Entomological Consulting Services 1997).

The ecology of the Dunes, and the status of the restoration plantings and wildlife habitat there has been the subject of several reviews over the last decade. In 1990 Mattoni produced a report entitled *Species diversity and habitat evaluation across the El Segundo sand dunes at LAX* (Agresearch 1990). This report summarized the results of a range of studies on then existing flora and fauna of the Dunes, including the El Segundo blue butterfly, and was preparatory to the extensive efforts at restoration that were subsequently carried out. In 1994, as the end of the major restoration effort approached, a *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* was developed for the City of Los Angeles Environmental Affairs Department by Environmental Science Associates and Sapphos Environmental (City of Los Angeles 1994). The results of the restoration work to date were reviewed and a recommendations developed for the long-term management of the Restoration Area. Restoration

efforts were completed in late 1994. Although the primary restoration efforts had been completed, serious problems threatening the success of the restoration and the long-term health of the El Segundo blue butterfly at the Dunes remained. In spite of extensive efforts at control, non-native invasive iceplant (*Carpobrotus* ssp.) and acacia (*Acacia* spp.) continued to be present and appeared to be expanding rapidly. California buckwheat, a prime link in an major threat to the El Segundo blue butterfly through parasitism, continued to be a problem in certain areas. The Deparment of Airports took over active management of the Restoration Area in January of 1995, assigning two full-time landscape maintenance crew members to the Dunes. Sapphos Environmental was hired to provide biological monitoring of the Restoration Area and to provide biological advice and assistance to the department of Airports on Dunes related matters. An extensive qualitative assessment of the current status of the Restoration Area was undertaken. By the time *State of the Dunes and Recommendations for Management* (Sapphos Environmental 1995) was forwarded to Department of Airports Environmental Management in May 1995, five months of efforts at weed control had begun to show results. Weed control efforts have been constant since that time, including not only the two full-time landscape maintenance crew, but a small monthly volunteer program, and a recently initiated effort using adult labor crews provided by the Los Angeles County Probation department under the Probations Adult Alternative Work Service Program. In 1996, Sapphos Environmental was asked to prepare a literature review and baseline assessment of biological resources in support of the proposed *Master Plan* efforts. The *Technical Memorandum Biotic Communities/Threatened and Endangered Species Literature Review for the LAX Master Plan and EIR* (Sapphos Environmental 1996b) provided an up to date review of the other sensitive species present, or potentially present, at the Dunes.

As a result of the analysis conducted for the *Master Plan* biological resources literature review and early conversations with the U.S. Fish and Wildlife Service (Service), the California Coastal Commission, and the California Department of Fish and Game, it was anticipated that *Master Plan* efforts would involve formal consultation with the Service pursuant to Section 7 of the Endangered Species Act. Preliminary input from the Service indicated their intent to exert jurisdiction over the entire 300-plus acre Dunes complex. The Dunes comprise the largest remaining habitat for the El Segundo blue butterfly, a species listed as endangered pursuant to the federal Endangered Species Act, administered by the Service.

The Service has indicated four major types of impacts that would contribute to a potential "jeopardy opinion" for the El Segundo blue butterfly:

- Direct loss of occupied habitat
- Direct loss of potentially restorable habitat
- Indirect loss of habitat in adjacent (buffer) areas to airport development
- Indirect impacts under existing flight paths with increased flyovers and new flightpath areas
- Indirect impacts on habitat quality from increased air pollutants, particularly carbon monoxide emissions on Pershing, World Way, and Imperial

The habitat quality evaluation will serve as the basis for assessing opportunities and constraints for mitigating for direct and indirect impacts on the federally endangered El Segundo blue butterfly (El Segundo blue butterfly) as a result of implementation of the *Los Angeles International Airport 2015 Master Expansion Plan* project. Data used as input to development of the Habitat Quality Evaluation index is based primarily on surveys undertaken at the Dunes in 1996 and 1997. Surveys conducted in support of the Habitat Quality Evaluation were designed to determine the quality of habitat of different subsites in relation to factors important to the success of the El Segundo blue butterfly. Surveys were conducted to observe and map the distribution and abundance of the El Segundo blue butterfly, and, since the primary factor affecting El Segundo blue butterfly success is the presence or absence of its host plant, surveys were conducted to quantify and map coast buckwheat.

Habitat Quality Index

The Habitat Quality Evaluation has three primary components: a Habitat Quality Evaluation Matrix; a set of Habitat Quality Indices which are numerical values ascribed to habitat quality; and, a set of maps. The Habitat Quality Evaluation Matrix (Table 1) displays quantitative data by subsite for a range of variables relevant to habitat quality. The data from four of these variables are ranked and summed, culminating in a Habitat Quality Index Value for each subsite. The Habitat Quality Evaluation maps graphically display the spatial distribution of the major habitat quality evaluation components.

The Habitat Quality Index is a numerical ranking of the relative value each of the Dunes subsites as habitat for the El Segundo blue butterfly. The HQ index value for each subsite is shown in the last column of the Habitat Quality Evaluation matrix (Table 1) and is graphically depicted in Figure 2. Possible index values range from 1 to 20. A value of 1 indicates the least quality of habitat and a value of 20 would indicate the greatest value of habitat. Actual values range from 1 to 19. It should be emphasized that these are *relative* rankings, they compare subsites at the Dunes to each other. Comparable data for other sites is either not available, e.g., Malaga Cove, or, where some information is available, e.g., El Segundo blue butterfly numbers at Chevron, data collection and evaluation methods differ, making direct comparison difficult or inappropriate.

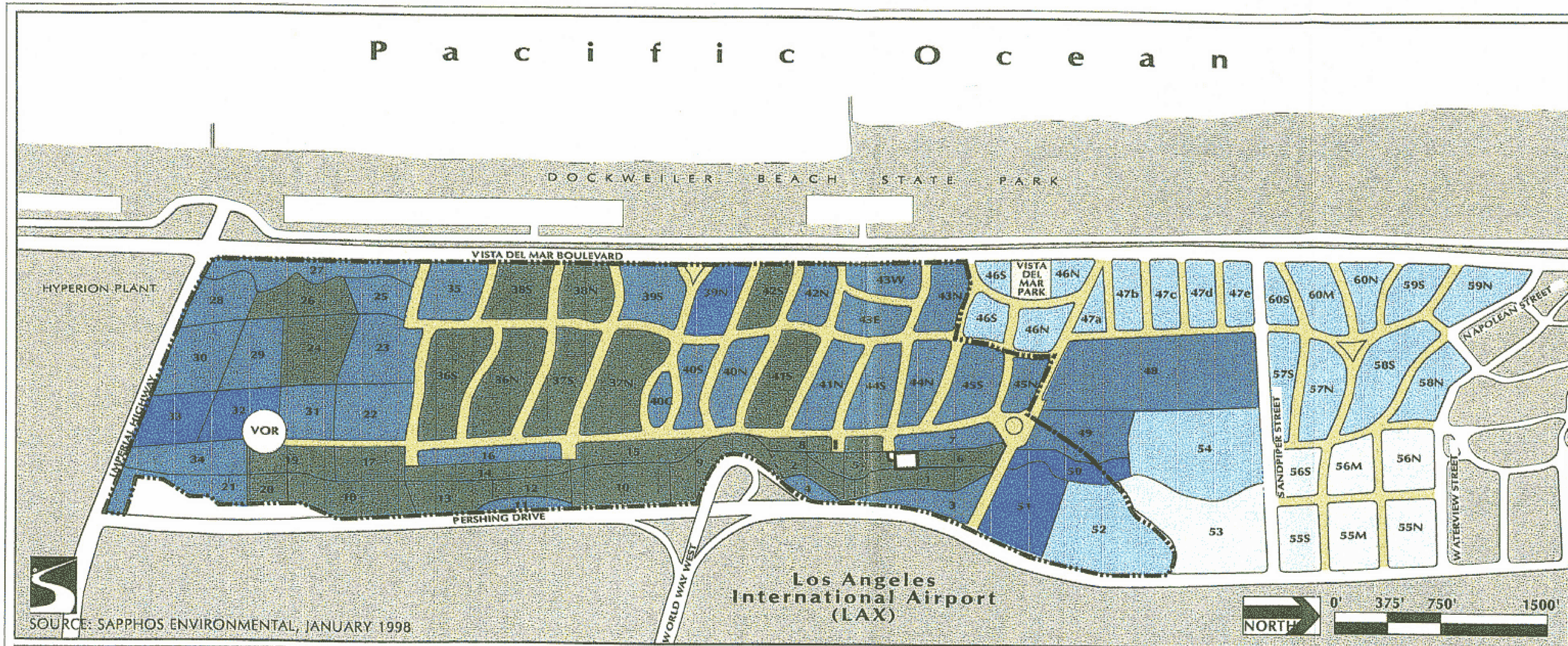
Several maps have been prepared that show the spatial distribution of individual data:

- Figure 1 (Oversize) is a topographic map of the site, with subsite boundaries.
- Figure 2 graphically displays the distribution of HQ index values.
- Figure 3 (Oversize) shows the distribution of observed El Segundo blue butterfly in 1996.
- Figure 4 (Oversize) shows the distribution of observed El Segundo blue butterfly in 1997.
- Figure 5 (Oversize) shows the distribution of coast buckwheat plants based upon 1996 surveys.
- Figure 6 shows the distribution of the two soil categories.
- Figure 7 shows historical transects and 1995 surveys for the El Segundo blue butterfly at the Los Angeles International Airport El Segundo Dunes.
- Figure 8 shows the distribution of coastal buckwheat in 1986.

Explanation of Habitat Quality Evaluation Matrix Headings

The Habitat Quality Evaluation Matrix lists Dunes' subsites as rows. Various data categories are listed across the top as column headings. A brief explanation of the nature and source of each data category is provided below.

Subsite Number



LEGEND

Road System (Many Subsites Are Delineated by Road System)

Habitat Restoration Area Boundary

Subsite Number (21)

Remote Communications Site

Very High Omni Range Navigation Beacon (VOR)

Trailer

Habitat Quality Index Values

6
5
4
3
2
1

Concrete roadways within the Dunes. Restoration in these areas will require removal of road and roadbed materials.

FIGURE 2
Habitat Quality Index Values for the Los Angeles El Segundo Dunes

w:\projects\1067-004\graphics\HQEXBblue.FH5 (Rev. 2)

The Dunes area was divided into 86 subsites, and subsites were assigned identifying numbers, by Mattoni (Agresearch 1990:20) as part of early efforts at study and restoration. Mattoni's subsite designations have been used in all subsequent work and reports produced at the Dunes and are used here for that reason. Small, local adjustments to subsite boundaries were made in 1995 as part of Dunes mapping efforts. Maps used in this report show those adjusted boundaries. As can be seen in Figure 1, subsite boundaries primarily follow the existing road system and major topographic discontinuities.

Acreage

Acreage of subsites was calculated by Psomas & Associates from the GIS-based topographic map of the site. Subsite boundaries were digitized from a Sapphos Environmental-produced subsite map overlaid on Psomas site topography. Table 2 lists calculated acreage of component areas of the Dunes. Subsite acreage used in the Habitat Quality Evaluation matrix reflects quantity of vegetated habitat and excludes roads, structures, and developed areas. Subsite acreage ranges from 0.8 to 13.7 acres, with a mean of 3.1 acres.

TABLE 2. DUNES AREA ACREAGE

	Area		Acres	
Habitat Restoration Area	A.	Vegetated	177.08	
	B.	Streets	23.25	
	C.	Developed	2.46	
Habitat Restoration Area Total				202.79
Non-restoration Area	A.	Vegetated[1]	91.53	
	B.	Streets	12.86	
Non-restoration Area Total				104.39
DUNES AREA TOTAL				307.18

[1] Improvements to the navigational aids and ancillary structures have been made since topographic mapping, therefore actual existing acreage is slightly smaller.

El Segundo Blue Numbers and Density

Numbers of El Segundo blue butterflies observed in each subsite during surveys conducted at the Dunes in 1996 and 1997 are provided in the Habitat Quality Evaluation matrix. El Segundo blue butterfly numbers per subsite were divided by subsite acreage to give El Segundo blue butterfly density per subsite. As mentioned above, and described in more detail below, El Segundo blue butterfly

numbers were higher in 1996 surveys than in 1997, and that data is considered more reliable. Therefore, 1996 El Segundo blue butterfly densities were used in calculating the Habitat Quality Evaluation index. Densities of El Segundo blue butterfly observed in 1996 ranged from a low of 0 per acre for subsites with no El Segundo blue butterfly to a high of 81.4 per acre in Subsite 42S. Rankings for density of El Segundo blue butterfly per acre were established from 0 to 5. Habitat Quality rankings were assigned as follows: A rank of 0 was assigned for 0 El Segundo blue butterfly; a rank of 1 was assigned for 0.1 to 20 El Segundo blue butterfly per acre; 2 for 21 to 40, 3 for 41 to 60, 4 for 61 to 80, and 5 for 81 to 100 El Segundo blue butterfly per acre.

The El Segundo blue butterfly numbers shown in Table 1 were recorded in a single observation in each year, that is, any given subsite was surveyed only once during the ten week flight period of the butterfly. The total population of El Segundo blue butterfly butterflies at the El Segundo Dunes would be expected to be much larger than that recorded as a result of a single observation day. Transect counts such as these are intended to provide a reliable index of the relative abundance of a butterfly species from year to year, but cannot, without additional work provide reliable estimates of actual abundance (Pollard 1977; Pollard 1982; Thomas 1983). The additional work would require capture and handling of the El Segundo blue butterfly and this is not currently permitted by the Service.

Figures 3 and 4 show the distribution of El Segundo blue butterfly observed in 1996 and 1997, respectively. Individual sightings of the El Segundo blue butterfly butterfly are represented in Figures 3 and 4 by dots, each dot representative of one sighting of the El Segundo blue butterfly butterfly. Comparison of the maps from the two years reveals similar overall patterns of El Segundo blue butterfly distribution across the Restoration Area as a whole. (Besides lower overall numbers, Figures 3 and 4 appear somewhat different as an artifact of survey mapping tools. 1996 El Segundo blue butterfly observations were mapped in the field on small, 1"=400' aerial photographs. In 1997, 1"=40' aerial photos were used. The resulting relative lack of precision of exact location within a subsite in 1996 is responsible for the more diffuse and less clustered appearance of that year's map.) A background on El Segundo blue butterfly survey methods is provided in Attachment 1.

Coast Buckwheat Numbers, Locations, Condition, and Number of Flowerheads

Where there are no buckwheat, there can be no El Segundo blue butterfly. Coast buckwheat were planted over approximately 125 acres of the Dunes during restoration activities from 1989 to 1994. As can be seen in Figure 5 (Oversize), not all portions of the Restoration Area currently support coast buckwheat and no buckwheat are present outside the Restoration Area. Some areas were not revegetated because they were in relatively good condition (e.g., subsites 1, 2, 5, 6, 12, 14, 17, 19, 20, 22, 23, 24, 25, and 26). A block of subsites at the southernmost portion of the Restoration Area were also not revegetated (subsites 28, 29, 30, 32, 33, 34, and the greater part of 21).

The size and health of the buckwheat plants are also important factors; larger, healthier plants produce more flowerheads, the part of the plant of most importance to the butterfly. The estimated number of flowerheads per acre per subsite is included as the second major component of the index number. The density of flowerheads per acre was calculated by summing estimated flowerheads per plant for all plants in the subsite and dividing by subsite acreage. Density of flowerheads ranged from 154,471 per acre in Subsite 9, to 0 for subsites with no buckwheat. Rankings for density of flowerheads were established from 1 to 5. A rank of 0 was assigned for subsites with no buckwheat; 1 was assigned for 0.1 to 32,000 flowerheads; 2 for 32,001 to 64,000; 3 for 64,001 to 96,000; 4 for 96,001 to 128,000; and 5 for 128,001 to 160,000.

The ratio of dead or senescent plants to the number of total plants on a subsite was also examined, though it is not included in the Habitat Quality Evaluation index number. Some areas of the Dunes that are part of the historic El Segundo blue butterfly habitat and that were not restored because they were relatively undisturbed have a relatively high number of dead or senescent plants and relatively few young and healthy plants. The causes of this are not clear, but definitely bear watching. The largest, healthiest, and most dense buckwheat plants are found in the older restoration areas (ca. 7 years old). We know very little about the long term demography of coast buckwheat plants in a given area on the Dunes. Coast buckwheat survey and mapping methods are provided in Attachment 2.

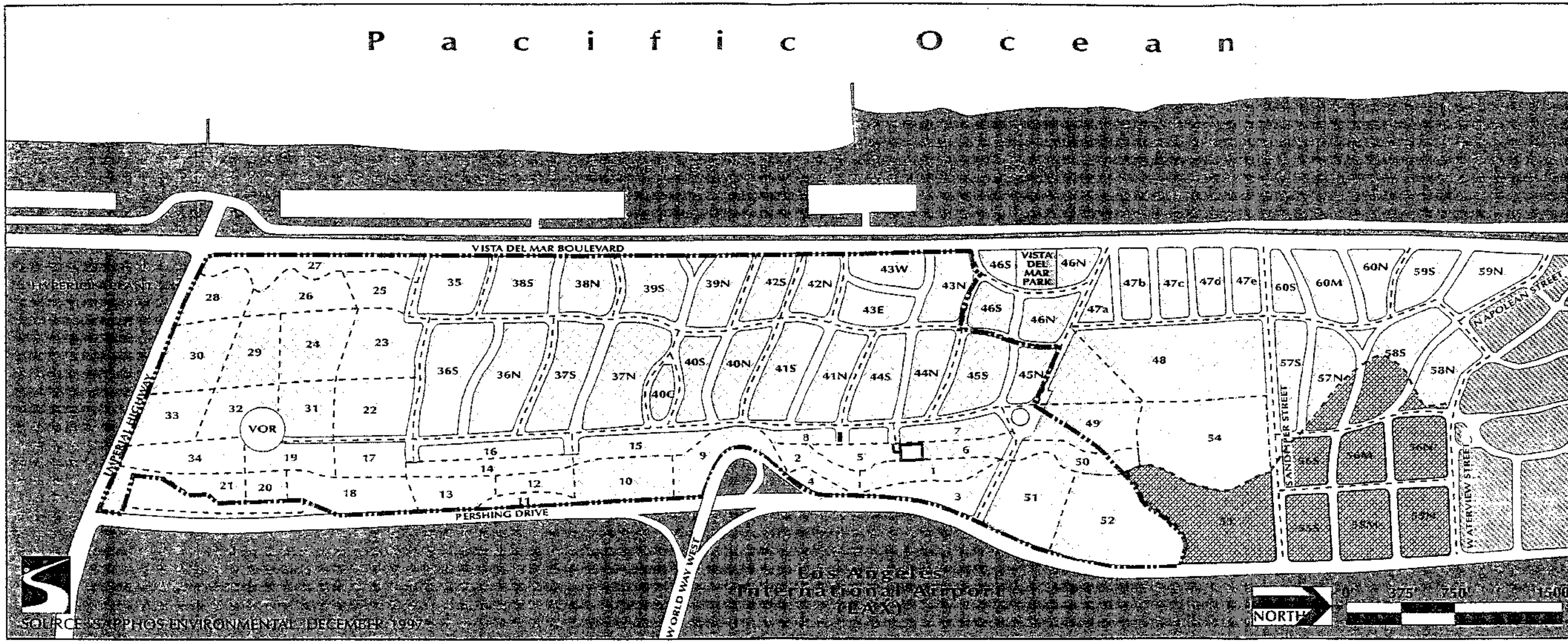
Cover of Subsite by Native and Non-native species

The third major factor considered in the evaluation index is the degree of infestation of a given subsite with non-native plants. Efforts to control non-native plants at the Dunes are on-going as a part of regular maintenance; these plants, particularly iceplant (*Carpobrotus* spp.) and acacia (*Acacia* spp.) remain one of the primary threats to long term success of the restoration plantings. The percent cover of a given subsite by non-native plants is therefore the third component of the Habitat Quality Evaluation index. Total vegetative cover by native species at the Dunes is unlikely to ever reach 100 percent; there will likely always be some bare ground. However, a site could theoretically not have any non-native species present, even if it had, for example, 50 percent cover by native species and 50 percent bare. Therefore, percent cover by non-native species was used as the evaluation criteria.

Estimated percent cover by non-native species range from a low of 3 percent on subsites 19, 24, and 31 to a high of 95 percent for a number of subsites outside the Restoration Area north of Sandpiper. Rankings for percent cover by non-native species were established from 1 to 5. A rank of 5 was assigned for 0 to 20 percent cover by non-natives, 4 for 21 to 40, 3 for 41 to 60, 2 for 61 to 80, and 1 for 81 to 100 percent cover by non-native species. The method for estimating percent cover by non-native species is provided in Attachment 3.

Soils

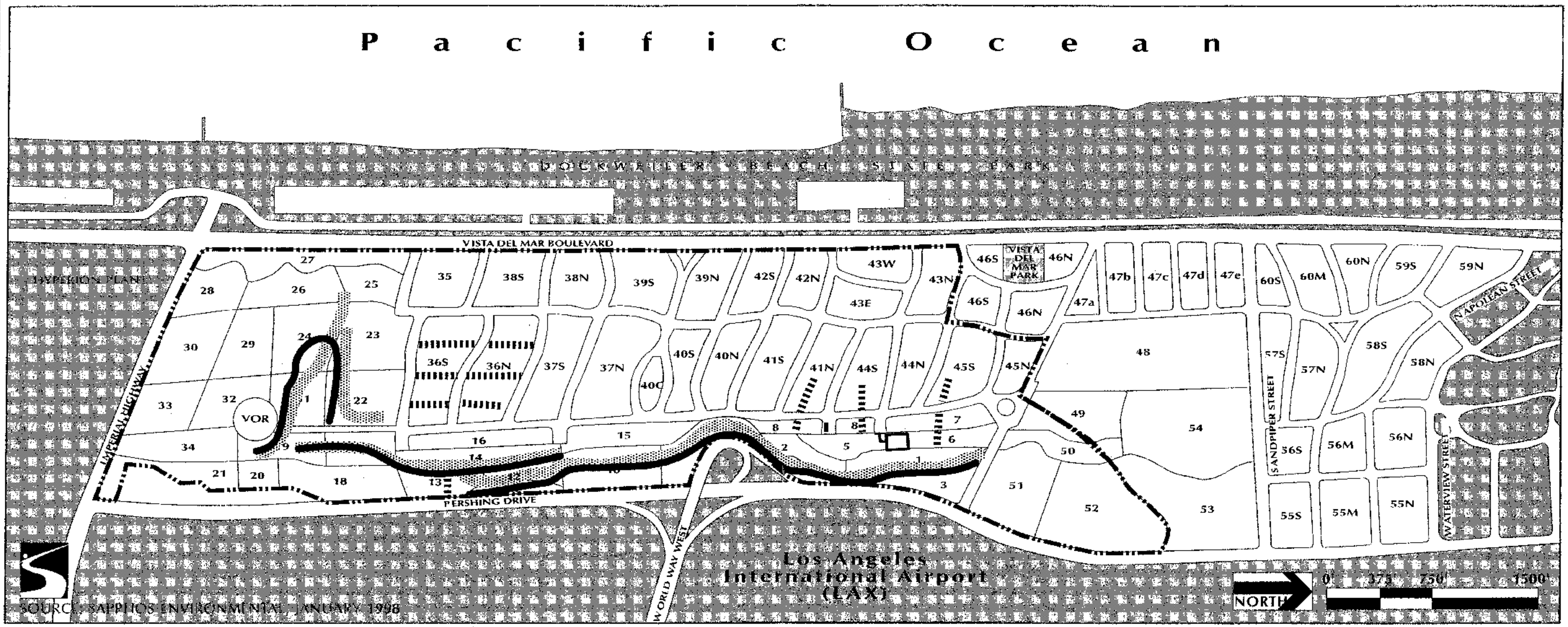
Two primary categories of soil are present in the Dunes area, a dune sand substrate (generally greater than 97% sand) that covers most of the area and a distinctly different soil present in the northeast portion of the area. The latter, while a sandy soil, does contain other components, including silt (approximately 7%) and clay (approximately 1.3%) that clearly differentiate it from the sand-dominated substrate of most of the Dunes (Agresearch 1990:28). The silt-clay non-dune soil area also supports distinct vegetation dominated by non-native species visibly different from that of adjacent pure sand substrates. The silt-clay non-dune soil is considered to be less suitable for restoration to native dunes vegetation and less appropriate as potential habitat for the El Segundo blue butterfly. Therefore the soil rank used in the Habitat Quality Evaluation is bivalent–either a 0 or a 5. Two subsites (57N and 58S) contain approximately equal areas of both substrates. Those two sites were given a value of 3, as an



LEGEND

- Reserve Boundary
- Subsite
- Remote Communications Site
- Very High Omni Range Navigation Beacon
- Trailer
- Dune Sand
- Sand Plus Silt and Clay

FIGURE 6
Los Angeles International Airport El Segundo Dunes
Soil Categories



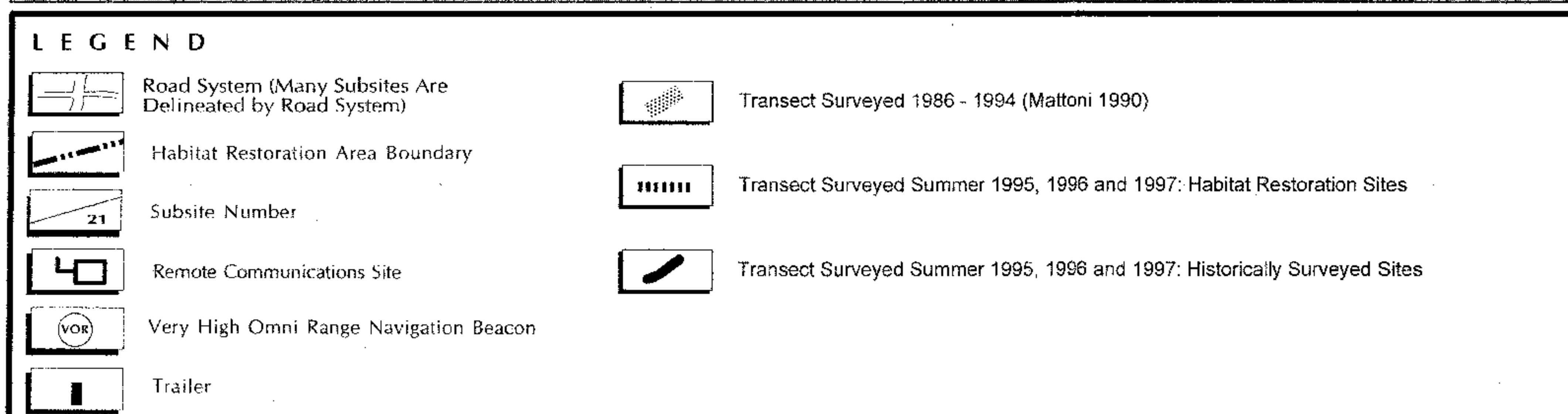


FIGURE 7
1986 - 1997 Transect Surveys for El Segundo Blue Butterfly at the Los Angeles El Segundo Dunes

w:\projects\1067-004\graphics\Dunes Historic transects of 1995 surveys.FH5 intermediate number. The boundary for the soil category map was determined by field inspection of the soils.

Age of Restoration Plantings

The age of the restoration for each subsite is shown in the Habitat Quality Evaluation matrix. Preliminary attempts to develop a statistical correlation between age of restoration and Habitat Quality Evaluation index values have not shown a strong correlation. However, restoration age is considered to be one of the suite of factors likely to account for some of the differences between sites. Only a few subsites at the Dunes never had houses or other major impacts (1, 2, 5, 6, 12, 14, 17, 22, 23, 24, 25, 26, and 50). The primary restoration of subsites 7, 8, 9, 10, and toe of slope of subsites 1, 2, and 11 which were areas of occupied habitat for the El Segundo blue butterfly was completed by 1989. Major restoration efforts over the remainder of the Restoration Area were completed in 1994.

Preliminary Discussion of Habitat Quality Evaluation Results

The Habitat Quality Index number for each subsite is derived from ranking of four input categories:

- Density of El Segundo blue butterfly (1996 data)
- Density of flowerheads of coast buckwheat (1996 data)
- Percent cover by native species
- Substrate (soil) character

Possible values for each category range from 0 or 1 to 5. The Habitat Quality Evaluation matrix shows the actual values for each of the categories, and well as the derived ranking. A subsite that received the highest ranking for each category would have a index value of 20.

5	+	5	+	5	+	5	=	20
Rank of		Rank of Flowerhead		Rank of Percent		Soil Classification		HQ Index
El Segundo blue butterfly Density				Density		Native Cover		

The Habitat Quality Evaluation Index values derived for each subsite are shown in the final column of Table 1. Values range from 1 to 19. The distribution of the Habitat Quality Evaluation Index values is shown graphically in Figure 2. A few preliminary observations may be made regarding the patterns observed in the Habitat Quality Evaluation Index Value Map.

Earlier work (Agresearch 1990) had indicated that several factors contributed to the constrained distribution of the El Segundo blue butterfly at the Dunes--limited distribution of the host plant, wind and exposure of habitat as it approaches the ocean, and the presence of relatively high level of disturbance in portions of the Dunes complex.

The first of these factors has obviously been overcome at the Dunes, at least in the short term. Revegetation of coast buckwheat has been very successful in some areas, less so in others. Figure 8 reproduces Mattoni's (1990) map of the distribution of coast buckwheat at the Dunes in 1986. Comparison with Figure 5 shows the dramatic expansion due to restoration efforts. Long-term demographic trends in coast buckwheat populations are not well understood, especially in regard to

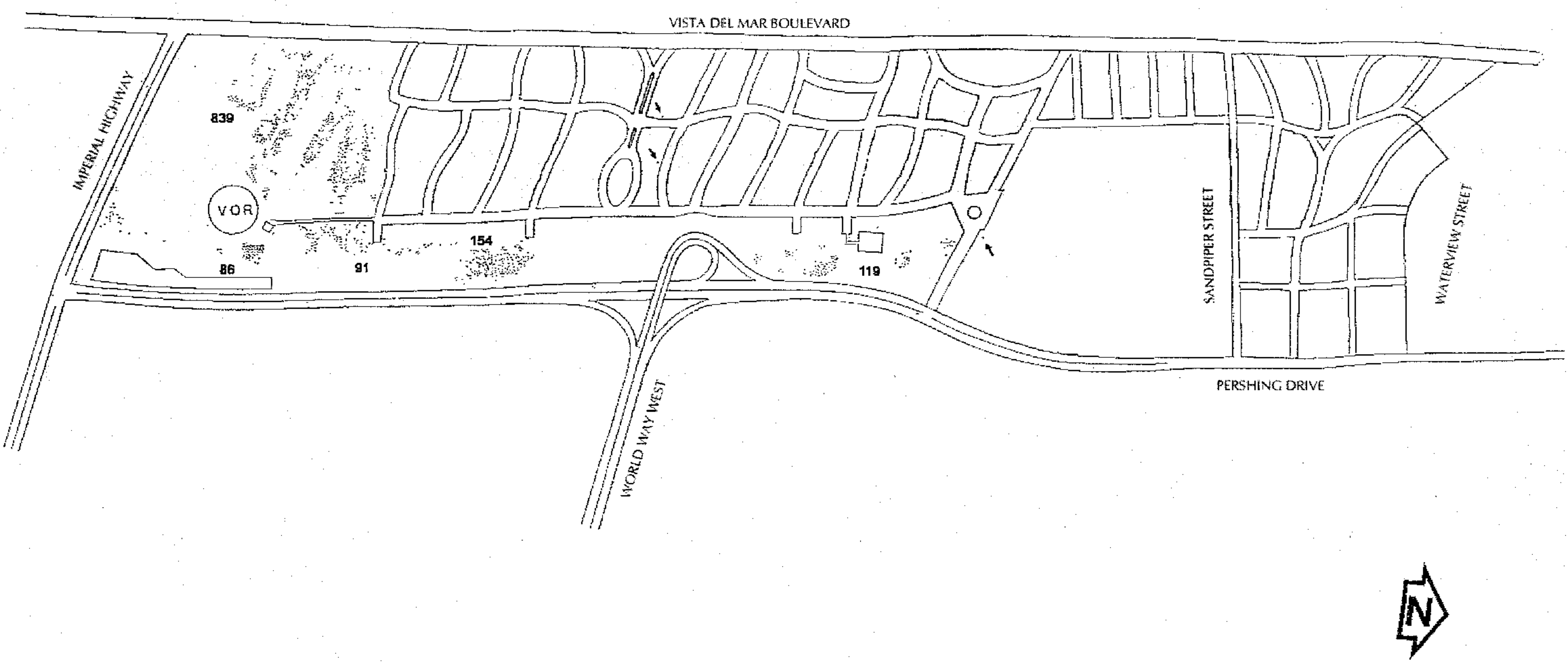


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Figure 8.
Coastal Buckwheat Distribution 1986

areas of stablized sand. It is regularly observed that coast buckwheat plants do senesce and produce fewer flowerheads. This can be readily seen in the VOR area subsites. The second of these factors, the limiting of El Segundo blue butterfly distribution by exposure to ocean winds, appears either incorrect, or more complicated, based upon results reported here.

Additional information is also provided relevant to the third factor mentioned, the effects of the past disturbance history at the Dunes. Figure 9 reproduces Mattoni's (1990) map of areas considered to have been relatively less disturbed at the Dunes. Comparison of Figure 9 with Figure 2, the Habitat Quality Evaluation Index Value map, immediately highlights the continued influence of this lack of disturbance. Two subsites that stand out in Figure 2, subsites 12 and 20, are revealed by Figure 9 to be two relatively undisturbed subsites. However, Figure 9 also highlights the dramatic potential of restoration. Subsite 9, considered today to provide the highest quality habitat at the Dunes, was completely disturbed during the reconfiguration of World Way West.

Other points that are highlighted by the Habitat Quality Evaluation maps include:

1. The highest quality subsites are no longer those of the historically undisturbed portions of the Dunes. Rather, the highest values...

2. Overall, backdune subsites continue to show the greatest densities of El Segundo blue butterfly and coast buckwheat.

3. Very high values are also returned by a few subsites very close to the ocean. Subsite 425 ...

Early results from Mattoni's (1990:47) studies conducted in existing habitat prior to restoration indicated that "El Segundo blue butterfly distribution is not correlated with foodplant number, but slope exposure. Densest populations are on the backdune." Mattoni based his conclusions on a comparison between then existing backdune and the foredune vegetation in the VOR area (Mattoni 1990:Appendix I-15-16). However, the highest El Segundo blue butterfly density observed in 1996 was on Subsite 425, a foredune site immediately adjacent to Vista del Mar Boulevard. Possible explanations for El Segundo blue butterfly success in this area need to be examined further. However, this data does seem to contradict Mattoni's earlier findings and suggest that factors other than exposure may limit El Segundo blue butterfly numbers in some areas. Explanations need to be pursued also for the relatively rapid growth, large size, and health of the coast buckwheat in this exposed location. Comparison of buckwheat and El Segundo blue butterfly distribution maps with the site topographic map suggestst that one possible explanation is that these plants are found at the bottom of a slope. Perhaps rain falling upslope travels through the sand to the bottom of the slope and provides these plants with an extra increment of moisture.

4. Areas in the north portion of the Dunes, outside the restoration area, fall into two classes. The eastern portion on dunes sand has a fair representation of more pioneering native dunes vegetation such as xxxx and xxxx lupine. The silt-clay-sand substrate on the eastern side of the north part supports a very different vegetation with very few native species.

One thought had been that coast buckwheat needed to attain a certain size and abundance of flowerheads to be "visible" to the El Segundo blue butterfly. Though the rapid expansion of El Segundo blue butterfly throughout the Dunes was somewhat unexpected given that many of the plants were only two years old, Arnold (1990:44) had reported from his experience at the Chevron site that El Segundo blue butterfly adults have been observed perching and nectaring on seedling buckwheat as early as the second year of plant growth.

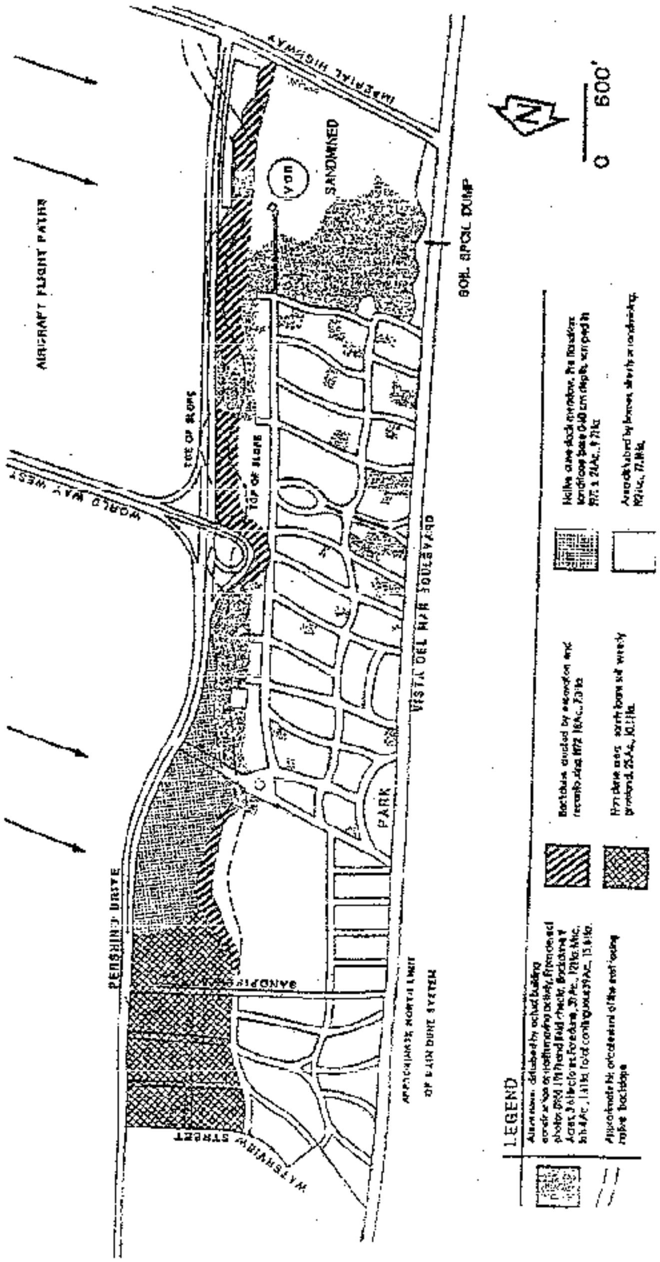

Figure 9.
Recent history of land use at the LAX El Segundo sand dunes.

REFERENCES:

Agresearch, Inc. 1990. *Species diversity and habitat evaluation across the El Segundo sand dunes at LAX.* Prepared by: Agresearch, Inc. Prepared for: Board of Airport Commissioners. July 1, 1990.

City of Los Angeles Environmental Affairs Department. 1994. *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes.* Prepared by: Environmental Science Associates in association with Sapphos Environmental. Prepared for: City of Los Angeles Environmental Affairs Department. June 23, 1994.

Entomological Consulting Services, Ltd. 1997. *Preliminary Report of El Segundo Blue Monitoring Activities at the Los Angeles International Airport in July and August 1997.* Prepared by: Entomological Consulting Services, Ltd. Prepared for: Sapphos Environmental. November 24, 1997.

Hawks, D.?. 1995. –El Segundo blue butterfly surveys

Mattoni, R. 1994. *El Segundo Sand Dunes Revegetation at LAX.* Prepared for: City of Los Angeles Environmental Affairs Department. Prepared by: Rudi Mattoni, Agresearch, Inc. Contract C-86086. November 1994.

Mattoni, R. H. T. 1990(1992). *The Endangered El Segundo Blue Butterfly.* Journal of Research on the Lepidoptera, 29(4):277-304.

Pollard, E. 1977. A method for assessing changes in the abundance of butterflies. *Biological Conservation* 12:115-134.

Pollard, E. 1982. Monitoring butterfly abundance in relation to the management of a nature reserve. *Biological Conservation* 24:317-328.

Pratt, . 1995. - El Segundo blue butterfly surveys

Sapphos Environmental. 1997. –lit review

Sapphos Environmental. 1996a. –El Segundo blue butterfly surveys

Sapphos Environmental. 1996b. *Technical Memorandum Biotic Communities/Threatened and Endangered Species Literature Review for the LAX Master Plan and EIR.* Prepared for: City of Los Angeles Department of Airports. Prepared by: Sapphos Environmental, under contract to Landrum & Brown. November 8, 1996.

Sapphos Environmental. 1995. *Status of the Dunes and Recommendations for Management.* Memorandum for the Record to the City of Los Angeles Department of Airports Environmental Management. May 5, 1995.

Thomas, J.A. 1983. A quick method for estimating butterfly numbers during surveys. *Biological Conservation* 27:195-211.

United States Fish and Wildlife Service. 1997. "Recovery Permits for Surveys for Listed Insects." Letter from the Service (Gail C. Kobetich), Carlsbad Field Office, Carlsbad, CA, 92008, to Sapphos Environmental (Ms. Marie Campbell). May 28, 1997.

Before 1995. Prior to the summer of 1995, all El Segundo blue butterfly surveys at LAX had been confined to the known occupied habitat as recorded prior to the initiation of restoration activities. Between 1984 and 1994, Mattoni or his associates performed weekly surveys during the height of the El Segundo blue butterfly flight season along a transect that connected existing areas of relatively high density of coast buckwheat (Figure 7). (No surveys were made in 1985; surveys in 1984 and 1986 were only performed 4 and 5 times respectively, as opposed to the 8 to 12 times in subsequent years.) Mattoni summarized the results of this decade of surveys in his 1994 report to the City of Los Angeles Environmental Affairs Department (Mattoni 1994). A typical flight season of the El Segundo blue butterfly lasts approximately 10 weeks from around mid-June to late-August (Mattoni 1990(1992)). The height of the flight season is considered to be approximately weeks 4 through 7 when a majority of butterflies have emerged from the pupal stage and transect counts reveal the largest numbers. Reconnaissance surveys by a botanist familiar with the phenology of the coast buckwheat and life habits of the El Segundo Blue butterfly are used to note first emergence and the beginning of the flight season.

1995. El Segundo blue butterfly surveys conducted in 1995 confirmed that historically occupied habitat continued to be occupied at roughly the same level that had been observed in previous years (Pratt 1995). Surveys conducted in 1995 followed the transect route and protocol used in previous years by Mattoni (Pratt 1995; Figure 7). Occasional, incidental observations of El Segundo blue butterfly outside the historic habitat area in 1994 suggested that the El Segundo blue butterfly may have begun to expand its range into the restoration area. Therefore, a series of new transects were run in 1995 to test this observation. Seven transects were run from the edge of occupied habitat into the restoration area (Figure 7). The results of these surveys demonstrated that some recently restored sites adjacent to known occupied sites did support El Segundo blue butterfly (Hawks 1995). The general trend of the new transects fit with what seemed a reasonable expectation: more El Segundo blue butterfly were seen closer to occupied habitat and numbers dwindled with distance.

1996. Given the 1995 results, and given *Master Plan* concerns about the extent of occupied habitat, surveys in 1996 were designed to survey the entire restoration area to determine the presence or absence of El Segundo blue butterfly. Teams of biologists were trained in identification of the El Segundo blue butterfly by Dr. Richard Arnold and all surveys were conducted under his direction. The survey technique used was a modification of the transect method described by Pollard (1977; 1982) and Thomas (1983). Since the primary concern was to determine the maximum extent of occupied habitat, the survey was designed to observe all areas of the Dunes known to support coast buckwheat, and therefore by implication, having the potential to support El Segundo blue butterfly. Surveys were scheduled to be conducted during the height of the flight season, that is, at the time of maximum El Segundo blue butterfly abundance. The survey teams worked subsite by subsite, moving from coast buckwheat plant to coast buckwheat plant, and recording any observations of El Segundo blue butterfly. Observed El Segundo blue butterfly locations were mapped onto a color aerial photograph of the site. The plan called for the rapid survey all areas of the Restoration Area within approximately 5 days, visiting each area only once. The entire survey essentially functions as a single observation. Originally it was planned to then resample any subsites where no El Segundo blue butterfly were observed during a second week, again, because the primary objective was to determine the extent of occupied habitat. This proved to be unnecessary as virtually all areas of the Restoration Area that contained coast buckwheat were found to have El Segundo blue butterfly present (Sapphos 1996a). The extent of the observed expansion of the El Segundo blue butterfly out of the historic occupied habitat was completely unexpected, especially given that much of the area had been planted only in 1994, and the buckwheat plants were only two years old; and given the relatively modest results of the 1995 surveys.

1997. El Segundo blue butterfly surveys in 1997 were intended to duplicate and confirm the 1996 efforts. Unfortunately, the U.S. Fish and Wildlife Service issued new requirements to survey for the El Segundo blue butterfly on April 10, 1997, approximately two months before the beginning of the flight season for the El Segundo blue butterfly in a normal year (USFWS 1997). The Service asserted that an Endangered Species Recovery Permit would be required to conduct even presence/absence surveys for the El Segundo blue butterfly. The Service's claim is that even *observation* of the El Segundo blue butterfly, without handling or capture, is detrimental to the species and would be considered harassment by the Service. The Service offered no documentation to support this assertion, nevertheless their requirement prevented replication of the 1996 surveys in a timely fashion in 1997. Issuance of a new Recovery Permit requires noticing in the Federal Register for 30 days; the timing of the issuance of these new regulations effectively prohibited surveys from taking place in a timely fashion. Eventually, the Carlsbad Field Office of the Service agreed to add Dr. Richard Arnold to their existing El Segundo blue butterfly Permit on July 17, 1997 and Dr. Oakley Shields on July 21, 1997 to allow at least some surveys to be conducted in 1997. All 1997 surveys at the Dunes were conducted by these two scientists. The historic transect was run 4 times between July 24 and August 16, 1997. Comprehensive Restoration Area surveys were conducted between July 22 and 26, 1997. The spring of 1997 was early and warm and the El Segundo blue butterfly emerged early. Therefore the July surveys were after the optimum height of the flight season survey window. Weather was also uncooperative; conditions during the survey week were unfavorable to El Segundo blue butterfly flight including fog, drizzle, relatively high wind speeds, and relatively cool temperatures (Entomological Consulting Services 1997). While the total El Segundo blue butterfly numbers observed for both the historic transect and the survey of the entire Restoration Area were considerably lower than in 1996, the overall pattern of distribution, encompassing all areas where coast buckwheat is present, is basically similar. Figures 3 and 4 show the 1996 and 1997 El Segundo blue butterfly distributions, respectively. Figure 5 shows the distribution of coast buckwheat in 1996.

In August and September of 1996, as part of the habitat quality assessment efforts, the location of coast buckwheat plants present on-site were mapped onto an aerial photograph at a scale of 1 inch equals 40. At this scale, individual plants could be located on the photo. Data recorded for each plant included size, a notation if the plant was senescent or dead, and an estimate of the number of flowerheads. Measuring rods marked in six inch increments were used to estimate buckwheat height and canopy width. Plant size was recorded as a member of a size class. Size classes used were:

- Small; plants less than 14 inches tall and up to 14 inches wide
- Medium; plants approximately 14 to 25 inches tall, and as wide as they are tall
- Large; plants approximately 25 inches tall or greater and twice as wide as they are tall
- Extra large; plants approximately 25 inches tall or greater and more than twice as wide as they are tall

Size categories were determined by field sampling and observation before surveys were initiated. The categories worked well, with one exception. The extra extra large category was added after the surveys had begun because it was observed that some plants were larger than anticipated.

The number of flower heads was determined by using a frame, 12 inches square. The frame was held against a portion of the plant and the number of flowerheads within the frame quickly counted. The number of square feet of surface area of the plant was then estimated using the 1 square foot frame. If the plant shape was irregular, or there were large areas with no stems or flowerheads, then those areas were excluded from the estimate. Multiplication of the number of flowerheads per square foot by the number of square feet was recorded as flowerhead classes. The flowerhead number classes were:

- 1; 0 to 20 flowerheads
- 2; 21 to 100 flowerheads
- 3; 101 to 500 flowerheads
- 4; 501 to 1000 flowerheads
- 5; 1001 to 2500 flowerheads
- 6; greater than 2500 flowerheads

The flowerhead categories were determined by field observations prior to the initiation of surveys. Analogously to plant size, category 6 was added after the initiation of surveys to better capture the number of flowerheads found on the largest plants.

During the process of data analysis for the Habitat Quality Evaluation, it was decided that calculation of the total number of flowerheads per subsite would function as a better indicator to be included in the evaluation index than number or size of plants. Therefore, flowerhead classes were converted back to flowerhead number by multiplication. For the purposes of this multiplication, the large boundary of the class was used. For example, a plant recorded as flowerhead class 4 (501 to 1000) was considered to have 1000 flowerheads. While this may overstate the actual flowerhead numbers, it does so uniformly across subsites and should not effect calculations of their relative value.

Percent cover of native species, non-native species, and bare ground, was estimated from 1" = 40' color aerial photographs of each subsite by botanists familiar with the Dunes and its vegetation.

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning
50 S. DeLacey, Suite 210 • Pasadena, California 91105

Site Topography with Sub-Site Boundaries

Los Angeles International Airport El Segundo Dunes • City of Los Angeles, California

0' 100' 200' 400' 600'
One inch equals two hundred feet

Base map prepared by
Psomas & Associates
3420 Ocean Park Boulevard
Santa Monica, California 90405

December 29, 1997

JN1067-004

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El Segundo Blue Butterfly Observations, 1996

Los Angeles International Airport El Segundo Dunes • City of Los Angeles, California

0' 100' 200' 400' 600'
One inch equals two hundred feet

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50 S. DeLacey, Suite 210 • Pasadena, California 91105

Coast Buckwheat Locations, 1996

Los Angeles International Airport El Segundo Dunes • City of Los Angeles, California

0' 100' 200' 400' 600'
One inch equals two hundred feet

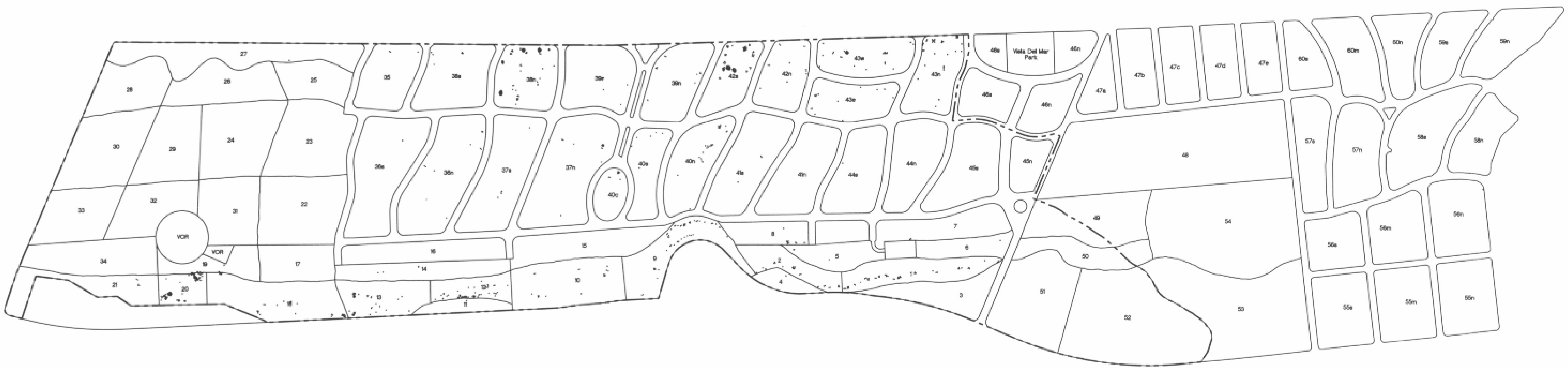
Base map prepared by
Psomas & Associates
3420 Ocean Park Boulevard
Santa Monica, California 90405

December 29, 1997

JN1067-004

LEGEND

— — — —	Reserve Boundary
42s	Subsite Number
•	One Observed Butterfly



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December 29, 1997

PN1067-004

january 13, 1998

MEMORANDUM FOR THE RECORD
JN 1067-005.M04

TO: Landrum and Brown
(Mr. Rich Macias and Ms. Karen Yamamoto)

Los Angeles World Airports
(Ms. Sheila Murphy, Mr. Ray Ilgunas, and Mr. Steve Crowther)

Cutler & Stanfield
(Ms. Katherine Andrus)

Hall & Associates
(Mr. Carlyle W. Hall, Jr.)

Mr. Jim Geocaris, Esq.

Federal Aviation Administration
(Mr. David Kessler)

U.S. Fish and Wildlife Service
(Mr. Robert James)

California Department of Fish and Game
(Ms. Lilia Martinez)

City of Los Angeles Environmental Affairs Department
(Ms. Melinda Bartlett)

FROM: Sapphos environmental
(Dr. Brad Blood)

SUBJECT: Final Report of Pacific Pocket Mouse Survey at LAX/El Segundo Dunes in Support of the LAX 2015 Master Plan Project, September 1 to 26, 1997

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

ATTACHMENTS:

1. Letter from U.S. Fish and Wildlife Service to Federal Aviation Administration, dated July 31, 1997
2. Emergency Listing for Pacific Pocket Mouse
3. Proposed Rule for Pacific Pocket Mouse
4. Plant Association Map
5. Personnel Matrix
6. Photographs of Traps
7. Photograph of Trap Line
8. Site Map with Trap Lines Demarcated
9. Photographs of Trap Area Habitat
10. Field Notes

REFERENCES: Sapphos Environmental Memorandum for the Record, dated September 2, 1997, Subject: Pacific Pocket Mouse Pre-survey Field Meeting at LAX/El Segundo Dunes in support of the LAX 2015 Master Plan Expansion Project

EXECUTIVE SUMMARY

This Memorandum for the Record summarizes the results of directed surveys conducted in late summer 1997 to assess the presence or absence of the Pacific pocket mouse (*Perognathus longimembris pacificus*) at the Los Angeles International Airport (LAX)/El Segundo Dunes (USGS 7.5 minute series: Venice Topographic Quadrangle; Township 2S & Range 15W, located within the Sausal Redondo Land Grant Boundary) in support of the Los Angeles International Airport 2015 Master Plan Project (Master Plan). The results of this study indicate that the Pacific pocket mouse is not present on the Dunes areas and is in fact extirpated from the Dunes. The City of Los Angeles Department of Airports and the Federal Aviation Administration concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Report (EIR) and Environmental Impact Statement (EIS) in support of the Los Angeles International Airport 2015 Expansion *Master Plan*. The U.S. Fish and Wildlife Service (Service) provided comments on the NOP /NOI in their letter dated July 31, 1997. The Service letter indicated the need to conduct directed surveys to assess the presence or absence of the federally endangered Pacific pocket mouse as part of the joint EIR/EIS. The Service, Federal Aviation Administration, City of Los Angeles Department of Airports, Landrum & Brown, and Sapphos Environmental met in the field on August 27, 1997 to discuss areas to be surveyed, survey protocols, and survey schedules.

Sapphos Environmental, in conjunction with Pacific pocket mouse trapping permit holders Dr. Michael O'Farrell (Permit # 744707), Mr. Peter Bloom (Permit # 787376), and Mr. Bill Vanherweg (Permit # 787644), completed directed surveys of the 302-acre LAX/El Segundo Dunes site and a 25 acre fragment on the east side of Pershing Drive (located on the airport property). All survey work was performed in accordance with the Service's Pacific pocket mouse trapping protocols. Intensive directed surveys started on September 1 and were completed on September 26. The survey utilized over 18,000 trap nights, and confirmed the absence of Pacific pocket mouse. No Pacific pocket mouse were found, nor was any sign or indication of recent or subrecent inhabitance of the Dunes by Pacific pocket mouse observed by the field team during this survey. This study concludes that the Pacific pocket mouse is extirpated from the Dunes. Three species of small mammal were captured as a result of the survey, including: house mouse (*Mus musculus*), roof rat (*Rattus rattus*), and western harvest mouse (*Reithrodontomys megalotis*). Of the three species, only one is native to the Dune system, the western harvest mouse. The other species present are introduced pest species. Red fox were observed each evening of the survey foraging across the entire Dunes property. This report further concludes that the red fox is a major contributor to the decline and extirpation of the native small mammal population of the Dunes.

INTRODUCTION

This Memorandum for the Record transmits the results of directed surveys undertaken by Sapphos Environmental to assess the presence or absence of the federally listed endangered Pacific pocket mouse (*Perognathus longimembris pacificus*) at the LAX/El Segundo Dunes in support of the LAX 2015 Master Plan Project draft EIR/EIS. The City of Los Angeles Department of Airports and the Federal Aviation Administration concurrently issued a Notice of Preparation (NOP) and Notice of Intent (NOI) for a joint Environmental Impact Report (EIR) and Environmental Impact Statement EIS) in support of the Los Angeles International Airport 2015 Expansion Master Plan (Master Plan). The U.S. Fish and Wildlife Service (Service) provided comments on the NOP/NOI in their letter dated July 31, 1997 (Attachment 1). The Service letter indicated the need to conduct directed surveys to assess the presence or absence of the federally endangered Pacific pocket mouse as part of the joint EIR/EIS. The Service, Federal Aviation Administration, City of Los Angeles Department of Airports, Landrum & Brown, and Sapphos Environmental met in the field on August 27, 1997 to discuss areas to be surveyed, survey protocols, and survey schedules.

Through its Master Plan consultant, Landrum & Brown, the City of Los Angeles Department of Airports and Federal Aviation Administration requested that Sapphos Environmental design a study and assemble a team of qualified consultants to conduct directed surveys for Pacific pocket mouse within the 300 acre Los Angeles/El Segundo Dunes site.

On August 27, 1997 a presurvey meeting took place at the Los Angeles/El Segundo Dunes (Dunes) to discuss the extent and intensity of the survey. That meeting was attended by the Federal Aviation Administration, U.S. Fish and Wildlife Service, Los Angeles City Department of Airports, Landrum & Brown, and Sapphos Environmental and its subcontractors (reference Sapphos Environmental MFR dated September 2, 1997).

As a result of the August 27, 1997 field meeting, the City of Los Angeles Department of Airports and the Federal Aviation Administration authorized Sapphos Environmental to conduct directed surveys for Pacific pocket mouse to address Item No. 2 in the scoping comments provided by the U.S. Fish and Wildlife Service in their letter dated July 31, 1997. This Memorandum for the Record summarizes information regarding the Pacific pocket mouse, its habitat, and current status; describes the study area characteristics; survey protocols and assigned personnel; survey results; and conclusions.

PACIFIC POCKET MOUSE

Pacific pocket mouse (*Perognathus longimembris pacificus*) is the smallest member of the genus *Perognathus* (the silky pocket mice (Hall, 1981, Osgood, 1900). In his revision of North American pocket mice, Osgood (1900) noted that the Pacific pocket mouse is, "the most diminutive member" of the genus *Perognathus*. The overall size is small (the total length of head and body and tail is only 110 to 131 mm). The length of the tail is equal to or slightly shorter than the length of the head and body. The fur is very soft. The dorsal fur color is brown to pinkish buff. The lateral color is similar to the dorsal and there is a distinct lateral line which separates the lateral coloration from the white belly. The base of each ear has a light patch of fur. This tiny mouse weighs only 7 to 9 gms (Hall, 1981; Osgood, 1900; U.S. Fish and Wildlife Service, 1997).

The Pacific pocket mouse was emergency listed as endangered by the Service February 3, 1994 (U.S. Fish and Wildlife Service, 1994a) (Attachment 2). A species can be listed as endangered when it is determined by the Service that the status of its population meets one of the following five criteria:

1. The present or threatened destruction, modification, or curtailment of its habitat or range
2. Overutilization for commercial, scientific, or educational purposes
3. Disease or predation
4. Inadequacies of existing regulatory mechanisms
5. Other natural and manmade factors affecting its continued existence

The Pacific pocket mouse was listed after a small population (39 individuals) was discovered extant at the Dana Point Headlands in 1993. This subspecies of *P. longimembris* had not been observed in 20 years at the time of its rediscovery. At the time of the emergency listing, the Service also published a proposed rule (U.S. Fish and Wildlife Service, 1994b) to list the Pacific pocket mouse as endangered (Attachment 3). The proposed rule was based upon two listing criteria. The Pacific pocket mouse is in "imminent danger of extinction due to habitat loss and fragmentation, and predation by feral and domestic cats" (U.S. Fish and Wildlife Service, 1994a).

Historically, the Pacific pocket mouse was known from areas with fine-grain, sandy substrates in the immediate vicinity (within 4 km) of the Pacific Ocean. The Pacific pocket mouse has been observed in association with coast strand, coastal dunes, river alluvium, and coastal sage scrub on marine terraces (Grinnell 1933; Mearns 1898; Meserve 1976; Bowers 1986). The Dunes is the northernmost extent of the Pacific pocket mouse's historic range which is believed to have extended as far south as northwestern Baja California, Mexico; however, the species has not been recorded outside of California. Brylski et. al. (1994) indicate that populations of the Pacific pocket mouse appear to have experienced a rapid decline as a result of coast development and highway construction. Collections of the species were made in Orange County as late as 1971. In 1993, Brylski discovered an extant population of this species at the Dana Point Headlands on loose sand substrates in a coastal sage scrub community dominated by California buckwheat (*Eriogonum fasiculatum*) and California sage (*Artemisia californica*). In 1993 it was the only known population. Two additional populations have since been located further south on Camp Pendleton, Orange County, California (U.S. Fish and Wildlife Service 1997).

Historically, only three localities within Los Angeles County are known to have harbored populations of Pacific pocket mouse: Marina del Rey/El Segundo, Clifton, and Wilmington. No records of Pacific pocket mouse are known from Los Angeles County since 1938 (U.S. Fish and Wildlife Service, 1994, 1997). Suitable habitat at Clifton and Wilmington has been lost to development. A large portion of the suitable habitat for the Marina del Rey/El Segundo has been developed in support of the Hyperion Wastewater Treatment Plant. The Service (1994a) reports that recent surveys have been unsuccessful in locating extant individuals in the vicinity of Marina del Rey or El Segundo. As part of ongoing biological monitoring activities at the Dunes by Sapphos Environmental, two recent small mammal surveys had been performed (Sapphos Environmental, 1995; 1997) The most recent survey was directly targeted to sample for the presence of Pacific pocket mouse. This survey utilized site specific sampling techniques over a five day period in June 1997. This survey, as in the previous surveys, did not detect the presence of Pacific pocket mouse. Additionally, no sign associated with Pacific pocket mouse, or

other Heteromyid rodent (e.g. kangaroo rat, pocket mouse) was seen. The Dunes contain the largest remaining habitat for the Pacific pocket mouse in Los Angeles County. Therefore, the presence or absence of the species at the Dunes is a key factor to be considered in the assessment of the potential for Pacific pocket mouse to survive and recover in the wild.

STUDY AREA

The 302-acre Dunes is a remnant of a once more extensive complex of coastal dune and coastal strand habitat fringing the Santa Monica Bay. The Dunes were relatively undisturbed until the early 1900's when the City of Redondo Beach and community of Venice were developed. Following residential construction, construction of a power plant, refinery and the Hyperion Wastewater Treatment Plant, approximately 345 acres of the dune system remained including the Dunes site. Between 1966 and 1972, the City of Los Angeles Department of Airports purchased and cleared 822 residences from land located seaward of the airport in order to avoid exposing residents to unhealthy noise levels. The net result of the City of Los Angeles Department of Airports's acquisitions was the conservation of approximately 300 acres of open space within the largely built-out area of western Los Angeles. The City of Los Angeles Department of Airports manages and maintains approximately 200 acres within the open space area as a Habitat Restoration Project for the federally endangered El Segundo blue butterfly.

Recognizing the importance of butterfly habitat, as well as other habitat values associated with the Dunes, the Los Angeles Board of Airport Commissioners approved overall expenditures of $200,000 towards habitat restoration for the El Segundo blue butterfly between 1985 and 1992. A limited habitat augmentation program in 1986 and 1987 was designed specifically to reduce stress on the endangered El Segundo blue butterfly. This restoration work included the removal of non-native vegetation, revegetation with coastal buckwheat (*Eriogonum parvifolium*) and other native dune species, installation of a drip irrigation system, and use of select herbicides and mechanized equipment to conduct larger scale non-native vegetation removal. The work was confined to three segments of the backdune in prime butterfly habitat. The program was successful within its limited scope and time frame; the decline of the El Segundo blue butterfly population temporarily reversed, and its population expanded.

The initial restoration efforts were continued in 1990 through an additional $75,000 granted by the California Coastal Conservancy which resulted in the revegetation of thirty-four acres and the removal of non-native exotic pest plant species from fifty-eight acres of remnant native habitat. The City of Los Angeles Department of Airports also funded a study at the Dunes resulting in the 1990 report entitled *Species Diversity and Habitat Evaluation Across the El Segundo Dunes* which provided recommendations for conservation and restoration efforts at the Dunes. In 1992, then-mayor Tom Bradley signed Ordinance No. 167940, authored by Councilwoman Ruth Galanter, which designated 200 acres within the Dunes as a Habitat Restoration Project for the El Segundo blue butterfly. Responding to the recommendations of the report, the City of Los Angeles Environmental Affairs Department applied and received a $430,000 grant from the Environmental Enhancement and Mitigation Grant Program of the State Resources Agency. The purpose of the grant was to restore 137 acres within the 200 acre Habitat Restoration Project Area established by the City Ordinance.

City of Los Angeles Department of Airports is currently implementing the recommendations of the Long-Term Habitat Management Plan. City of Los Angeles Department of Airports has dedicated two full-time landscape staff to the Dunes who are actively involved in the removal of invasive non-native pest plants such as iceplant (*Carpobrotus aequilaterus* and *Carpobrotus edulis*) and acacia (*Acacia cyclops* and *Acacia retinoides*). Another critical element of their activities is the continued removal of California buckwheat whose presence is detrimental to the El Segundo blue butterfly population. In addition, City of Los Angeles Department of Airports has retained Sapphos Environmental to provide technical guidance in the ongoing conservation and management of the El Segundo blue butterfly and it's habitat at the Dunes.

In 1995, the Board of Airport Commissioners directed City of Los Angeles Department of Airports to initiate the preparation of a Master Plan guiding the planning and development of Los Angeles International Airport to an anticipated level of demand for the year 2015. The consideration and evaluation of biological resources, particularly at the El Segundo Dunes, is a major component of the planning process.

Topography

Sand dune systems result from a dynamic interplay between the high energy processes of the ocean and the protected inland areas of the coastal plain that are outside the direct influence of ocean water, salt spray, and sand. Dune system plant communities typically form a continuum in response to topography and proximity to the ocean. Four main landforms associated with dunes systems are present at El Segundo: strand and bluff (adjacent to the ocean), followed by the foredune, backdune and deflation plain as one moves inland.

Strand and Bluff: Strand is defined as the expanse of sandy substrate between the mean tide line and the beginning of the foredune. At the Dunes, a narrow 100- to 150 foot wide strand formerly extended from the mean tide line to the base of a 10- to 15-foot bluff. The present day strand has artificially been widened to form Dockweiler Beach and an extensive parking lot has been placed on top of the bluff. Regular sand sweeping activities prevent strand vegetation from becoming established..

Foredune: Historically the foredune extended from the bluff just above the strand to the point of drop off which forms the backdune. With the construction of Vista Del Mar Boulevard, the foredune was relocated approximately 150 to the east of its historical seaward border.

Backdune: The steeply sloping aspect of the backdune is formed as sand-laden winds experience a sharp drop in velocity after, crossing the crest of the dunes, and deposit most of their sand load there. The steepness of the backdune renders it highly susceptible to erosion upon removal of the dense plant cover.

Deflation Plain: Deflation plains form at the base of backdunes as a layer of sand is deposited over non-dunes related substrates. The deflation plain at the Dunes once extended eastward past Pershing Drive and onto LAX proper. An older dune system in which the sand grains have fused to become weakly-cemented sandstone is found at the base of the present dunes and underlies the deflation plain.

The Habitat Restoration Area within the Dunes supports three distinct natural plant communities. Associated with the foredune is southern foredune (California Natural Diversity Data Base Element Code 21230); associated with the backdune is southern dune scrub (CNDDB Element Code 21330); and associated with the deflation plain is valley needlegrass grassland (CNDDB Element Code 421 10). To the north of the Habitat Restoration Area are approximately 100 acres of open space characterized by disturbed former dune and a disturbed area with a non-dunes related substrate.

Subsite Numbers

At the beginning of the 1987-1988 research program, the entire 302-acre property was subdivided into 60 subsites to serve as reference for all clearing, revegetation, and other restoration activities. The subsites were primarily divided by extant streets within the Dunes and serve as useful location reference points for the clearing, revegetation, and restoration activities.

Plant Communities

The Dunes are characterized by five plant communities (Attachment 4). The Southern Foredune and Southern Dune Scrub Plant communities at the Dunes provide suitable habitat for Pacific pocket mouse. The Disturbed Former Dune Habitat which is believed to have historically provided suitable habitat for the Pacific pocket mouse, is not believed to currently provide suitable habitat due to the extensive cover of iceplant. It is possible that suitable habitat could be provided through removal of constructed materials (concrete, etc.), removal of non-native plants, and restoration of plants native to Southern Foredune and Southern Dune Scrub. Areas supporting Valley Needlegrass Grassland are characterized heavy soils and are not considered to be suitable habitat for the Pacific pocket mouse.

Southern Foredune (CNDDB Element Code 21230): The foredune area is a single gradual slope, rising to a maximum of approximately 70 meters; average width is approximately 800 meters. The substrate is fine-grained sand except in small depressions and gullies on the north- and east-facing slopes where organic debris accumulates from plant growth. Southern foredune plant communities are typically dominated by perennial species with a high proportion of suffrutescent (i.e., shrubby but not very woody) plants up to 30 cm tall. The 204 acres of southern foredune comprises the main body of the Dunes. Of the 204 acres, 35 acres are considered to be relatively undisturbed and 29 acres were sand mined. One hundred forty acres were revegetated with southern foredune plant species during 1987-1994 restoration efforts. The foredune supports coast buckwheat (*Eriogonum parvifolium*), bush lupine (*Lupinus chamissonis*), coast golden bush (*Ericameria ericoides*), beach evening primrose (*Camissonia chieranthifolia*), dune wallflower (*Erysimum suffrutescens*), beach sand verbena (*Abronia umbellata*), beach bur (*Ambrosia chamissonis*), morning glory (*Calystegia macrostegia*), and Russian thistle (*Salsola tragus*). Two non-native weedy pest species, acacia and iceplant, are particularly pernicious in the foredune area and are aggressively managed by City of Los Angeles Department of Airports.

Southern Dune Scrub (CNDDB Element Code 21330): The steep slope of the backdune is formed as wind-transported sand is deposited at the dune crest due to a rapid decrease in wind velocity on the backside of the Dunes. Because it is steep, the backdune slope is also unstable; sand falls easily except where stabilized by plant growth. At the Dunes, the backdune area comprises 27 acres of more-or-less stabilized ridges, flats, and backdune slopes. In these areas southern dune scrub (CNDDB:21330) vegetation can be found. Southern dune scrub typically consists of a dense coastal scrub community of scattered shrubs, sub-shrubs, and herbs, generally less than 3 ft. tall. This community typically develops considerable cover, and is typically more dense than the foredune community. The plant diversity of the backdune area is also typically higher than that of the foredune, because the backdune is subject to lower thermal stress and wind dehydration. The richest biota of the entire dune complex occurs along the toe of the backdune slope. Two plants, hedge-leaved horkelia (*Horkelia clineatus*) and hairy golden-aster (*Heterotheca sessiliflora* ssp. *fastigiata* [as *Chrysopsis villosis*]), were noted as early as 1938 as occurring only at the backdunes interface. These two plants are limited to the same situation today. As a result of the habitat restoration efforts undertaken between 1987 and 1994, the southern dune scrub is currentey dominated by native plants including coast goldenbusn, bladderpod, morning glory, Lewis's evening primrose, beach evening primrose, bush lupine, coast buckwheat, and beach sand verbena. A pest species present in the southern dune scrub community is California buckwheat, which although native to other southern California native plant communities, is not native to the Dunes. Removal of California buckwheat has been and continues to be a major component of habitat restoration efforts within the Habitat Restoration Area. Other pest species which are actively being removed by City of Los Angeles Department of Airports include acacia and iceplant.

Valley needlegrass grassland (CNDDB Element Code 42110) and Vernal Pools: The deflation plain east of the backdune consists of loosely consolidated (incipient) sandstone covered to variable depths with aeolian (wind-transported) sand. The Los Angeles coastal prairie that was historically described as occurring on the deflation plain has been significantly altered and degraded by development activities. The plant community typically associated with this prairie was dominated by the native perennial, bunch grass, nodding needlegrass (*Nassella* [*Stipa*] *cernua*), along with a rich mix of herbaceous flowering plants. The valley needlegrass grassland community is now almost completely absent due to extensive grading and paving, and the invasion of exotic annual grasses. Habitat restoration efforts in the deflation plain has largely consisted of revegetation with nodding needlegrass. Other native dunes species that have expanded in to this area without planting include California encelia, Lewis's evening primrose, deerweed, and bush lupine.

Historically, in addition to supporting a grassland community, the deflation plain area supported vernal pools. Vernal pools are commonly found in deflation areas in the lee of sand dunes, especially where deflation areas have eroded down to or near the water table. The characteristics of the vernal pool habitats at the El Segundo Dunes are not fully captured by the Holland classification: based on the available data, the El Segundo Dunes show affinities with Northern hardpan vernal pools (CNDDB Element Code 44110) and San Diego Mesa claypan vernal pools (CNDDB Element Code 44322). One vernal pool was also recorded to exist on the foredune of the Dunes as late as 1974. The vernal pool community is associated with colorful annual forbs (non-grass herbaceous plants) which bloom in successive concentric circles as the pools dry. Species reported to have occurred on site include meadowfoam (*Limnanthes dianthiflorus*), goldfields (*Lasthenia glabrata*) and checker mallow (*Sidalcea malvaeflora* ssp. *malvaeflora*). California buckwheat and iceplant are scattered throughout the grassland areas of the Dunes. City of Los Angeles Department of Airports has removed California buckwheat and iceplant from approximately 10 acres of grassland.

Disturbed Former Dune: Active restoration of native plant communities has not been undertaken in the 100 acres of open space to the north of the Habitat Restoration Area, including all of the Dunes property north of Sandpiper Street. Highly degraded versions of southern foredune and southern foredune scrub can be found within this site.

Disturbed: Close to forty acres located in the northeast corner of the Dunes site is composed of a soil substrate unrelated geologically to the Dunes proper. The soil consists of sandy loam and past land uses included intensive farming activities. The characteristic vegetation includes a dense cover of exotic annual grasses and other weedy species interspersed with a few recolonizing native species. Several ornamental trees and agricultural tree species are also present.

SURVEY PROTOCOL AND PROCEDURES

As a result of the August 27, 1997 field meeting with the Service, it was determined that all areas supporting Southern Foredune, Southern Dune Scrub, and Disturbed Dune would be subject to intensive directed surveys for Pacific pocket mouse. Areas surveyed in June of 1997 did not require additional sampling. The Service indicated that all trapping must have been completed prior to September 30, 1997.

Pacific pocket mouse permits

The Service provided the Federal Aviation Administration with a list of individuals authorized to conduct directed surveys for Pacific pocket mouse. Due to the large area to be surveyed in the limited amount of time, Sapphos Environmental retained the services of three permit holders to assist in the implementation of directed surveys. The following individuals who hold Pacific pocket mouse permits were retained:

1. Mr. Bill Vanherweg.........Permit No. 787644
2. Mr. Peter Bloom..............Permit No. 787376
3. Dr. Michael J. O'Farrell...Permit No. 744707

One to three of the above persons was present at all times and phases of the Pacific pocket mouse survey.

Field Personnel: Dr. Brad Blood of Sapphos Environmental served as project manager for implementation of the field work. Mr. Bill Vanherweg, Mr. Peter Bloom and Dr. Michael J. O'Farrell were assisted by staff of Sapphos Environmental and O'Farrell Biological Consulting. All field team members were briefed on the sensitivity of the coastal buckwheat and its relationship with the El Segundo blue butterfly. Mr. Peter Bloom and Mr. Bill Vanherweg inserviced and trained all Sapphos Environmental employees involved with the survey on proper techniques in utilizing live traps and checking traps for live animals. At least one Sapphos Environmental employee badged by City of Los Angeles Department of Airports was present at all times when the field team was engaged on Dunes property. At least one Pacific pocket mouse permit holder was present and within supervising range at all times during the survey. Only Pacific pocket mouse permit holders handled and processed animals captured during the survey. A listing of all field personnel and the time they worked is listed in Attachment 5.

Survey Equipment

The survey equipment consisted of Sherman Live Traps and Stoddard Live Traps (Attachment 6). These traps have been used safely for many years and are standard live trapping equipment for small mammal survey work (O'Farrell et. al., 1994). Two sizes of Sherman Live Traps were used. The standard 7.5X9X23 cm trap, and the longer 35 cm trap. Both trap types are aluminum, and solid on all sides. The Stoddard Live traps have the same dimensions as the 23 cm Sherman, but are constructed out of heavy duty wire mesh so that it is possible to view the contents of the trap without opening the trap door. Traps were deployed in trap lines with distances between individual traps within a single line varying from 10 m to 15 m depending on the suitability of the habitat. Traplines (Attachment 7) were spaced from 10 m to 15 m apart based upon the suitability of the habitat. Traplines followed the contours and land forms of the Dunes (Attachment 8). All traplines were marked with small flags at their start and end points and intermittently with flagging tape. All flags and flagging tape was removed when trapping was completed for each session.

Survey Organization

The survey was divided into 5 sessions with each session consisting of 5 consecutive nights following protocol established by the Service for the Pacific pocket mouse (Attachment 4). The survey proceeded from south to north across the Dunes from essentially the highest quality extant habitat to Disturbed Dunes which support marginally suitable habitat (Attachment 9). Three areas were not surveyed. One area not surveyed consisted of subsites 55S, 55M, 55N, 56S, 56M, and 56N north of Sandpiper Street. These subsites were subject to intense agricultural land practices in the past and are currently covered with dense grass. It was determined by the Pacific pocket mouse permit holders, in consultation with the Service, that these subsites did not need to be surveyed (August 27, 1997 Pacific pocket mouse presurvey meeting). The second area not surveyed is to the south of the VOR. This area had been the subject of intensive surveys in June, 1997 (Sapphos Environmental 1997), with no captures were recorded. The previously surveyed area consists of loose sand and steep slopes. The Pacific pocket mouse permit holders in consultation with the Service concluded that the terrain combined with the previous survey made another survey unnecessary. The third area not surveyed consists of the subsites to the east of the VOR (10, 11, 12, 13, 18, 20, 21, and 34). These sites are situated on steep slopes with loose sandy soils. The Pacific pocket mouse permit holders considered the slopes too steep and the soils too loose to be able to support burrow structures and so these subsites were not sampled.

RESULTS

Session 1 (September 1 - 6, 1997)

This session sampled Subsites 25, 26, 27, 28, and portions of 23, 24, 29, and 30. The area covered during this period was the southwest corner of the Dunes. The survey employed 600 Sherman live traps deployed along 12 separate traplines. The traplines were spaced at 10 m intervals and the traps within each line were also spaced at 10 m intervals. This results in a total of 3000 trap nights for this session. Permit holders present for this session were Mr. Bill Vanherweg and Mr. Peter Bloom.

The weather for this session varied from daily highs of 86°F to nightly lows of 65°F. Winds varied from 0 to 2 on the Beaufort scale, generally calm to still in the morning. Skies were partly cloudy with generally humid conditions. Heavy dew was present on the mornings of September 5 and 6.

Captures for this session: Total of 17. Captures consisted of 16 house mice (*Mus musculus*), and 1 western harvest mouse (*Reithrodontomys megalotis*). All captures occurred in areas of greater than

50% cover with a significant grassy understory. The single western harvest mouse was captured at the southernmost end of Trapline 12 in a thick scrubby understory directly adjacent to a stand of acacia trees. The pattern of capture on the site map demonstrates that the animals avoid areas of open space. Much of the interior of Subsite 26 is open sandy-dune habitat with less than 20% cover. Much of Subsite 27 and the southern extent of Subsite 26 is densely vegetated with grass and scrubs and acacia trees. A single male house mouse, considered to be resident was captured on three occasions during this session at the mid-point of Trapline 2 and 1.

Evidence of red fox (*Vulpes vulpes*) was visible in the vicinity of most traplines. At least two adult red fox were observed each evening and most mornings during this trapping session.

No Pacific pocket mouse were captured during this session. No signs of Pacific pocket mouse presence were observed by the field team during this session. Field notes from this survey session can be found in Attachment 10.

Session 2 (September 6 - 11, 1997)

This session sampled Subsites 14, 16, 17, 19, 23, 24, 29, 30, 31, and portions of Subsites 32, 33, and 15. One thousand live traps (600 Sherman and 400 Stoddard) were used during this session for a total of 5000 trap nights. All traps were deployed at 10 m intervals throughout. Permit holders present for this session were Mr. Bill Vanherweg, Mr. Peter Bloom, and Dr. Michael O'Farrell.

The weather for this session varied from daily highs of 88°F to nightly lows of 60°F. Wind varied from 0 to 3 on the Beaufort scale. The moon was a quarter full to start and half full at the finish.

Captures for this session: Total of 24. Captures consisted of 21 house mice and 3 black rats (*Rattus rattus*). The black rats were captured near heavy acacia growth. Two near the southernmost end of the trapline and one near the midpoint of the survey area, but this midpoint was next to a large acacia tree with substantial scrubby undergrowth. The area sampled during this session along the eastern edge of the mesa (Subsites 15, 16, 17, and 19) yielded captures of several house mice. All of these were taken at the edge of the bluff near the steep slope drop off. All of these were considered juvenile migrants or adult male migrants.

Evidence of red fox was visible in the vicinity of most traplines. At least two adult red fox were observed each evening and most mornings during this trapping session.

No Pacific pocket mouse was captured during this session. No sign indicative of the presence of Pacific pocket mouse was observed by the field team during this session of the survey. Field notes from this survey session can be found in Attachment 10.

Session 3 (September 11 - 16, 1997)

This session sampled Subsites 5, 6, 7, 8, 9, 15, 35, 36S, 36N, 37S, 37N, 38S, 38N, 39S, 39N, 40C, 40S, 40N, 41S, 41N, 42S, 42N, 43E, 43W, 43N, 44S, 44N, 45S, 45N, 46S, 46N, 47a, 47b, 47c, 47d, 47e, 48, 49, 50, and 54. One thousand live traps (600 Sherman and 400 Stoddard) were laid out as illustrated on the site map (Attachment 8). Traps in Subsites 36S north to Sandpiper Street and 45S north to Sandpiper street were spaced at 15 m intervals (as agreed on during the August 27, 1997 presurvey meeting). The remaining subsites were trapped at 10 m intervals. The substrate and habitat quality on these remaining subsites was of higher quality, with less disturbance than the subsites with the 15 m spacing. This trapping effort resulted in 5000 trap nights for this session. Permit holders present for this session were Mr. Bill Vanherweg, Mr. Peter Bloom, and Dr. Michael O'Farrell.

Weather for this session varied from highs of 80°F to lows of 60°F. The wind varied from 0-1 on the Beaufort scale. The moon ranged from three-quarters to full. The skies were clear with some morning clouds, and the humidity was above normal.

Captures for this session: Total of 4. Captures consisted of 4 house mice. As with the previous trapping session the house mice were captured in heavily vegetated areas.

Evidence of red fox was visible in the vicinity of most traplines. At least two adult red fox were observed each evening and most mornings during this trapping session.

No Pacific pocket mouse was captured during this session. No sign indicative of the presence of Pacific pocket mouse was observed by the field team during this session of the survey. Field notes from this survey session can be found in Attachment 10.

Session 4 (September 16 - 21, 1997)

This session sampled Subsites 1, 3, 36S, 36N, 37N, 40C, 40N, 41S, 41N, 44S, 44N, 45S, 45N, 51, 52, 53. Five hundred Sherman and 220 Stoddard live traps were used during this session resulting in a total of 3600 trap nights. The traps were deployed in lines as illustrated on the site map. Traps were spaced at 15 m intervals throughout. Permit holders present during this session were Mr. Bill Vanherweg, Mr. Peter Bloom, and Dr. Michael O'Farrell.

Weather for this session varied from highs of 80°F to lows of 65°F. The wind varied from 0 to 1 on the Beaufort scale. The moon was full to half phase, and the skies were partly cloudy.

Captures for this session: Total of 4. Captures consisted of 4 house mice.

Evidence of red fox was visible in the vicinity of most traplines. At least two adult red fox were observed each evening and most mornings during this trapping session.

No Pacific pocket mouse was captured during this session. No sign indicative of the presence of Pacific pocket mouse was observed by the field team during this session of the survey. Field notes from this survey session can be found in Attachment 10.

Session 5 (September 21 - 26, 1997)

This session sampled Subsites 57S, 57N, 58S, 58N, 59S, 59N, 60S, 60M, 60N, and a small area east of Pershing Drive on the northwest corner of the Airport proper as illustrated on the site map (Attachment 8). 164 Sherman and 176 Stoddard Live Traps were used in this session resulting in 1700

trap nights for this session. Permit holders present for this session were Mr. Peter Bloom and Dr. Michael O'Farrell.

The weather for this session varied from daily highs of 85°F to lows of 65°F. Skies varied from partly cloudy to cloudy. Light misty-rain occurred on the morning of September 25. The amount of precipitation was insignificant at the Dunes and did not interrupt the survey schedule. The wind varied from 0 to 2 on the Beaufort scale. The moon varied from none to half full.

Captures for this session: 1 house mouse. The house mouse was captured on the northwest corner of the airport property proper, north of runway 24R.

Evidence of red fox was visible in the vicinity of most traplines. At least two adult red fox were observed each evening and most mornings during this trapping session.

No Pacific pocket mouse was captured during this session. No sign indicative of the presence of Pacific pocket mouse was observed by the field team during this session of the survey. Field notes from this survey session can be found in Attachment 10.

DISCUSSION

The earliest known inventory of small mammals at the Dunes was performed in the late 1930's. At that time the following small mammals were recorded as present: ornate shrew (*Sorex ornatus*), California mole (*Scapanus latimanus*), desert cottontail (*Sylvilagus Audubon*), blacktailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), pocket gopher (*Thomomys bottae*), Pacific pocket mouse (*Perognathus longimembris pacificus*), agile kangaroo rat (*Dipodomys agilis*), western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii*), southern grasshopper mouse (*Onychomys torridus*), dusky-footed wood rat (*Neotoma fuscipes*), desert wood rat (*Neotoma lepida*), coyote (*Canis latrans*), racoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), spotted skunk (*Mephitis mephitis*), and bob cat (*Felis rufus*). The only introduced species observed during the 1930 study was the common opossum (*Didelphis virginiana*). No house mice, black rat, Norway rat, or red fox were recorded. These pest species have moved into the Dunes only in recent times (Sapphos Environmental 1995).

Only three taxa of mammals were captured as a result of directed surveys for Pacific pocket mouse: house mouse (*Mus musculus*), black rat (*Rattus rattus*), and western harvest mouse (*Reithrodontomys megalotis*). Of these three only one is a known native mammal, the western harvest mouse (*Reithrodontomys megalotis*). A vast majority of the captures occurred in the southern-most section of the Dunes. All captures occurred in areas with greater than 50 percent vegetative cover. Dense stands of acacia trees were associated with the capture locations for the black rat and with the single individual of the harvest mouse.

Although only three taxa of small mammal were captured, two other species of small mammal were observed either through direct sightings or indirectly through sign. These two species were the red fox and the pocket gopher (*Thomomys bottae*). Individual red fox were observed every night and most mornings of the survey. Tracks and trails of the red fox were observed to criss-cross all areas surveyed. Many traps used during the survey were urine-marked by red fox consistently night after night. Several traps were rolled over and moved as a result of red fox investigation. Numerous scat from the red fox were observed. Although not quantitatively studied, most of the scat contained insect remains and vegetable matter. Some scat however, contained fur and bone. The red fox seem to be taking advantage of all food sources available on the Dunes property. As fresh tracks were seen daily and since foxes were observed consistently, it is assumed that red fox are maintaining regular foraging routes throughout the Dunes.

No living pocket gophers were observed. Many old burrow systems were encountered during the survey throughout the Dunes. Fresh burrows were only rarely encountered.

Consistent with previous surveys no rabbits or ground squirrels were observed during the present survey. Also, no sign or indication of the presence of kangaroo rats were observed. The most recent previous mammal survey (Sapphos Environmental, 1997) targeted areas of sandy soils with less than 50 percent cover which appeared to represent typical Heteromyid (Pacific pocket mouse) habitat. This survey resulted in no captures in 650 trap nights. Also, no indication of the presence of pocket mice or kangaroo rats was observed. The 1995 survey (Sapphos Environmental,) captured only 2 species of small mammal in 765 traps nights. This survey captured several house mice and three woodrats (*Neotoma lepida*) near a cactus (*Opuntia* sp.) patch in the south west corner of the Dunes in Subsite 27. This 1995 survey did not capture either harvest mice or black rats. The most recent three mammal surveys have not recorded the presence of *Peromyscus boylii*. This species of white-footed mouse was recorded as present in the 1993 mammal survey (as cited in Sapphos Environmental, 1995). No recent survey has ever record the presence of Pacific pocket mouse at the Dunes.

CONCLUSIONS

The present survey is the most intensive and comprehensive small mammal survey to date at the Dunes. This study involved a nightly crew of five individuals and totaled 18,300 nights over a 26 day period. During this period only three species of mammal were captured, and a majority of these were captured in the southern-most area of the Dunes. Of these three species there was only a single individual captured of a native species, the harvest mouse. The house mouse was the most numerous small mammal captured. The majority of house mice captured were considered to be migrants moving in to the area from the outer perimeters of the Dunes. The above observations combined with the consistent sightings of healthy red fox leads the conclusion that the red fox has significantly contributed to the depauperate diversity and density of small mammals at the Dunes.

The following conclusions are offered as a result of the intensive surveys:

1. Pacific pocket mouse is extirpated from the Los Angeles/El Segundo Dunes and Los Angeles International Airport.
2. The presence of red fox is a significant contributor to the decline of populations of native small mammals which were historically present at the Los Angeles/El Segundo Dunes.

REFERENCES

Bowers, M. A. 1986. Geographic comparison of microhabitats used by three heteromyids in response to rarefaction. Journal of Mammalogy, 67(1):46-52.

Bryiski, P., R. Erickson, D. Laabs. 1994. "Pacific Pocket Mouse". In *Life on the Edge*, Carl G. Thelander (Ed.). BioSystem Books, Santa Cruz, California.

Grinnell, J. 1933. Review of the recent mammal fauna of California. University of California Publications in Zoology, 40: 71-234.

Hall, E. R. 1981. The Mammals of North America. 2nd, ed., John Wiley and Sons. New York.

Mearns, E. A. 1898. Descriptions of three new forms of pocket mice from the Mexican border of the United States. Bulletin of the American Museum of Natural History, 10: 299-302.

Meserve, P. L. 1976. Food relationships of a rodent fauna in a California coastal sage scrub community. Journal of Mammalogy, 57(2):300-319.

O'Farrell, M.J, W.A. Clark, F.H. Emmerson, S.M. Juarez, F.R. Kay, T.M. O'Farrell, and T.Y. Goodlett. 1994. Use of a mesh live trap for small mammals: are results from Sherman traps deceptive? Journal of Mammalogy, 75(3): 692-699

Osgood, W. H. 1900. Revision of the pocket mice of the genus *Perognathus*. North American Fauna, No. 18. Washington, D.C.

Sapphos Environmental. 1995. Baseline inventory for small mammals and carnivores at the Los Angeles Airport El Segundo Dunes restoration project site, Los Angeles County, California. Prepared by Steve Tabor.

Sapphos Environmental. 1997. Directed survey for Pacific pocket mouse. Prepared by Bill Vanherweg.

U.S. Fish and Wildlife Service. 1997. Draft Recovery Plan for the Pacific Pocket Mouse. Carlsbad Field Office, Ecological Services, Carlsbad, California. 93pp.

U.S. Fish and Wildlife Service. 1994a. Endangered and threatened wildlife and plants: emergency rule to list the Pacific pocket mouse as endangered. Federal Register, 59(23):5306-5310.

U.S. Fish and Wildlife Service. 1994b. Endangered and threatened wildlife and plants: proposed rule to list the Pacific pocket mouse as endangered. Federal Register: 59(23):5311-5312.

ATTACHMENT 1

LETTER FROM U.S. FISH AND WILDLIFE SERVICE TO FEDERAL AVIATION ADMINISTRATION, DATED JULY 31, 1997

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

31 JUL 1997

Mr. David B. Kessler
Federal Aviation Administration
U.S. Department of Transportation
P.O. Box 92007, Worldway Postal Center
Los Angeles, California 90009-2007

Subject: Notice of Preparation for Los Angeles International Airport Master Plan

Dear Mr. Kessler:

The U.S. Fish and Wildlife Service (Service) has reviewed the Notice of Preparation (NOP) for the proposed Environmental Impact Statement/Environmental Impact Report on the Master Plan for the Los Angeles International Airport (DEIS/DEIR). The proposed project is a master plan for the Los Angeles International Airport in Los Angeles, Los Angeles County, California. It is our understanding that the proposed master plan includes five alternatives, including one which involves extending a runway through the northern portion of the Airport Dunes. The Airport Dunes, which is bounded by Pershing Avenue, West Imperial Highway, Vista del Mar, and Waterview/Napoleon Avenues, is the largest coastal sand dune between the mouth of the Santa Maria River and Ensenada in Baja California.

The Service is concerned about the impacts of this proposed project on the endangered El Segundo blue butterfly (*Euphilotes bernardino allyni*)(butterfly), endangered Pacific pocket mouse (*Perognathus longimembris pacificus*)(mouse), endangered California least tern (*Sterna antillarum browni*)(tern), endangered brown pelican (*Pelecanus occidentalis*)(pelican), endangered American peregrine falcon (*Falco peregrinus*)(falcon), several animal and plant Species of Special Concern, fish and wildlife resources, and wetlands. The butterfly, mouse, falcon, pelican, and tern are protected under the Endangered Species Act of 1973, as amended (Act). The comments and recommendations in this letter are based on the project NOP for the DEIS/DEIR dated June 11, 1997, a visit to the Airport Dunes by Chris Nagano and Marj Nelson of my staff on July 9, 1997, a visit to the Airport Dunes by Chris Nagano, Art Davenport, and Bob James of my staff on July 15, 1997, and other information available to the Service.

Regarding fish and wildlife resources, the DEIS/DEIR should assess fully the impacts of the proposal and its alternatives on species populations and their habitats, with emphasis on wetlands and endangered, threatened, proposed, candidate species, and Species of Special

Concern. The DEIS/DEIR should state clearly the purposes of, and document the needs for the proposed project so that the capabilities of the various alternatives to meet those purposes and needs can be readily determined. The DEIS/DEIR should include a thorough description of all the facilities to be constructed as part of the proposal. Figures accurately depicting proposed project features in relation to natural features in the project areas also should be included in the DEIS/DEIR.

Section 9 of the Endangered Species Act of 1973, as amended (Act) prohibits the "take" of any federally listed animal species. As defined in the Act, take means "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" has been further defined to include habitat destruction when it kills or injures a listed species by interfering with essential behavioral patterns such as breeding, foraging, or resting. Thus, not only is a listed animal protected from activities such as hunting or collecting, but also likely from actions that damage or destroy its habitat. The term person is defined as "an individual, corporation, partnership, trust, association, or any other private entity, or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or political subdivision of a State, or any other entity subject to the jurisdiction of the United States."

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency is involved with the permitting, funding, or carrying out of the project, then initiation of formal consultation between that agency and the Service pursuant to Section 7 of the Act is required if it is determined that the proposed project may affect a federally listed species. Such consultation would result in a biological opinion that addresses the anticipated effects of the project to the listed species and may authorize a limited level of incidental take. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an incidental take permit pursuant to Section 10(a) of the Act would need to be obtained. The Service may issue such a permit upon completion of a satisfactory conservation plan for the listed species that would be affected by the project.

Surveys for several federally listed species may only be conducted by permitted biologists. Complete surveys should be conducted on the Airport Dunes, as well as other areas of the Los Angeles International Airport, including the areas located between Pershing Avenue and the existing runways. The findings of the surveys and measures that will be taken to avoid/mitigate any adverse impacts to these species should be included in the DEIS/DEIR.

The Service offers the following specific information and recommendations to assist the Federal Aviation Administration in planning for the preservation of sensitive wildlife species and habitats within the proposed project area, and as a means to assist you in complying with pertinent statutes. To facilitate the evaluation of the proposed project from the standpoint of environmental resource planning, we request that the DEIS/DEIR contain the following specific information:

1) The Airport Dunes contain the largest known population of the endangered El Segundo blue butterfly. The DEIS/DEIR should contain information on the location of the animals and their food plants, as well as all areas containing coastal sand dune habitat. The survey for the animal and its habitat should be conducted within the area bordered by Napoleon/Waterview Avenues, West Imperial Highway, Vista del Mar, and Pershing Drive, as well as the areas located between Pershing Drive and the runways. The information in the DEIS/DEIR should include the precise location and number of butterflies observed, as well as the dates and times, and weather conditions when the animals were observed. The information presented in the DEIS/DEIR should include the survey data collected by Sapphos Environmental during the 1995-1997 flight seasons of the El Segundo blue butterfly and any other relevant information.

2) The project area is a historical locality for the Pacific pocket mouse, a Federal endangered species, extant at only three other locations. A live-trapping survey should be done for this animal by a permitted biologist following Service survey protocol. The survey conducted in 1997 was inadequate since the area was incompletely covered. The Service would like the opportunity to review the survey approach with the biologist prior to initiation of trapping.

3) The DEIS/DEIR should completely assess the impacts of the proposed project on the California least tern, brown pelican, and American peregrine falcon.

4) An assessment should be made of the direct, indirect, and cumulative project impacts to wildlife and associated habitats as a result of this project and other reasonably expected projects. All facets of the project (e.g., construction, implementation, operation and maintenance) should be included in this assessment.

5) Cumulative impacts should include an complete discussion of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, pursuant to §15130 of the CEQA Guidelines.

6) A description of Federal (listed, proposed, candidate) species, state-listed species, and locally sensitive species that are on or near the project site should include a detailed discussion, including information pertaining to their local status and distribution. This discussion should include species not observed but reasonably expected to occur. The species of concern include the burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), El Segundo spineflower (*Chorizanthe californica* var. suksdorfii), El Segundo dune flower (*Pholisma paniculatum*), Trask's snail (*Helminthoglypta traski*), 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), Dorothy's sand dune weevil (*Trigonoscuta dorothae*), Lange's dune weevil (*Onychobaris langei*),

El Segundo crab spider (*Eoo* new species), El Segundo sun spider (*Eremobates* new species), trapdoor spider (*Aptostichus simus*), Santa Monica dunes moth (*Copeblepharon sanctamonicae*), River's dune moth (*Euxoa riversii*), south coast dune beetle (*Psammodius maccleayi*), dune scarab beetle (*Aegilia convexa*), Belkin's dune fly (*Brennania belkini*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), California legless lizard (*Anniella pulchra*), and western spadefoot toad (*Scaphiopus hammondi*). Complete surveys should be conducted by qualified biologists who are familiar with these species and the results and appropriate mitigations included in the DEIS/DEIR. The surveys should include the habitats located east of Pershing Drive and west of the runways and also the habitats located in the area bordered by Waterview/Napoleon Avenues, Vista del Mar, Pershing Drive, and Sand Piper Street. The real and anticipated impacts of the project on these species should be fully addressed.

7) The status and likely impacts to botanical resources, including rare plants, should be reassessed. A literature search should be conducted, including a review of the Natural Diversity Database maintained by the State of California, for species that are Federal and State listed, proposed, candidate, or are otherwise considered to be endemic or rare by knowledgeable authorities such as the California Native Plant Society.

8) The Service is concerned about potential impacts to wetlands and waters of the United States resulting from the proposed project. We recommend avoidance as the preferred form of mitigation for projects that contain aquatic habitat for resident and migratory species of wildlife and plants. Wetlands, ponds, and drainages in the project area should be accurately mapped according to the Service's definition of biological wetlands. Since the purposes of this section is to discuss biotic resources, a biologically based definition of wetland should be used. Mapping of wetlands based on the U. S. Army Corps of Engineers may not result in disclosure of all resources associated with biological wetlands. In reviewing any future proposals for development in these areas, the Service will evaluate impacts not only on jurisdictional wetlands, but on all wetlands and other habitats for fish and wildlife. We recommend that the DEIS/DEIR include complete information on the impacts and mitigation for wetlands and waters of the United States.

9) Specific mitigation plans should be made to fully offset project-related impacts, including proposals for mitigating the cumulative impacts of direct and indirect habitat loss, degradation, or modification. Adverse project-related impacts should be mitigated, to the maximum extent practicable, through appropriate on-site conservation or revegetation of impacted habitat types. The objective of each mitigation plan should be to offset the project-induced qualitative and quantitative losses of wildlife habitat values. These mitigation plans involving restoration and enhancement should be prepared by persons with specific expertise on southern California coastal ecosystems and state-of-the-art native plant revegetation techniques. Each plan should include, at a minimum: a) the location of the mitigation site; b) the species, actual number, and size of the plants to be used (seeds and seedlings should be obtained from an appropriate on-site location or from an appropriate site in the immediate vicinity of the project site); c) a schematic layout depicting the arrangement of the plants within the compensation area; d) time of year that planting will occur; e) identification of the irrigation methodology to be employed; f) measures to be taken to control exotic vegetation on site; g) a detailed monitoring program that includes provisions for replanting areas where planted materials have not survived; and h) identification of the agency or party responsible for assuring the successful creation of the mitigation habitat and providing for the perpetual conservation of the restoration site.

10) A complete description should be made of measures to be taken to perpetually protect habitat values that are created during restoration (mitigation). Issues that should be addressed include, but not be limited to, restrictions on vehicle and people access, proposed land dedications, monitoring and management programs, control of illegal dumping, and lighting restrictions near mitigation areas.

We are available to assist the Federal Aviation Administration and the City of Los Angeles in the development of a master plan for Los Angeles International Airport that avoids or minimizes adverse impacts to listed species, wetlands, and other wildlife resources. Please contact Chris Nagano or Marj Nelson (butterfly and other wildlife) or Bob James (Pacific pocket mouse) of my staff at the letterhead address or at 760/431-9440 if you have any questions.

Sincerely,

Stephen H. Stewart

for Gail C. Kobetich
Field Supervisor

1-6-97-TA-155

cc: CDFG, San Diego, CA (Attn: B. Tippets)
CDFG, Long Beach, CA (Attn: J. Hernandez)
CDFG, Long Beach, CA (Attn: Environmental Services Supervisor)
CDFG, Sacramento, CA (Attn: D. Warenycia)
DRP, Los Angeles, Ca (Attn: D. Koutnik)
CCC, Long beach, CA (Attn: P. Emerson)
LAX, Westchester, CA (Attn: S. Crowther)

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ATTACHMENT 2
EMERGENCY LISTING FOR PACIFIC POCKET MOUSE

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AC39

Endangered and Threatened Wildlife and Plants; Emergency Rule to List the Pacific Pocket Mouse as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Emergency rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) exercises its emergency authority to determine the Pacific pocket mouse (*Perognathus longimembris pacificus*) to be an endangered species pursuant to the Endangered Species Act of 1973, as amended (Act). Prior to 1993, this species had not been observed in over 20 years. The Pacific pocket mouse was rediscovered on the Dana Point Headlands, Orange County, California, during July 1993. No more than 39 individuals are known to exist despite relatively intensive, recent surveys in all of the remaining, undisturbed locales where the species historically occurred.

The only known existing Pacific pocket mouse population is imminently threatened by a land development project and depredation by feral and/or domestic cats. Because of the need to make Federal funding, protection, and other measures immediately available to protect this species and its habitat, the Service finds that an emergency rule action is justified. This emergency rule provides Federal protection pursuant to the Act for this species for a period of 240 days. A proposed rule to list the Pacific pocket mouse as endangered is published concurrently with this emergency rule in this same Federal Register separate part.

DATES: This emergency rule is effective on January 31, 1994, and expires on September 28, 1994.

ADDRESSES: The complete file for this rule is available for inspection by appointment during normal business hours at the Carlsbad Field Office, U.S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, California 92008.

FOR FURTHER INFORMATION CONTACT: Gail Kobetich, Field Supervisor, Carlsbad Field Office, at the above address (telephone 619 431–9440; facsimile 619 431–9624).

SUPPLEMENTARY INFORMATION:

Background

The Pacific pocket mouse (*Perognathus longimembris pacificus*) is 1 of 19 recognized subspecies of the little pocket mouse (*Perognathus longimembris*) (Hall 1981), a species that is widely distributed throughout arid regions of the western United States and northwestern Mexico. It is the smallest member of the family Heteromyidae, which consists of spiny pocket mice (*Heteromys and Liomys*), pocket mice (*Perognathus and Chaetodipus*), kangaroo rats (*Dipodomys*), and kangaroo mice (*Microdipodops*). Virtually all members of this family are nocturnal, granivorous, and have external, deep, fur-lined cheek pouches (Ingles 1965; P. Brylski, consulting mammalogist, pers. comm., 1993).

The little pocket mouse is about 110 to 140 millimeters (mm) (4.3 to 6 inches (in)) long from nose to tip of tail. Its body pelage is spineless, bristle-free, and predominately brown, pinkish buff, or ochraceous buff above and light brown, pale tawny, buff, or whitish below. Two small patches of lighter hairs typically exist at the base of the ear. The tail can be either distinctly or indistinctly bicolored. The soles of the hind feet are hairy (Hall 1981).

The Pacific pocket mouse is the smallest subspecies of the little pocket mouse, ranging from about 110 to 126 mm (4.3 to 4.9 in) long from nose to tip of tail. The tail, hind foot, and skull lengths and the size of skull structures are also the smallest of all little pocket mouse subspecies.

The Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), which occurs mostly northeast of and more interior than the Pacific pocket mouse, is the only other subspecies of little pocket mouse in cismontane southern California, is 125 to 145 mm (4.9 to 5.7 in) in total length, and has a longer tail, hind foot, and skull than the Pacific pocket mouse. The nasal bones in the skull of the Los Angeles pocket mouse are also considerably larger than those of the Pacific pocket mouse (Huey 1939).

The Pacific pocket mouse was originally described by Mearns (1898) as a distinct species, *Perognathus pacificus*, based on the type specimen from San Diego County, California. von Bloeker (1931a,b) later recognized the Pacific pocket mouse as a distinct species, but subsequently concluded that the morphology of *P. pacificus* was not sufficiently distinct from *P. longimembris* to maintain the Pacific pocket mouse as a distinct species. von Bloeker reduced *P. pacificus* to *P. longimembris pacificus*. von Bloeker also described a second coastal subspecies, *P. longimembris cantwelli*, from El Segundo in Los Angeles County, California (von Bloeker 1932). After an analysis of 231 specimens of the little pocket mouse, Huey (1939) recognized *P. l. pacificus* to include the two subspecies described by von Bloeker (1932).

Although a taxonomic review of *P. longimembris* may be appropriate, Williams (*in litt.*, 1993) indicated that "the Pacific pocket mouse is distinct."

The Pacific pocket mouse occurs within about 3 kilometers (km) (2 miles (mi)) of the immediate coast of southern California from Marina del Rey and El Segundo in Los Angeles County south to the vicinity of the Mexican border in San Diego County (Hall 1981, Williams 1986, Erickson 1993) and below 180 meters (m) (600 feet (ft)) in elevation (Erickson 1993). Although the range map in Hall (1981) suggests that the range of the Pacific pocket mouse may extend into northwestern Baja California, Mexico, this subspecies has never been recorded outside of California (Erickson 1993).

The Pacific pocket mouse occurs on fine-grain, sandy substrates in the immediate vicinity of the Pacific Ocean (Mearns 1898, von Bloeker 1932a, Grinnell 1933, Bailey 1939). The Pacific pocket mouse inhabits coastal strand, coastal dunes, river alluvium, and coastal sage scrub growing on marine terraces (Grinnell 1933, Meserve 1972, Erickson 1993). Brylski (1993) detected the only known extant population on the Dana Point Headlands on loose sand substrates in a coastal sage scrub community dominated by California buckwheat (*Eriogonum fasciculatum*) and California sage (*Artemisia californica*).

The Pacific pocket mouse is likely facultatively or partially fossorial, relatively sedentary, and able to become torpid, estivate, or hibernate in response to adverse environmental conditions (Ingles 1965, Vaughan 1978, Zeiner *et al.* 1990).

While active above ground, little pocket mice have ranged up to 320 m (1,000 ft) from their burrows in a 24-hour period (Burt and Grossenheider 1976). Little pocket mouse home ranges vary in size from 0.12 to 0.56 hectares (0.30 to 1.4 acres), and populations range in density from 1 to 5.5 individuals per hectare (0.4 to 2.2 individuals per acre) (Chew and Butterworth 1964).

Pacific pocket mice primarily eat the seeds of grasses and forbs, but occasionally eat leafy material and soil-dwelling insects (von Bloeker 1931a; Meserve 1976a; Jameson and Peeters 1988; P. Brylski, pers. comm., 1993).

The little pocket mouse has a high metabolic rate (Bartholomew and Cade

1957), continually needs food supplies while active, and loses heat rapidly. It has limited capacity to store food. Little pocket mice may stay in their burrows continuously for up to 5 months in winter, alternating between periods of dormancy and feeding on stored seeds or hibernation in winter under adverse conditions (Bartholomew and Cade 1957, Ingles 1965, Kenagy 1973, Whitaker 1980).

Little pocket mice live up to 7.5 years in captivity and 3 to 6 years in the wild (Burt and Grossenheider 1976, Whitaker 1980). Pregnant and lactating females have been found from April through June, and immatures have been reported from June through September (Erickson 1993). Burt and Grossenheider (1976) previously reported that the little pocket mouse produces one or two litters (ranging in size from three to seven young) in a year.

The Pacific pocket mouse is historically known from eight populations. Approximately 80 percent of all Pacific pocket mouse records are from 1931 or 1932 (Erickson 1993). The following summarizes the historical distribution of the Pacific pocket mouse by county:

Los Angeles County. The Pacific pocket mouse historically was detected in three areas: Marina del Rey/El Segundo, Wilmington, and Clifton. No records of the Pacific pocket mouse exist in Los Angeles County since 1938 (P. Brylski, *in litt.*, 1993; D. Erickson, consulting biologist, *in litt.*, 1993; Erickson 1993).

Orange County. The Pacific pocket mouse has been found at two locales in Orange County: Dana Point and the San Joaquin Hills. The species was found on "Spyglass Hill" in the San Joaquin Hills from 1968 to 1971 (Erickson 1993). G.G. Cantwell previously collected 10 specimens at the Dana Point Headlands in 1932.

San Diego County. The Pacific pocket mouse has been detected at three general locales in San Diego County: the San Onofre area, Santa Margarita River Estuary, and the lower Tijuana River Valley. Another report of a single Pacific pocket mouse in suitable habitat from Lux Canyon, Encinitas, in June 1989 is now considered probable by the observer (Erickson 1993).

The only known extant population of the Pacific pocket mouse was rediscovered in July 1993 on the Dana Point Headlands in Orange County, California. Between 25 to 39 individual Pacific pocket mice were detected during trapping surveys conducted into August 1993 (Brylski 1993). This was the first time the Pacific pocket mouse had been collected at this site since 1971 (Erickson 1993). Numerous small-mammal survey and trapping efforts within its historical range (D. Erickson, *in litt.*, 1993; Erickson 1993) have failed to locate any additional populations. The remaining site is imminently threatened by a development that is expected to receive final approval in the very near future.

Previous Federal Action

The Pacific pocket mouse was designated by the Service as a category 2 candidate species for Federal listing as endangered or threatened in 1985 (50 FR 37958). It was retained in this category in subsequent notices of review published by the Service in the Federal Register in 1989 and 1991 (54 FR 554 and 56 FR 58804, respectively). Category 2 comprises taxa for which information now in the possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. The Service made the determination to list this species on the basis of new information received in 1993 that resulted in the elevation of the Pacific pocket mouse to category 1 status. Category 1 comprises taxa for which the Service has on file sufficient information to support proposals for endangered or threatened status.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the Pacific pocket mouse should be classified as an endangered species. Procedures found at section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Pacific pocket mouse (*Perognathus longimembris pacificus*) are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. Although originally known from eight locales, the Pacific pocket mouse now occurs in one site on the Dana Point Headlands of Dana Point in Orange County. Although the Dana Point Headlands have remained relatively unchanged since the Pacific pocket mouse was first detected at this locale, a land development project has been approved by the Planning Commission, with final approval anticipated in early 1994. This proposed residential and hotel complex project would result in the removal of 1.65 acres of the 1.75 acres of habitat that Brylski (1993) identified as being occupied by Pacific pocket mice (EDAW 1993b). Grading that would destroy the only known Pacific pocket mouse population may proceed upon final approval of the proposed project. This site is also threatened by fuel modification for fire protection.

In Los Angeles County, two of the three historic locales for the Pacific pocket mouse (Clifton and Wilmington) have been developed, and the third (Marina del Rey/El Segundo) has been substantially altered since the species was last detected there. Recent surveys have been unsuccessful in relocating the species in the vicinity of Marina del Rey or El Segundo. The Hyperion area, which formerly contained relatively large expanses of coastal strand and wetland habitats, has been extensively developed.

In Orange County, the development of the Spyglass Hill area began in 1972. This development resulted in the destruction of the formerly occupied habitat at that site.

Although portions of the San Onofre area and the Santa Margarita River mouth in San Diego County remain relatively undisturbed, recent survey and small mammal trapping efforts at these locations failed to detect the presence of the Pacific pocket mouse (P. Brylski, pers. comm., 1993; R. Erickson, *in litt.*, 1993; Erickson 1993; R. Zembal, U.S. Fish and Wildlife Service, pers. comm., 1993). During the 1930s, Camp Pendleton Marine Corps Base did not exist and the city of Oceanside was immediately adjacent to the Santa Margarita River estuary. Much of the southern half of the Santa Margarita River estuary was destroyed in the early 1940s during the establishment of Camp Pendleton Marine Corps Base and the related construction of a boat basin and harbor facilities. In addition, the Oceanside area has been extensively developed since the Pacific pocket mouse was last recorded there in 1972, and little, if any, suitable habitat remains at that location.

Although the lower Tijuana River Valley evidently supported a relatively large population of the Pacific pocket mouse in the early 1930s, this area has been substantially altered and currently provides little, if any, suitable habitat. Recent trapping efforts have failed to detect the Pacific pocket mouse at this location (Taylor and Tiszler 1991; R.T. Miller, pers. comm. to Erickson, 1993).

Another potential site for the Pacific pocket mouse is Lux Canyon in Encinitas, San Diego County, where an unverified sighting occurred in 1989. However, the majority of Lux Canyon has already been converted to urban development and agriculture. The remaining habitat in Lux Canyon is highly fragmented and subject to additional urban development (F. Roberts, U.S. Fish and Wildlife Service, pers. comm., 1993).

Opportunities to find additional populations of the Pacific pocket mouse are limited. Less than 400 hectares (1,000 acres) of about 28,000 hectares (70,000 acres) (1 percent) encompassing the range of the Pacific pocket mouse in Los Angeles County are undeveloped (U.S. Fish and Wildlife Service, unpublished data, 1993). About 17,800 hectares (44,000 acres) of approximately 21,600 hectares (54,000 acres) (81 percent) encompassing the range of the Pacific pocket mouse in Orange County has been converted to urban uses (U.S. Fish and Wildlife Service, unpublished data, 1993). Land use patterns in coastal San Diego County are similar. Oberbauer and Vanderwier (1991) reported that 72 percent of coastal sage scrub, 94 percent of native grasslands, 88 percent of coastal mixed chaparral, 88 percent of coastal salt marsh, 100 percent of coastal strand, and 92 percent of maritime sage scrub habitats in San Diego County had been converted to urban and agricultural uses by 1988.

An additional 16 hectares (41 acres) of suitable habitat for the Pacific pocket mouse occurs on the Dana Point Headlands. However, 13 hectares (32 acres) of this habitat would be eliminated by the same project that threatens the only known occupied habitat (EDAW 1993b). Additional potential habitat occurs on Pelican Hill in the San Joaquin Hills and along the coastal bluffs in Crystal Cove State Park. Over 50 percent of the Pelican Hill site was graded in March 1993 with the remainder approved for development (F. Roberts, pers. comm., 1993).

Within the remaining undeveloped range of the Pacific pocket mouse, areas that contain suitable habitat for the species represent less than 10 percent of the remaining habitat. This is exemplified by the situation in Orange County, where identified suitable habitat for the Pacific pocket mouse is restricted to less than 60 hectares (150 acres) (F. Roberts, pers. comm., 1993).

B. Overutilization for commercial, recreational, scientific, or educational purposes. Not known to be applicable.

C. Disease or predation. Disease is not known to be a factor affecting this species at this time.

The proliferation of non-native populations of the red fox (*Vulpes vulpes*) in coastal southern California is well documented (Lewis *et al.* 1993). Erickson (1993) has speculated that the red fox "may have hastened the demise of the Pacific pocket mouse in the El Segundo area," where the species apparently was well-represented historically.

Feral and domestic cats are known to be predators of native rodents (Hubbs 1951, George 1974). Pearson (1964) concluded that the removal of 4,200 mice from a 14 hectare (35 acre) test plot was accomplished largely by 6 cats over an 8-month period. Feral and/or domestic cats are threatening the only known population of the Pacific pocket mouse. A resident living immediately adjacent to the only known population has reported that domestic cats had recently and repeatedly brought home a number of "tiny gray mice" (P. Brylski, *in litt.*, 1993). Of all rodent captures at Dana Point Headlands reported by Brylski (1993), 51 percent were Pacific pocket mice.

D. The inadequacy of existing regulatory mechanisms. Existing regulatory mechanisms that may provide some protection for the Pacific pocket mouse include: (1) The Federal Endangered Species Act (Act) in those cases where the pocket mouse occurs in habitat occupied by a listed species; (2) the California Natural Community Conservation Planning Program; (3) the California Environmental Quality Act; (4) land acquisition and management by Federal, State, or local agencies or by private groups and organizations; and (5) local laws and regulations.

The Pacific pocket mouse is currently classified as a candidate for Federal listing under the Act and as a Species of Special Concern "Of Highest Priority" by the California Department of Fish and Game (Department). However, Federal candidate species and Department Species of Special Concern have no legal status and are afforded no protection under the Federal or California Endangered Species Acts.

The only known population of the Pacific pocket mouse is found in conjunction with a population of coastal California gnatcatchers on the Dana Point Headlands (Brylski 1993; EDAW 1993a,b). The coastal California gnatcatcher's status as a threatened species gives it protection under the Act. However, the legal authority to protect the gnatcatcher does not extend to candidate species.

Under provisions under section 10(a) of the Act, the Service may permit the incidental "take" of the gnatcatcher during the course of an otherwise legal activity as long as the likelihood of that species' survival and recovery in the wild is not precluded. If the Service authorized take of the gnatcatcher at the Dana Point Headlands pursuant to section 10(a), the permitted activities could result in the extinction of the Pacific pocket mouse.

In 1991, the State of California established the Natural Communities Conservation Planning Program to address the conservation needs of natural ecosystems throughout the State. The initial focus of that program is the coastal sage scrub community occupied, in part, by the Pacific pocket mouse. At the present time, no plans have been completed or implemented, and no protection is currently proposed to prevent or reduce impacts to 1.65 of the 1.75 acres of occupied habitat on the Dana Point Headlands that are proposed for development.

In many cases, land-use planning decisions are made on the basis of environmental review documents prepared in accordance with the California Environmental Quality Act (CEQA) or the National Environmental Policy Act. These Acts have not adequately protected Pacific pocket mouse habitat.

A relocation program proposed to mitigate impacts to the Pacific pocket mouse on the Dana Point Headlands (EDAW 1993b) has not been fully defined or developed and must be considered highly experimental. As part of this proposed mitigation program, "the Pacific pocket mouse will be relocated to suitable on-site or off-site locations that are or will be preserved as suitable habitat" (EDAW 1993b). EDAW (1993b) has concluded that the "implementation of this mitigation will not reduce impacts to this species to a level of insignificance." The program proposed in the Dana Point Headlands to control domestic cat predation is also inadequate.

E. Other natural or man-made factors affecting its continued existence. This species is highly susceptible to extinction as a result of stochastic environmental or demographic causes because the remaining animals are found in one location.

The Service has determined that listing as endangered is appropriate because the remaining location is imminently threatened by urban development.

Reasons for Emergency Determination

Under section 4(b)(7) of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) and 50 CFR 424.20, the Secretary may determine a species to be endangered or threatened by an emergency rule that shall cease 240 days following publication in the Federal Register. The reasons why this rule is necessary are discussed below. If at any time after this rule has been published the Secretary determines that substantial evidence does not exist to warrant such a rule, it shall be withdrawn.

Of the eight known sites historically occupied by the species, all but two have been developed or significantly altered through human activities. Suitable habitat remains in the Marina del Rey/El Segundo portion of Los Angeles County; however, efforts to find the animal in this area have not been successful. One other site at San Onofre in San Diego County still retains suitable habitat. However, the Pacific pocket mouse was never common at this site, and recent surveys have not located any individuals.

The only remaining population (containing no more than 39 animals) of the Pacific pocket mouse occurs on the Dana Point Headlands of Dana Point, California. As discussed under factors A, C, and D in the Summary of Factors Affecting the Species section above, an emergency posing a significant risk to the well-being and continued survival of the Pacific pocket mouse exists as the result of the imminent, proposed destruction of 2.85 of the 3.75 acres of occupied habitat (Brylski 1993; EDAW 1993a,b). The Pacific pocket mouse is also imminently threatened at this location by feral and/or domestic cat depredation.

For these reasons, the Service finds that the Pacific pocket mouse is in imminent danger of extinction throughout all or a significant portion of its range and warrants immediate protection under the Act.

Critical Habitat

Critical habitat, as defined by section 3(5)(A) of the Act, means: (i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species, and (II) that may require special management considerations or protection, and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Section 4(a)(3) of the Act requires that critical habitat be designated to the maximum extent prudent and determinable concurrently with the determination that a species is endangered or threatened. The Service's regulations (50 CFR 424.12(a)(1)) state that a designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species, or (2) such designation of critical habitat would not be beneficial to the species.

The Service finds that designation of critical habitat is not prudent at this time for the Pacific pocket mouse. The only known population of this species is found on private lands where Federal jurisdiction or involvement in land-use activities is not expected. Therefore, the designation of critical habitat within the existing range of the Pacific pocket mouse would not appreciably benefit the species.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Act provides for possible land acquisition, cooperation with the States, and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against certain activities are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service. The Service does not expect to receive requests for consultation from other Federal agencies with respect to this species because no Federal involvement is expected for activities occurring within habitat currently occupied by the Pacific pocket mouse.

The Act and implementing regulations found at 50 CFR 17.21 set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such conduct), import or export, transport in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities.

Requests for copies of the regulations on listed wildlife and inquiries regarding same should be addressed to the U.S. Fish and Wildlife Service, Endangered Species Permits, 911 N.E. 11th Avenue, Portland, Oregon 97232-4181 (telephone 503/231-6241; facsimile 503/231-6243).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

References Cited

A complete list of references cited herein is available upon request from the U.S. Fish and Wildlife Service, Carlsbad Field Office (see ADDRESSES section).

Author

The primary authors of this emergency rule are Loren R. Hays and Fred M. Roberts, Jr., U.S. Fish and Wildlife Service, Carlsbad Field Office (see ADDRESSES section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulation Promulgation

Accordingly, effective from January 31, 1994 until September 28, 1994, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) by adding the following in alphabetical order under "MAMMALS," to the List of Endangered and Threatened Wildlife, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
Mammals							
*	*	*	*	*	*	*	*
Mouse, Pacific pocket.	*Perognathus longimembris pacificus.*	U.S.A. (CA)	Entire	E	530	NA	NA
*	*	*	*	*	*	*	*

Dated: January 26, 1994.

Mollie H. Beattie,

Director, U.S. Fish and Wildlife Service.

[FR Doc. 94-2463 Filed 1-31-94; 3:57 pm]

BILLING CODE 4310-55-P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AC[illegible]

Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Pacific Pocket Mouse as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The Fish and Wildlife Service (Service) proposes to make the provisions of the emergency rule listing the Pacific pocket mouse (*Perognathus longimembris pacificus*) as an endangered species pursuant to the Endangered Species Act of 1973, as amended (Act), permanent. Although a minimum of 8 populations of the Pacific pocket mouse encompassing 29 sites from Los Angeles County south to San Diego County formerly occurred, the only known extant population occurs on the Dana Point Headlands in Orange County, California. Depredation by feral and/or domestic cats and a proposed development threaten the continued existence of the remaining population. Additional data and information, which may assist the Service in making a final decision on this proposed action, is solicited on the status of this species.

DATES: Comments from all interested parties must be received by April 4, 1994. The Service intends to hold a public hearing on this proposal and will soon announce the date, time, and location in the Federal Register.

ADDRESSES: Comments and materials concerning this proposal should be submitted to the Field Supervisor, U.S. Fish and Wildlife Service, Carlsbad Field Office, 2730 Loker Avenue West, Carlsbad, California 92008. Comments and materials received will be available for public inspection by appointment during normal business hours at the address listed above.

FOR FURTHER INFORMATION CONTACT: Gail Kobetich, Field Supervisor, Carlsbad Field Office, at the address listed above (telephone 619/431–9440).

SUPPLEMENTARY INFORMATION:

Background

For a thorough discussion of biological information, previous Federal action, a summary of the factors affecting the species, the reasons why critical habitat is not being proposed, and conservation measures available to listed and proposed species, consult the emergency rule on the Pacific pocket mouse published in this same Federal Register separate part.

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited. Comments particularly are sought concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this species;

(2) The location of any additional populations of this species and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of the Act;

(3) Additional information concerning the range, distribution, and population size of this species; and

(4) Current or planned activities in the subject area and their possible impacts on this species.

Any final decision on this proposal will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

The Endangered Species Act requires that a public hearing be held if requested within 45 days of the date of publication of a proposed rule. As indicated under the DATES section of this proposed rule, the Service intends to hold a public hearing on this proposal and will soon announce the date, time, and location in the Federal Register.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

Author

The primary author of this proposed rule is Loren R. Hays of the Carlsbad Field Office (see ADDRESSES section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulation Promulgation

Accordingly, the Service hereby proposes to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) by revising the entry for "Mouse, Pacific pocket" under "MAMMALS," in the List of Endangered and Threatened Wildlife, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
Mammals							
*	*	*	*	*	*	*	*
Mouse, Pacific pocket	*Perognathus longimembris pacificus*	U.S.A. (CA)	Entire	E	535	NA	NA
*	*	*	*	*	*	*	*

ATTACHMENT 3
PROPOSED RULE FOR PACIFIC POCKET MOUSE

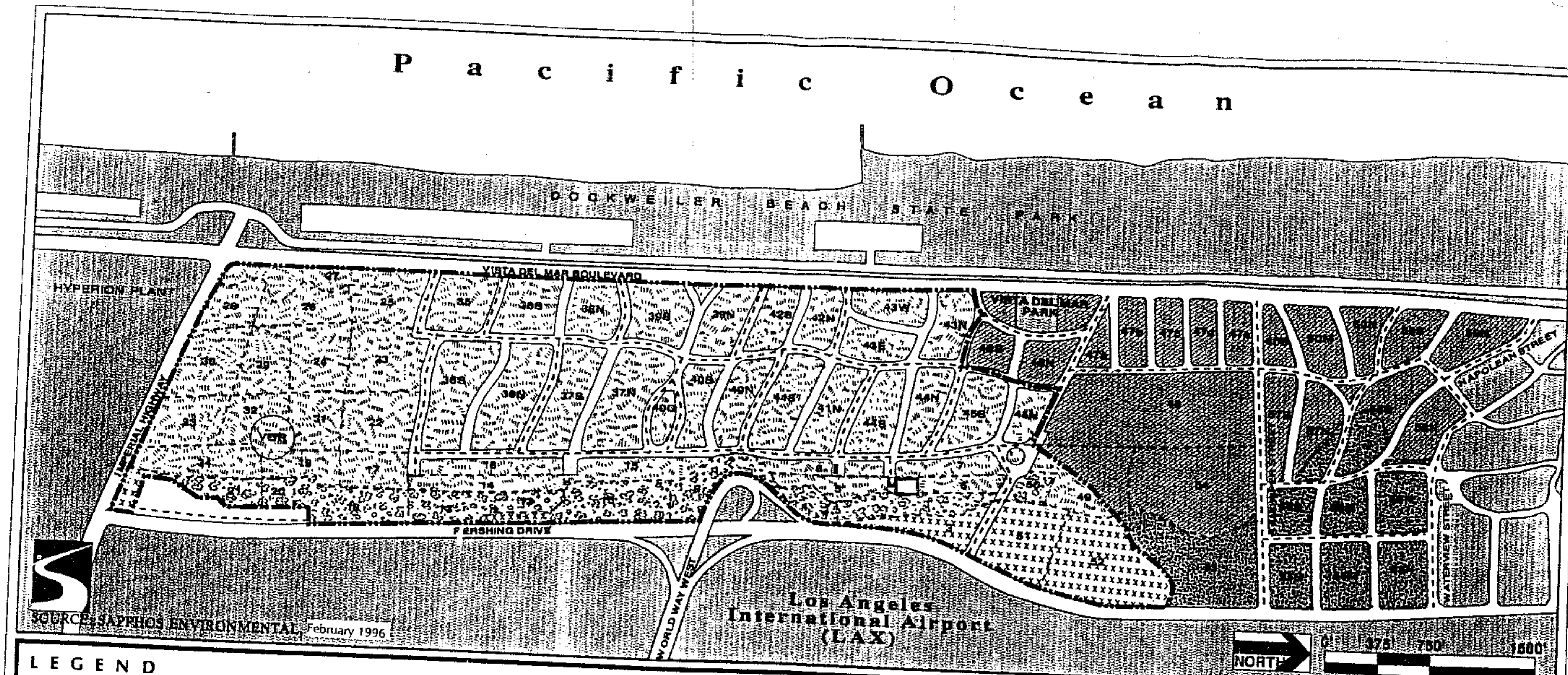
Dated: January 28, 1994.

Mollie H. Beattie,

Director, U.S. Fish and Wildlife Service.

[FR Doc. 94-2464 Filed 1-31-94; 8:45 am]

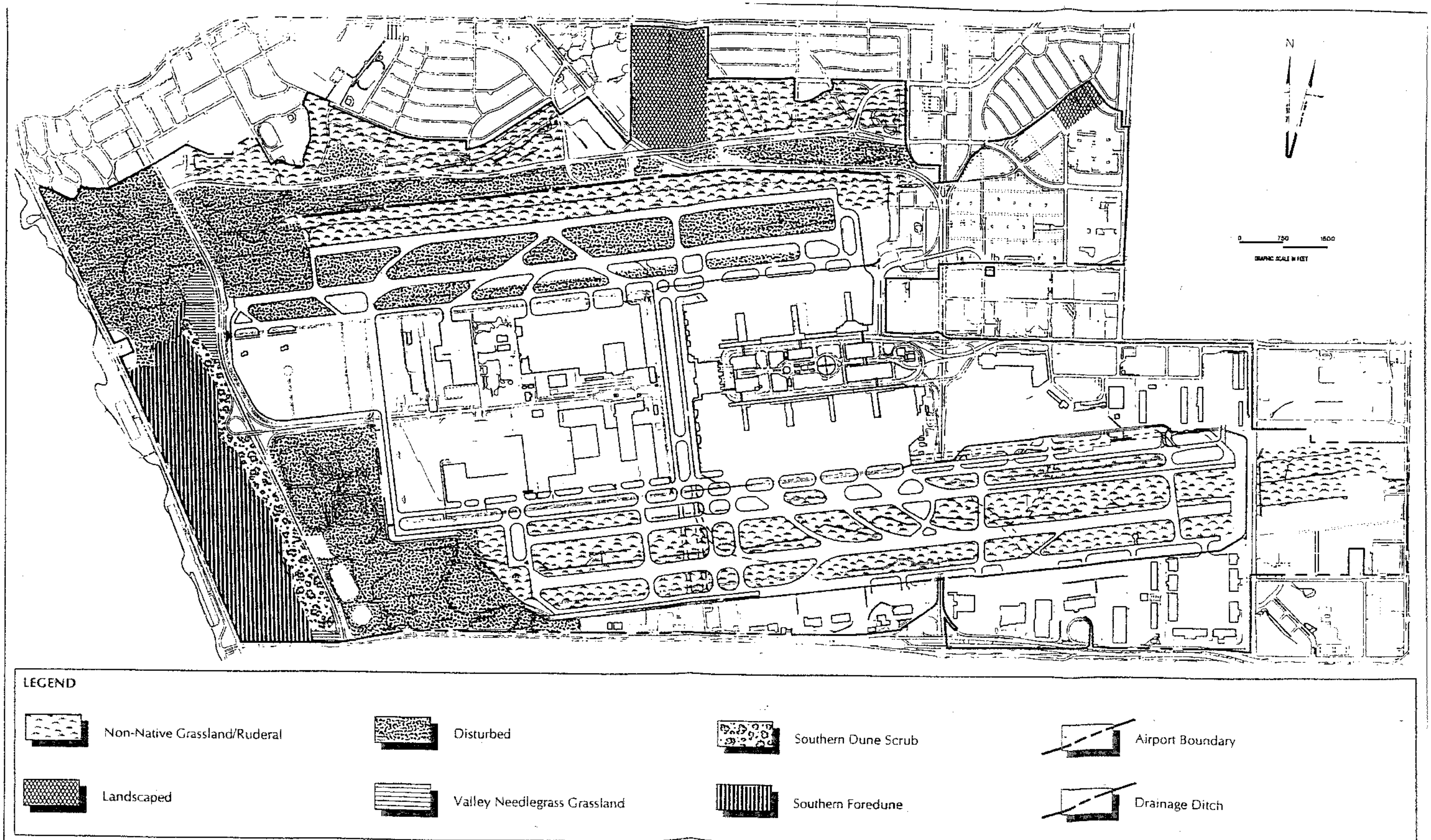
ATTACHMENT 4
PLANT COMMUNITIES MAPS



LEGEND

- Reserve Boundary
- Subsite
- Remote Communications Site
- Very High Omni Range Navigation Beacon
- Trailer
- Southern Foredune
- Southern Dune Scrub
- Valley Needlegrass Grassland
- Disturbed Former Dune
- Disturbed

Figure . Plant Communities of the LAX/El Segundo Dunes



Los Angeles International Airport Master Plan

Plant Communities of the LAX Master Plan Area

FIGURE

ATTACHMENT 5
PERSONNEL MATRIX

PACIFIC POCKET MOUSE SURVEY PERSONNEL MATRIX
SEPTEMBER 1 - SEPTEMBER 26, 1997

DAYS	1	2	3	4	5	M 6	7	8	9	10	M 11	12	13	14	15	M 16	17	18	19	20	M 21	22	23	24	25	26
SAPPHOS ENVIRONMENTAL																										
Dr. Brad Blood	B	A		P	P	B	B	B	B	B	A		A	A	P	B		B	A	P	B	P		P	P	P
Ms. Tracey Alsobrook	A	P	B	A	B	B	B	B	B	B	B	B				A			P	A		A	A	A		
Mr. Robert Witthaus						A					B	P	P	P		A	P		P	P	B		P		A	A
Dr. Irena Mendez															A	A					A					
Ms. Marie Campbell						A					A										A					
Dr. Steve Patterson																	A									
Mr. Scott Graff						A					A															
Ms. Regeina Hoawrd											A										A					
Ms. Nadine Stephen											A															
Ms. Anne Dove																A										
Ms. Phelicia Gomes												A				A										
SUBCONTRACTORS																										
Mr. Bill Vanherweg	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A						
Mr. Peter Bloom	B	B	B	B	B								B	B	B	B	B	B	B	B	B	B	B	B	B	A
Dr. Mike O'Farrell						P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Ms. Theda O'Farrell						P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A

A = AM (6:00 AM - 8:00 AM)
P = PM (4:00 PM - 10:00 PM)
B = Both
M = Trap Line Moving

ATTACHMENT 6
PHOTOGRAPHS OF TRAPS

Stoddard Line Trap. 7.5 by 9 by 23cm.
Trap is heavy duty wire with tin door.

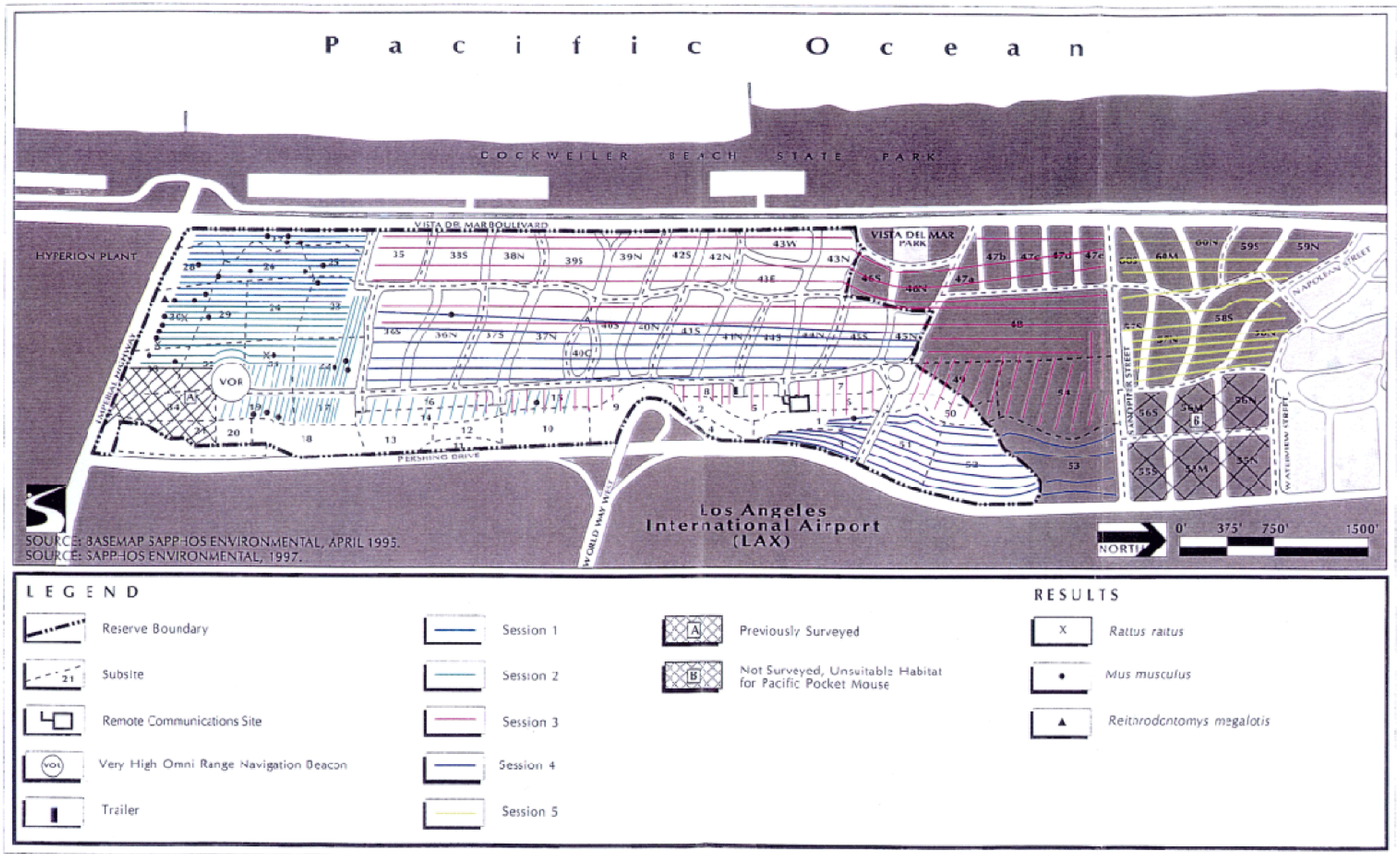
Sherman Line Trap. 7.5 by 9 by 23cm.
Trap is all aluminum sides with tin doors.

ATTACHMENT 7
PHOTOGRAPH OF TRAP LINE

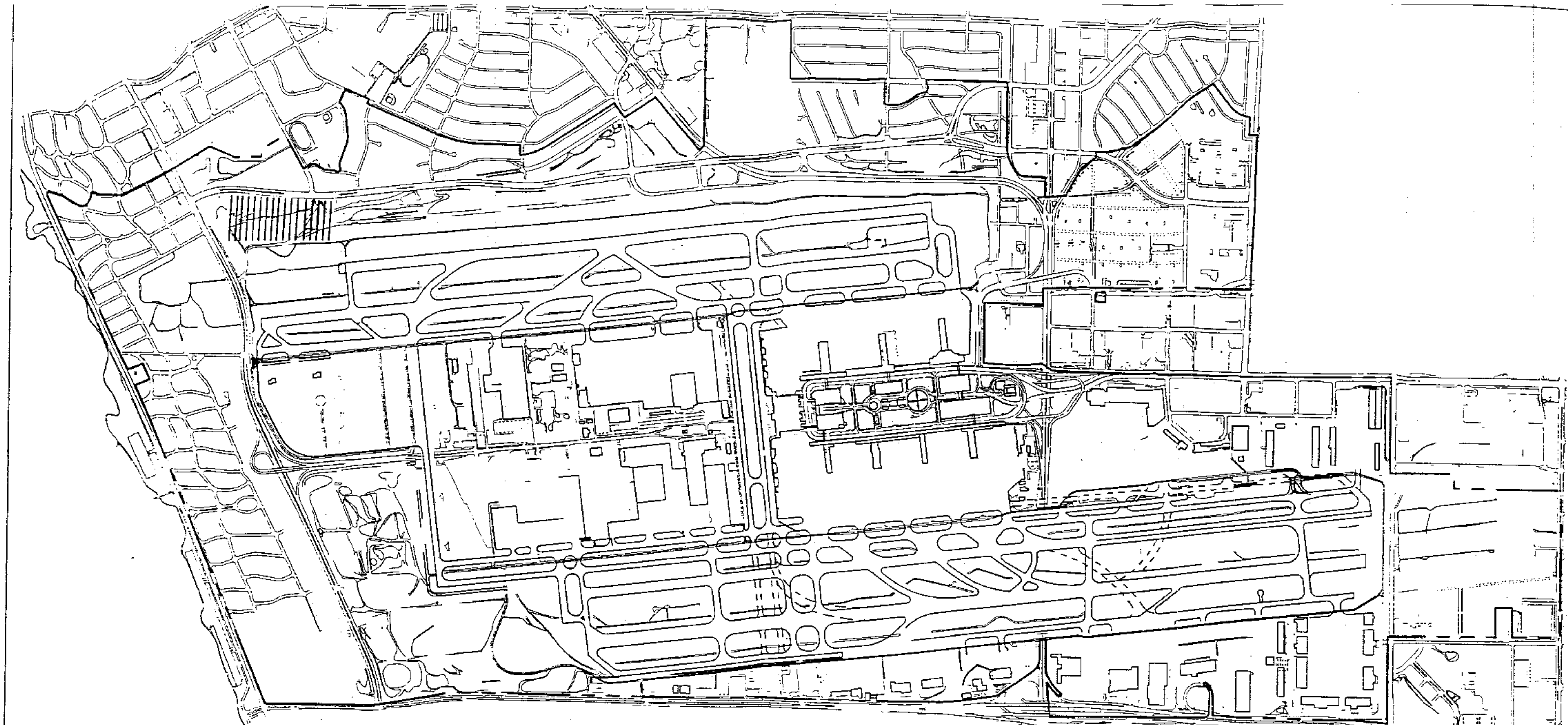
A Typical Trapline

ATTACHMENT 8

SITE MAP WITH TRAP LINES DEMARCATED



Pacific Ocean
DOCKWEILER BEACH STATE PARK
VISTA DEL MAR BOULEVARD
VISTA DEL MAR PARK
HYPERION PLANT
IMPERIAL HIGHWAY
NAPOLEON STREET
SANDPIPER STREET
WATERVIEW STREET
PERSHING DRIVE
WORLD WAY WEST
VOR
Los Angeles International Airport (LAX)
NORTH
0' 375' 750' 1500'
SOURCE: BASEMAP SAPPHOS ENVIRONMENTAL, APRIL 1995.
SOURCE: SAPPHOS ENVIRONMENTAL, 1997.
LEGEND
Reserve Boundary
Subsite
Remote Communications Site
Very High Omni Range Navigation Beacon
Trailer
Session 1
Session 2
Session 3
Session 4
Session 5
Previously Surveyed
Not Surveyed, Unsuitable Habitat for Pacific Pocket Mouse
RESULTS
Rattus rattus
Mus musculus
Reithrodontomys megalotis



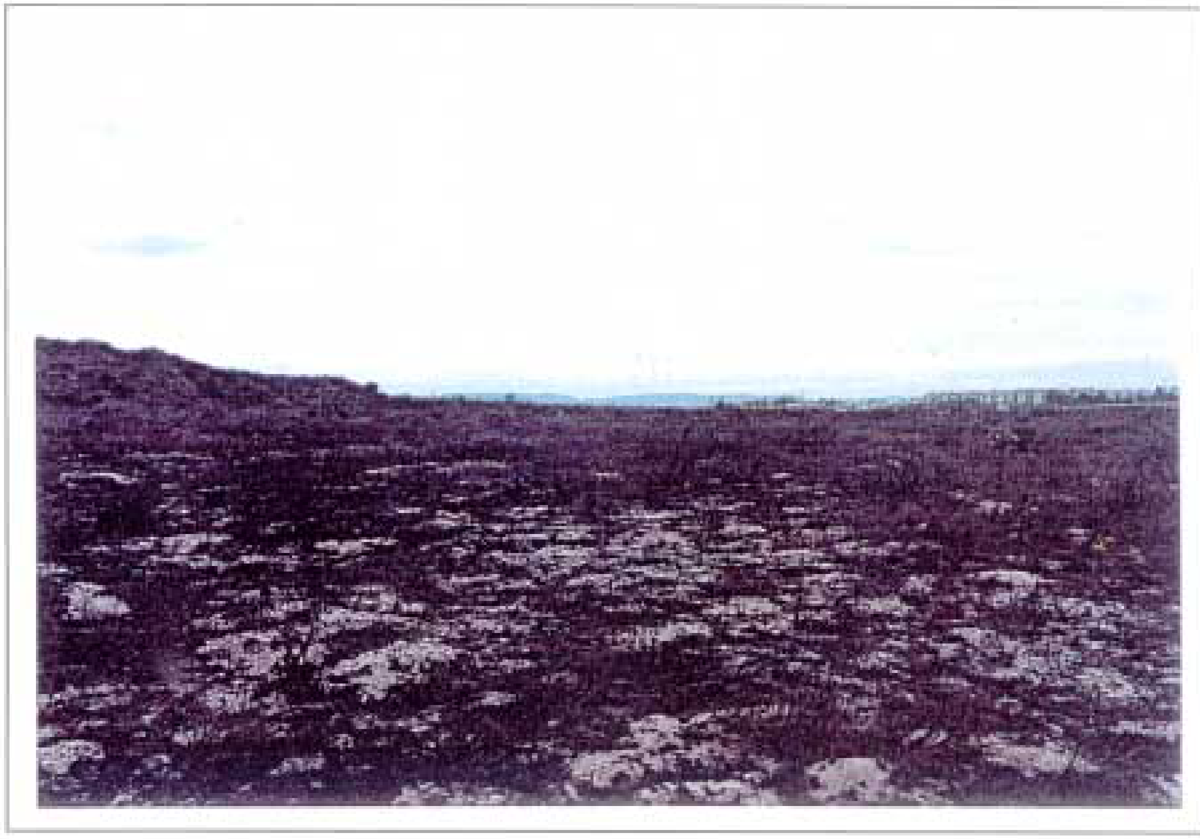
LEGEND

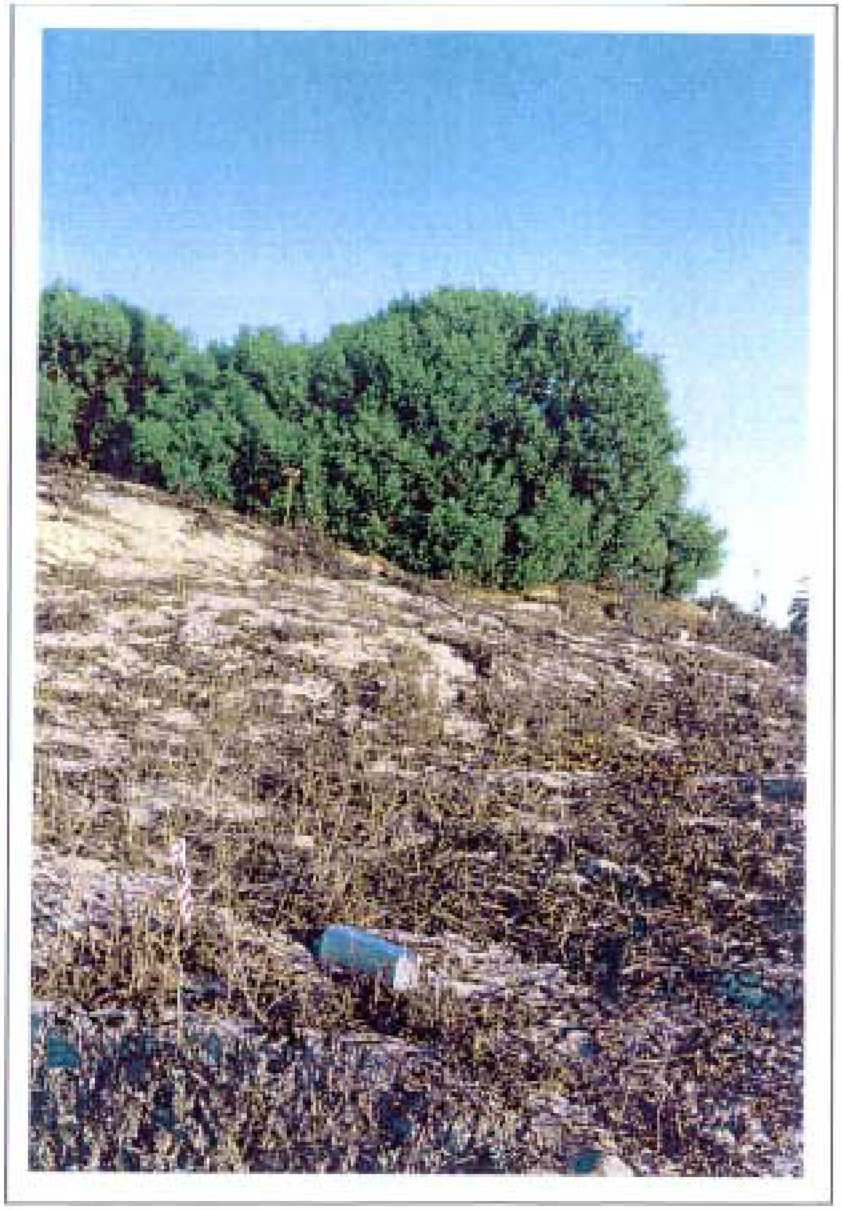
Area Surveyed During Session 5

Los Angeles International Airport Master Plan

FIGURE

ATTACHMENT 9
PHOTOGRAPHS OF TRAP AREA HABITAT





ATTACHMENT 10
FIELD NOTES

Session 1 – [illegible]

W.J. Vanderwerg

Small Mammal Trapping Form

Dates: 9/1/97 – 9/6 Observers: Peter, Brad, Bill, Tracy

Area Trapped: SW corner/VOR Temperature: Low 65° F High 85° F

Moon Phase New General Weather partly cloudy, humid
heavy dew on 9/5 & 9/6

Results

Visit	Date	Station	Wgt.	Hind Foot	Tail	Body	Sex/ Rep. Cond.	Pelage/ Comments	Species
	9/1	1st	Check	—	No	Captures		21:00	
1	9/2	2nd	check	06:00					
		Line 2 Trap 15							Mus musculus
		Line 9 Trap 10	9 g					Juvenile	Mus musculus
	9/2	1st	Check	21:00					
		Line 2 Trap 15							Mus musculus
2	9/3	2nd	check	06:00					
		Line 2 Trap 20							Mus musculus
		Line 6 Trap 10							Mus musculus
		Line 12 Trap 20							Mus musculus
		Line 12 Trap 40							Mus musculus
	9/3	1st	check		21:00	No	Captures		
	9/4	2nd	check		06:00				
3		Line 1 Trap 20							Mus musculus
		Line 1 Trap 23							Mus musculus
		Line 6 Trap 45							Mus musculus
		Line 8 Trap 40							Mus musculus
	9/4	1st	Check	21:00		No captures			
	9/5	2nd	Check	06:00					
4		Line 8 Trap 45							Mus musculus
		Line 5 Trap 30							Mus musculus
		Line 5 Trap 15							Mus musculus
	9/5	1st	check	21:00					
		Line 1 Trap 20							Mus musculus
	9/6	2nd check		06:00					
		Line 12 Trap 50	12 g				♂		Reithro. mega.
		Line 11 Trap 40							Mus musculus

3000 Trap nights

W.J. Vanbenwey

Small Mammal Trapping Form

Dates: 9/6/97 - 9/11/97 Observers: Bill Vanbenwey, Brad Blood, Tracey Alsobrook

Area Trapped: SE to VOR Temperature: Low 60°F High 80°F

Moon Phase crescent - 1/4 General Weather clear

M. Dove III

Results

	Date	Station	Wgt.	Hind Foot	Tail	Body	Sex/ Rep. Cond.	Pelage/ Comments	Species
	9/6	1st	check	- 21:00		No Captures			
1	9/7	2nd	check	- 06:00					
		Line 7 Trap 50							Rattus rattus
		Line 3 Trap 25							mus musculus
		Line 3 Trap 20							mus musculus
	9/7	1st	check	21:00					
		Line A2	9g						mus musculus
2		Line A4							mus musculus
	9/8	2nd	check	06:30					
		Line 5 Trap 50							mus musculus
		Line 4 Trap 5	12g						mus musculus
	9/8	1st	check	21:00					
		Line 4 Trap 50							mus musculus
3	9/9	2nd	check	06:30					
		Line 10 Trap 40	11g				♂		mus musculus
		Line 6 Trap 49	12g				♂		mus musculus
	9/9	1st	check	21:00					
		Line 5 Trap 49	8g				♂ Juv.		mus musculus
		Line 10 Trap 49	9g				♂ Juv.		mus musculus
4	9/10	2nd	check	06:30					
		Line 5 Trap 50	12g				♂		mus musculus
		Line 6 Trap 50	8g				♂ Juv		mus musculus
		Line 8 Trap 50	16g				♀		mus musculus
	9/10	1st	check	20:30					
		Line 10 Trap 20	76g						Rattus rattus
		Line 5 Trap 49	12g				♀		mus musculus
5	9/11	2nd	check	06:30					
		Line 10 Trap 30	14g				♀		mus musculus
		Line 3 Trap 40	35g				♀		Rattus rattus
		Line 3 A							mus musculus

W.J. Vanbenwey

Small Mammal Trapping Form

Dates: 9/11/97 - 9/16/97 Observers: Bill, Brad, Tracey, Rob, Peter

Area Trapped: Fore dune prev. developed Temperature: Low 60°F High 80°F

Moon Phase 1/2 - Full General Weather mild, humid, cloudy in A.M.

Results

	Date	Station	Wgt.	Hind Foot	Tail	Body	Sex/ Rep. Cond.	Pelage/ Comments	Species
	9/11	1st	check	20:30		- No Captures			
1	9/12	2nd	check	06:30					
		Line 1 Trap 25	7g				♀		mus musculus
	9/12	1st	check 20:30	- No Captures					
2	9/13	2nd	check	- 06:30	- No Captures				
3	9/13	1st	check	- 20:30	- No captures				
	9/14	2nd	check	- 06:30	- No captures				
	9/14	1st	check	- 20:30	- No captures				
4	9/15	2nd	check	06:30					
		Line 6	8g				♂ Juv		mus musculus
	9/15	1st	check	20:30	- No captures				
5	9/16	2nd	check	06:30	- No captures				

...chael J. O'Farrell - Ineda M. O'Farrell

PLOT	DAY	MONTH	YEAR	SOS
II	DD	MM	YY	I
2-3	5-6	7-8	9-10	12
LAX				

SEX: 2 Female, 9 Unknown
AGE: 1 Young Yr., 2 Adult, 9 Unknown
SEXUAL CONDITION: MALE — 1 Testes Abdominal, 2 Testes scrotal Up, 3 Testes scrotal Down; FEMALE — 4 Vulva inactive, closed, 5 Vulva turgid, enlarged, 6 Cop. plug, 7 Pregnant, 8 Lactating, 9 Condition unknown

Time	Air Temp.	Rel. Hum.	Wind Beauf. No.	Cloud Cover	Moon
II	IIID	II	II	I	I
51-52	54-57	59-60	62-63	65	55

SPECIES CODE	GENUS	SPECIES	NEW	ANIMAL NUMBER		NO. CONFUSED	SEX	SEXUAL COND.	AGE	TORPID-DEAD	GRID STAKE NUMBER			BODY WT. (g.)	BRIEF NOTES
II	AAA	AAA	I	IIII		I	I	I	I	I	IIII			IIID	AAAAAAAAA
4-15	17-19	20-22	24	26-30		32	34	36	38	40	41-44			46-49	72-80
				START	END						WIND	SKY	MOON		
06-09-97				2150	2336						2	Ø	1		
				0636	0730						Ø	2	Ø		
07-09-97				2100	2237						3	Ø	1		
				0636	0728						Ø	Ø	Ø		
*	mus	mus		—			2	4	2					7.2	
08-09-97				2100	2203						2	Ø	2		
				0645	0738						2	Ø	Ø		
*	mus	mus	1				1	2	2					13.0	
*	mus	mus	1				1	3	2					13.7	
*	mus	mus	1				1	2	2					14.3	
09-09-97				2045	2152						2	Ø	2		
				0629	0715						Ø	Ø	Ø		
10-09-97 ~~09-10-97~~				2050	2155						3	Ø	2		
				0600	0742						1	Ø	Ø		
*	mus	mus					1	2	2	2				—	IN TRAP prob. from Sept. 7, Found Sept. 9

WIND: Beauf. No. / km. / mi. — 00 .5 .5; 02 9 6; 04 23 14; 06 40 25; 08 60 38; 10 84 52; 12 104 65
CLOUD COVER: 0 Clear, 1 Partly Cloudy, 2 Cloudy, 3 Drizzle, 4 Rain, 5 Snow, 6 Fog
MOON: 0 None, 1 Quarter, 2 Half, 3 3-Quarter, 4 Full
NEW (Basic): 1 New animal, 2 Retag; NEW (Assess.): 5 New animal; RE-CAPTURES: Blank; TIME: Hr. from sunset
NUMBER CONFUSED: 1 Tag lost, 2 Natural amputation, 3 Escaped; TORPID - DEAD: 1 Torpid, 2 Dead; GRID STAKE NUMBER: 9999 - Unusual location
ANIMAL NUMBER: 8 Dead unmarked animal, 9 Multiple amputation; FIRST DIGIT - EAR CLIP: 0 = No Clip, 1 = Right ear, 2 = Left ear, 3 = Both ears; Animals [illegible] cut

Michael J. O'Farrell 19 Sept. 1997

...Michael J. O'Farrell - Ineda M. O'Farrell

PLOT	DAY	MONTH	YEAR	SOS
II	DD	MM	YY	I
2-3	5-6	7-8	9-10	12
LAX				

SPECIES CODE	GENUS	SPECIES	NEW	ANIMAL NUMBER		NO. CONFUSED	SEX	SEXUAL COND.	AGE	TORPID-DEAD	GRID STAKE NUMBER			BODY WT. (g.)	BRIEF NOTES
II	AAA	AAA	I	IIII		I	I	I	I	I	IIII			IIID	AAAAAAAAA
4-15	17-19	20-22	24	26-30		32	34	36	38	40	41-44			46-49	72-80
				START	END						WIND	SKY	MOON		
11-09-97				2042	2300						2	Ø	3		
				0637	0814						2	2	Ø		
12-09-97				2030	2207						1	1	3		
				0632	0739						1	2	Ø		
*	mus	mus	1				1	1	2					11.5	
13-09-97				2026	2159						2	1	4		
				0633	0741						1	1	Ø		
14-09-97				2030	2151						1	2	4		
				0634	0737						1	3	Ø		
*	mus	mus	1				2	4	2					13.0	
15-09-97				2033	2156						Ø	2	4		
				0627	0825						1	2	Ø		

Michael J. O'Farrell 19 Sept. 1997

Michael J. O'Farrell - Theda M. O'Farrell

PLOT	DAY	MONTH	YEAR	ODS
II	DD	MM	YY	I
2-3	5-6	7-8	9-10	12
LAX				

SEX: 1 Male, 2 Female, 9 Unknown

AGE: 1 Young Yr., 2 Adult, 9 Unknown

SEXUAL CONDITION: MALE — 1 Testes abdominal, 2 Testes scrotal Up, 3 Testes scrotal Dwn.; FEMALE — 4 Vulva inactive, closed, 5 Vulva turgid, enlarged, 6 Cop. plug, 7 Pregnant, 8 Lactating, 9 Condition unknown

Time	Air Temp. °C	Rel. Hum. %	Wind Beauf. No.	Cloud Cover	Moon
II	IIIO	II	II	I	I
51-52	54-57	59-60	62-63	65	66

SPECIES CODE	GENUS	SPECIES	NEW	ANIMAL NUMBER START	ANIMAL NUMBER END	NO. CONFUSED	SEX	SEXUAL COND.	AGE	TORPID-DEAD	GRID STAKE NUMBER: WIND	GRID STAKE NUMBER: SKY	GRID STAKE NUMBER: MOON	BODY WT. (g.)	BRIEF NOTES
II	AAA	AAA	I	IIIII		I	I	I	I	I	IIII			IIIO	AAAAAAAAA
4-15	17-19	20-22	24	26-30		32	34	35	38	40	41-44			46-49	72-80
16-09-97				2036	2136						Ø	2	4		S-40% m-occluded
				0636	0714						Ø	2	Ø		
17-09-97				2026	2117						1	1	4		S-70/80%
				0629	0706						1	1	4		
18-09-97				2035	2117						Ø	1	Ø		
				0630	0707						Ø	Ø	4		
19-09-97				2027	2109						1	Ø	Ø		
				0631	0705						1	1	3		
20-09-97				2030	2115						1	Ø	Ø		
				0635	0734						Ø	1	2		

WIND

Beauf. No.	km.	mi.
00	.5	.5
02	9	6
04	22	14
06	40	25
08	60	38
10	84	52
12	104	65

CLOUD COVER: 0 Clear, 1 Partly Cloudy, 2 Cloudy, 3 Drizzle, 4 Rain, 5 Snow, 6 Fog

MOON: 0 None, 1 Quarter, 2 Half, 3 3-Quarter, 4 Full

NEW (Basic): 1 New animal, 2 Recap

NEW (Assess.): 5 New animal

RE-CAPTURE: Blank

TIME: Hr. from sunset

NUMBER CONFUSED: 1 Toe lost, 2 Natural amputation, 3 Escaped

TORPID - DEAD: 1 Torpid, 2 Dead

GRID STAKE NUMBER: 9999 - Unusual location

ANIMAL NUMBER: 8 Dead unmarked animal, 9 Multiple amputation

FIRST DIGIT - EAR CLIP: 0 = No Clip, 1 = Right ear, 2 = Left ear, 3 = Both ears; Animals straight cut

Michael J. O'Farrell 24 Sept. 1997

Michael J. O'Farrell - Theda M. O'Farrell (4th Set)

PLOT	DAY	MONTH	YEAR	ODS
II	DD	MM	YY	I
2-3	5-6	7-8	9-10	12
LAX				

Time	Air Temp. °C	Rel. Hum. %	Wind Beauf. No.	Cloud Cover	Moon
II	IIIO	II	II	I	I
51-52	54-57	59-60	62-63	65	66

SPECIES CODE	GENUS	SPECIES	NEW	ANIMAL NUMBER START	ANIMAL NUMBER END	NO. CONFUSED	SEX	SEXUAL COND.	AGE	TORPID-DEAD	GRID STAKE NUMBER: WIND	GRID STAKE NUMBER: SKY	GRID STAKE NUMBER: MOON	BODY WT. (g.)	BRIEF NOTES
II	AAA	AAA	I	IIIII		I	I	I	I	I	IIII			IIIO	AAAAAAAAA
4-15	17-19	20-22	24	26-30		32	34	35	38	40	41-44			46-49	72-80
21-09-97				2030	2115						1	Ø	Ø		
				0639	0704						1	6	Ø		
22-09-97				2031	2101						1	Ø	Ø		
				0633	0658						1	Ø	2		
23-09-97				2024	2151						1	Ø	Ø		
				0642	0715						Ø	1	2		SKY less than 10%
24-09-97				2013	2036						2	1	Ø		
				0641	0703						2	3	Ø		
*	mus	mus	1				1	1	1					8.4	
25-09-97				2024	2051						1	2	Ø		
				0654	0730						Ø	Ø	1		

WIND

Beauf. No.	km.	mi.
00	.5	.5
02	9	6
04	22	14
06	40	25
08	60	38
10	84	52
12	104	65

CLOUD COVER: 0 Clear, 1 Partly Cloudy, 2 Cloudy, 3 Drizzle, 4 Rain, 5 Snow, 6 Fog

MOON: 0 None, 1 Quarter, 2 Half, 3 3-Quarter, 4 Full

NEW (Basic): 1 New animal, 2 Recap

NEW (Assess.): 5 New animal

RE-CAPTURE: Blank

TIME: Hr. from sunset

NUMBER CONFUSED: 1 Toe lost, 2 Natural amputation, 3 Escaped

TORPID - DEAD: 1 Torpid, 2 Dead

GRID STAKE NUMBER: 9999 - Unusual location

ANIMAL NUMBER: 8 Dead unmarked animal, 9 Multiple amputation

FIRST DIGIT - EAR CLIP: 0 = No Clip, 1 = Right ear, 2 = Left ear, 3 = Both ears; Animals straight cut

Michael J. O'Farrell 26 Sept. 1997

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

November 18, 1997

MEMORANDUM FOR THE RECORD
JN 1043-007.m02

TO:	Federal Aviation Administration (Mr. David Kessler)
	L.A. City Department of Airports (Ms. Sheila Murphy)
	Landrum and Brown (Mr. Rich Macias and Ms. Karen Yamamoto)
	U.S. Fish and Wildlife Service (Mr. Bob James)
FROM:	Sapphos Environmental (Dr. Brad R. Blood and Tracey Alsobrook)
SUBJECT:	Wildlife Survey of the Argo Ditch
ENCLOSURE:	1. Field Notes of Argo Ditch Wildlife Survey on 10/9/97

This Memorandum for the Record transmits the results of the wildlife survey of the Argo Ditch that was performed in support of the proposed Emergency Channel Pre-Construction Maintenance at Los Angeles International Airport (U.S.G.S. 7.5 minute Venice Quadrangle, Range 15 West, Township 2 South, lies within the Sausal Redondo Land Grant Boundary). The survey took place on October 9, 1997 between the hours of 7:00 a.m. and 10:30 a.m and was conducted by personnel from Sapphos Environmental (Dr. Brad R. Blood, Ms. Tracey Alsobrook). Weather conditions during the survey hours were as follows: temperatures varying between 68° F to 75° F; cloud cover was 5 percent to 15 percent; and wind speed was less than 5 miles per hour.

The entire length of the Argo Ditch (9,800 feet) was walked beginning at the east end (station 0 + 00) and moving west (station 9800 + 00). All species of wildlife detected were recorded. Birds were detected either by direct observation using 10 x 40 binoculars or by call notes. Mammals were detected by tracks, scat or the observation of burrows. Reptiles and amphibian were detected by direct observation or the observation of tracks.

Twenty-two species of birds were detected during the wildlife survey of the Argo Ditch (Attachment 1). No state or federally listed rare, threatened or endangered species were observed. The three most abundant species observed were house finch (*Carpodacus mexicanus*), bushtit (*Psaltriparus minimus*), and the non-native red-bishop (*Euplectes franciscanus*). One of the species observed while it was

foraging, the loggerhead shrike (*Lanius ludovicianus*), is a California Department of Fish and Game "Species of Special Concern". Several of the bird species observed, including the common yellowthroat (*Geothlypis trichas*), song sparrow (*Melospiza melodia*) and black phoebe (*Sayornis nigricans*) are normally found in association with riparian habitats. The majority of birds were observed either in the dense willow thickets at the bottom of the Ditch, located west of the proposed work area, or in non-native grass areas on the sides of the Ditch. Many of the birds observed in the Argo Ditch were also seen utilizing the line of tall eucalyptus trees on the north side of the Ditch. Although no active nests were observed due to the timing of the survey, the Argo Ditch does provide potentially suitable nesting habitat for several bird species that are protected pursuant to the Migratory Bird Treaty Act. These species include the common yellowthroat, song sparrow and red-winged blackbird (*Agelaius phoeniceus*). Early spring breeders would most likely begin nest construction in early to mid-March. It is recommended that construction be completed by this time to avoid any potential impacts to nesting migratory birds.

Mammal species detected included Botta's pocket gopher (*Thomomys bottae*) and the non-native species Virginia oppossum (*Didelphis virgiana*) and red fox (*Vulpes vulpes*). No reptiles were observed directly although lizard tracks were seen in the sandy bottom of the ditch approximately .75 miles west of the beginning of the ditch. One species of amphibian, the non-native bullfrog (*Rana catesbeiana*), was observed.

If you have any questions concerning this Memorandum For the Record please contact Dr. Brad R. Blood or Ms. Tracey Alsobrook at (626) 683-3547.

No. 392

Argo Ditch Wildlife Survey 1043-007
JN ~~[illegible]~~

Date: October 9, 1997
Location: LAX, L.A. County - Argo Ditch
Observers: Tracey Alsobrook,
Brad Blood
Time: start 7:00 a.m.
finish 10:30 am
Conditions: start approx 65°,
5% cloud cover, <5 mph
wind finish approx. 75°
15% cloud cover
Started at east end of ditch & walked west
Species Observed
W. meadowlarks 𝍸 (next to runway 24R)
bullfrog 𝍸 ||
American crow 𝍸 𝍸 ||
common yellowthroat 𝍸 ||| (seen in pairs calling)
song sparrow 𝍸 ||
mourning dove 𝍸 𝍸 |
rock dove ||||
house wren |||
spotted dove ||
Ca towhee 𝍸
red fox (tracks & scat)
Anna's hummingbird |||

house finch 𝍸 𝍸 𝍸 |||| 𝍸
red bishop |||| 𝍸 𝍸 | (w/fledglings)
red-winged blackbird ||||
Costa's hummingbird |
black phoebe |||
American Kestrel |||
lesser goldfinch 𝍸 𝍸 ||
white-crowned sparrow 𝍸
scrub jay |||
loggerhead shrike ||
Say's phoebe |||
N. mockingbird ||
red-shafted flicker |
bushtit 𝍸 𝍸 𝍸

6

Numerous burrows observed in new road cut, most likely pocket gophers

In small ponded water area at west end of road cut, there were numerous mosquito larvae & small (1/4") freshwater snails.

Virginia opossum cranium found approx. 1.5 miles west of beginning of ditch.

Row of eucalyptus trees at NW end of channel contained many birds that were utilizing ditch.

Lizard tracks observed in sandy bottom of wash. Lungless salamander have the potential to occur in the wetter portions of the ditch.

Fox burrows observed in north bank of ditch near its west end.

7

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

June 3, 1997

Mr. Lary Salata
U. S. Fish and Wildlife Service
Ecological Services
Endangered Species Permits
911 N. E. 11th Avenue
Portland, Oregon 97232-4181

SUBJECT: Recovery Permit Application 10(a) (1) (A) for On-Going Monitoring and Maintenance at the El Segundo Blue Habitat Restoration Area

Dear Mr. Salata :

Sapphos Environmental appreciates the opportunity to submit this recovery permit application 10(a) (1) (A) for On-Going Monitoring and Maintenance at the El Segundo Blue Butterfly Habitat Restoration Area. Sapphos Environmental understands that recent review by the U. S. Fish and Wildlife Service (Service) of the biology and the ecology of the square-spotted blue butterflies, as well as other listed butterflies, indicate that field surveys and other similar activities, even when they do not involve mark-recapture or handling, often result in disturbance of natural behaviors. While Sapphos Environmental has not observed any disturbance in natural behaviors or mortality of the ESB as a result of the transect count method undertaken in 1995 and 1996, or the presence/absence surveys conducted across the entire El Segundo Blue Butterfly Habitat Restoration Area, Sapphos Environmental will follow the Service's recommendation in this regard. Sapphos Environmental understands that the Service has adopted the same recommendation to researchers conducting population surveys of other listed lepidopteran species.

Should there be any questions or should you require additional information regarding this recovery permit application, please feel free to contact Ms. Marie Campbell at (818) 683-3547.

Respectfully submitted,

SAPPHOS ENVIRONMENTAL

Marie C. Campbell
Principal

Attachments:
1. Resumes for Sapphos Environmental Staff and Entomological Consultant
2. Statement Justifying Permit
3. Map of Survey Area and Aerial Photograph of Study Site

4. Sapphos Environmental Cost Estimate for 1996/1997 Monitoring at the Los Angeles Airport/El Segundo Dunes and City of Los Angeles, DOA Authorization for Expenditure

CC: Mr. Chris Nagano
U. S. Fish and Wildlife
Ecological Services
Carlsbad Field Office

File: 1043-004.L03

OMB NO. [illegible]

U.S. FISH & WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE LICENSE/PERMIT APPLICATION

1. APPLICATION FOR (Indicate only one)

☐ IMPORT OR EXPORT LICENSE ☒ PERMIT

2. BRIEF DESCRIPTION OF ACTIVITY FOR WHICH REQUESTED LICENSE OR PERMIT IS NEEDED.

Implementation of "Long-term Habitat Management Plan for the Los Angeles/El Segundo Dunes," which includes
- Weed abatement
- Habitat Enhancement
- ESB Monitoring.

3. APPLICANT. (Name, complete address and phone number of individual, business, agency, or institution for which permit is requested)

Sapphos Environmental
30 S. DeLacey, Suite 210
Pasadena, CA 91105 (818)683-3547

4. IF "APPLICANT" IS AN INDIVIDUAL, COMPLETE THE FOLLOWING:

☐ MR. ☐ MRS. ☐ MISS ☐ MS. | HEIGHT | WEIGHT

DATE OF BIRTH | COLOR HAIR | COLOR EYES

PHONE NUMBER WHERE EMPLOYED | SOCIAL SECURITY NUMBER

OCCUPATION

ANY BUSINESS, AGENCY, OR INSTITUTIONAL AFFILIATION HAVING TO DO WITH THE WILDLIFE TO BE COVERED BY THIS LICENSE/PERMIT

5. IF "APPLICANT" IS A BUSINESS, CORPORATION, PUBLIC AGENCY, OR INSTITUTION, COMPLETE THE FOLLOWING:

EXPLAIN TYPE OR KIND OF BUSINESS, AGENCY, OR INSTITUTION

Sapphos Environmental: Environmental Compliance and Resource Management Planning.

NAME, TITLE, AND PHONE NUMBER OF PRESIDENT, PRINCIPAL OFFICER, DIRECTOR, ETC.

Marie Campbell - Principal - 818-683-3547

IF "APPLICANT" IS A CORPORATION, INDICATE STATE IN WHICH INCORPORATED

-NA- Sole Proprietorship

6. LOCATION WHERE PROPOSED ACTIVITY IS TO BE CONDUCTED

Los Angeles/El Segundo Dunes at LAX

7. DO YOU HOLD ANY CURRENTLY VALID FEDERAL FISH AND WILDLIFE LICENSE OR PERMIT? ☐ YES ☒ NO
(If yes, list license or permit numbers)

Note:
REF: Dr. Dick Arnold | [illegible] ([illegible] Consultant)

8. IF REQUIRED BY ANY STATE OR FOREIGN GOVERNMENT, DO YOU HAVE THEIR APPROVAL TO CONDUCT THE ACTIVITY YOU PROPOSE? ☐ YES ☐ NO
(If yes, list jurisdictions and type of documents)

-NA-

9. CERTIFIED CHECK OR MONEY ORDER (if applicable) PAYABLE TO THE U.S. FISH AND WILDLIFE SERVICE ENCLOSED IN AMOUNT OF
$

10. DESIRED EFFECTIVE DATE 7/1/97

11. DURATION NEEDED 1997-1998 Renew Annually

12. ATTACHMENTS. THE SPECIFIC INFORMATION REQUIRED FOR THE TYPE OF LICENSE/PERMIT REQUESTED (See 50 CFR 13.12(a)) MUST BE ATTACHED. IT CONSTITUTES AN INTEGRAL PART OF THIS APPLICATION. LIST SECTIONS OF 50 CFR UNDER WHICH ATTACHMENTS ARE PROVIDED.

CERTIFICATION

I HEREBY CERTIFY THAT I HAVE READ AND AM FAMILIAR WITH THE REGULATIONS CONTAINED IN TITLE 50, PART 13, OF THE CODE OF FEDERAL REGULATIONS AND THE OTHER APPLICABLE PARTS IN SUBCHAPTER B OF CHAPTER I OF TITLE 50, AND I FURTHER CERTIFY THAT THE INFORMATION SUBMITTED IN THIS APPLICATION FOR A LICENSE/PERMIT IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF. I UNDERSTAND THAT ANY FALSE STATEMENT HEREIN MAY SUBJECT ME TO THE CRIMINAL PENALTIES OF 18 U.S.C. 1001.

SIGNATURE (In ink) | DATE

3-200
(6/74)

Application for Federal Fish and Wildlife License/Permit

PRIVACY ACT - NOTICE

In accordance with the Privacy Act of 1974 (5 U.S.C. 552a), please be advised that:

1. The gathering of information on fish and wildlife is authorized by: (a) Bald Eagle Protection Act (16 U.S.C. 668a); (b) Endangered Species Act of 1973 (16 U.S.C. 1539); (c) Migratory Bird Treaty Act (16 U.S.C. 703-711); (16 U.S.C. (d) Marine Mammal Protection Act of 1972 (16 U.S.C. 1371-1383); (e) Lacey Act (18 U.S.C. 42 & 44); (f) Tariff classification At of 1962 (19 U.S.C. 1202); and (g) Title 50, Part 13, of the Code of Federal Regulations.

2. Submission of requested information is required in order to process applications for licenses or permits authorized under the above acts. With the exception of your social security number, failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny a permit.

3. Applications for licenses or permits authorized under the Endangered Species Act of 1973 (16 U.S.C. 1539) and the Marine Mammal Protection Act of 1972 (16 U.S.C. 1371-1383) may be published in the Federal Register as required by the two acts.

4. In the event a violation of a statute, regulations, rule, order, or license, whether civil, criminal, or regulatory in nature is discoveryed during the application review process, the requested information may be transferred to the appropriate Federal, State, local, or foreign agency charged with investigating or prosecuting such violations.

5. In the event of litigation involving the records or the subject matter of the records, the requested information may be transferred to the U.S. Department of Justice or appropriate law enforcement authorities.

6. Information provided in the application may be disclosed to subject matter experts, and State and other federal agencies, for the sole purpose of obtaining advice relevant to issuance of the permit.

7. For individuals, personal information such as home address and telephone number, financial data, and personal identifiers (social security number, birth date, etc.) will be removed prior to any release of the application.

FOIA - NOTICE

8. For organizations, businesses or individuals operating as a business (i.e. permittees not covered by the Privacy Act), we request that you identify any information that should be considered privileged and confidential business information [43 CFR 2.13(c)(4), 43 CFR 2.15(d)(1)(i)] to allow the Service to meet its responsibilities under FOIA.

U.S. Fish and Wildlife Service - Region 1
SUPPLEMENTAL INFORMATION FORM
FOR ENDANGERED OR THREATENED WILDLIFE AND PLANTS
RECOVERY PERMITS

This supplemental form provides all application requirements found under 50 CFR 13 and 17. All applicable questions must be answered for an application to be complete.

I. PERMIT RENEWAL/AMENDMENTS:

If you are applying for renewal of your permit with no changes in personnel, location, or study plan, you may sign statement A. If you do have any changes to your permit, sign statement B and answer the appropriate questions under section II for your requested changes. Up-to-date annual reports and any other required reports must be on file before a permit will be considered for renewal or amendment.

A. I certify that the information submitted in support of my original application for a U.S. Fish and Wildlife Service permit is still currently correct and hereby request reissuance or renewal of that permit.

Permittee's signature ____________ Date ____________

B. I certify that the information submitted in support of my original application for a U.S. Fish and Wildlife Service permit is still currently correct except for the changes listed below and hereby request amendment of that permit. Provide a brief description of changes (answer the appropriate questions for these changes under section II):

Permittee's signature ____________ Date ____________

II. NEW AND AMENDED PERMITS:

A. Species (provide both scientific, to the most specific taxonomic level, and common names for each species to be covered): Euphilotes Battoides Allyni : El Segundo Blue butterfly (ESB)

B. Indicate whether, at the time of the application, the organism is: (i) still in the wild X, (ii) has been removed from the wild ____, or (iii) was born in captivity or artificially propagated ____. Provide state and specific location of wild origin or captive/artificial propagation: Los Angeles / El Segundo Dunes; Los Angeles California

If you are applying for a permit for the collection of plants, list the lands that are under Federal jurisdiction from which you plan to collect the plants: -NA-
(Permission to work on these lands should be noted on 3-200 form or note here.)
Describe what plant part you plan to collect (e.g., whole plant, leaves, pollen, seeds, etc.) and the size of the plant/plant part: -NA-

B. (cont.) If applicable:

1. Provide the name and address of the individual or organization from whom the organism will be obtained. [If outside of the United States and territories, you must apply to the Office of Management Authority; call 1-800-358-2104 for more information.] -NA- Species will not be collected.

2. Provide appropriate documentation to show that the organism was legally obtained from the wild. If born in captivity or artificially propagated outside your facility, provide certification of such from breeder or propagator. For plants, provide the source of the parental stock for material that will be used. -NA-

3. Identifying features of wildlife (e.g., band number, collar number, scars, tattoo number, etc.): -NA-

4. Birth date, birth place, and sex of wildlife: -NA-

5. Name and address of institution or facility where wildlife or plant will be used, displayed, or maintained: -NA-

C. Quantity [including the number that would be taken (harassed, pursued, captured, collected, injured, killed, or removed from the wild), or number to be part of interstate commerce]: -NA-

1. Describe your attempts to obtain the wildlife or plant specimens in a manner which would not cause injury, death, or removal from the wild (a: methods to avoid/minimize injuries or mortalities, or b: use of specimens currently held in captivity/nurseries/museums, or produced in captivity, etc.): No specimens will be obtained; the butterfly will be visually monitored. No specimens are currently held in captivity; no specimens will be captured, only observed.

D. Provide the name of all individuals who will work under this permit. If more than one activity is included in the permit request, indicate exactly which activity each individual will be responsible for: Dick Arnold (Senior), Irena M. Mendez, Steven D. Patterson, Marie C. Campbell, Eric S. Wilson, Scott D. Marshall, Rob K. Witthaus, Ann Dove, Brad Blood and Tracey Alsobrook

1. For each person named above, attach a statement/resume/curriculum vitae of his/her technical expertise, including education, training, and prior experience related to the activity for which a permit is requested and the species that will be studied. See attached.

E. Provide a statement justifying the permit including the following (copies of research proposals may be attached): See attached

1. Purpose/objectives of the project (i.e., hypotheses to be tested).

2. Sampling design for this study (i.e., methods to be used to collect or sample each listed species, the frequency of sampling, the timing and duration of any sampling, and data analysis methods).

3. Planned disposition of specimens upon termination of activities, if applicable (including if incidental mortalities occur). No specimens to be collected. Species will be observed only for monitoring purposes.

5. Has similar research been conducted on this species? Yes If yes, how will this project answer questions unanswered by the earlier research? How will you coordinate your efforts with past and existing research studies? ESB has been monitored at the Chevron site by Dr. Arnold since 1977. ESB has been monitored at LAX site by Dr. Mattoni since 1984.

F. Identify contracts and agreements held for the proposed activities (attach copy or give title, funding organization name and address, date of signature, duration of contract). Please find attached Dept. of Airports AE# (Authorization for expenditure)

G. If live wildlife or plant to be covered by permit are to be held in captivity: —NA—

1. Give a complete description, including photographs and/or diagrams, of the area and facilities where wildlife or plant will be held and/or maintained in captivity and describe arrangements for care during transportation and maintenance. —NA—

2. Provide resume(s) of person(s) who will care for live specimens including any experience they have had in raising, caring for, and propagating similar wildlife or plants. —NA—

3. List mortalities resulting from your activities with those or similar species in the last 2 years. Not aware of any ESB mortality resulting from monitoring of species via observation. ESB numbers steadily rose during past 2 years.

4. Indicate your willingness to participate in a cooperative breeding or propagation program or to contribute data to a database or studbook. Cooperative breeding or propagation program to be coordinated with Dept. of Airports (DOA).

H. (Optional) The Service often receives request for lists of Permittees that could conduct contract work for listed species (e.g., presence/absence surveys). In accordance with the Privacy Act, we do not release the addresses of individuals in such lists (only business names/addresses are released). If you have applied as an individual and the address on the application is your business address, please indicate if you voluntarily allow the release of your address for such requests: ____

SUBMIT THE COMPLETED APPLICATON TO:

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
ENDANGERED SPECIES PERMITS
911 N.E. 11TH AVENUE
PORTLAND, OREGON 97232-4181

ANY QUESTIONS? CALL 503-231-2063

ATTACHMENT 1

Resumes for Sapphos Environmental Staff and Entomological Consultant

ERIC WILSON
ENVIRONMENTAL ANALYST

Mr. Wilson, a recent addition to the Sapphos Environmental team, is trained as an environmental planner with specific emphasis on the regulatory framework and compliance requirements associated with public sector land-use planning. He has experience in the evaluation of public work projects, and in assembling the legislative documentation necessary for permitting of public projects. Much of Mr. Wilson's experience is a direct result of the course of study undertaken during his academic training (Environment Economics and Politics) at Claremont McKenna College, furnishing him with unique experience in the environmental planning field.

Since his involvement in Sapphos Environmental, he has been assigned to the open end contract with the Los Angeles County Department of Parks and Recreation, providing 'as needed' services for that agency's planning division. Specific tasks have included assistance with response to comments on the *Draft Environmental Impact Report for the Frank G. Bonelli Regional Park Master Plan Project*, and review and preparation of environmental planning documentation pertaining to the Franklin Roosevelt County Park and Victoria Golf Course. Mr. Wilson has acquired additional CEQA related experience in his contributions to the recently completed Final Environmental Impact Report for *Longden Reservoir No. 1, Van Nuys Reservoir, Van Nuys Booster Pump Station and the 24-Inch Parallel Pipeline*.

Mr. Wilson's experience serving as a team member was exemplified in his involvement with two academic environmental planning projects: *An Evaluation of Alternative Land-use Proposals for the Marine Corps Air Station at El Toro* in conjunction with the Rose Institute of State and Local Government, and an Environmental Impact Analysis of the proposed Olympic Village in Salt Lake City, Utah. Work efforts completed pursuant to these projects included: field evaluations, preparation of technical reports, delivering professional presentations, and reviewing all aspects of environmental documentation related to compliance and regulation of each project.

Mr. Wilson has experience with all aspects of project implementation. In 1994 Mr Wilson was awarded an Eaton Ecological Research Foundation Grant in coordination with the W.M. Keck Science Center in Claremont, California. This self-designed project was established to determine *The Effects of Fire on Birds in Coastal Sage Scrub Habitats*. In satisfying the requirements of the grant, Mr. Wilson conducted the necessary field monitoring, data collection and analysis and report writing and presentation. This project highlights the range of Mr. Wilson's project capabilities, from field monitoring to professional quality report generation.

Professional History

Sapphos Environmental, Environmental Analyst. 1996.
Wilson Geosciences, Geologic Technician. 1992-1996.
Keck Science Center, Research Scientist. 1994.
Pasadena City College, Material Handler. 1993.
Altadena Estates, Maintenance Staff. 1992.

Education

B.A., Environment, Economics, and Politics (EEP), Claremont McKenna College, 1996.

IRENA MENDEZ
HABITAT RESTORATION SPECIALIST

Dr. Mendez is a habitat restoration ecologist whose expertise is the identification and restoration of habitats and communities that have been disrupted, degraded, and depleted. Dr. Mendez has been involved with a number of restoration work efforts throughout southern California, including projects for the Los Angeles County Sanitation District, the City of Los Angeles Department of Airports, and the State of California. These work efforts have been performed under the purview of the California Coastal Commission, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. Dr. Mendez is a specialist in the propagation and establishment of native plant materials, and is deeply interested in the interrelationships that exist in California's native plant communities.

Professional Experience

- Project Scientist, El Segundo Dunes Restoration Project, Agresearch, 1993-1994. Quantitative recording of all plant materials present in 116 acres of heavily disturbed habitats of foredune, backdune and coastal prairie, in addition to the non-disturbed areas and sand-minded areas of the foredune habitat proximal to the VOR (60 acres).
- Post-doctoral Scholar, University of California, Los Angeles, Dept. of Chemistry and Biochemistry, 1988-1990. Work conducted on the synthesis of radio-labeled substrate (tritium labeled geranylgeranyl-pyrophosphate) for use in the quantification of kaurene made by Kaurene synthase *in vitro* in rice and wild cucumber and casbene made by Casbene Synthetase in castor bean, synthesis of radio-labeled affinity ligand to be used in the purification of Kaurene synthetase from *Marah macrocarpus*, and covalent coupling of affinity ligand to solid supports to determine which one gives the best resolution via HPLC.
- Post-doctoral Scholar, University of California, Los Angeles, Dept. of Biology, 1986-1988. Responsibilities included laboratory setup and organization. Work conducted on the synthesis of phytyl pyrophosphate, a possible inhibitor of Kaurene synthetase to be used as an affinity ligand in the purification of Kaurene synthase from wild cucumber (*Marah macrocarpus*).
- Research Assistant, University of California, Riverside, Division of Toxicology and Physiology, 1981-1986. Work included the design and synthesis of new DDT analogs, the determination of insecticidal activity in houseflies using probit analysis and linear regression analyses correlating activity with structure.
- Research Assistant, Instituto Venezolano de Investigaciones Cientificas (IVIC), Caracas, Venezuela, 1978-1980. Work consisted of natural products chemistry, specifically the chemical study of the constituents of the fruits of *Phytolacca icosandra L.*

IRENA M. MENDEZ (continued)

Professional History

Sapphos Environmental - Habitat Restoration Ecologist
University of California Los Angeles - Post-doctoral Scholar
University of California Riverside - Research Assistant
Instituto Venezolano de Investigaciones Cientificas - Research Assistant

Education

Post-doctoral Scholar, University of California, Los Angeles, Departments of Chemistry and Biochemistry, 1988-1990
Post-doctoral Scholar, University of California, Los Angeles, Department of Biology, 1986- 1988
Ph.D., Chemistry (Organic Chemistry), University of California, Riverside, 1986
M.S., Chemistry, University of California, Riverside, 1982
B.S., Chemistry, Universidad Simon Bolivar, Caracas, Venezuela, 1980

Educational Awards

Post-doctoral Scholar, UCLA 1986-1990
Dissertation Research Award, 1985
Chancellor's Patent Fund, 1983-1984
Gran Mariscal de Ayacucho (GMA) Foundation Scholarship, 1981-1982

Professional Affiliations

California Native Plant Society, Board member Santa Monica Chapter, 1992 - present

Publications

Mendez, I. and Heath, F., *The Buckwheat Blues*, American Butterflies, Vol. 2, pp. 4-9, 1994

Mendez, I., *Field guide to the Flora of the El Segundo Dunes*, in preparation

MARIE C. CAMPBELL
PRINCIPAL
ENVIRONMENTAL PROTECTION SPECIALIST

Ms. Campbell is principal of Sapphos Environmental. She is an environmental compliance specialist with over 14 years experience in project management of all aspects of environmental compliance and resource management planning. As principal of Sapphos Environmental, she has served as project manager on over one hundred projects including state and federal environmental compliance documents, technical reports, mitigation monitoring plans, resource management plans, and consensus planning efforts. Ms. Campbell's work experience during the last four years includes the successful coordination of six open-end contracts for environmental services, two environmental impact reports, three joint NEPA/CEQA documents, and numerous technical reports and regulatory permits. Typically these projects involve coordination of a multidisciplinary team with the project design and engineering team. Ms. Campbell has extensive experience in the management and preparation of biological constraints analyses and biota reports for submittal to the County of Los Angeles Department of Regional Planning, Significant Ecological Area Technical Advisory Committee. A brief summary of Ms. Campbell's relevant experience for project management, environmental compliance documents, and resource management planning efforts follows.

Project Management

The open-end contracts managed by Ms. Campbell during the last four years include two for The Metropolitan Water District of Southern California, and one for the Los Angeles County Department of Public Works, and an ongoing contract with the County of Los Angeles Department of Parks and Recreation. In the performance of Services under these open-end contracts, she has managed multi-disciplinary teams consisting of biologists, archaeologists, paleontologists, land use planners, air and water quality specialists, acoustical engineers, traffic engineers, and civil engineers. As many as fifteen simultaneous delivery orders (during a one-month period) have been managed during the course of these contract efforts. As project manager, Ms. Campbell's responsibilities included preparation of individual scopes of service for each delivery order (including schedules and estimated costs), client and project team coordination, project staffing, supervision of all work efforts, timely submittal of all work products, provision of technical input and graphics for internal and external project briefings, and quality control. Ms. Campbell has managed the preparation of envronmental compliance and resource management planning efforts including:

- *EIR for Deane Dana Friendship Community Regional County Park*
- *Mitigation Plan and Biological Assessment for Erosion Protection Facilities for the Valencia Water Reclamation Plan Solids Processing Expansion Project, Los Angeles County, California (Nationwide Permit, Streambed Alteration Agreement, and Water Quality Certification)*
- *Construction Monitoring for Repair and Rehabilitation of the Orange County Feeder Extension and Related Protective Improvements, Newport Back Bay, California (Nationwide Permit, Streambed Alteration Agreement, Water Quality Certification, and Coastal Development Permit)*
- *Permit Processing and Long-term Habitat Management Plan for Red Tail Golf and Equestrian Project*
- *Habitat Restoration Plan and EIR for Deane Dana Friendship Community Regional County Park*

- *Revegetation Plan and Exotic Pest Plant Control for Bosque del Rio Hondo Project)*

Environmental Compliance

NEPA/CEQA Documents

Ms. Campbell has prepared all types of environmental compliance documents for state and federal lead agencies, including categorical exclusions, negative declarations, mitigated negative declarations, environmental assessments, environmental impact reports (EIR), environmental impact statement (EIS), and joint environmental documents (EIR/EIS). Ms. Campbell recently completed the EIR for *Longden Reservoir No. 1, Van Nuys Reservoir, Van Nuys Booster Pump Station and 24-inch Parallel Pipeline Project* and EIR for *Deane Dana Friendship Community County Park EIR*. She serves as project manager for the wildlife resources inventory of the 75 square-mile study area for the Great Basin Unified Air Pollution Control District Owens Valley PM-10 State Implementation Plan EIR. Ms. Campbell has recently completed three joint NEPA/CEQA documents. *Programmatic Negative Declaration/Environmental Assessment* (Los Angeles County Department of Public Works and U.S. Army Corps of Engineers); *Negative Declaration and Environmental Assessment for the Bosque del Rio Hondo Riverfront Park Project* (Mountains Recreation and Conservation Authority, Los Angeles County Department of Parks and Recreation, and U.S. Army Corps of Engineers; and *Joint Environmental Assessment and Mitigated Negative Declaration* (U.S. Fish and Wildlife Service and The Metropolitan Water District of Southern California). Under Ms. Campbell's direction, Sapphos Environmental recently completed Mitigates Negative Declaration for Implementation Three Facilities Programs at the Franklin Delano Rosevelt Park. An initial study was prepared for the proposed refurbishment of the Victoria County Golf Course.

Regulatory Permitting

Regulatory permitting has been undertaken by Ms. Campbell in support of a variety of infrastruture projects. Most recently, Ms. Campbell prepared the *Mitigation Plan Biological Assessment for the Proposed Erosion Protection Facilities for the Valencia Water Reclamation Plant Solids Processing Plant, Los Angeles County California* for the County Sanitation Districts of Los Angles County. Regulatory permitting included documentation for a Pre-Discharge Notification for use of Nationwide Permit submitted to the U.S. Army Corps of Engineers (including formal consultation with the U.S. Fish and Wildlife Service); Streambed Alteration Agreement submitted to the California Department of Fish and Game); and Request for Waiver of Water Quality Certification to the Regional Water Quality Control Board. Similar efforts were undertaken for two projects for the Metropolitan Water District of Southern California, emergency pipeline repairs and recurring maintenance for the Box Springs Feeder Project, and emergency debris removal and routing channel maintenance for the Weldon Canyon Creek tributary to Bull Creek at the Jensen Filtration Plant.

Construction Monitoring

Numerous construction monitoring projects have been supervised by Ms. Campbell to ensure compliance with mitigation programs defined in environmental compliance documents and as part of regulatory permitting programs. She is currently preparing a construction monitoring and wildlife relocation program for the Cascades Golf Course project which is currently under construction. Previously, she served as the in-field supervisor for construction monitoring of the repair and rehabilitation of the Orange County Feeder Extension and Related Protective Improvements, Newport Back Bay, California. Construction monitoring was required to ensure compliance with permit conditions established by the U.S. Fish and Wildlife Services (California gnatcatcher), U.S. Army Corps of Engineers (Nationwide Permit), Regional Water Quality Control Board (Water Quality Certification), California Department of Fish and Game (Streambed Alteration Agreement), and California Coastal Commission (Coastal Development Permit).

Resource Management

Management Plans

The *Draft Long-term Habitat Management Plan for the Red Tail Golf and Equestrian Project* is among the resource management plans recently managed by Ms. Campbell. The *Management Plan* will serve as the basis for processing the Application for Streambed Alteration with the California Department of Fish and Game. The *Management Plan* includes an introduction, description of the regulatory framework, summary of baseline conditions, impact analysis, and conservation measures. Other similar plans have been prepared including: *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* and *Lake Mathews Fire Management Plan, Riverside County*, California.

Habitat Restoration

Ms. Campbell has supervised the preparation of habitat restoration plans for several locations including: *Habitat Restoration Program for Palos Verdes Blue Butterfly at Deane Dana Friendship Community Regional County Park, Revegetation Plan in Support of the Bosque del Rio Hondo Project*, and *Habitat Restoration Program in Support of the Valencia Water Reclamation Plant Solids Processing Expansion Project*. Each of these programs includes a delineation of goals to be achieved through implementation of the habitat restoration program, plans and specification for project implementation, recommended maintenance, and long-term monitoring to ensure achievement of project specifications.

Other Relevant Professional Experience

- *Biological Constraints Analysis for County of Los Angeles Department of Parks and Recreation Nature Center at Catalina Island*
- *Biological Constraints Analysis* and *Biota Technical Report for Tesoro del Valle Planned Community*
- *Phase 1 Significant Ecological Area Studies for Las Virgenes (SEA No. 6), Cold Creek (SEA No. 9), Tuna Canyon (SEA No. 10), Tonner Canyon (SEA No. 15), San Francisquito Canyon (SEA No. 19), Dudleya densiflora Population (SEA No. 45), and Kentucky Springs (SEA No. 61)*
- *Constraints Analysis for Westside Conveyance System*
- *Biological Assessment, Negotiated Settlement Agreement and Biological Resources Evaluation for the East Orange General Plan Amendment EIR*

MARIE C. CAMPBELL (continued)

- *Preliminary Administrative Draft Environmental Impact Statement for Fort Irwin/National Training Center*
- *Calleguas Creek Feasibility Study EIS*
- *Los Angeles Raiders EIR/EIS*
- *U.S. Army Corps of Engineers Section 14 Emergency Environmental Assessments for the Cities of Pleasanton and Reserve, New Mexico; Chinle, Santa Cruz, and Safford, Arizona; and Redondo Beach King Harbor, California*

Professional History

Sapphos Environmental, Principal–October 1992 to Present
Michael Brandman Associates, Associate, Manager of Environmental Protection Services–1989 through 1992
U.S. Army Corps of Engineers, Environmental Protection Specialist–1984 through 1989
University of California at Los Angeles, Teaching Assistant/Research Analyst–1982 through 1985

Education

M.A., Geography (Geomorphology/Biogeography), University of California, Los Angeles–1988
B.A., Ecosystems: Conservation of Natural Resources, University of California, Los Angeles–1982

Professional Affiliations

American Planning Association
Association of Environmental Professionals
Association of American Geographers
UCLA Alumni Association
Ecological Society of America
Society for Ecological Restoration
California Exotic Pest Plant Council

Selected Publications

Campbell, Marie. 1990. *Mitigation Monitoring AB 3180: The NEPA Perspective.* California Chapter of the American Planning Association. AB 3180 Revisited Workshops (March 16, 23, and 30, 1990).

Campbell, M.C. 1988. Unpublished master's thesis. *Rill Erosion in a Post-Burn Chaparral Environment.* Department of Geography, University of California, Los Angeles.

Mackey, Ellen, R. Green, B. Newby, D. Matis, J. Bradley, D. Karavidas, and M. Campbell. 1994. *Integrating Fire Management Plans and Conservation of Endangered Species.* Ecological Society of America 1994 Conference, Knoxville, Tennessee, August 11. Poster session.

Mackey, Ellen, and Marie C. Campbell. The Metropolitan Water District of Southern California (Metropolitan), Los Angeles, CA; Sapphos Environmental, Pasadena, CA.; *Using Integrated Pest Management Approach to Ensure Conservation of Endangered Species.* Ecological Society of America 1995 Conference, Snowbird, Utah - August 1, 1995.

STEVEN PATTERSON
PLANT GEOGRAPHER

Dr. Patterson is a plant geographer and habitat restoration specialist with seventeen years of experience conducting and managing a variety of biological studies and evaluations for a wide range of projects. He has worked with the natural plant communities of southern California for over ten years. Dr. Patterson has conducted numerous baseline vegetation surveys, jurisdictional delineations, and directed surveys for sensitive plant species. He has developed specialized expertise in mitigation planning, especially restoration and revegetation design and programs to control pest plant species. Dr. Patterson relies heavily on his academic training as a biogeographer when characterizing baseline biological resources, assessing impacts on these resources pursuant to the California Environmental Quality Act, or when reviewing technical reports prepared by others for technical and procedural adequacy.

As a plant geographer, Dr. Patterson has wide-ranging field experience, including, in addition to California plant communities, extensive field experience in Yucatan, Mexico, and the ecosystems of the Ouchita National Forest, in Arkansas and Oklahoma, where he conducted extensive plant biodiversity sampling for the U.S. Forest Service. Dr. Patterson has served as visiting lecturer at the University of California Los Angeles and other local colleges teaching courses in biogeography and environmental science. Previous to graduate work in biogeography, Dr. Patterson spent five years conducting research in plant pathology, primarily laboratory and field studies of soil-borne fungal and bacterial diseases and mycorrhizal interactions with those pathogens.

Professional Experience

- Currently overseeing biological analyses for the Los Angeles International Airport Master Plan EIR including a research program to develop potential measures to compensate for potential impact on the federally endangered El Segundo blue butterfly.
- Serving as Project Manager for maintenance and biological monitoring of the Los Angeles El Segundo Dunes El Segundo Blue Butterfly Reserve and Ecological Restoration Area for the City of Los Angeles Department of Airports.
- Developed a conceptual restoration plan for the County of Los Angeles Department of Public Works for Deane Dana Friendship County Regional Park. The plan involves restoration of coastal sage scrub and the planting of *Astragalus trichopodus* var. *lonchus* as the host plant for the potential reintroduction of the endangered Palos Verdes Blue butterfly
- Conducted vegetation surveys, drafted biological resource section, and developed a habitat restoration plan for Bosque del Rio Hondo Riverfront Park, Los Angeles County, for the Mountains Restoration and Conservation Authority.
- Conducted directed surveys for sensitive plant species for the County of Los Angeles Department of Public Works and authored the *Sensitive Species Report for the Hunt Canyon Detention Basin, Los Angeles County.* The report was reviewed by the Los Angeles County Department of Regional Planning accepted without revision.
- Conducted sensitive species surveys for the endangered slender-horned spineflower in Tujunga

Wash, Los Angeles County, and provided input to the Draft EIR for the Los Angeles Golf Course.

- Conducted reconnaissance level surveys and drafted the biological resource section for the Environmental Assessment for the Los Angeles River Master Plan for the Los Angeles County Department of Public Works.
- Conducted vegetation surveys and developed revegetation plan for required erosion control facilities at Valencia Water Treatment Plant on the Santa Clara River for the Sanitation Districts of Los Angeles County
- Developed and supervised implementation of exotic pest plant eradication programs for tamarisk and arundo for The Metropolitan Water District of Southern California's (Metropolitan) Lake Mathews and Joseph P. Jensen Filtration Plants.
- Conducted biological surveys and developed mitigation plan for the County of Los Angeles Department of Public Works Old Topanga Canyon Road Improvement Project
- Served as a principal editor for four major documents in the past year including *The Long-term Habitat Management Plan for the Los Angles/El Segundo Dunes*, the *Skinner Branch Integrated Pest Management Plan*, and *Vol. II, Biological Resources of the Lake Mathews Multiple Species Habitat Conservation Plan and Natural Communities Conservation Plan.*

Professional History

Sapphos Environmental–Plant Geographer and Restoration Ecologist
University of California Los Angeles–Visiting Lecturer
University of California Los Angeles–Counseling Assistant
University of California Los Angeles–Teaching Associate
Texas A&M University–Teaching Assistant
University of Arkansas, Fayetteville, Department of Plant Pathology–Research Assistant

Education

Ph.D., Geography (Biogeography), University of California, Los Angeles, 1992
M.S., Geography, Texas A&M University, 1985
– Post-graduate work in agriculture and biology, University of Arkansas, Fayetteville, 1979-1983
B.A., Humanities (botany minor), Hendrix College, 1978

STEVEN PATTERSON (continued)

Selected Professional Continuing Education and Training

Wetlands Delineation (U.S. Army Corps of Engineers approved), Wetland Training Institute, March 1995
Geomorphology and Stream Restoration, University of California Berkeley, April 1995
Revegetation Planning, California Chapter of the Society for Ecological Restoration, September 1995
Desert Rehabilitation Workshop, U.C. Davis Extension and the Desert Lands Rehabilitation Consortium, November 1995

Professional Affiliations

Society for Ecological Restoration
SERCAL–California Chapter of the Society for Ecological Restoration
California Exotic Pest Plant Council
California Native Plant Society
Southern California Botanists

SCOTT MARSHALL
ENVIRONMENTAL ANALYST

Scott Marshall recently joined Sapphos Environmental to provide expertise related to environmental planning and policy related issues. His academic training at Claremont McKenna College has allowed him to develop a thorough knowledge of the state and federal statutes that guide local and regional environmental planning efforts. In the course of his academic endeavors, he completed both local and international field studies related to land use and wildlife resources. He is experienced in the use of GIS and other software programs to analyze environmental planning questions. Mr. Marshall has strong public and interpersonal communication skills.

Mr. Marshall's experience as a team member is exemplified with his involvement with two academic environmental planning projects: *An Evaluation of Alternative Land-use Proposals for the Marine Corps Air Station at El Toro* in conjunction with the Rose Institute of State and Local Government, and an Environmental Impact Analysis of the proposed Olympic Village in Salt Lake City, Utah. Work efforts completed pursuant to these projects included: field evaluations, preparation of technical reports, delivering professional presentations, and reviewing all aspects of environmental documentation related to compliance and regulation of each project.

Mr. Marshall's background includes experience using the GIS facilities of the Rose Institute at Claremont McKenna College, where he studied mountain lion populations in southern California in relation to human population densities. He analyzed the problems associated with cutting off mountain lion habitat corridors and the reasons behind increased attacks on people. Other large mammal research conducted by Mr. Marshall includes a population study of the endangered Zanzibar leopard. Through his unique research tactics on the island of Zanzibar, Mr. Marshall was able to obtain valuable unprecedented information about the current status of the island sub-species.

Mr. Marshall has extensive experience in environmental education and through his work with Aerotek in Seattle, Washington he has developed a strong business background. While at Aerotek, Mr. Marshall coordinated with numerous technical firms in the public and private sector, helping to place qualified individuals from a variety of disciplines in diverse and challenging positions. Mr. Marshall's experience demonstrates his ability to effectively communicate and simultaneously manage multiple agendas. Mr. Marshall's environmental experience was exemplified by his recently completed work at the Aspen Center for Environmental Studies. While at the Center, he led alpine ecology tours and wildflower walks. He also conducted Bird-of-Prey informational programs.

Professional History

Sapphos Environmental, Environmental Analyst. 1997.
Aerotek, Technical Recruiter. 1996 - 1997.
Claremont McKenna College, Resident Assistant. 1995 - 1996.
Aspen Center for Environmental Studies, Naturalist. 1995.
Island of Zanzibar Forestry Department, Wildlife Researcher. 1994.

Education

B.A., Environment, Economics, and Politics (EEP), Claremont McKenna College, 1996.
Two-week training course, Mweka College of Wildlife Management (Tanzania), 1994.

ROBERT WITTHAUS
HABITAT RESTORATION SPECIALIST

Robert Witthaus, a recent addition to Sapphos Environmental's staff, is a habitat restoration ecologist with over 5 years of field experience in the performance of land management, monitoring, and habitat restoration work efforts. He received his B.S. in Biological Sciences from California Polytechnic State University, San Luis Obispo. Relevant coursework includes Course Botany, Plant Taxonomy, Plant Physiology, Ornithology, Mammalogy, Endangered Species, General Ecology, Introduction to Conservation, and Fisheries and Wildlife Management. Mr. Witthaus comes to Sapphos Environmental after successfully completing restoration and monitoring work efforts in California, North Dakota, and Florida with The Nature Conservancy.

Mr. Witthaus is knowledgeable and experienced in all facets of habitat restoration. He served as Restoration Assistant for The Nature Conservancy's Blowing Rocks Preserve in Blowing Rocks, Florida. His responsibilities included the supervision of staff and volunteers in non-native plant control, design and implementation of herbicide program, restoration planting in wetland and upland sites, monitoring of construction and restoration of stormwater retention basins, restoration of tidal wetlands in coordination with federal mitigation for Florida Power and Light, irrigation design and installation, management of an on-site nursery, gathering and propagation of plants for nursery, native tree rescue, photo sampling, vegetation and wildlife monitoring, and data analysis. Mr. Witthaus also served as Stewardship Ecologist for The Nature Conservancy's John E. Williams and Pigeon Point Preserves in North Dakota where his responsibilities included the collection of breeding information on Piping Plover, estimation of fledgling success, and collection of baseline forest overstory and understory data. As a Range Monitor for the Carrizo Plain Natural Area in California, he worked on the estimation of surface plant biomass and the use of grasses and shrubs by livestock, establishment and running of vegetation transects, photo-sampling, and assistance with a research project on native grasses. Recently, Mr. Witthaus completed six weeks with the National Park Service assisting with removal of invasive plant species within the area of the Mt. Vision Fire at Point Reyes National Seashore. He also monitored the breeding season of Western Snowy Plover and California Least Tern, installed plants and irrigation systems, and conducted weed abatement efforts at the Guadalupe/Nipomo Dunes. While working as maintenance supervisor, Mr. Witthaus aquired many of the applied skills of landscape design and installation, such as site preparation, installation and maintenance of a variety of irrigation systems, development of plant palettes, plant installation, pest control, and use and upkeep of landscape equipment.

In addition to his habitat restoration expertise, Mr. Witthaus is trained in First Aid and Adult CPR, and has completed the Worker Safety Course for application of pesticides. He is trained and proficient in the operation of tractors, all-terrain vehicles, and four-wheel drive vehicles, and has experience with Trimble and PLGR GPS units.

Professional History

Sapphos Environmental, Habitat Restoration Specialist. 4/97.
National Park Service, Point Reyes National Seashore, California. Biological Technician (Plants) 3/17/97 - 4/25/97
The Nature Conservancy, Blowing Rocks Preserve, Florida. Restoration Assistant. 4/96 - 12/96.
The Nature Conservancy, Blowing Rocks Preserve, Florida. Restoration Intern. 10/95 - 3/96.
The Nature Conservancy, John E. Williams and Pigeon Point Preserves, North Dakota. Stewardship Ecologist. 5/95 - 8/95.
The Nature Conservancy, Carrizo Plain Natural Area, California. Range Monitor Intern. 12/94 - 5/95.

ROBERT WITTHAUS, continued...

The Nature Conservancy, Guadalupe/Nipomo Dunes, California. Field Aide. 10/93 - 9/94.
Takahashi Landscape & Maintenance, Cayucos, California. Maintenance Supervisor. 6/91 - 8/94.

Education

B.S. Biological Sciences. California Polytechnic State University, San Luis Obispo. December 1993.

BRAD BLOOD, Ph.D.
WILDLIFE BIOLOGIST

Brad Blood, Ph.D., is a wildlife biologist with Sapphos Environmental. Dr. Blood has a broad knowledge of the wildlife of California, especially of birds and mammals. He is especially experienced in the mammals and birds of the agricultural regions of Imperial and Riverside counties through his work on the Colorado River Cotton Rat and the Hispid Cotton Rat. Dr. Blood designed and implemented the survey techniques in both natural and agricultural habitats. This project involved cooperation by farmers and other private land holders, and by the California Department of Fish and Game. He also has authored a species recovery plan for the Colorado River Cotton Rat (*Sigmodon arizonae plenus*) which was published by the IUCN. He has assisted in surveys of banded Scrub Jays on Santa Cruz island, involving capture and rebanding. He has participated in population counts of banded Snow Geese in the Imperial Valley of California. Additionally, he has worked as part of a field team surveying for *Perognatus parvus alticola* (the Walker Pass Pocket Mouse) in the Walker Pass area of California. This survey included habitat transects and analysis of associated mammal species.

Professional History

Sapphos Environmental, Wildlife Biologist.
Mt. St. Mary's College; Associate Professor, Department of Physical Therapy. 1988-1997.
University of Southern California; Assistant Professor, Department of Physical Therapy. 1987-1988.
California State University, Long Beach; Lecturer, Department of Anatomy and Physiology. 1986-1987.
University of Southern California; Teaching Assistant, Department of Biological Sciences. 1981-1987.

Education

Ph.D., University of Southern California; Biology. 1987.
M.S., California State University, Long Beach; Biology. 1981.
B.S., California State University, Long Beach; Zoology. 1978.

Professional Affiliations

American Society of Mammalogists
Southern California Academy of Sciences
Society for the Study of Evolution
Society for the Study of Mammalian Evolution
American Association of Physical Anthropologists

Research/Selected Publications

Dr. Blood's research has been centered on the taxonomy, distribution, and natural variation in population of small mammals, and the application of multivariate techniques to solve those questions.

Blood, Brad R. 1990. Taxonomy and distribution of *Sigmodon* in California. Bulletin of the Southern California Academy of Science, 89: 86-93.

Blood, Brad R. 1981. Urban Area Farm. In, Thirty-third Winter Bird Population Study, C. L. Cink and R. L. Boyd, eds., American Birds, 35: 45.

Blood, Brad R. and D. A. MacFarlane. 1988. Notes on some bats from Northern Thailand, with comments on the subgeneric status of *Myotis altarium*. Zeit. Fur Saugetierkunde, 53: 276-280.

Blood, Brad R., J. O. Matson, and D. R. Patten. 1985. A multivariate analysis of allometry in a single population of the coyote (*Canis latrans*). Australian Mammalogy, 8:221-231.

Matson, J. O. and B. R. Blood. 1994. A report on the distribution of small mammals of Namibia. Zeit. Fur Saugetierkunde, 59: 289-298.

Veirheller, J. And B. R. Blood. 1981. Urban Park. In Forty-fourth Breeding Bird Census, W. T. VanVelsen, ed., American Birds, 35: 93.

Conferences Attended

Dr. Blood has attended 16 national conferences and 1 international conference. He has presented research findings at 11 national and 1 international conference. He has also attended 24 state and local scientific conferences. Dr. Blood regularly attends the annual meeting of the American Society of Mammalogists and the Southern California Academy of Science.

TRACEY ALSOBROOK
WILDLIFE BIOLOGIST

Tracey Alsobrook is a wildlife biologist with Sapphos Environmental. She is a wildlife biologist with three years experience working on environmental compliance, biota surveys and public outreach for the City of Pasadena. Environmental compliance issues included working with the local California Department of Fish and Game warden to identify possible violations of streambed alteration agreements and consulting with the United States Fish and Wildlife Service on a least Bell's vireo sighting in Hahamongna Watershed Park. Biota surveys included adding approximately fifty plant species to an existing flora list for Hahamongna Watershed Park and creating a bird checklist of over 100 species for this area. These lists were provided to the Los Angeles County Department of Public Works, Hydraulics and Water Conservation Division for inclusion in the Negative Declaration for the Devil's Gate Dam Rehabilitation Project. Public outreach included leading natural history hikes throughout Hahamongna Watershed Park and presenting programs for City of Pasadena officials and the public on the Park.

As a field trip leader for the local chapter of the National Audubon Society Ms. Alsobrook has several years experience identifying and counting bird species in the Southern California region. She has assisted with mist-netting and banding of migratory and resident bird species at Whittier Narrows.

As an environmental technician she also worked in a variety of other environmental areas including conservation of resources and water quality issues . Ms. Alsobrook participated in an extensive survey of the Arroyo Seco watershed for a document for the California Department of Health Services. Aerial and foot surveys were conducted to determine any existing or possible surface water contaminant source. In addition she conducted a Ms. Alsobrook's work experience during the last three years includes comments on a draft environmental impact report and overseeing maintenance and security for a local park. Other experience includes participation in a burrowing owl survey and several bird biology classes with field trips to mountain, desert and coastal regions.

Professional History

Sapphos Environmental, Wildlife Biologist-1997 to present.
City of Pasadena, Office of Environmental Affairs, Environmental Technician-1993 to 1996
Freelance Photographer-1982 to1992

Education

B.A., Biology, Occidental College, Los Angeles - 1982

Professional Affiliations

American Birding Association
Association of Environmental Professionals

Tracey Alsobrook, continued...

Conferences

2nd Interface Between Ecology and Land Development in California, 1997
National Audubon Society Western Regional Conference, 1996
CEQA Workshop, 1994
Watershed Management Council Fifth Biennial Conference, 1994
California Exotic Pest Plant Control Council Symposium, 1994
National Audubon Society Western Regional Conference, 1994
Coalition to Restore Urban Waterways Conference, 1993
National Audubon Society National Convention, 1992
Status and Management of Neotropical Migratory Birds Conference, 1992
National Audubon Society Western Regional Conference, 1992

Professional Training

Biology and the Law, Cal State Long Beach - 1996
Groundwater Monitoring, Protection and Clean-Up, University of California, Los Angeles-1996

ANNE DOVE
318 East Alvarado Street
Pomona, CA 91767
(909) 620-6259

OBJECTIVE

Land planning position in the environmental consulting field.

EDUCATION

Master of Landscape Architecture 1993-1997
~~Regenerative Studies Option~~
California State Polytechnic (Cal Poly) University, Pomona CA

Bachelor of Arts, Environmental Studies 1988-1992
Mills College, Oakland CA

Study Abroad Program in Environmental Science January-June 1991
University of East Anglia, Norwich, England

Projects

Puente-Chino Hills Wildlife Corridor: A Management Framework January-June 1997
- Developed project proposal
- Collected and analyzed ecological and cultural information
- Created planning alternatives
- Managed project budget of $20,000

Upper Newport Bay Watershed Study April-June 1996
- Analyzed environmental data
- Generated alternatives to proposed water district plan
- Developed document for the project

Fire and Erosion in the Malibu Creek Watershed: Planning, Designing and Managing for Fire Processes January-March 1996
- Modeled fire-related environmental variables
- Applied fire models to case study area
- Identified management strategies for fire processes

RELATED EXPERIENCE

Research Assistant November 1996-June 1997
Alluvial Fan Sage Scrub Conservation Plan
Cal Poly University, Pomona, CA
- Collected, analyzed, and modeled environmental data
- Tracked project finances totaling $17,000
- Developed report document for state agency

Landscape Technician June-September 1995
Center for Regenerative Studies
Cal Poly University, Pomona, CA
- Constructed landscape site elements
- Produced and harvested organic food crops

Research Assistant April 1994- May 1995
Oak Revegetation Study for Los Angeles County
Cal Poly University, Pomona, CA
- Surveyed vegetation patterns on the study site
- Prepared environmental inventory and analytical models
- Generated and formatted graphics and text in desktop publishing program for report to client

Research Assistant January-March 1995
Energy Use Study, Center for Regenerative Studies
Cal Poly University, Pomona, CA
- Surveyed and input energy use data into computer program
- Analyzed digital data using a spreadsheet program
- Designed analytical graphs of research data for scholarly paper

OTHER EXPERIENCE

Regenerative Design Symposium Volunteer October-November 1996
Cal Poly University, Pomona, CA
- Developed design charette/workshop for symposium participants
- Documented participant input during workshop
- Summarized workshop results for symposium newsletter

Student Intensive Orientation Program Volunteer March-June 1996
Cal Poly University, Pomona, CA
- Developed educational program for high school students
- Instructed high school students about regenerative studies

Planning Committee: February-June 1996
Center for Regenerative Studies Phase III Development
Cal Poly University, Pomona, CA
- Researched community governance systems for student resident program
- Developed and facilitated design workshops to solicit input for design process
- Prepared report for the Phase III design document

Assistant High School Volleyball Coach August-November 1992
Mission Viejo High School, Mission Viejo, CA
- Managed the girls junior varsity volleyball team
- Instructed students in volleyball
- Counseled students in academic and personal issues

RELATED TRAINING

Takepart Workshop Participant: March 1994-February 1996
Laguna Coast Wilderness Park, Irvine, CA
- Attended a series of organizational and preparatory field trips and meetings
- Participated in set of community workshops regarding park planning

RICHARD A. ARNOLD, PH.D.
ENTOMOLOGICAL CONSULTING SERVICES, LTD.
104 Mountain View Court
Pleasant Hill, CA 94523
(510) 825-3784; fax 827-1809
e-mail: bugdctr@igc.apc.org

EDUCATION:

Ph.D. in Entomology, University of California, Berkeley.
M.S. in Entomology, Michigan State University.
B.S. in Biology, Cornell University.

EMPLOYMENT HISTORY:

Self-Employed Entomological Consultant, 1977 to present. Founder and president of Entomological Consulting Services, Ltd., a firm that is contracted to conduct environmental and technical studies dealing with rare and endangered terrestrial and aquatic insects, arachnids, crustaceans, and other invertebrates for various federal, state, and local governmental agencies, law, environmental planning, land developers, architectural, and civil engineering firms, agribusiness, defense department contractors, energy, forestry, mining, utility, chemical, water, and oil companies, plus non-profit organizations.

SUMMARY OF PROFESSIONAL AND TECHNICAL SKILLS:

- Status survey and habitat assessment methods for rare and endangered terrestrial and aquatic insects, arachnids, crustaceans, gastropods, and other invertebrates
- Population sampling and census techniques
- Ecological and behavioral research methods
- Insect, arachnid, crustacean, and invertebrate identifications
- Environmental impact and constraints analysis
- Mitigation design and monitoring
- Habitat management and enhancement to benefit endangered insects and plants
- Preparation of environmental documents to satisfy CEQA, the Endangered Species Act of 1973, NEPA, California Coastal Act, and SMARA
- Preparation of mitigation, resource management, and habitat restoration plans
- Aerial photo interpretation, plus vegetation sampling and classification techniques
- Map preparation using microcomputer-based geographic information systems (GIS)
- Agency consultation and permit acquisition
- Education awareness training and construction monitoring
- Expert witness testimony
- Supervision and direction of field and office personnel, plus subconsultants

PROFESSIONAL ACTIVITIES:

Secretary, The Lepidopterists' Society: 1986-1989.
Executive Council, The Lepidopterists' Society: 1976-1979, 1990-1992.
Research Associate, Department of Entomology, Los Angeles County Museum of Natural History: 1984-present.
Research Associate, Department of Entomological Sciences, University of California at Berkeley: 1980-1989.
Survival Service Commission (International Union for the Conservation of Nature/World Wildlife Fund), Lepidoptera Specialist's Group: 1979-1983.
Chief Counsellor, Xerces Society: 1981-1985.
Board of Trustees, Lepidoptera Research Foundation: 1980-1983.
Board of Directors, Xerces Society: 1978-1980.
Board of Directors, San Francisco Bay Chapter, California Native Plant Society: 1978-1980
Review Editor of ATALA, Journal of the Xerces Society: 1976-1979.
Assistant Editor of Insect World Digest: 1973-1977.
Editor-in-Chief, Teen International Entomology Group (TIEG): 1971-1973.

MEMBERSHIP IN SCIENTIFIC AND PROFESSIONAL SOCIETIES:

Association of Environmental Professionals (AEP), California Native Plant Society (CNPS), Entomological Society of America, Lepidoptera Research Foundation, Lepidopterist's Society, Natural Areas Association, New York Entomological Society, Pacific Coast Entomological Society, Society for Conservation Biology, and Xerces Society.

ENTOMOLOGICAL PUBLICATIONS:

1) 1968. The effects of x-irradiation on *Papilio polyxenes asterius* (L.) (Lepidoptera: Papilionidae). *J. Lepid. Soc.* 22:173-177 (with A. Arnold).

2) 1969. The effects of x-irradiation on *Colias philodice* Godart (Lepidoptera: Pieridae). *J. Lepid. Soc.* 23:257-260.

3) 1970. Practical tips for improving your insect photography. *TIEG Newsletter* 4 (2):14-16.

4) 1971. Sex attraction: a new way to control insect pests. *TIEG Newsletter* 6 (4):26-28.

5) 1972. Butterflies in mailboxes. *Cornell Countryman* 49 (6):10-11.

ENTOMOLOGICAL PUBLICATIONS: (cont'd)

6) 1974. The future of entomology: an interview with Dr. Gordon E. Guyer, President of the ESA. *Insect World Digest* 1 (2):24-26.

7) 1977. Copulatory and ovipositional mechanisms in *Speyeria* (Lepidoptera: Nymphalidae). *Annals Ent. Soc. Amer.* 70:455-468 (with R. L. Fischer).

8) 1978. *Survey and status of six endangered butterflies in California.* California Department of Fish and Game, Inland Fisheries Branch report. 95 pp.

9) 1980. Great Basin Silverspot (*Speyeria nokomis nokomis*) butterfly study. Bureau of Land Management administrative report. 119 pp.

10) 1980. The Antioch Dunes--safe at last? *Fremontia* 8 (3):3-12+ (with A.Q. Howard).

11) 1980. *Ecological studies of six endangered butterflies: island biogeography, patch dynamics and the design of habitat preserves.* Ph.D. thesis, University of California, Berkeley. 365 pp.

12) 1981. *Status of proposed threatened or endangered California Lepidoptera.* California Department of Fish and Game, Inland Fisheries Branch report. 39 pp.

13) 1981. A review of endangered species legislation in the U.S.A. and preliminary research on 6 endangered California butterflies (Lepidoptera: Lycaenidae). IN: *Biotop- und Artenschutz bei Schmetterlingen.* Referate des II. Europaischen Kongresses fur Lepidopterologie. G. Schmid, ed. *Beih. Veroff.* Naturschutz Landschaftspflege Bad.-Wurtt. Karlsruhe. 21:79-96.

14) 1982. *Recovery plan for the endangered El Segundo Blue butterfly.* Office of Endangered Species, U.S. Fish & Wildlife Service. Portland, OR. 44 pp.

15) 1983. Ecological studies of six endangered butterflies (Lepidoptera: Lycaenidae); island biogeography, patch dynamics and the design of habitat preserves. *Univ. of Calif. Publ. in Entomol.* 99: 1-161.

16) 1983. *Speyeria callippe*: (Lepidoptera: Nymphalidae): Application of information-theoretical and graph-clustering techniques to analyses of geographic variation and evaluation of classifications. *Annals Entomol. Soc. Amer.* 76:929-941.

17) 1983. Conservation of the Endangered Smith's Blue Butterfly. *J. Research Lepid.* 22: 135-153.

ENTOMOLOGICAL PUBLICATIONS: (cont'd)

18) 1984. *Recovery plan for the endangered Palos Verdes Blue butterfly.* Office of Endangered Species, U.S. Fish & Wildlife Service. Portland, OR. 46 pp.

19) 1984. *Recovery plan for the San Bruno Elfin and Mission Blue butterflies.* Office of Endangered Species, U.S. Fish & Wildlife Service. Portland, OR. 81 pp.

20) 1984. *Valley Elderberry Longhorn beetle recovery plan.* Office of Endangered Species, U.S. Fish & Wildlife Service. Portland, OR. 62 pp.

21) 1984. An introduction to computer-assisted cladistic methods. IN, *Cladistics: Perspectives on the Reconstruction of Evolutionary History.* Proceedings of a National Science Foundation workshop. T. Duncan and T.F. Stuessy, eds. Columbia Univ. Press. pp. 295-298. (with Thomas Duncan).

22) 1985. *Recovery plan for the endangered Lotis Blue butterfly.* Office of Endangered Species, U.S. Fish & Wildlife Service report. Portland, OR. 46 pp.

23) 1985. Geographic variation in natural populations of *Speyeria callippe* (Bdv.) (Lepidoptera: Nymphalidae). *Pan-Pacific Entomol.* 61:1-23.

24) 1985. *Delta Green Ground Beetle and Solano Grass Recovery Plan.* Office of Endangered Species, U.S. Fish & Wildlife Service report. Portland, OR. 82 pp. (with R. Holland).

25) 1985. Private and government-funded conservation programs for endangered insects in California. *Natural Areas Journal* 5 (2):28-39.

26) 1985. *Studies of the El Segundo Blue butterfly–1984.* Calif. Dept. of Fish & Game, Inland Fisheries Branch. Administrative Report. 35 pp.

27) 1986. Observation of an inter-subfamilial mating (Lycaenidae: Lycaeninae and Riodininae). *Jour. Lepid. Soc.* 40:238-239.

28) 1987. Habitat enhancement techniques for the El Segundo Blue butterfly, an urban endangered species. IN, *Integrating Man and Nature in the Metropolitan Environment.* Proc. Natl. Symp. on Urban Wildlife, Chevy Chase, MD, 4-7 Nov. 1986, L.W. Adams and D.L. Leedy, eds. Published by the National Institute for Urban Wildlife. pp. 173-181. (with Audrey E. Goins).

29) 1987. Mission Blue butterfly. IN, *Audubon Wildlife Report–1987.* R.L. Di Silvestro, ed. National Audubon Society. Academic Press, Inc., New York. pp. 370-379.

ENTOMOLOGICAL PUBLICATIONS: (cont'd)

30) 1987. Decline of the endangered Palos Verdes Blue butterfly in California. *Biol. Conserv.* 40:203-217.

31) 1987. Book Review: The ecology and conservation of the Purple Emperor butterfly (*Apatura iris*), by K.J. Willmott. *Atala, The Journal of Invertebrate Conservation* 15 (1/2):21.

32) 1990. The ecology and conservation of two endangered Southern California butterflies. IN, *Endangered Wildlife and Habitats in Southern California.* P.J. Bryant and J. Remington, eds. Memoirs of the Natural History Foundation of Orange County. Vol. 3, pp. 36-47.

33) 1990. *Impacts of diseases and arthropods on California's rangeland oaks.* California Department of Forestry and Fire Protection, Forest and Rangeland Resources Assessment Program, Sacramento, CA. 94 pp. (with Tedmund J. Swiecki and Elizabeth A. Bernhardt).

34) 1991. Insect and disease impacts on blue oak acorns and seedlings. *Proc. of the Symposium on Oak Woodlands and Hardwood Rangeland Management, Oct. 31 - Nov. 2, 1990, Davis, CA,* R.B. Standiford, Tech. Coord. General Technical Report PSW-126. Pacific Southwest Research Station, Forest Service, U.S. Dept. of Agriculture. Berkeley, CA. pp. 149-155. (with Tedmund J. Swiecki and Elizabeth A. Bernhardt). 376 pp.

35) 1991. Monitoring insect and disease impacts on rangeland oaks in California. *Proc. of the Symposium on Oak Woodlands and Hardwood Rangeland Management, Oct. 31 - Nov. 2, 1990, Davis, CA,* R.B. Standiford, Tech. Coord. General Technical Report PSW-126. Pacific Southwest Research Station, Forest Service, U.S. Dept. of Agriculture. Berkeley, CA. pp. 208-213. (with Tedmund J. Swiecki and Elizabeth A. Bernhardt). 376 pp.

36) 1992. Biological diversity and seral stages: a case study of the Lotis Blue Butterfly (*Lycaeides idas (= argyrognomon) lotis.* *Proceedings of the Symposium on Biodiversity of Northwestern California, October 28-31, 1991, Santa Rosa, CA.* R.R. Harris, D.C. Erman, and H.M. Kerner, eds. Wildland Resources Center, University of California, Berkeley. Report #29. (with S. de Becker and M. Boland). pp. 119-121.

37) 1993. *Endangered Wildlife Species of the World, Vols. 1-11.* G. Lee, ed. Essays on numerous endangered insects and invertebrates. Marshall Cavendish Corp., North Bellmore, NY. 1,536 pp.

ENTOMOLOGICAL PUBLICATIONS: (cont'd)

38) 1993. The Lotis Blue butterfly, *Lycaeides idas lotis*. IN, *Conservation biology of Lycaenidae (butterflies)*. T.R. New, ed. Occasional Paper of the International Union for the Conservation of Nature and Natural Resources, Species Survival Commission, No. 8. Gland, Switzerland. pp. 143-144.

39) 1993. *CAPTABLE: an IBM PC-based program for analysis of capture-recapture data for open wildlife populations. User's manual.* Entomological Consulting Services, Ltd., Pleasant Hill, CA. 218 pp. (with Larry Arndt).

40) 1995. *Recovery plan for seven coastal dune plants and Myrtle's Silverspot butterfly.* Prepared for the U.S. Fish & Wildlife Service. 103 pp. (with The Habitat Restoration Group).

41) 1995. Design of captive environments for endangered invertebrates. IN, *Conservation of endangered species in captivity: an interdisciplinary approach.* E.F. Gibbons, B.S. Durrant, and J. Demarest, eds. State University of New York Press, Stonybrook. (with L. Saul and J. Mark Scriber). pp. 51-71.

42) (in press). The California oak disease and arthropod (CODA) database. Pacific Southwest Research Station, U.S. Forest Service, U.S. Dept. of Agriculture. (with T.J. Swiecki and E. Bernhardt).

SOFTWARE PRODUCTS:

1) *BUGGY Database*. Locality records for special-status insects and invertebrates that occur in California. (with Larry Arndt). Available from Entomological Consulting Services, Ltd.

2) *CAPTABLE*. A computer program for the analysis of capture-recapture data using open populations. (with Larry Arndt). Available from Entomological Consulting Services, Ltd.

3) *CODA* - California Oak Disease and Arthropod host insect database and computer program. (with Tedmund J. Swiecki, E.A. Bernhardt, and J. Kellogg). Available from Phytosphere Research, 1027 Davis St., Vacaville, CA 95687.

ATTACHMENT 2
Statement Justifying Permit

STATEMENT JUSTIFYING PERMIT

Sapphos Environmental has been providing Los Angeles World Airports (formerly City of Los Angeles Department of Airports) with technical assistance in the maintenance and monitoring of the El Segundo Blue Butterfly Habitat Restoration Project Area located at the Los Angeles/El Segundo Dunes in the City of Los Angeles since 1994. Sapphos Environmental is submitting this request for a permit to conduct scientific research pursuant to Section 10(a)(1)(A) of the federal Endangered Species Act in response to a letter received from the U.S. Fish and Wildlife Service dated April 10, 1997:

> "Therefore, we recommend that members of your company who will be engaged in field surveys or other similar activities involving the endangered El Segundo blue butterfly obtain a recovery permit pursuant to Section 10 (a)(1)(A) in order to avoid potential violations of the Act."

The Los Angeles World Airports owns and controls a 302 acre area west of Pershing Drive at the terminus of the existing airfield. This area is the remnant of a much more extensive coastal dune complex that stretched from Playa del Rey to Malaga Cove. In 1991, the City of Los Angeles recognized the ecological significance of the Dunes and passed Ordinance No. 167940 which contains a land use map showing two primary areas: (1) 200 acre Dunes Habitat Preserve, and (2) a 100-acre "golf course area."

The ESB butterfly was recognized as a distinct species in 1975 and officially designated as an endangered species pursuant to the federal Endangered Species Act in 1976 (Hogue 1993). The ESB is currently restricted to three locations: the Los Angeles/El Segundo Dunes (Dunes), the Chevron refinery ESB butterfly reserve, approximately 4 miles south of the Dunes, and Malaga Cove, approximately 10 miles south of the Dunes. The 200-acre El Segundo Blue Butterfly Habitat Restoration Area within the Dunes is the largest remaining area supporting an extant population of the El Segundo blue butterfly. The Chevron refinery site (1.6 acres) and Malaga Cove site (1.5 acres) are small and more susceptible to impacts from surrounding human land uses (fire, pesticides, invasion of non-native pest plants) and natural environmental factors (fire, flooding, predation).

The 200-acre Dunes Habitat Preserve portion of the site has been undergoing ecological restoration for approximately ten years. Restoration efforts initiated in 1986 consisted of a pilot program designed to augment habitat for the El Segundo blue butterfly. Based on the successful implementation of the test program, approximately $900,000 in public funds were allocated for a comprehensive program to remove non-native invasive pest plants and restore native vegetation on 167 acres of the 200-acre Dunes Habitat Preserve. The intensive phase of the revegetation effort was completed in 1994. A Special Condition of the Coastal Commission Permit (CDP No. 5-92-131) issued in 1992 for the full restoration program required that a plan for long-term management of the Dunes habitat be submitted to the Executive Director of the Coastal Commission by the City of Los Angeles.

The City completed *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* (HMP) in 1994. The HMP identifies eleven habitat management goals and objectives:

- Manage for self-sustainability
- Protect habitat for designated species
- Control invasive alien and pest species
- Respect physical systems
- Apply non-damaging management techniques
- Set and follow management priorities
- Maintain record of physical and biological change
- Exercise patience and flexibility in attempting to accomplish goals of full ecosystem restoration
- Encourage scientific research
- Ensure continuing public involvement

Los Angeles World Airports retained Sapphos Environmental in 1994 to assist airport personnel in the implementation of high priority management efforts identified in the HMP, including:

- Ongoing maintenance activities including weed removal, trash removal, and fence maintenance
- Monitoring of biological resources including qualitative and quantitative evaluation of plant communities, and plant and wildlife species

An annual estimate of butterfly population size is required to evaluate impact of management techniques and status of the species. Adult ESB spend over 90% of their time on flowerheads of coast buckwheat, moving less than 10% of the time when traveling to a nearby flowerhead (Mattoni 1990). Mattoni (1990) has observed that due to this singular behavior, the transect count method of monitoring may be more accurate than the traditional mark-release-recapture (MRR) technique used for the same purpose. In the transect count method, visual scoring of individuals is realized over a transect walk maintaining a constant gait over the transect and recording those insects within an imaginary box about 5 meters square projected ahead of the observer (Mattoni 1990). This monitoring method was established at the Dunes by Mattoni in 1984 and modified in 1986 to be more comprehensive (Mattoni 1990). Sapphos Environmental employed the transect count method in 1995 and 1996.

Sapphos Environmental intends to continue the use of the transect count method to monitor the modified transects established by Mattoni in 1986. Sapphos Environmental has retained the services of Dr. Richard Arnold to serve as lead scientist on survey. Four transect walks, at one week intervals, will be conducted by Dr. Arnold during the height of the 1997 ESB flight season along the historical transect route. The transect route takes 4 to 5 hours to complete. The transect route sampled since 1984 was laid out (Mattoni 1990) to traverse areas that at that time (1984) had large clumps of coast buckwheat and therefore habitat for the ESB. Although the route has remained basically the same each year, the number of days of sampling has varied over the years. On average, the transects have been conducted approximately a week apart; some years they began earlier and stopped later than in other years. Conducting transects at one week intervals reduces the likelihood of counting the same butterfly twice, but does not preclude it. These two caveats must be kept in mind when comparing the total butterflies counted each year. Collected data will be analyzed an compared to results of previous years to assess population trends at the Dunes. The 1986 transects are an important tool in documenting reproductive success of the El Segundo blue butterfly in an area where coast buckwheat is reaching senescence. The collected data will also be made available to the Federal Aviation Administration to be used during coordination with the U.S. Fish and Wildlife Service in support of the joint environmental impact report and environmental impact statement currently under preparation for the Los Angeles International Airport 2015 Master Plan expansion project.

Sapphos Environmental has not observed and mortality of El Segundo blue butterfly as a result of the transect count method undertaken in 1995 and 1996. Should incidental mortality occur as a result of 1997 field efforts, Sapphos Environmental is prepared to notify the U.S. Fish and Wildlife Service and transfer such incidental specimens in accordance with their instructions.

ATTACHMENT 3
Map of Survey Area

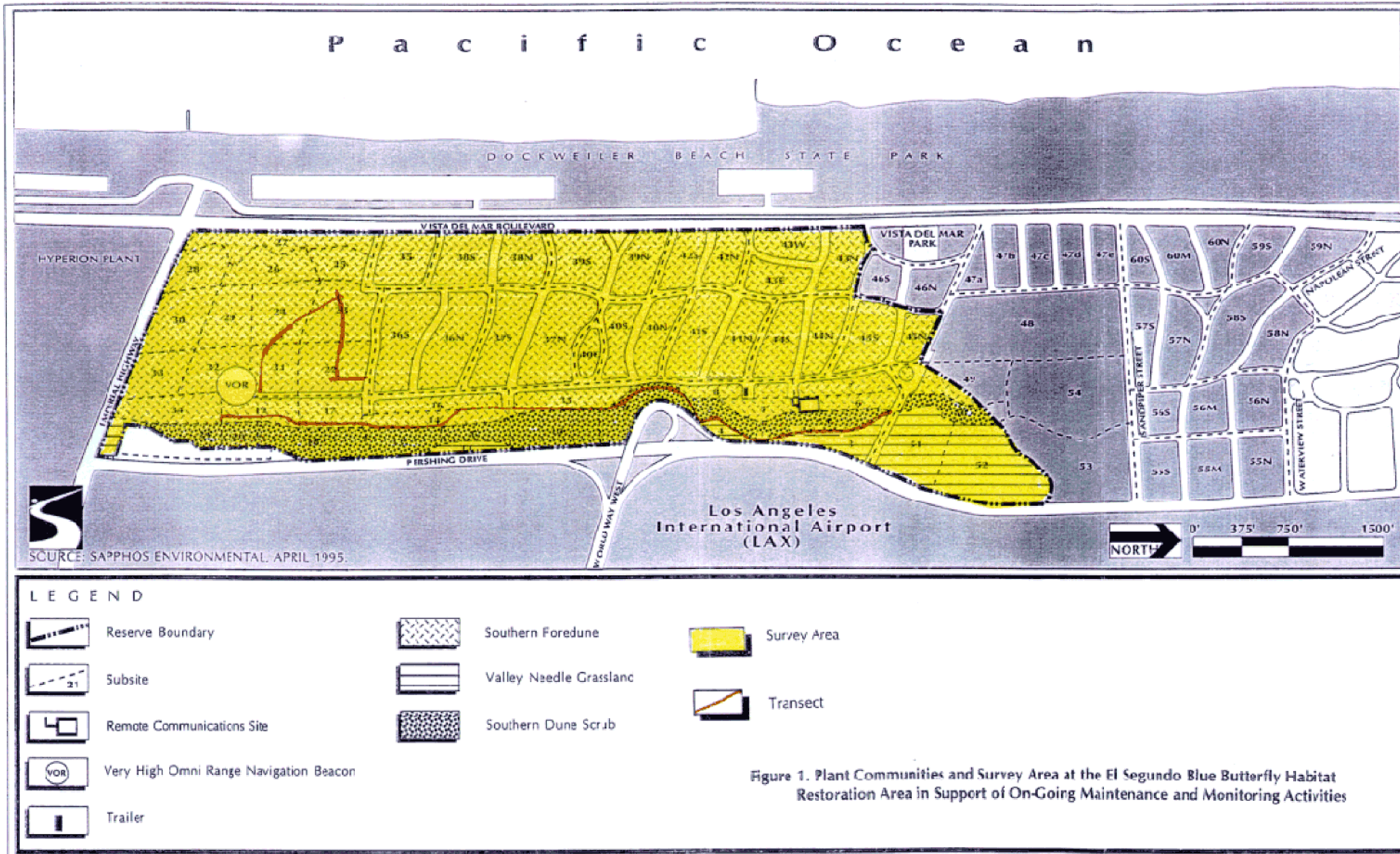


Figure 1. Plant Communities and Survey Area at the El Segundo Blue Butterfly Habitat Restoration Area in Support of On-Going Maintenance and Monitoring Activities

ATTACHMENT 4

Sapphos Environmental Cost Estimate for 1996/1997 Monitoring at the Los Angeles Airport/El Segundo Dunes and City of Los Angeles, DOA Authorization for Expenditure

SAPPHOS ENVIRONMENTAL
environmental compliance
resource management planning

May 31, 1996

Mr. Steve Crowther
City of Los Angeles
Department of Airports
Bureau of Environmental Management
1 World Way, Room 219
Los Angeles, CA 90045

SUBJECT: **Cost Estimate for 1996/1997 Monitoring at the Los Angeles Airport El Segundo Dunes**

Dear Mr. Crowther:

Sapphos Environmental appreciates the opportunity to submit this Cost Estimate for 1996/1997 Monitoring at the Los Angeles Airport El Segundo Dunes and to continue to serve the city of Los Angeles Department of Airports (Department) by providing environmental monitoring services and advice on Dunes-related matters.

Since January 1995 a great deal of progress has been made at the Dunes, and we look forward to continuing these maintenance and monitoring efforts during 1996/1997. Sapphos Environmental estimates that the real cost for 1996/1997 Monitoring at the Dunes is approximately $80,000.00. Since budget for monitoring efforts at the Dunes is currently set at $50,000.00, our Cost Estimate has been prepared to comply with that level of funding. Sapphos Environmental strongly encourages the Department to seek out additional funding sources for monitoring efforts at the Dunes in the years to come.

We look forward to continuing to work with the Department to attain the goals and objectives specified in the *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes*. Should you have any comments or questions regarding the enclosed Cost Estimate, please feel free to contact me at (818) 683-3547.

Respectfully submitted,

SAPPHOS ENVIRONMENTAL

Marie Campbell
Principal

Enclosure: Standard Schedule of Fees and Estimated Cost

1043-004.I01

50 S. DeLacey, Suite 210 • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 818/683-3547 Fax 818/683-3548

ENCLOSURE 1
STANDARD SCHEDULE OF FEES
AND ESTIMATED COST

HOURLY LABOR RATES

Principal	60	hrs @ $75.00/hour	$	4,500.00
Project Manager	120	hrs @ $55.00/hour	$	6,600.00
Botanist II	604	hrs @ $35.00/hour	$	21,140.00
Senior Wildlife Ecologist	50	hrs @ $100.00/hour	$	5,000.00
Wildlife Biologist II	140	hrs @ $40.00/hour	$	5,600.00
Wordprocessing	40	hrs @ $30.00/hour	$	1,200.00
Graphics	20	hrs @ $30.00/hour	$	600.00

Estimated Labor Cost $ 44,640.00

DIRECT EXPENSES

Direct expenses typically run approximately 12% of labor costs.

1. Out-of-pocket expenses (such as, but not limited to, travel, telephone, messenger service, lodging, meals, blueprint, reproduction, photographic services): cost, as charged to Sapphos Environmental.
2. Subcontractors fees: as quoted.
3. Passenger car mileage: $0.30 per mile.
4. Four-wheel drive vehicles: $0.70 per mile.
5. Photocopy: $0.10 per page (8.5" x 11" or 8.5" x 14") or $0.25 per page (oversize)
6. Facsimile: $1.00 per page. Charge does not apply to materials received via facsimile from client.

Estimated Direct Cost $ 5,350.00

TOTAL COST NOT TO EXCEED: $ 49,990.00

...ION:
...AL — CONTROLLER (GOLDEN ROD)
...ICATE — VENDOR (WHITE)
...PLICATE — DEPARTMENT (PINK)
QUADRUPLICATE — DEPARTMENT (WHITE)

CITY OF LOS ANGELES
AUTHORITY FOR EXPENDITU...E

AIG

Dept. AIRPORTS

TRANS. CODE	DEPT. NO.	DOCUMENT NO. TYPE	F.Y.	AUTHORITY NO.	DOC. DATE M M D D Y Y	ACCT'G. PERIOD P P Y Y	BUDGET F.Y. Y Y
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ACTION	TYPE OF ORDER	VENDOR NO.	SS OR IRS ID NO.	COMMENTS OR STRC NO.	DOCUMENT TOTAL
☒ ORIG. ENTRY (E) ☐ ADJUSTMENT (M)	A	SAP490000		128573-80	49990.00

TO: (NAME AND ADDRESS)
Sapphos Environmental
50 South DeLacey, Suite 210
Pasadena, CA 91105
(818) 683-3547

PLEASE FURNISH TO THE CITY OF LOS ANGELES, CARE OF (GIVE ADDRESS)
Department of Airports
Environmental Management Bureau
P.O. Box [illegible]
Los Ang[illegible]

LINE NO. 01 | FUND | DEPT. | APPR. ACCT. | OB[illegible] | [illegible]CRIPTION | I/O
QUANTITY | U/O | U/O/M | [illegible] | PROGRAM | SUB [illegible] | TASK | ST/EN | CHANGE ORDER | REPT'G. CAT.

02

FOR: Los Angeles/[illegible] for fis[illegible] 1996/97 not to exceed $49,990.00. Se[illegible]

REV 0.4111.0[illegible] Last AF[illegible] dated[illegible]

[illegible]TED AUTH. TOTAL 49990.00

TO THE OFFICE OF THE CONTROLLER:
CONTRACT OR OFFER NO. (STRIKE OUT ONE)

PURSUANT TO PROVISIONS OF THE CITY CHARTER AND TO THE ANNUAL DEPARTMENTAL BUDGET APPROPRIATIONS OR OF APPROPRIATIONS MADE SUBSEQUENT TO THE BUDGET, THIS IS AUTHORITY TO ISSUE A DEMAND ON THE FUND AND DEPARTMENT DESCRIBED ABOVE.

BUREAU OR DIVISION HEAD	DATE	HEAD OF DEPARTMENT	DATE
[signature] OK pb	7-1-96	[signature]	8-2-96
ACCOUNTING	**DATE**	**CITY ATTORNEY APPROVAL OF AFE OVER $500**	**DATE**
		[signature]	7/31/96

READ THIS CAREFULLY: THIS A.F.E. MUST BE APPROVED FOR FUNDS BY THE CITY CONTROLLER BEFORE SERVICE IS RENDERED. THIS FORM SHALL NOT BE USED FOR THE PURCHASE OF MATERIALS, SUPPLIES OR RENTAL OF EQUIPMENT. INVOICES IN DUPLICATE MUST BE FORWARDED TO THE DEPARTMENT TO WHICH SERVICES WERE RENDERED.

(1) DOCUMENT NUMBER, NAME AND ADDRESS OF DEPARTMENT MUST APPEAR ON ALL INVOICES.

(2) IN CASE OF A DELAY IN PAYMENT OF INVOICE BEYOND 30 DAYS FOLLOWING THE DATE OF INVOICE, PLEASE NOTIFY THE CONTROLLER IN WRITING GIVING REFERENCE TO A.F.E. NUMBER, AND STATE TO WHAT DEPARTMENT SERVICE WAS RENDERED.

CONTROLLER'S APPROVAL

3.1 1067-004

PRELIMINARY REPORT OF EL SEGUNDO BLUE MONITORING ACTIVITIES AT THE LOS ANGELES INTERNATIONAL AIRPORT IN JULY AND AUGUST 1997

Conducted under USFWS subpermit FWSCFO-11

Prepared for:
U.S. Fish and Wildlife Service
Carlsbad Field Office
2730 Loker Ave. West
Carlsbad, CA 92008

and

Irena Mendez, Ph.D.
Sapphos Environmental
50 So. DeLacey
Suite 210
Pasadena, CA 91105

Prepared by:
Richard A. Arnold, Ph.D.
Entomological Consulting Services, Ltd.
104 Mountain View Court
Pleasant Hill, CA 94523

November 24, 1997

INTRODUCTION

This report summarizes the preliminary findings of monitoring activities for the endangered El Segundo Blue (ESB) butterfly (*Euphilotes bernardino allyni*) that occurred in July and August, 1997, at the Los Angeles International Airport (LAX). All activities described in this report were conducted under the auspices of recovery subpermit FWSCFO-11, issued to the Carlsbad Field Office of the U.S. Fish & Wildlife Service. The Carlsbad Field Office added Drs. Richard A. Arnold and A. Oakley Shields to this subpermit to assist Sapphos Environmental with monitoring activities for the ESB at LAX in 1997. Dr. Arnold was added to the subpermit on July 17th and Dr. Shields was added on July 21st, 1997. It is anticipated that a more complete report of findings will be prepared once LAX budgets for and authorizes this task.

The following monitoring activities were performed at the LAX dunes:

a) counts of El Segundo Blue adults along the historical transect route;

b) block counts of El Segundo Blue adults throughout the preserve area;

c) surveys of the dunes located north of Sandpiper Street; and

d) surveys undeveloped portions of the airport property located east of Pershing.

The remainder of this report describes the monitoring methods and findings. All observations of the ESB were performed by Dr. Richard A. Arnold or Dr. A. Oakley Shields.

METHODS

Historical Transect.

Dr. Rudi Mattoni previously established a transect route for monitoring the El Segundo Blue butterfly at the airport. This same transect route was walked on four days (July 24th, August 2nd, 7th, and 16th) during the latter portion of the butterfly's flight season in 1997. The transect route meanders through a portion of the foredunes that lie immediately west of the VOR facility, and along the backdunes of the preserve area. It traverses areas where the ESB's foodplant, *Eriogonum parvifolium*, was abundant and thriving in prior years, some hillside areas where natural regeneration has occurred, areas where non-natives have been removed, and one portion of the dune preserve where restoration activities have occurred.

Prior to the 1996 monitoring, the beginning, ending, and numerous intermediate points along the historical transect route were marked by stakes with unique identifying numbers or letters.

The locations of all stakes were mapped on aerial photographs. The portion of the transect between two consecutive stakes is an interval. As an observer walks the transect, from beginning to end, and tallies the numbers of adult ESBs that are observed along the route within approximately 10-15 feet on either side of the observer. Tallies were recorded as males or females when diagnostic characteristics could be observed, and undetermined sex when sexual characteristics could not be observed. No ESBs are captured or otherwise handled. The locations of observed adults are noted by the transect interval between consecutive stake locations. Hand held weather instruments were used to measure air temperature and wind speed. Dr. Richard A. Arnold conducted all transect walks during 1997.

Block Counts.

Prior to 1996, *Eriogonum parvifolium*, the ESB's foodplant at LAX, was planted in many portions of the southern, approximately 200 acres. In order to assess the distribution and abundance of the ESB throughout the entire preserve area, blocks counts were begun during the butterfly's 1996 flight season and were repeated in 1997.

Each block is delineated by the streets that remain from the former residential neighborhood. Every block and sub-block at the LAX dunes has a unique identification number. In addition, during the 1996 monitoring activities, the location of every buckwheat plant within each block was mapped on aerial photographs.

During the block count, an observer systematically surveys all portions of a particular block and visits every buckwheat plant only once, looking for ESB adults. As adults are observed, their numbers are tallied and their locations are mapped on an aerial photograph. Tallies were recorded as males or females when diagnostic characteristics could be observed. Tallies were recorded as undetermined sex (undet. sex on the attached tables) when sexual characteristics could not be readily observed, or in a few cases, when butterflies were so abundant at a single plant that individuals could not be tracked to reliably sex all individuals. No ESBs are captured or otherwise handled. By repeating this procedure, all blocks within the preserve can be visited in approximately five days.

Hand held weather instruments were used to measure air temperature and wind speed. Dr. Richard A. Arnold and Dr. A. Oakley Shields conducted the block counts between July 22nd and 26th, 1997.

Surveys North of Sandpiper Street.

Surveys for *Eriogonum parvifolium* and the El Segundo Blue butterfly were conducted in the blocks north of Sandpiper Street. These surveys were conducted during the week of July 23rd, 1997.

All portions of each block within the north of Sandpiper area was systematically surveyed by walking by Dr. Richard A. Arnold and Dr. A. Oakley Shields to determine the distribution of the butterfly and its foodplant.

Surveys East of Pershing.
Surveys for *Eriogonum parvifolium* were conducted in the undeveloped portions of LAX that lie east of Pershing Ave. Areas immediately west of the north and south runways, plus undeveloped areas located north and south of the runways, were surveyed. Initially a windshield survey was conducted while driving existing service roads. This was followed up by walking surveys throughout these areas. This survey was performed by Dr. Richard A. Arnold on August 16th, 1997.

RESULTS AND DISCUSSION

The El Segundo Blue's adult flight season at LAX in 1997 may have began somewhat earlier than normal and peaked before the subpermits from the U.S. Fish & Wildlife Service were issued. Since no monitoring activities were authorized until the subpermits were issued, we have little information on the ESB to report for the first half of its 1997 flight season. Dr. Irena Mendez the first adult ESB was observed at LAX near the trailer on June 14th. A probable cause of the early flight season and peak was the early winter rains, followed by a dry and warm period during the latter half of the usual rainy season, which resulted in earlier than normal flowering periods for many plants, including *Eriogonum parvifolium*. In the Monterey area, the related Smith's Blue butterfly, *Euphilotes enoptes smithi*, which also feeds on *Eriogonum parvifolium*, experienced an earlier than normal flight season and peak during 1997 (Arnold, personal observation).

Historical Transect.
A total of only 126 adult ESBs were observed on the four survey dates in 1997. This total is substantially less than the daily totals for several walks of the same transect route during the ESB's 1996 flight season. The following table summarizes the observations by survey date. A complete set of field notes from each survey date are attached to this report. Tallies of the numbers of observed butterfly are presented for every transect interval and survey date.

Historical Transect Count Summaries by Survey Date

Date	Males	Females	Total
vii-24	29	15	44
viii-2	13	35	48
viii-7	3	21	24
viii-16	2	8	10
Totals	47	79	126

Unfortunately, LAX has not yet authorized Sapphos Environmental and Entomological Consulting Services, Ltd. to complete a thorough analysis of the 1996 and 1997 ESB monitoring data. Even without the benefit of a complete data analysis, fewer ESB adults were observed along the historical transect route during 1997 compared to 1996. Although these numbers might initially suggest that a decline in ESB population numbers occurred between 1996 and 1997, I doubt that such a decline has actually occurred for the following reasons. ESB population data from transect counts from previous years at LAX and from other locations usually reveals that males are more frequently observed than females, especially in the beginning and middle portions of the flight season. Females may become more abundant than males in the latter portion of the ESB's flight season. Thus, the preponderance of females observed in 1997 on three of the four transect survey dates indicates that the ESB's flight season was at or already past its peak by the time the subpermits were issued by the U.S. Fish & Wildlife Service. Thus, a more plausible explanation for the apparent "decline" is that the population numbers were fewer since the surveys began later in the butterfly's flight season.

Also, weather conditions at LAX during the late-July through mid-August survey period were quite foggy, which may have limited activity of the ESB. Since the ESB is cold-blooded, it requires solar radiation to warm up and be active. If the butterfly cannot be active, then it is more difficult to detect during the transect surveys. The combination of surveys starting later in the butterfly's flight season and poor weather conditions probably explains why fewer butterflies were observed compared to 1996.

Block Counts.
A total of 723 adult ESBs were observed during the block counts, including 380 males, 259 females, and 84 individuals of undetermined sex. Each block, as illustrated on the attached map of the LAX dunes, was visited only once during the week of July 21st.

The attached tables present the tallies for each block. The tallies ranged from zero individuals in a number of blocks to 83 individuals observed in block #42 South (S in table). Since weather conditions (fog, drizzle, wind speed, and temperature) for ESB activity were marginal for portions or all of some survey days, the numbers of butterflies tallied is probably less than what could have been observed if better weather conditions had occurred during the survey period. Ideally, it would have been useful to repeat the block count under better weather conditions and at the peak of the butterfly's flight season. However, since the population was probably past its peak when the block count began, we decided to not repeat the count during the ESB's 1997 flight season.

Surveys North of Sandpiper Street.

No individuals of *Eriogonum parvifolium* were observed in the blocks north of Sandpiper Street. Similarly, no ESBs were observed here during our surveys. Since the butterfly's foodplant does not currently grow in these blocks, the ESB would not be expected to occur here.

Surveys East of Pershing.

No individuals of *Eriogonum parvifolium* were observed in the undeveloped portions of LAX that lie East of Pershing. Since the butterfly's foodplant does not currently grow in these areas, the ESB would not be expected to occur here.

El Segundo Blue at LAX: 1997 Historical Transect Data

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
				start @ 0952; foredunes W of VOR - overcast with partial clearing, humid, 20.5°C; slight intermittent breeze
#1	–	–	–	Eriog. dead
#2	–	–	–	ca. 6 fls.
#3	–	–	–	ca. 30 fls. with 1/3 past flowering peak
#4	–	–	–	ca. 15 fls., mostly past A. mormo - fly
#5	–	–	–	Eriog. dead
#6	–	–	–	Eriog. dead
#7	–	–	–	Eriog. dead
#8	–	–	–	Eriog. dead
#9	–	–	–	Eriog. senescing, with ca. 30 fls. mostly past flowering pea
#10	–	–	–	ca. 20 fls., mostly past
#11	–	–	–	
#12	–	–	–	
#13	–	–	–	
#14	–	–	–	
#15	–	–	–	ca. 35 fls., all past
#16	–	–	–	Eriog. dead
#17	–	–	–	no fls., largely senescent
#18	–	–	–	only 1 fl., largely senescent
#19	–	–	–	ca. 30 fls., mostly past
#20	–	–	–	gone
#21	–	–	–	no fls., senescent
#22	–	–	–	ca. 100 fls., mostly at peak or past; A. mormo
#23	–	–	–	ca. 50-60 fls., mostly past
#24	–	–	–	dead
#25	–	–	–	ca. 25 fls., largely senescent
#26	–	–	–	no fls. in bloom, a few in bud; early senescent
#27	–	–	–	ca. 10 fls., mostly past; early senescent
#28	–	–	–	no fls., nearly dead
#29	–	–	–	ca. 20 fls., mostly past; early senescent
#30	–	–	–	2 plants with ca. 300 fls., ca. 20% past
				end @ 1020

ESB AT LAX: 1997 HISTORICAL TRANSECT DATA
R.A. ARNOLD – OBSERVER

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
M				Start @ 1030 top of [illegible] dune, E of VOR
#1	–	–	–	A. [illegible] fly; still overcast with light intermittent breeze; 21°C
#2	–	–	–	
#3	–	–	–	
#4	–	1	–	perched
#5	2	1	–	all flying
#6	–	–	–	Erioq. dead
#7	–	–	–	
#8	–	–	–	no fls.
#9	–	–	–	
#10	–	–	–	2 plants, ca. 10 fls., mostly past
#11	–	–	–	ca. 15 fls. mostly past
#12	–	–	–	3 plants, ca. 35 fls. mostly past
#13	–	–	–	ca. 200 fls., ca. 50% past
#14	–	–	–	
#15	–	–	–	ca. 400 fls., mostly past
#16	–	–	–	very few fls.
#17	–	–	–	ca. 400 fls., mostly past
#18	–	–	–	few fls.
#19	–	–	–	gone
N	–	–	–	
#20	–	–	–	ca. 150 fls., ca. 50% past
O	–	–	–	
P	–	–	–	
#21	–	–	–	2 plants (1 dead), ca. 60 fls. mostly past
#22	–	–	–	2 plants (1 dead), ca. 40 fls. mostly past
#23	–	–	–	
#24	–	–	–	ca. 25 fls., mostly past
#25	–	–	–	Erioq. dead
#26	–	–	–	ca. 30 fls., ca. 1/3 past
Q	–	–	–	
R	–	–	–	
S	–	–	–	
T	–	–	–	
U	–	–	–	@ 1108
V+W	–	–	–	
X	–	–	–	
[illegible]				[illegible] @ 1112

ESB AT LAX: 1997 HISTORICAL TRANSECT DATA
OBSERVER – R.A. ARNOLD

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
AA	–	–	–	Start about toe of slope leg @ 1115
#16	–	–	–	fls. ca. 40% past
#17	–	–	–	very few fls.
#18	–	–	–	fls. ca. 25% past; A. [illegible] active
#19	–	–	–	full fl. (i.e., peak)
#20	–	–	–	no fls.
#21	–	–	–	Erioq. dead
#22	–	–	–	peak fl.
#23	–	–	–	peak fl., ca. 25 fls., 22°C @ 1123
#24	1	1	–	flying around fls.
#25	–	–	–	ca. 25% past
#26	–	1	–	ca. 25% past
#27	–	–	–	ca. 35% past
#28	–	–	–	ca. 50% past
#29	–	–	–	ca. 50% past
#30	–		–	ca. 25% past; ♂ P. [illegible]
				end @ 1130
				return to main transect @ 1135
BB	6	1	–	ca. 50% past
CC	–	–	–	
DD	2	1	–	
EE	–	–	–	
FF	5	1	–	
GG	5	2	–	
HH	3	–	–	
II	–	–	–	
JJ	–	–	–	
KK	–	–	–	
LL	–	–	–	
MM	–	–	–	
#15	–	–	–	ca. 25% past
#14	–	–	–	
#13	–	–	–	
#12	–	–	–	
#11	–	2	–	ca. 25% past
#10	–	–	–	
#9	1	1	–	

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	
#5	—	—	—	Eriog. dead
#4	—	—	—	senescent
#3	—	1	—	
#2	—	—	—	
#1	—	—	—	
NN	—	—	—	
OO	1	1	—	
PP	2	—	—	fly around Eriog. fls.; P. acmon + S. melinus
#28	—	—	—	
#27	—	1	—	
QQ	—	—	—	
#26	—	—	—	
#25	—	—	—	
#24	—	—	—	
#23	—	—	—	
#22	—	—	—	Eriog. dead
#21	—	—	—	
#20	—	—	—	2 plants, 1-100% past & 1-peak fl.
#19	—	—	—	
#18	—	—	—	
#17	—	—	—	
#16	—	—	—	
#15	—	—	—	
#14	—	—	—	Eriog. dead
#13	—	—	—	largely past } 75-80%
#12	—	—	—	largely past }
#11	1	—	—	
#10	—	—	—	
#9	—	—	—	
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	peak fl.
#5	—	—	—	ca. 50% past
#4	—	—		
#3	—	—	—	[illegible]

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PLANT OR STAKE NO.	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
				start @ 1118; foredunes W of VOR; 22.5°C, sunny, wind <5mph
#1	—	—	—	
#2	—	—	—	
#3	—	—	—	
#4	—	—	—	
#5	—	—	—	
#6	—	—	—	
#7	—	—	—	
#8	—	—	—	
#9	—	—	—	
#10	—	—	—	
#11	—			A. mormo
#12	—	—	—	
#13	—	—	—	
#14	—	—	—	
#15	—	—	—	S. melinus
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
#20	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	—	—	
#24	—	—	—	
#25	—	—	—	S. melinus
#26	—	—	—	
#27	—	—	—	
#28	—	—	—	
#29	—	—	—	
#30	—	—	—	finished @ 1151

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PLANT OR STAKE NO.	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
M	–	–	–	start @ 1157 Top of backdune, E of VOR
#1	–	–	–	P. acmon
#2	1	–	–	
#3	–	–	–	A. mormo
#4	–	1	–	
#5	–	–	–	
#6	–	–	–	
#7	–	–	–	
#8	–	–	–	
#9	–	–	–	S. melinus
#10	–	–	–	A. mormo
#11	–	–	–	
#12	–	–	–	A. mormo
#13	–	–	–	A. mormo
#14	–	1	–	
#15	–	–	–	
#16	–	–	–	
#17	–	–	–	
#18	–	–	–	
#19	–	–	–	
N	–	–	–	
#20	–	–	–	
O	–	–	–	A. mormo
#21	–	–	–	
#22	–	–	–	
#23	–	–	–	
#24	–	–	–	
#25	–	–	–	
#26	–	–	–	
P	–	–	–	
Q	–	–	–	
R	–	–	–	
S	–	–	–	
T	–	–	–	
U	–	–	–	
V	–	–	–	
W	–	–	–	
X	–	–	–	

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PLANT OR STAKE NO.	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
AA	–	–	–	lower slope along Riesling
#16	–	–	–	A. mormo
#17	–	–	–	
#18	–	–	–	
#19	–	1	–	A. mormo, S. melinus
#20	–	–	–	
#21	–	–	–	no fls.
#22	–	–	–	
#23	1	2	–	
#24	–	1	–	
#25	1	3	–	
#26	–	–	–	
#27	–	–	–	
#28	–	–	–	
#29	–	–	–	
#30	–	–	–	finish @ 1231; 24°C @ 1242
				return to main transect @ 1244
BB	–	4	–	
CC	–	–	–	P. acmon, A. mormo
DD	–	–	–	A. mormo
EE	–	–	–	A. mormo
FF	–	–	–	S. melinus
GG	–	–	–	A. mormo
HH	–	–	–	A. mormo, S. melinus
II	–	1	–	P. acmon
JJ	–	–	–	
KK	–	–	–	A. mormo
LL	–	1	–	P. acmon & A. mormo
MM	–	3	–	
#15	–	–	–	
#14	–	–	–	
#13	–	–	–	
#12	–	–	–	
#11	–	–	–	
#10	–	–	–	
#9	–	–	–	

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PLANT OR STAKE NO.	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	
#5	—	—	—	
#4	—	—	—	
#3	—	—	—	
#2	—	—	—	
#1	—	—	—	
NN	—	2	—	A. mormo & P. acmon
OO	2	5	—	
PP	5	7	—	1 mating pair @ 1323
#28	1	1	—	
#27	—	—	—	
QQ	—	—	—	
#26	2	—	—	
#25	—	—	—	
#24	—	—	—	
#23	—	—	—	
#22	—	—	—	
#21	—	—	—	
#20	—	—	—	
#19	—	—	—	
#18	—	1	—	
#17	—	—	—	
#16	—	—	—	
#15	—	—	—	P. acmon
#14	—	—	—	
#13	—	—	—	
#12	—	—	—	
#11	—	1	—	
#10	—	—	—	
#9	—	—	—	
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	
#5	—	—	—	
#4	—	—	—	
#3 [illegible]	—	—	—	[illegible] @ 1334 [illegible]

ESB at LAX: 1997 HISTORICAL TRANSECT DATA
OBSERVER - R.A. ARNOLD

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
				start @ 0940; fore dunes W of VOR; 24°C, sunny & clear; very light, intermittent breeze < 3 mph
#1	—	—	—	
#2	—	—	—	
#3	—	—	—	
#4	—	—	—	
#5	—	—	—	
#6	—	—	—	
#7	—	—	—	
#8	—	—	—	
#9	—	—	—	
#10	—	—	—	
#11	—	—	—	
#12	—	—	—	
#13	—	—	—	
#14	—	—	—	
#15	—	—	—	
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
#20	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	—	—	
#24	—	—	—	
#25	—	—	—	
#26	—	—	—	
#27	—	—	—	
#28	—	—	—	
#29	—	—	—	
#30	—	—	—	A. mormo; finish @ 0957

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
M	—	—	—	start @ 1002 top of back dune, E of VOR
#1	—	—	—	
#2	—	—	—	
#3	—	—	—	
#4	—	—	—	
#5	—	—	—	
#6	—	—	—	
#7	—	I	—	
#8	—	—	—	
#9	—	—	—	
#10	—	—	—	
#11	—	—	—	
#12	—	—	—	
#13	—	—	—	
#14	—	—	—	
#15	—	—	—	
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
N	—	—	—	
#20	—	—	—	
O	—	—	—	
P	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	—	—	
#24	—	—	—	
#25	—	—	—	
#26	—	—	—	
Q	—	—	—	
R	—	—	—	A. mormo
S	—	—	—	
T	—	—	—	
U	—	—	—	
V+W	—	—	—	
X	—	—	—	
[illegible]			—	[illegible]

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
AA	—	—	—	start toe of slope beg @ 1034
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	I	II	—	
#20	—	—	—	
#21	—	—	—	
#22	—	I	—	
#23	—	I	—	
#24	—	I	—	
#25	—	—	—	
#26	—	I	—	
#27	—	—	—	
#28	—	—	—	
#29	—	—	—	
#30	—	—	—	end @ 1051 ; 28°C
				return to main transect
BB	I	—	—	S. melinus, P. acmon, A. mormo
CC	—	—	—	
DD	—	I	—	
EE	—	—	—	
FF	—	—	—	
GG	—	I	—	
HH	—	—	—	
II	—	—	—	
JJ	—	—	—	
KK	—	—	—	
LL	—	—	—	
MM	—	—	—	
#15	—	—	—	
#14	—	—	—	
#13	—	—	—	
#12	—	—	—	
#11	—	I	—	
#10	—	—	—	
#9	—	I	—	

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
#8	—	—	—	
#7	—	—	—	
#6	—	1	—	
#5	—	—	—	
#4	—	—	—	
#3	—	—	—	
#2	—	—	—	
#1	—	—	—	
NM	—	—	—	
00	—	1	—	
PP	—	3	—	
#28	—	1	—	
#27	—	1	—	
QQ	—	1	—	
#26	—	—	—	
#25	—	—	—	
#24	—	—	—	
#23	—	—	—	
#22	—	—	—	
#21	—	—	—	
#20	—	—	—	
#19	—	—	—	
#18	—	—	—	
#17	—	—	—	
#16	—	—	—	
#15	—	—	—	
#14	—	—	—	
#13	—	—	—	
#12	—	—	—	
#11	—	—	—	
#10	—	—	—	
#9	—	—	—	
#8	—	—	—	
#7	1	1	—	
#6	—	—	—	
#5	—	—	—	
#4	—	—	—	
#3	—	—	—	

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p. 1

PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
				Start @ 1350; foredunes W of VOR; 22°C mostly cloudy, slight breeze <5 mph
#1	—	—	—	
#2	—	—	—	
#3	—	—	—	
#4	—	—	—	
#5	—	—	—	
#6	—	—	—	
#7	—	—	—	
#8	—	—	—	
#9	—	—	—	
#10	—	—	—	
#11	—	—	—	
#12	—	—	—	
#13	—	—	—	
#14	—	—	—	
#15	—	—	—	
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
#20	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	—	—	
#24	—	—	—	
#25	—	—	—	
#26	—	—	—	
#27	—	—	—	
#28	—	—	—	
#29	—	—	—	
#30	—	—	—	A. mormo, A. nelsoni, P. acmon

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
M	—	—	—	top of back dune, E of VOR
#1	—	—	—	
#2	—	—	—	
#3	—	—	—	
#4	—	—	—	
#5	—	—	—	
#6	—	—	—	
#7	—	—	—	
#8	—	—	—	
#9	—	—	—	
#10	—	—	—	
#11	—	—	—	
#12	—	—	—	
#13	—	—	—	
#14	—	—	—	
#15	—	—	—	
#16	—	—	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
N	—	—	—	A. mormo, S. melinus, P. acmon
#20	—	—	—	
O	—	—	—	
P	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	—	—	
#24	—	—	—	
#25	—	—	—	
#26	—	—	—	
Q	—	—	—	
R	—	—	—	
S	—	—	—	
T	—	—	—	
U	—	—	—	
V+W	—	—	—	
X	—	—	—	
Y+Z	—	—	—	

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PLANT OR STAKE ID	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	NOTES
AA	—	—	—	
#16	—	1	—	
#17	—	—	—	
#18	—	—	—	
#19	—	—	—	
#20	—	—	—	
#21	—	—	—	
#22	—	—	—	
#23	—	1	—	
#24	—	1	—	
#25	—	—	—	
#26	—	1	—	
#27	—	—	—	
#28	—	—	—	
#29	—	—	—	
#30	—	—	—	
BB	—	—	—	
CC	—	—	—	
DD	—	—	—	
EE	—	—	—	
FF	—	1	—	
GG	1	—	—	
HH	—	—	—	
II	1	—	—	
JJ	—	—	—	
KK	—	—	—	
LL	—	—	—	
MM	—	—	—	
#15		—	—	
#14	—	—	—	
#13	—	—	—	
#12	—	—	—	
#11	—	—	—	
#10	—	—	—	
#9	—	—	—	

ESB AT LAX: 1997 HISTORICAL TRANSECT DATA
R.A. ARNOLD - OBSERVER

VIII-16-97 p.4

PLANT OR STAKE ID	OBSERVED ESB ADULT ♂	♀	UNDET. SEX	NOTES
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	
#5	—	—	—	
#4	—	—	—	
#3	—	—	—	
#2	—	—	—	
#1	—	—	—	
NN	—	—	—	
OO	—	—	—	A. momo, P. acmon
PP	—	—	—	
#28	—	2	—	
#27	—	—	—	
QQ	—	—	—	B. exilis
#26	—	—	—	
#25	—	—	—	
#24	—	—	—	
#23	—	—	—	L. marina, P. acmon
#22	—		—	
#21	—	—	—	A. melinus, A. momo
#20	—	—	—	
#19	—	—	—	
#18	—	—	—	
#17	—	—	—	
#16	—	—	—	
#15	—	—	—	
#14	—	—	—	
#13	—	—	—	
#12	—	—	—	
#11	—	1	—	
#10	—	—	—	
#9	—	—	—	
#8	—	—	—	
#7	—	—	—	
#6	—	—	—	
#5	—	—	—	
#4	—	—	—	
#3	—	—	—	
[illegible]	—	—	—	[illegible] partly sunny light breeze <5mph

ESB at LAX: 1997 Adult Butterfly Monitoring
Counts at Block Subsites
OBSERVERS R.A. ARNOLD & A.O. SHIELDS p.1

Date: VII-23-97

BLOCK	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	Start Time	End Time	NOTES
43W	22	8	—	1044	1114	overcast and breezy; sunny @1106 A. momo, A. melinus active
43E	4	9	—	1116	1148	wind $\bar{x}$ = 11mph @ 1136
13	20	14	—	1305	1345	23°C @ 1300, partly cloudy
11	1	—	—	1348	1353	partly cloudy, slight breeze <5mph
12	10	42	1	1355	1427	23°C @ 1432

Date: VII-25-97

BLOCK	♂	♀	UNDET. SEX	Start Time	End Time	NOTES
40 S	2	3	—	0945	1011	1 ESB larva; buckwheats largely past 18°C @ 0954
40 N	16	10	—	1013	1051	19°C @ 1043
37 S	3	2	—	1058	1136	wind $\bar{x}$ = 4mph @ 1056; 20°C @ 1103
36 S	1	—	—	1141	1218	wind $\bar{x}$ = 5.5mph; L. marina; 1212 partial sun A. melinus
19	4	6	—	1227	1317	wind $\bar{x}$ = 5.7mph; 21.1°C @1316; partial sun
17	—	—	—	1340	1348	A. momo common
18	17	13	—	1351	1438	sunny
20	46	29	—	1439	1503	sunny
48 N	—	—	—			NO ERIOGONUM PARVIFOLIUM GROWS IN THESE BLOCK AREAS
47 A-E	—	—	—			
48 S	—	—	—			
49	—	—	—			
54	—	—	—			
53	—	—	—			

ESB at LAX: 1997 ADULT BUTTERFLY MONITORING
COUNTS AT BLOCK SITES — OBSERVERS - R.A. ARNOLD + A.O. SHIELDS — p. 2

BLOCK	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	START TIME	END TIME	NOTES
DATE:	VII-24-97					
49	—	—	—	1320	1333	
50	—	—	—	1336	1354	
51	—	—	—	1358	1414	
52	—	—	—	1420	1437	
55A	—	—	—			No Eriogonum parvifolium present
55B	—	—	—			
55C	—	—	—			
56A	—	—	—			
56B	—	—	—			
56C	—	—	—			
57 No.	—	—	—			
57 So.	—	—	—			
58 No.	—	—	—			
58 So.	—	—	—			
59 No.	—	—	—			
59 So.	—	—	—			
60A	—	—	—			
60B	—	—	—			
60C	—	—	—			

ESB AT LAX: 1997 ADULT BUTTERFLY MONITORING
COUNTS AT BLOCK SUBSITES — OBSERVERS - R.A. ARNOLD & A.O. SHIELDS — p. 3

BLOCK	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	START TIME	END TIME	NOTES
DATE:	VII-22-97					
42S	7	12	—	1018	1101	wind ~5 mph; overcast
39N	5	6	—	1105	1131	wind 5-6 mph
39S	2	1	—	1135	1158	
38S	3	3	—	1317	1343	wind 7.5 mph; 70°F
35	2	1	—	1345	1401	wind 8 mph; light sprinkles
38N	16	12	54	1419	1510	
DATE:	VII-23-97					
43N	23	9	—	1032	1106	22°C @ 1039; wind ~9 mph (max.)
42N	4	7	—	1113	1142	24°C @ 1113; wind ~8 mph
8	6	3	—	1249	1326	
5	2	1	—	1331	1347	partly cloudy
7	1	—	—	1356	1420	wind ~10 mph @ 1353
6	1	—	—	1420	1429	
DATE:	VII-24-97					
15	2	—	—	0917	0944	
16	—	—	—	0949	1001	
14	—	2	—	1008	1024	65°F @ 1028; sprinkles
44N	—	—	—	1048	1101	
44S	1	—	—	1105	1120	
45S	—	—	—	1123	1137	

ESB AT LAX: 1997 ADULT BUTTERFLY MONITORING
COUNTS AT BLOCK SUBSITES   OBSERVERS – R.A. ARNOLD & A.O. SHIELDS   p. 4

BLOCK	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	START TIME	END TIME	NOTES
DATE:	VII-24-97					
45N	–	–	–	1140	1149	wind 6-8 mph @ 1150; 64°F; misting
1	1	3	–	1313	1336	overcast; breezy; [illegible]
3	–	–	–	1337	1347	
DATE:	VII-25-97					
41N	–	–	–	0931	0945	wind 3 mph @ 0943
41S	2	1	–	0947	1011	
40C	5	3	1	1017	1030	wind 3-4 mph @ 1039
37N	10	6	–	1041	1112	
36N	2	8	–	1123	1159	68°F @ 1123; wind 5 mph
9	30	15	4	1316	1401	70°F @ 1316; wind 6 mph
10	11	4	3	1408	1440	partly sunny
1	24	21	6	1451	1512	76°F @ 1451, wind 9 mph, partly cloudy
2	10	5	10	1513	1526	
4	–	1	–	1527	1537	
DATE:	VII-26-97					
22	–	–	–	0931	0937	wind 5-7 mph; 66°F
23	–	–		0939	0948	
31	–	–	–	0949	0959	
24	–	–	–	1000	1006	
27	–		–	1007	1019	

ESB AT LAX: 1997 ADULT BUTTERFLY MONITORING
COUNTS AT BLOCK SUBSITES
OBSERVERS – R.A. ARNOLD & A.O. SHIELDS   p. 5

BLOCK	OBSERVED ESB ADULTS ♂	♀	UNDET. SEX	START TIME	END TIME	NOTES
DATE:	VII-26-97					
28	–	–	–	1019	1028	
26	–	–	–	1029	1044	
25	–	–	–	1044	1053	wind 4-6 mph @ 1055; 68°F
21	–	–	5	1115	1128	
	VII-26-97					
46N	–	–	–			
46S	–	–	–			
34	–	–	–			
32	–	–	–			
33	–	–	–			
29	–	–	–			
30	–	–	–			
TOTALS	380	259	84			

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File Section 2..

JN 1067003

December 11, 1996

MEMORANDUM FOR THE RECORD
JN 1067-003.M14

TO: Landrum& Brown
(Mr. Rich Macias)

FROM: Sapphos Environmental
(Mr. Pedro Campos)

SUBJECT: Results of 1996 Field Surveys for the El Segundo Blue (ESB) Butterfly at the El Segundo Dunes

This Memorandum for the Record transmits the 1996 El Segundo Blue Butterfly Survey Map which summarizes the results of directed surveys for the ESB butterfly completed by Sapphos Environmental over the 1996 summer quarter. The information displayed on the map is point data information derived directly from field notes and field mapping undertaken by the Sapphos Environmental staff. The objective of this map is to accurately represent the locations where the ESB butterfly was sighted on the El Segundo Dunes parcel during 1996 survey efforts. This work is pursuant to the Habitat Quality Assessment (HQA) for the El Segundo Dunes currently undertaken by Sapphos Environmental, as part of the biological resources input to the Los Angeles International Airport Master Plan.

In order to further assist Landrum&Brown in developing and evaluating alternatives for the Los Angeles International Airport Master Plan, Sapphos Environmental has synthesized the field information into a subsite by subsite approach. Table 1 of this enclosure depicts this information, presenting total numbers of observed and catalogued ESB butterflies at each subsite of the E Segundo Dunes. The information included in Table 1 accompanies the 1996 El Segundo Blue Butterfly Survey Map. Individual sightings of the ESB butterfly are represented on the map by dots, each dot representative of one sighting of the ESB butterfly. Total number of sightings of the ESB butterfly per subsite are offered on the left-hand column of the table, and a total figure of observed ESB butterflies is found at the bottom of the table (2,093 ESB butterflies.) This number represents the number of ESB butterflies recorded in a single observation during the eight week flight period of the butterfly. The total population of ESB butterflies at the El Segundo Dunes would be expected to be much larger than that recorded as a result of a single observation day. However, the field surveys and the recorded ESB butterfly sightings are useful in that they provide an accurate characterization of the spatial data, demonstrating the areas of the El Segundo Dunes colonized and utilized by the ESB butterfly, and their relative densities.

The next step of the HQA effort will be to correlate the ESB butterfly spatial information with the coastal buckwheat (*Eriogonum fasciculatum*) mapping which was also undertaken over the 1996 summer quarter.

50 S. DeLacey, Suite 210 • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 818/683-3547 Fax 818/683-3548

Should you have any question pertaining to the information included in this transmittal please do not hesitate to contact me. I will be happy to answer and clarify any of your concerns. I hope this information is of assistance to your staff.

Yours Truly,

Pedro Campos

TABLE 1

Subsite Number	Male ESB	Female ESB	Unidentified ESB	Total
1	58	48	2	107
2	24	8	2	34
3	0	0	0	0
4	12	10	0	22
5	21	4	1	26
6	7	1	0	8
7	18	4	1	23
8	42	53	8	103
9	150	58	13	221
10	27	17	0	54
11	8	6	0	14
12	50	32	3	85
13	90	58	4	152
14	3	2	0	5
15	28	26	1	55
16	5	1	0	6
17	2	1	0	3
18	35	9	3	47
19	10	0	0	10
20	31	14	5	50
21	7	4	0	11
22	0	1	0	1
23	0	1	0	1
24	15	2	1	18
25	0	0	0	0

Subsite Number	Male ESB	Female ESB	Unidentified ESB	Total
26	5	1	0	6
27	0	0	0	0
28	0	1	0	1
29	1	1	0	2
30	0	0	0	1
31	2	0	0	2
32	0	0	0	0
33	0	0	0	0
34	0	1	0	1
35	15	9	1	25
36N	36	18	2	56
36S	24	11	1	36
37N	29	16	2	47
37S	41	17	1	59
38N	34	41	2	77
38S	30	20	2	52
39N	27	10	3	40
39S	17	10	2	29
40N	36	44	11	91
40S	23	29	1	53
40C	11	13	0	24
41N	13	5	1	19
41S	55	28	5	88
42N	22	16	1	39
42S	96	80	3	179
43N	18	8	1	27

Subsite Number	Male ESB	Female ESB	Unidentified ESB	Total
43E	11	20	0	31
43W	14	11	3	28
44N	7	8	0	15
44S	4	3	0	7
45N	0	0	0	0
45S	1	1	0	2
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
TOTAL ESB	1225	782	86	2093

SAPPHOS ENVIRONMENTAL
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October 25, 1996

MEMORANDUM FOR THE RECORD
JN 1043-004.M01

TO: City of Los Angeles, Department of Airports, Environmental Management (Mr. Steve Crowther)

FROM: Sapphos Environmental (Dr. Steve Patterson)

SUBJECT: 1996 ESB Numbers at LAX El Segundo Dunes

This Memorandum for the Record transmits the result of surveys for the El Segundo Blue butterfly (ESB) conducted during the summer of 1996 by Sapphos Environmental at the Los Angeles International Airport El Segundo Dunes Butterfly Habitat Restoration Area (Dunes). During the 1996 flight season of the El Segundo blue butterfly two separate sets of surveys were conducted. Transect surveys were conducted along the transect route that has been surveyed since 1984 and, for the first time, the entire Dunes Restoration Area was surveyed to determine the presence or absence of the ESB.

Surveys were conducted during the height of the ESB flight season, from July 12 to August 1, 1996. The transect route that has been sampled since 1984 was laid out by Mattoni (Mattoni 1990) to traverse areas that at that time (1984) had large clumps of coast buckwheat and therefore habitat for the ESB. Although the route has remained basically the same each year, the number of days of sampling has varied over the years. On average, the transects have been conducted approximately a week apart; some years they began earlier and stopped later than in other years. Conducting transects at one week intervals reduces the likelihood of counting the same butterfly twice, but does not preclude it. These two caveats must be kept in mind when comparing the total butterflies counted each year. Result of surveys along the historic transect are shown in Table 1. Fourteen-hundred- fifty-five (1455) ESB were observed during four weekly transects in 1996.

While some of the older restoration plantings are now 5 years old, the bulk of the restoration plantings were completed in 1994, making them 2 years old in 1996. These plants are just beginning to be large enough to support the ESB. Nevertheless, ESB were observed in all areas of the restoration area, though some had higher numbers than other. Some the 5 year old restoration plantings now support the highest concentration of ESB. The survey for ESB presence over the entire restoration area was conducted during roughly the same timespan as the transects. These surveys were conducted by a team of researchers, all areas of the Dunes that contain coast buckwheat were searched. Surveyors went to each buckwheat plant and watched for ESB. Location of butterflies observed were mapped. A total of 2063 ESB were observed during the whole Dunes survey.

The numbers from the transect study and the whole Dunes study should not be added together because the transect area was included within the area surveyed for the whole Dunes study. The transect number represents four weeks of sampling, the whole Dunes number is a one-time count. Nevertheless, it is instructive to note that the one-time survey of the whole Dunes yield twice as many

ESB as had been counted over a whole season on the transect in any previous year. Though absolute numbers of ESB present at the Dunes are not known, this nevertheless indicates a dramatic increase in its population.

TABLE 1. ESB OBSERVED ALONG HISTORIC TRANSECT

Year	# of samples	Span of days	# of ESB observed
1984	4	19	193
1985	no data		
1986	5	35	258
1987	9	56	473
1988	10	61	1049
1989	11	54	1390
1990	10	63	1792
1991	12	90	906
1992	15	111	1051
1993	10	58	925
1994	8	63	500
1995	10	69	1,239
1996	4	21	1455

The source for 1984 through 1994 numbers is Table 13 of Mattoni's 1994 *Final Report*.

cc: Mr. Andrew Huang
Mr. Rich Macias

environmental compliance
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May 23, 1996

MEMORANDUM FOR THE RECORD
JN 1067-001.M23

TO: Landrum & Brown
(Mr. Rich Macias)

FROM: Sapphos Environmental
(Mr. Jim Jennings and Ms. Sharon Coe)

SUBJECT: 1996 Herpetofauna Surveys at the Los Angeles International Airport

This Memorandum for the Record transmits the results of surveys for herpetofauna (reptiles and amphibians) conducted by Sapphos Environmental at the Los Angeles International Airport (LAX) in March and April of 1996 in support of the *LAX Master Plan Environmental Impact Report.*

Methods

General surveys for reptiles and amphibians were conducted by Sapphos Environmental (Mr. Jim Jennings) on April 11, 24, and 26, 1996. Meandering transects were walked in areas with potential reptile and amphibian habitat (Figure 1). Surveys were conducted beginning at 1000 hours to insure that the air temperature exceeded 25 degrees Celsius (C). Any rocks or debris found in the areas surveyed were lifted or overturned, looked under and replaced. Areas surveyed include: (1) the El Segundo Dunes; (2) 100 acres north of Sandpiper Street; (3) north of Westchester Parkway and east of Cum Laude Avenue; (4) west of the south runways and east of Pershing Drive; (5) west of the north runways and east of Pershing Drive; and (6) north and northwest of the north runways and south of Westchester Parkway.

Directed surveys for western spadefoot toad (*Scaphiopus hammondii*), a State Species of Special Concern, were conducted on by Sapphos Environmental (Ms. Sharon Coe) on March 21 and 22, 1996. The most recent rainfall with respect to the survey dates occurred on March 13, approximately one week prior to the surveys. The purpose of the survey was to examine small pools and puddles that might contain tadpoles of western spadefoot toad, a species that lays its eggs in shallow, temporary pools formed by winter rains and sometimes in ephemeral streamcourses (Jennings, et. al. 1994; Zeiner, et. al. 1988, Stebbins 1985). Three areas at the El Segundo Dunes that had the potential to hold standing water were assessed on March 21 between 1300 and 1400 hours. These were (1) an approximately 50 x 15 yard site just north of the Very High Omni Range (VOR) Navigation Beacon (subsite 22) that last contained a vernal pool in 1978; (2) a 5 x 1 yard site located on the west portion of the Dunes adjacent to Vista Del Mar Boulevard containing less than 1/2 inch to 3/4 inch deep of water pooled on a sand layer on cement; the water source is a leaking water hydrant that has created a moist area since July 1995; Bermuda grass (*Cynodon dactylon*) surrounds the pools; and (3) an area located approximately 1/8 miles south of the El Segundo Dunes Preserve main gate between the backdune and Pershing Drive that had formerly held standing water whose source was a leaking water pipe and supported cattail (*Typha* spp.). No additional sites containing standing water were observed, nor are any expected to occur based on the highly porous sandy soil that covers the majority of the Dunes, and on the lack of observations by Sapphos Environmental biologists who have conducted field work at the Dunes for the past four years.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

Areas that were considered to have the potential to hold standing water at the Airport proper were surveyed on March 22 between 0830 and 1130 hours. The sites included (1) the vicinity of a drainage ditch on the northern boundary of the Airport north of the northern-most runway; (2) a detention pond on the west edge of Airport between World Way West and Imperial Highway; (3) the southwest corner of the Airport south and west of Service Road and east of the Mock Airplane Fire Drill Facility.

Directed surveys for San Diego horned lizard (*Phrynosoma coronatum blainvillei*), a State species of special concern, were conducted on April 11, 24 and 26, 1996, by Sapphos Environmental (Mr. Jim Jennings). Meandering transects were walked in potential horned lizard habitat. San Diego horned lizards prefer a habitat with friable, rocky or shallow sandy soil with low vegetation. Their preferred prey is harvester ants. Because their scat (feces) has a distinctive appearance, horned lizard presence can be determined by finding the lizard or its scat. Directed surveys were conducted in the following areas: (1) El Segundo Dunes; (2) 100 acres north of Sandpiper Street; and (3) northwest of the north runways and south of Westchester Parkway.

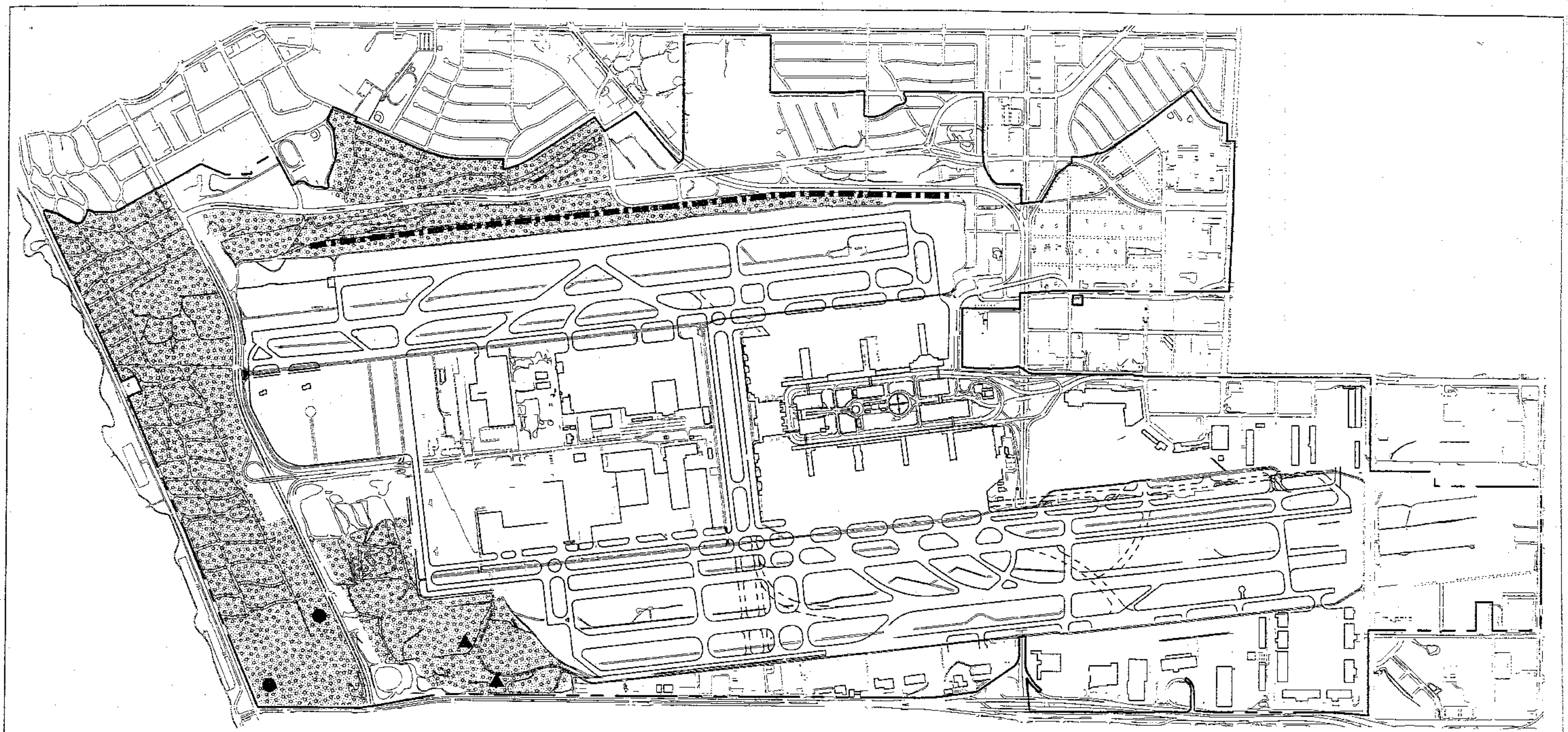
Species names used in the text follow nomenclature according to Jennings (1983).

Results

By far the most abundant reptile found during the general reptile and amphibian surveys was the side-blotched lizard (*Uta stansburiana*). This is a very common lizard in southern California. This lizard was found in every area surveyed except the areas north of Westchester Parkway. The only amphibian found during the general surveys was a garden slender salamander (*Batrachoseps pacificus major*), a non-sensitive species. It was found under debris located under a eucalyptus tree, in the row of eucalyptus just north of the drainage ditch, north of the north runways.

Of the sites surveyed for spadefoot toads at the El Segundo Dunes, the only one that contained standing water was the 5 x 1 yard site located on the western portion of the Dunes adjacent to Vista Del Mar Boulevard. No tadpoles were observed in the standing water. The other two sites surveyed contained no standing water and showed no evidence of recently having supported standing water. Soils were sandy at both of the sites that lacked standing water, with some organic matter accumulation at the site located aproximately 1/8 miles south of the El Segundo Dunes Preserve main gate.

Of the sites surveyed for spadefoot toads at the Airport proper, tadpoles of western spadefoot toad were observed in two distinct temporary pools at the southwest corner of the Airport south and west of Service Road and east of the Mock Airplane Fire Drill Facility (Figure 1). One pool was approximately 1.5 feet x 6 feet in size and was located at the base of a grassy slope in a ditch and was of high silt content. Greater than 20 western spadefoot toad tadpoles were present. A much larger pool of irregular shape (approximately 25 yards long by 7 yards wide) was encountered on the edge of a flat, graded



LEGEND

Airport Boundary

Drainage Ditch

San Diego horned lizard (*Phrynosoma coronatum blainvillei*): April 1996

Western spadefoot toad (*Scaphiopus hammondii*) tadpoles: March 1996

Herpetofauna Surveys: March, April 1996

Los Angeles International Airport Master Plan

Herpetofauna Survey of the LAX Master Plan Area

FIGURE 1

area that lacked vegetation located to the northwest of the previous location. Greater than 100 tadpoles were present, with western spadefoot species confirmed in this pool. While tadpoles were not inspected, they all were likely to be western spadefoot as no perennial source of water is nearby that could support other potential species of amphibians.

Standing water at the Airport proper in which western spadefoot toad adults, tadpoles, or egg masses were *not* observed include: (1) a drainage ditch on the northern boundary of the Airport north of the northern-most runway that contained bullfrog (*Rana catesbeiana*), a species not native to California; (2) a seasonal pool (approximately 80 yards x 5 yards) supporting sedges (*Eleocharis macrostachya*) located south of the drainage ditch and north of the northern-most runway; and (3) the detention pond (approximately 60 yards x 25 yards) on the west edge of the Airport proper between World Way West and Imperial Highway that supports mulefat (*Baccharis salicifolia*) growth on its borders and was dry by late April; waterfowl were observed using this pond (mallard, pied-billed grebe).

San Diego horned lizards or their scat were found at two locations in the project area (Figure 1). During plant surveys on April 27, Dr. Irena Mendez of Sapphos Environmental observed horned lizard scat in the area northwest of the north runways within 25 meters of Pershing Drive. No lizards were observed at this time. During the directed surveys for San Diego horned lizards, four horned lizards and eight horned lizard scats were observed in the southern half of the El Segundo Dunes. One horned lizard was observed on the crest of the backdune area north of the VOR. The rest of the horned lizard and horned lizard scat observations occurred southwest of the VOR.

References

Jennings, M., D. Germano, D. Morafka. 1994. *Biology and Management of Sensitive Amphibians and Reptiles of Central and Southern California Workshop*. June 11, 12, 1994, Goleta Community Center, Goleta, California.

Jennings, Mark R. 1983. "An Annotated Check List of the Amphibians and Reptiles of California." *California Fish and Game* 69(3):151-171.

Stebbins, R.C. 1985. Peterson Field Guide to Western Reptiles and Amphibians. Boston: Houghton Mifflin Company.

Zeiner, D.C., W.F. Laudenslayer, Jr., and K.L. Mayer. 1988. *California's Wildlife: Amphibians and Reptiles* (Volume I). Sacramento: State of California, The Resources Agency, Department of Fish and Game.

SAPPHOS ENVIRONMENTAL
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April 3, 1996

MEMORANDUM FOR THE RECORD
JN 1067-001.M19

TO:	Landrum & Brown (Mr. Rich Macias)
FROM:	Sapphos Environmental (Mr. Jim Jennings)
SUBJECT:	1996 Breeding Birds of Prey Survey at the Los Angeles International Airport

This Memorandum for the Record transmits the results of the breeding birds of prey (raptors) survey conducted by Sapphos Environmental at the Los Angeles International Airport (LAX) in March of 1996.

Methods:

On March 21 and 27, 1996, Sapphos Environmental (Ms. Sharon Coe, Mr. Jim Jennings) conducted breeding raptor surveys at LAX within the LAX Master Plan project area. The surveys were conducted in the morning, beginning at approximately 8:30 am. and ending when the project area had been covered. The survey consisted of searching areas within the master plan project area that had been previously identified as having the potential for supporting raptor nests (Figure 1). These areas were determined by the presence of raptors during past surveys and areas with trees tall enough to potentially house stick nests. Directed surveys for northern harrier (*Circus cyaneus*) and burrowing owl (*Speotyto cunicularia*) nests were conducted in areas where the birds had been observed foraging during the wintering bird survey in January. Meandering transects were used to cover broad areas for ground or burrow nesting raptors and potential nest trees were inspected individually from beneath the tree or from a distance with binoculars. Species names used in the text follow AOU (1983, with supplements in 1985, 1987, 1989, 1991, and 1995).

Results:

Three species of raptors were observed during surveys: sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). While the sharp-shinned hawk is a State Species of Special Concern where it nests, the only locations in southern California that it is likely to nest are forested areas of the Transverse and Peninsular Ranges (Zeiner et. al. 1990). Therefore, this species would not be expected to nest in the LAX Master Plan project area based on the lack of suitable habitat and being outside of the known breeding range. No nests of either the red-tailed hawk or the American kestrel, two non-sensitive species of birds, were found on the project area. However, palm trees, which are potential American kestrel nest trees, were present. American kestrels nest in holes or areas within a tree that approximate a hole (e.g. old passerine nests in dead palm tree

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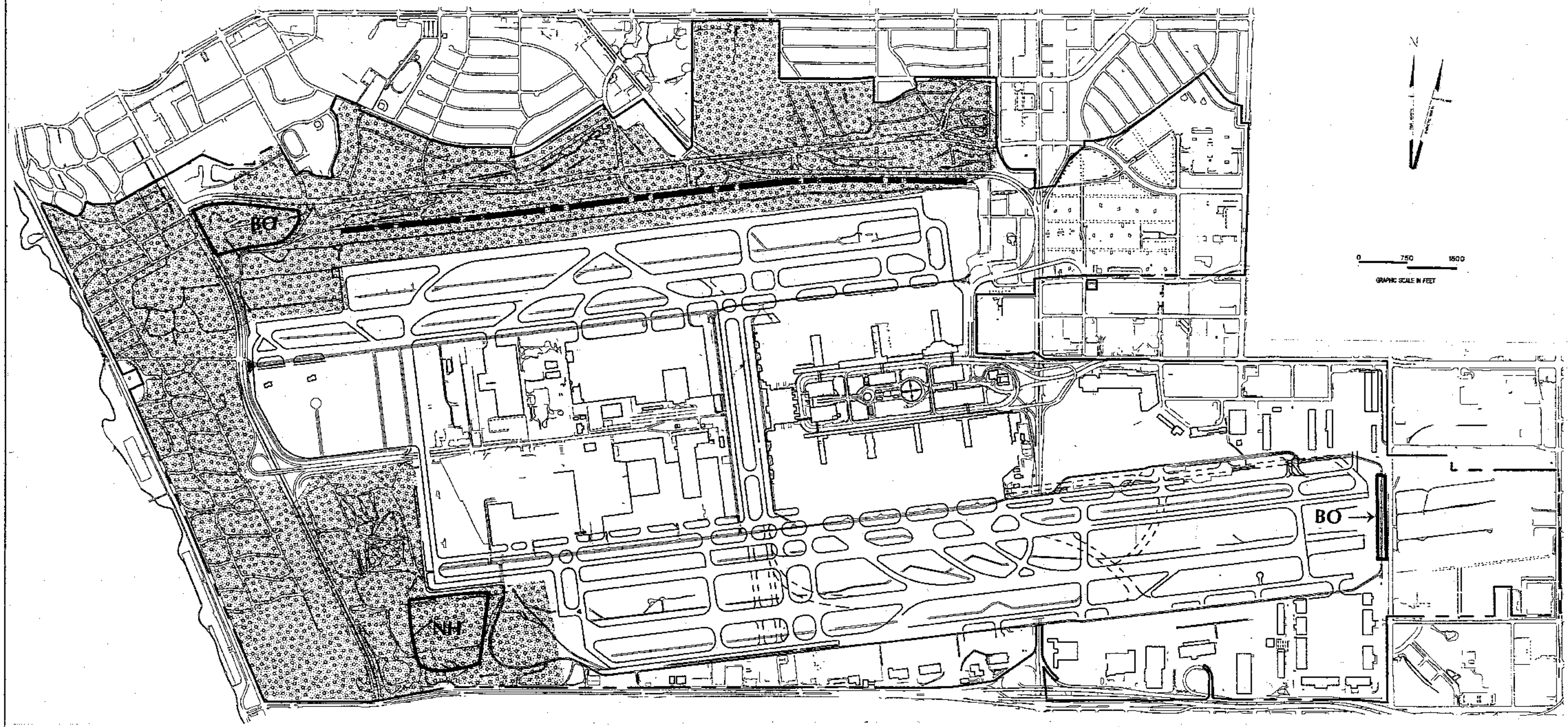
fronds). The presence of a kestrel nest can only be determined by observing a kestrel entering or leaving the nest hole. This behavior was not observed during the survey, but nests may nevertheless be present. Northern harriers build their nests in tall grass on the ground or in marshes and burrowing owls use the burrows of colonial rodents for their nests. No active nests of either of these species were found.

Reports of recent observations of burrowing owls at the east end of the south runways by airport staff persist. An old abandoned burrowing owl nest burrow was found at the fence line in this area during the 1995 wintering bird surveys conducted by Sapphos Environmental. Burrowing owls nest in April in southern California and as long as they are being observed in the vicinity of LAX, there is the potential that they may still breed in the project area.

References:

American Ornithologists' Union (AOU). 1983. *Check-list of North American Birds*. Sixth Council ed. Lawrence, Kansas: Allen Press. With supplements in 1985, 1987, 1989, and 1991.

Zeiner, D.C., W.F. Jr. Laudenslayer, K.E Mayer, M. White, eds. 1990. *California's Wildlife: Birds, Volume 2*. Sacramento, California: State of California. The Resources Agency, Department of Fish and Game.



LEGEND

Airport Boundary	General Breeding Birds of Prey Survey Area
Drainage Ditch	Directed Northern Harrier Nest Survey Area
BO: Directed Burrowing Owl Survey Area	

Los Angeles International Airport Master Plan

Breeding Birds of Prey Survey of the LAX Master Plan Area

FIGURE 1

SAPPHOS ENVIRONMENTAL
environmental compliance
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March 7, 1996

MEMORANDUM FOR THE RECORD
JN 1043-002.M04

TO:	City of Los Angeles Department of Airports (Mr. Steve Crowther)
FROM:	Sapphos Environmental (Dr. Steve Patterson and Mr. Jim Jennings)
SUBJECT:	1995 Amphibian and Reptile Surveys at the Los Angeles International Airport El Segundo Dunes
ATTACHMENT:	Results of 1995 Surveys for Amphibians and Reptiles at Los Angeles International El Segundo Dunes

This Memorandum for the Record transmits the results of amphibian and reptile surveys conducted by Sapphos Environmental at the Los Angeles International Airport El Segundo Dunes (Dunes) in 1995.

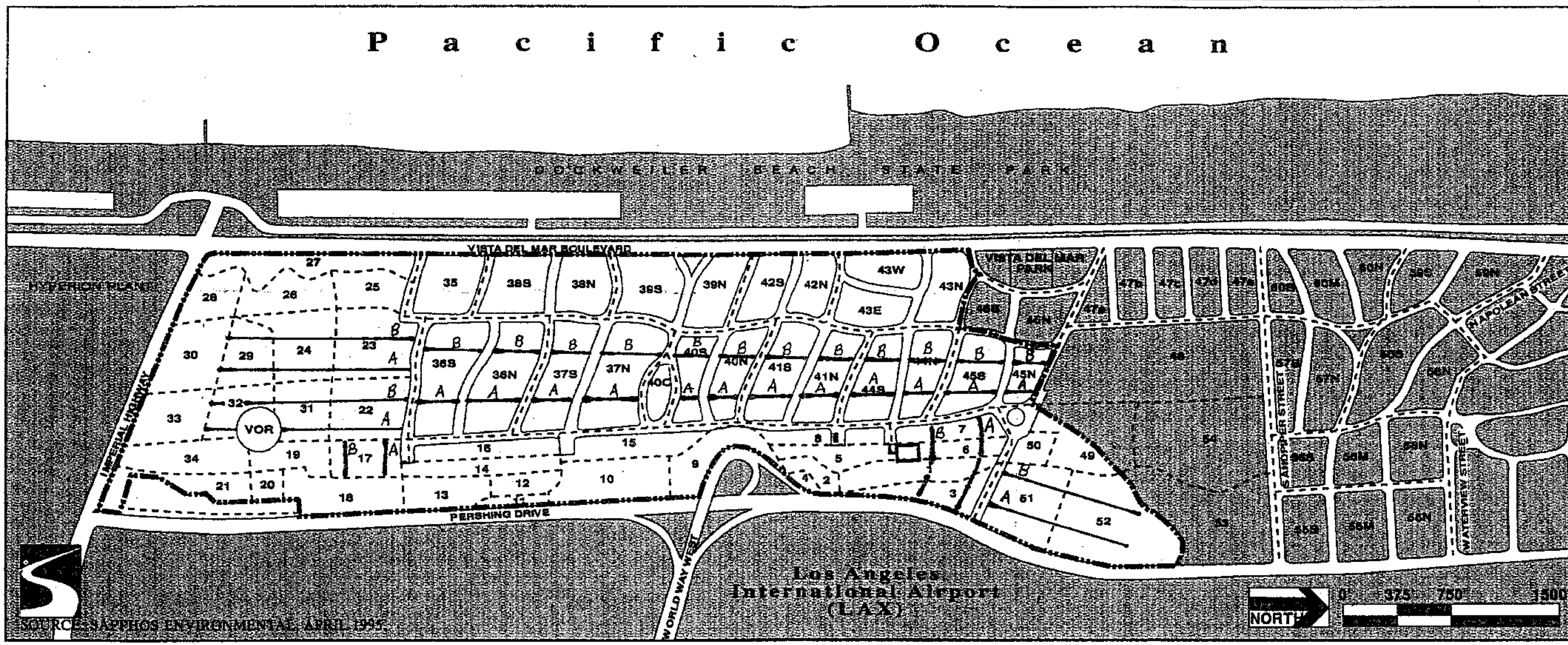
Methods:

As recommended in the *Long-Term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* (City of Los Angeles EAD 1994), Sapphos Environmental conducted the first of annual reptile and amphibian surveys at the Dunes. The survey protocols were based on the Southern California Coastal Sage Scrub Scientific Review Panel's Survey Guidelines (CDFG 1991). Permanent transect lines were established to facilitate repeated surveys (Figure 1). Transect numbers were marked on street curbs in the project area. Transect numbers for single subsites consisted of the subsite number and either the letter A or B, e.g. 17A. If the transect passes through more than one subsite, all of the subsite numbers plus either the letter A or B make up the transect number, e.g. 51 & 52-A. Three surveys were conducted: June 9, June 23 and September 11, 1995. Surveys were conducted beginning at 10 A.M. to insure that the air temperature exceeded 25 degrees Celsius (C). The surveys were conducted by Mr. Peter Bloom (6/23 and 9/11) and Mr. Jim Jennings (6/9, 6/23 and 9/11). Species names used in text follow Jennings (1987).

Results:

Three species of reptiles were observed during the surveys. The most numerous was the side-blotched lizard (*Uta stansburiana*). The only sensitive species observed was the San Diego Horned Lizard (*Phrynosoma coronatum blainvillii*). There were no amphibians observed and the overall numbers of reptiles observed were very low. This can likely be attributed to the lack of suitable habitat in the restoration area and to the degraded condition of the habitat present, particularly lack of water for amphibians. Table 1 summarizes the results of reptile and amphibian surveys. Complete survey results are provided in Attachment 1, and as an Excel file on floppy disk. The results of these surveys indicate

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548



LEGEND

Reserve Boundary

Subsite

Remote Communications Site

Very High Omni Range Navigation Beacon

Trailer

Transect Lines

FIGURE 1
1995 AMPHIBIAN AND REPTILE SURVEY TRANSECTS
AT THE LAX/EL SEGUNDO DUNES

the continuance of a trend reported by Mattoni (1990) of decreasing numbers and species of reptiles and amphibians at the Dunes. Mattoni recorded one species of amphibian and 7 species of reptiles based on surveys conducted in 1987-88. A previous survey by Olson (1975) reported 4 species of amphibians and 10 species of reptiles. Both previous surveys reported the 3 reptile species recorded in the 1995 surveys.

Recommendations:

Reptile and amphibian surveys should continue to be conducted annually. As the habitat restoration plantings continue to mature, the surveys should be conducted during the same months as the 1995 survey for validity in comparison. Repeated surveys will permit tracking of population trends over time and therefore the effects of habitat management and the maturation of the restoration plantings on amphibian and reptile population size and diversity.

TABLE 1.
SUMMARY OF SPECIES OBSERVED DURING THE 1995 SURVEY FOR REPTILES AND AMPHIBIANS AT THE LOS ANGELES INTERNATIONAL AIRPORT EL SEGUNDO DUNES

Species	Scientific Name	Total Sightings	Locations
San Diego horned lizard (and scat)	*Phrynosoma coronatum blainvillii*	4	Transects 29, 31 and 32-A; in street next to subsite 37N
gopher snake	*Pituophis melanoleucus*	2	Transect 44NA; subsite 38S, west transect of bird survey
side-blotched lizard	*Uta stansburiana*	121	Transects 6A, 7 A & B, 17A, 22 A & B, 23 A & B, 24 A & B, 29 A & B, 31A & B, 32 A & B, 33A, 36N A & B, 36S A & B, 37N A & B, 37S A & B, 40N A & B, 40S A & B, 41NA, 41S A & B, 44N A & B, 44SA, 45NB, 45S A & B, 47NA, 51 A & B, and 52B

References:

California Department of Fish and Game (CDFG). 1991. *Southern California Coastal Sage Scrub Scientific Review Panel. Coastal Sage Scrub Survey Guidelines*. 1416 9th Street, Sacramento, California. 95814

City of Los Angeles Environmental Affairs Department. 1994. *Long-Term Habitat Management Plan For Los Angeles Airport/El Segundo Dunes*. Prepared by Environmental Science Associates in Association with Sapphos Environmental and Rudolf H.T. Mattoni, Ph.D. 4221 Wilshire Boulevard, Suite 480, Los Angeles, California. 90010.

Jennings, M. R. 1987. "An Annotated Check List of the Amphibians and Reptiles of California". *California Fish and Game* 69(3): 151-171.

Mattoni, R.H.T. 1990. "Species Diversity and Habitat Evaluation Across the El Segundo Sand Dunes at LAX". Prepared by: Mattoni, R.H.T., Agresearch, Inc. Prepared for: The Board of Airport Commissioners, One World Way West, Los Angeles, California 90009

Olson Laboratories, Inc. 1975. Los Angeles International Airport Series. Volume 3. Physical Environmental Studies. Prepared by: Olson Laboratories, Inc. An Envirodyne Company. Prepared for: The Los Angeles Department of Airports and the Federal Aviation Administration. Unpublished Report.

ATTACHMENT 1

RESULTS OF 1995 SURVEYS FOR REPTILES AND AMPHIBIANS AT THE LOS ANGELES INTERNATIONAL AIRPORT EL SEGUNDO DUNES

Date	Surveyor	Species	Number	Transect
6/9/95	Jim Jennings	San Diego horned lizard	1	Transect 32A
9/11/95	Pete Bloom, Jim Jennings	San Diego horned lizard	1	Transect 37N – 1 juvenile not on a transect line
6/9/95	Jim Jennings	San Diego horned lizard scat	1	Transect 29A
6/23/95	Pete Bloom, Jim Jennings	San Diego horned lizard scat	1	Transect 31A
		TOTAL SIGHTINGS	4	
5/17/95	Jim Jennings, Pete Bloom	gopher snake	1	Transect 44NA
6/23/95	Jim Jennings	gopher snake	1	Transect 38S - observed while doing bird survey
		TOTAL SIGHTINGS	2	
6/9/95	Jim Jennings	side-blotched lizard	1	Transect 44SA
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 41NA
6/9/95	Jim Jennings	side blotched lizard	1	Transect 41SA
6/9/95	Jim Jennings	side-blotched lizard	1	Transect 40NA
6/9/95	Jim Jennings	side-blotched lizard	3	Transect 47NA
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 36NA
6/9/95	Jim Jennings	side-blotched lizard	1	Transect 22A
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 32A
6/9/95	Jim Jennings	side-blotched lizard	6	Transect 32B
6/9/95	Jim Jennings	side-blotched lizard	1	Transect 29A
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 29B
6/9/95	Jim Jennings	side-blotched lizard	1	Transect 24B
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 23B
6/9/95	Jim Jennings	side-blotched lizard	2	Transect 44NB
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 51A
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 51B
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 52A
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 52B
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 45SA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 44NA
6/23/95	Pete Bloom, Jim Jennings	side blotched lizard	1	Transect 41NA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 41SA
6/23/95	Pete Bloom, Jim Jennings	side blotched lizard	1	Transect 40NA
6/23/95	Pete Bloom, Jim Jennings	side blotched lizard	2	Transect 40SA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 37NA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	3	Transect 37SA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 36SA
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 31A
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 32A
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 32B
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 22B
6/23/95	Pete Bloom, Jim Jennings	side blotched lizard	2	Transect 37SB
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 37NB
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 40SB
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 41SB
6/23/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 45SB
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 51A -- 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	3	Transect 51B – 2 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 45NB -- 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 45SB – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	2	Transect 44NB – 2 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 41SB -- 1 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	7	Transect 40NB – 5 juvenile and 2 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 40SB – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 37SB -- 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 36NB – 1 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 36SB – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	6	Transect 23B – 4 juvenile and 2 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	3	Transect 24B -- 2 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 29B – 1 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	3	Transect 29A – 3 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 24A – 2 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	2	Transect 23A – 1 juvenile and 1 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 7B -- 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 44SA – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 41SA – 1 adult
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	3	Transect 37NA – 3 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 37SA – 1 adult
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	3	Transect 33A – 1 juvenile and 2 adult
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	5	Transect 32A – 5 juvenile
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	1	Transect 32B – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 31B – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 22B -- 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 17A – 1 juvenile
9/11/95	Pete Bloom, Jim Jennings	side blotched lizard	3	Transect 7A – 3 juvenile
9/11/95	Pete Bloom, Jim Jennings	side-blotched lizard	1	Transect 6A 1 juvenile
		TOTAL SIGHTINGS	121	

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March 7, 1996

MEMORANDUM FOR THE RECORD
JN 1043-002.M07

TO:	City of Los Angeles Department of Airports (Mr. Steve Crowther)
FROM:	Sapphos Environmental (Dr. Steve Patterson and Mr. Jim Jennings)
SUBJECT:	1995 Bird Surveys at the Los Angeles International Airport El Segundo Dunes
ATTACHMENTS:	Results of Audubon 1994 Christmas Bird Count Survey (January 6, 1995) at the Los Angeles International Airport El Segundo Dunes
	Results of 1995 Spring Surveys for Birds at the Los Angeles International Airport El Segundo Dunes

This Memorandum for the Record transmits the results of bird surveys conducted by Sapphos Environmental at the Los Angeles International Airport El Segundo Dunes in 1995.

Methods:

As recommended in the *Long-Term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* (City of Los Angeles EAD 1994), Sapphos Environmental conducted bird surveys at the El Segundo Dunes. A Christmas count survey was conducted in early January and spring surveys were conducted in May and June. The spring surveys were based on the Southern California Coastal Sage Scrub Scientific Review Panel's Survey Guidelines (CDFG 1991). Three transects were developed for the surveys (Figure 1). The east transect runs along the top of the slope above the back dune. The other two transects (the middle transect and west transect) were positioned to divide the remaining area approximately equally. The surveys were conducted in the morning, beginning as close as possible to first light, and ending when the transects were completed. This timing takes advantage of the period of highest activity and greatest vocality for most species of birds. Eight surveys were conducted: May 12, 19, and 26; June 2, 9, 16, 23, and 29, 1995. The surveys were conducted by Mr. Jim Jennings. The Christmas count survey was based on the Audubon Christmas count guidelines. This is a one day survey conducted in late December or early January; counting as many birds as possible within an area. No transects are used. The survey was conducted on the morning of January 6 and began at 6:45 am. It was conducted by Mr. Peter Bloom and Ms. Marie Campbell. Species names used in the text follow AOU (1983, with supplements in 1985, 1987, 1989, and 1991).

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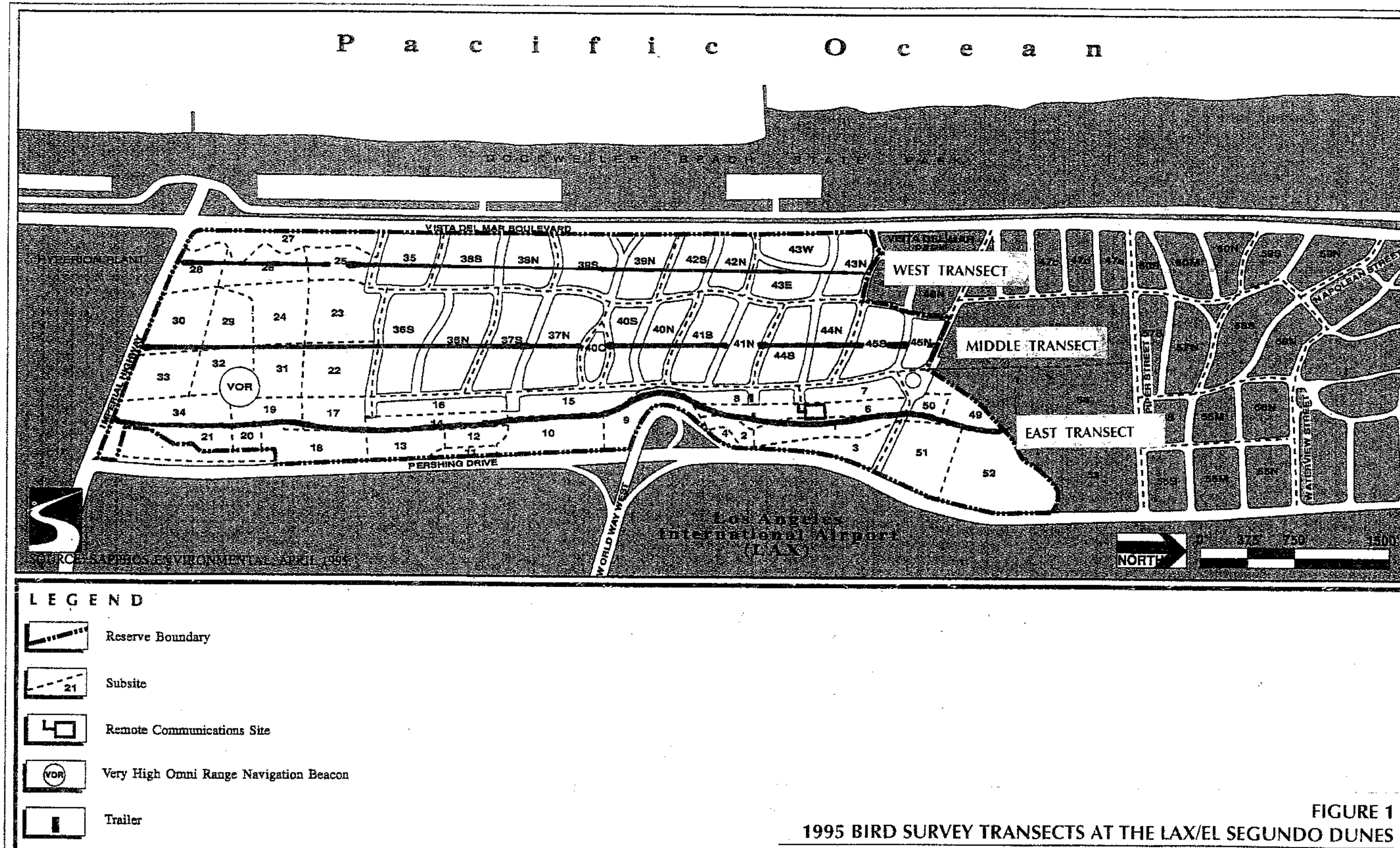

FIGURE 1
1995 BIRD SURVEY TRANSECTS AT THE LAX/EL SEGUNDO DUNES

Results:

Twenty-six species of birds were observed during the surveys spring surveys. Fourteen of these species breed or potentially breed on the project area. Of those fourteen species, only the loggerhead shrike (*Lanius ludovicianus*) is a sensitive species. Four species were wintering or migrating species and the remaining species only forage or rest on the project area. Table 1 summarizes the results of the bird surveys. Complete results of the bird surveys are provided in Attachments 1 and 2 and as an Excel file on floppy disk..

Recommendations:

Bird surveys should continue to be conducted as important management information will be provided by documenting any change in the bird population or diversity during the changes in the composition and structure of plant communities. The spring surveys conducted in 1995 should be repeated on an annual basis. An additional Christmas Count type survey should be conducted in December or early January of each year to provide information concerning wintering birds. Contacts with the local chapter of the National Audubon Society could be explored to determine if they would conduct annual Christmas (December) and Christmas in Spring (June) bird counts to monitor the long term presence of birds identified by the previous more thorough surveys.

TABLE 1.
SUMMARY OF SPECIES OBSERVED DURING THE 1995 SURVEYS FOR BIRDS AT THE LOS ANGELES INTERNATIONAL AIRPORT EL SEGUNDO DUNES

Species	Scientific Name	Total Sightings	
		Spring Survey	Christmas Survey
American crow	*Corvus brachyrhynchos*	54	1
American kestrel	*Falco sparverius*	32	3
Anna's hummingbird	*Calypte anna*	14	5
ash-throated flycatcher	*Myiarchus cinerascens*	5	0
barn owl	*Tyto alba*	1	0
barn swallow	*Hirundo rustica*	3	0
burrowing owl	*Speotyto cunicularia*	0	1
California gull	Larus californicus	0	5
California towhee	*Pipilo crissalis*	29	1
chipping sparrow	*Spizella passerina*	0	2
cliff swallow	*Hirundo pyrrhonota*	13	0
common raven	*Corvus corax*	5	1
European starling	*Sturnus vulgaris*	831	27
gull sp.	unknown	0	120
hooded oriole	*Icterus cucullatus*	6	0
house finch	*Carpodacus mexicanus*	602	182
house sparrow	*Passer domesticus*	1	48
killdeer	*Charadrius vociferus*	3	2
loggerhead shrike	*Lanius ludovicianus*	44	2
mourning dove	*Zenaida macroura*	213	17
northern mockingbird	*Mimus polyglottos*	60	0
northern oriole	*Icterus galbula*	1	0
northern rough-winged swallow	*Stelgidopteryx serripennis*	1	0
Pacific-slope flycatcher	*Empidonax difficilis*	2	0
red-tailed hawk	*Buteo jamaicensis*	15	2
rock dove	*Columba livia*	51	20
savannah sparrow	*Passerculus sandwichensis*	0	5
Say's phoebe	*Sayornis saya*	0	2
sharp-shinned hawk	*Accipiter striatus*	0	2
song sparrow	*Melospiza melodia*	0	1
sparrow sp.	unknown	0	2
spotted dove	*Streptopelia chinensis*	1	0
Townsend's warbler	*Dendroica townsendi*	2	0
western gull	*Larus occidentalis*	0	3
western wood peewee	*Contopus sordidulus*	1	0
white-crowned sparrow	*Zonotrichia leucophrys*	0	288
Wilson's warbler	*Wilsonia pusilla*	13	0

References:

American Ornithologists' Union (AOU). 1983. *Check-list of North American Birds*. Sixth Council ed. Lawrence, Kansas: Allen Press. With supplements in 1985, 1987, 1989, and 1991.

California Department of Fish and Game (CDFG). 1991. *Southern California Coastal Sage Scrub Scientific Review Panel. Coastal Sage Scrub Survey Guidelines*. 1416 9th Street, Sacramento, California. 95814

City of Los Angeles Environmental Affairs Department. 1994. *Long-Term Habitat Management Plan For Los Angeles Airport/El Segundo Dunes*. Prepared by Environmental Science Associates in Association with Sapphos Environmental and Rudolf H.T. Mattoni, Ph.D. 4221 Wilshire Boulevard, Suite 480, Los Angeles, California. 90010.

Attachment 1

Results of Audubon 1994 Christmas Bird Count Survey (January 6, 1995) at the Los Angeles International Airport El Segundo Dunes

4.6 1043-001
Christmas Bird Count
Date: January 6, 1995
Start time: 6:45am
Location: El Segundo Dunes Preserve
Recorders: Peter Bloom, Marie Campbell
55°. ~~[illegible]~~ + High Clouds
Rain Jan 3 and 4

TABLE A-7: KNOWN BIRD SPECIES OF THE EL SEGUNDO DUNES[1]

PODICIPEDIDAE - GREBES
[#, 2, 3] *Aechmophorus occidentalis*
western grebe

PELECANIDAE - PELICANS
[#, 2, 3] *Pelecanus occidentalis*
brown pelican

PHALACROCORACIDAE - CORMORANTS
[#, 2, 3] *Phalacrocorax auritus*
double-crested cormorant

ARDEIDAE - HERONS
Ardea herodias
great blue heron

CATHARTIDAE - NEW WORLD VULTURES
Cathartes aura
turkey vulture

ACCIPTRIDAE - HAWKS
Accipiter cooperii
Cooper's hawk
[#] *Buteo jamaicensis*
red-tailed hawk
[#] *Falco sparverius*
American kestrel

CHARADRIIDAE - PLOVERS
[#] *Charadrius vociferus*
killdeer

SCOLOPACIDAE - SANDPIPERS
[#, 2, 3] *Numenius americanus*
long-billed curlew

LARIDAE - GULLS AND TERNS
[#, 2] *Larus californicus*
California gull
Larus occidentalis
western gull
Larus delawarensis
ring-billed gull
[#, 2, 3] *Larus heermanni*
Heermann's gull
[#, 3, 4] *Sterna antillarum browni*
least tern

COLUMBIDAE - PIGEONS AND DOVES
[#] *Columba livia*
rock dove (pigeon)
[#] **Streptopelia chinensis*
spotted dove
[#] *Zenaida macroura*
mourning dove

TYTONIDAE - BARN OWLS
1 Burrowing Owl
Tyto alba
barn owl

STRIGIDAE - TRUE OWLS
Asio flammeus
short-eared owl

TROCHILIDAE - HUMMINGBIRDS
[#] *Calypte anna*
Anna's hummingbird
[#] *Selasphorous sasin*
Allen's hummingbird

PICIDAE - WOODPECKERS
Colaptes cafer
northern flicker

TYRANNIDAE - TYRANT FLYCATCHERS
Tyrannis verticalis
western kingbird
Sayornis nigricans
black phoebe
Sayornis saya
Say's phoebe

ALAUDIDAE - LARKS
Eremophilus alpestris
horned lark

TABLE A-7: KNOWN BIRD SPECIES OF THE EL SEGUNDO DUNES[1]

PODICIPEDIDAE - GREBES
[#, 2, 3] *Aechmophorus occidentalis*
western grebe

PELECANIDAE - PELICANS
[#, 2, 3] *Pelecanus occidentalis*
brown pelican

PHALACROCORACIDAE - CORMORANTS
[#, 2, 3] *Phalacrocorax auritus*
double-crested cormorant

ARDEIDAE - HERONS
Ardea herodias
great blue heron

CATHARTIDAE - NEW WORLD VULTURES
Cathartes aura
turkey vulture

ACCIPTRIDAE - HAWKS
Accipiter cooperii
Cooper's hawk
[#] *Buteo jamaicensis*
red-tailed hawk
[#] *Falco sparverius*
American kestrel

CHARADRIIDAE - PLOVERS
[#] *Charadrius vociferus*
killdeer

SCOLOPACIDAE - SANDPIPERS
[#, 2, 3] *Numenius americanus*
long-billed curlew

LARIDAE - GULLS AND TERNS
[#, 2] *Larus californicus*
California gull
Larus occidentalis
western gull
Larus delawarensis
ring-billed gull
[#, 2, 3] *Larus heermanni*
Heermann's gull
[#, 3, 4] *Sterna antillarum browni*
least ter

COLUMBIDAE - PIGEONS AND DOVES
[#] *Columba livia*
rock dove (pigeon)
[#] **Streptopelia chinensis*
spotted dove
[#] *Zenaida macroura*
mourning dove

TYTONIDAE - BARN OWLS
Tyto alba
barn owl

STRIGIDAE - TRUE OWLS
Asio flammeus
short-eared owl

TROCHILIDAE - HUMMINGBIRDS
[#] *Calypte anna*
Anna's hummingbird
[#] *Selasphorous sasin*
Allen's hummingbird

PICIDAE - WOODPECKERS
Colaptes cafer
northern flicker

TYRANNIDAE - TYRANT FLYCATCHERS
Tyrannis verticalis
western kingbird
Sayornis nigricans
black phoebe
Sayornis saya
Say's phoebe

ALAUDIDAE - LARKS
Eremophilus alpestris
horned lark

A-15

TABLE A-8. BIRD SPECIES EITHER EXTIRPATED OR NOT SEEN IN RECENT SURVEYS[1]

ACCIPITRIDAE
Haliaeetus leucocephalus
bald eagle

CHARADRIIDAE
[2]*Charadrius alexandrinus*
snowy plover

STRIGIDAE
[2]*Athene cunicularia*
burrowing owl

CUCULIDAE
Geococcyx californianus
greater roadrunner

TROCHILIDAE
[3]*Archilochus alexandri*
black-chinned hummingbird

HIRUNDINIDAE - SWALLOWS
Hirundo pyrrhonota
cliff swallow

CHAMAEIDAE
Chamaea fasciata
wrentit

MIMIDAE
Toxostoma redivivum
California thrasher

TURDIDAE
[3]*Sialia mexicana*
western bluebird
[3]*Myadestes townsendi*
Townsend solitaire

ICTERIDAE
[3]*Icterus bullocki*
northern oriole

SYLVIDAE
[3,5]*Polioptila caerulea*
blue-grey gnatcatcher

1 The information in this table is based on Agresearch (1990, Table 17). Species observed in 1938 surveys but not in 1975 or 1988 surveys, with the exceptions noted: least tern, snowy plover, California quail and burrowing owl.

2 The breeding component for this species has been extirpated. Migrants and dispersing individuals probably utilize the El Segundo Dunes on a seasonal basis for resting and foraging. The burrowing owl was a probable breeder at El Segundo Dunes; it was recorded as recently as 1988 and reportedly observed in 1994 (R. Mattoni, pers. comm.). However, during the course of the 1992-94 work no evidence of breeding activity was observed.

3 Although not recorded since the 1938/39 surveys, the black-chinned hummingbird, western bluebird, Townsend solitaire, northern oriole and blue-grey gnatcatcher (recorded in 1975) may occur during migration. The lack of observations is probably due to limited surveys conducted after the 1938/39 surveys. More structured surveys during migration and the breeding season would probably reveal their presence.

4 California quail was last observed onsite during the 1975 survey, but was not observed during the 1988 survey or 1994 site reconnaisance. The bird is easily identified due to its gregarious habits and distinctive plumage. Because this species is a conspicuous ground-dweller with limited flight, it is not likely to have been onsite without being observed and is therefore expected to be extirpated from the site. The coastal strand vegetation at the base of the El Segundo Dunes is likely to have provided suitable nesting habitat for this species. However, there are no nesting records on the California Natural Diversity Database (CNDDB).

5 In all probability, the blue-grey gnatcatcher recorded in the 1938/1939 survey was actually a coastal California gantcatcher. Based on the habitat that historically occurred at El Segundo, it is expected that the coastal California gnatcatcher was present and breeding onsite. The site does not currently (or historically) support appropriate breeding habitat for the blue-grey gnatcatcher.

TABLE A-8: BIRD SPECIES EITHER EXTIRPATED OR NOT SEEN IN RECENT SURVEYS[1]

ACCIPITRIDAE
Haliaeetus leucocephalus
bald eagle

CHARADRIIDAE
[2]*Charadrius alexandrinus*
snowy plover

STRIGIDAE
[2]*Athene cunicularia*
burrowing owl

CUCULIDAE
Geococcyx californianus
greater roadrunner

TROCHILIDAE
[3]*Archilochus alexandri*
black-chinned hummingbird

HIRUNDINIDAE - SWALLOWS
Hirundo pyrrhonota
cliff swallow

CHAMAEIDAE
Chamaea fasciata
wrentit

MIMIDAE
Toxostoma redivivum
California thrasher

TURDIDAE
[3]*Sialia mexicana*
western bluebird
[3]*Myadestes townsendi*
Townsend solitaire

ICTERIDAE
[3]*Icterus bullocki*
northern oriole

SYLVIDAE
[3,5]*Polioptila caerulea*
blue-grey gnatcatcher

1 The information in this table is based on Agresearch (1990, Table 17). Species observed in 1938 surveys but not in 1975 or 1988 surveys, with the exceptions noted: least tern, snowy plover, California quail and burrowing owl.

2 The breeding component for this species has been extirpated. Migrants and dispersing individuals probably utilize the El Segundo Dunes on a seasonal basis for resting and foraging. The burrowing owl was a probable breeder at El Segundo Dunes; it was recorded as recently as 1988 and reportedly observed in 1994 (R. Mattoni, pers. comm.). However, during the course of the 1992-94 work no evidence of breeding activity was observed.

3 Although not recorded since the 1938/39 surveys, the black-chinned hummingbird, western bluebird, Townsend solitaire, northern oriole and blue-grey gnatcatcher (recorded in 1975) may occur during migration. The lack of observations is probably due to limited surveys conducted after the 1938/39 surveys. More structured surveys during migration and the breeding season would probably reveal their presence.

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A-17

Bubulcus ibis cattle egret	uR
Butorides striatus green-backed heron	oR
Nycticorax nycticorax black-crowned night-heron	uR
THRESKIORNITHIDAE - IBISES	
Plegadis chihi white-faced ibis	oR
ANATIDAE - WATERFOWL	
Chen caerulescens snow goose	sW
Branta bernicla brant	sW
Branta canadensis Canada goose	oW
Anas crecca green-winged teal	uR
Anas platyrhynchos mallard	fR
Anas acuta northern pintail	fW
Anas discors blue-winged teal	oW
Anas cyanoptera cinnamon teal	uR
Anas clypeata northern shoveler	fF
Anas strepera gadwall	uR
Anas americana American wigeon	fW
Aythya valisineria canvasback	uW
Aythya americana redhead	uW
Aythya collaris ring-necked duck	oW
Aythya marila greater scaup	uW

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

Bubulcus ibis cattle egret	uR
Butorides striatus green-backed heron	oR
Nycticorax nycticorax black-crowned night-heron	uR
THRESKIORNITHIDAE - IBISES	
Plegadis chihi white-faced ibis	oR
ANATIDAE - WATERFOWL	
Chen caerulescens snow goose	sW
Branta bernicla brant	sW
Branta canadensis Canada goose	oW
Anas crecca green-winged teal	uR
Anas platyrhynchos mallard	fR
Anas acuta northern pintail	fW
Anas discors blue-winged teal	oW
Anas cyanoptera cinnamon teal	uR
Anas clypeata northern shoveler	fF
Anas strepera gadwall	uR
Anas americana American wigeon	fW
Aythya valisineria canvasback	uW
Aythya americana redhead	uW
Aythya collaris ring-necked duck	oW
Aythya marila greater scaup	uW

A-19

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

Gallinula chloropus	sR
common moorhen	
Fulica americana	uR
American coot	
CHARADRIIDAE - PLOVERS	
Pluvialis squatarola	uW
black-bellied plover	
Charadrius alexandrinus	uR
snowy plover	
Charadrius semipalmatus	uW
semipalmated plover	
Charadrius vociferus	fR
killdeer	
RECURVIROSTRIDAE - STILTS & AVOCETS	
Himantopus mexicanus	uR
black-necked stilt	
Recurvirostra americana	uR
American avocet	
SCOLOPACIDAE - SANDPIPERS	
Tringa melanoleuca	uW
greater yellowlegs	
Tringa flavipes	uW
lesser yellowlegs	
Catoptrophorus semipalmatus	uW
willet	
Heteroscelus incanus	oW
wandering tattler	
Actitis macularia	uW
spotted sandpiper	
Numenius phaeopus	uW
whimbrel	
Limosa fedoa	uW
marbled godwit	
Arenaria interpres	oW
ruddy turnstone	
Arenaria melanocephala	oW
black turnstone	
Calidris canutus	uW
red knot	

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

Gallinula chloropus sR
common moorhen
Fulica americana uR
American coot
CHARADRIIDAE - PLOVERS
Pluvialis squatarola uW
black-bellied plover
Charadrius alexandrinus uR
snowy plover
Charadrius semipalmatus uW
semipalmated plover
Charadrius vociferus fR
killdeer
RECURVIROSTRIDAE - STILTS & AVOCETS
Himantopus mexicanus uR
black-necked stilt
Recurvirostra americana uR
American avocet
SCOLOPACIDAE - SANDPIPERS
Tringa melanoleuca uW
greater yellowlegs
Tringa flavipes uW
lesser yellowlegs
Catoptrophorus semipalmatus uW
willet
Heteroscelus incanus oW
wandering tattler
Actitis macularia uW
spotted sandpiper
Numenius phaeopus uW
whimbrel
Limosa fedoa uW
marbled godwit
Arenaria interpres oW
ruddy turnstone
Arenaria melanocephala oW
black turnstone
Calidris canutus uW
red knot

A-21

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

Sterna forsteri	uW
Forster's tern	
Rynchops niger	sS
black skimmer	
COLUMBIDAE - PIGEONS & DOVES	
Columbina passerina	sT
common ground-dove	
STRIGIDAE - TRUE OWLS	
Bubo virginianus	oR
great horned owl	
CAPRIMULGIDAE - GOATSUCKERS	
Chordeiles acutipennis	sS
lesser nighthawk	
Phalaenoptilus nuttallii	sR
common poorwill	
APODIDAE - SWIFTS	
Chaetura vauxi	sT
Vaux's swift	
TROCHILIDAE - HUMMINGBIRDS	
Calypte costae	uR
Costa's hummingbird	
ALCEDINIDAE - KINGFISHERS	
Ceryle alcyon	sT
belted kingfisher	
PICIDAE - WOODPECKERS	
Melanerpes formicivorus	sV
acorn woodpecker	
Sphyrapicus ruber	sV
red-breasted sapsucker	
Picoides nuttallii	sV
Nuttall's woodpecker	
Picoides pubescens	sV
downy woodpecker	
Picoides villosus	sV
hairy woodpecker	

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

Sterna forsteri	uW
Forster's tern	
Rynchops niger	sS
black skimmer	
COLUMBIDAE - PIGEONS & DOVES	
Columbina passerina	sT
common ground-dove	
STRIGIDAE - TRUE OWLS	
Bubo virginianus	oR
great horned owl	
CAPRIMULGIDAE - GOATSUCKERS	
Chordeiles acutipennis	sS
lesser nighthawk	
Phalaenoptilus nuttallii	sR
common poorwill	
APODIDAE - SWIFTS	
Chaetura vauxi	sT
Vaux's swift	
TROCHILIDAE - HUMMINGBIRDS	
Calypte costae	uR
Costa's hummingbird	
ALCEDINIDAE - KINGFISHERS	
Ceryle alcyon	sT
belted kingfisher	
PICIDAE - WOODPECKERS	
Melanerpes formicivorus	sV
acorn woodpecker	
Sphyrapicus ruber	sV
red-breasted sapsucker	
Picoides nuttallii	sV
Nuttall's woodpecker	
Picoides pubescens	sV
downy woodpecker	
Picoides villosus	sV
hairy woodpecker	

A-23

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

MIMIDAE - THRASHERS	
Mimus polyglottos northern mockingbird	fR
Toxostoma redivivum California thrasher	sR
BOMBYCILLIDAE - WAXWINGS	
Bombycilla cedrorum cedar waxwing	oW
PTILOGONATIDAE - SILKY-FLYCATCHERS	
Phainopepla nitens phainopepla	sS
VIREONIDAE - VIREOS	
Vireo solitarius solitary vireo	sS
Vireo gilvus warbling vireo	sS
Vireo bellii bell's vireo	sV
EMBERIZIDAE - WOOD WARBLERS, TANAGERS, BUNTINGS & BLACKBIRDS	
Vermivora ruficapilla Nashville warbler	sT
Dendroica petechia yellow warbler	sT
Dendroica nigrescens black-throated gray warbler	sT
Dendroica occidentalis hermit warbler	sT
Oporornis tolmiei MacGillivray's warbler	sT
Wilsonia pusilla Wilson's warbler	sT
Icteria virens yellow-breasted chat	sT
Piranga ludoviciana western tanager	sS
Pheucticus melanocephalus black-headed grosbeak	sS
Guiraca caerulea blue grosbeak	sT

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES[1] (Continued)

MIMIDAE - THRASHERS
Mimus polyglottos northern mockingbird fR
Toxostoma redivivum California thrasher sR
BOMBYCILLIDAE - WAXWINGS
Bombycilla cedrorum cedar waxwing oW
PTILOGONATIDAE - SILKY-FLYCATCHERS
Phainopepla nitens phainopepla sS
VIREONIDAE - VIREOS
Vireo solitarius solitary vireo sS
Vireo gilvus warbling vireo sS
Vireo bellii bell's vireo sV
EMBERIZIDAE - WOOD WARBLERS, TANAGERS, BUNTINGS & BLACKBIRDS
Vermivora ruficapilla Nashville warbler sT
Dendroica petechia yellow warbler sT
Dendroica nigrescens black-throated gray warbler sT
Dendroica occidentalis hermit warbler sT
Oporornis tolmiei MacGillivray's warbler sT
Wilsonia pusilla Wilson's warbler sT
Icteria virens yellow-breasted chat sT
Piranga ludoviciana western tanager sS
Pheucticus melanocephalus black-headed grosbeak sS
Guiraca caerulea blue grosbeak sT

A-25

TABLE A-9: EXPECTED BIRD SPECIES AT THE EL SEGUNDO DUNES (Continued)

EXPLANATION OF CODES

ABUNDANCE[1]

- c - common--observed or expected throughout the site in relatively high numbers
- f - fairly common--observed or expected in moderate numbers over most of the site
- u - uncommon--observed or expected in low numbers over a portion or all of the site
- o - occasional--observed or expected only sporadically on the site
- s - scarce--observed or expected rarely on the site

SEASONALITY[2]

- R - resident or found in vicinity year round
- S - present in summer only
- W - present in winter only
- V - visitor from nearby areas
- T - transient

* Non-native

1. This is simply an indication of relative frequency of occurrence onsite; quantitative sampling methods were not employed to arrive at these determinations.
2. This is simply an indication of relative frequency of occurrence onsite; quantitative sampling methods were not employed to arrive at these determinations.

TABLE A-10: KNOWN MAMMALIAN SPECIES OF THE EL SEGUNDO DUNES[1]

DIDELPHIIDAE
Didelphis marsupialis
Virginia opossum

GEOMYIDAE - POCKET GOPHERS
Thomomys bottae bottae
Botta's pocket gopher

CRICETIDAE - NEW WORLD RATS & MICE
Peromyscus boylii rowleyi
brush mouse
Neotoma fuscipes macrotis
dusky-footed woodrat
Microtus californicus stephensi
California vole

MURIDAE - OLD WORLD RATS AND MICE
**Rattus norvegicus*
Norway rat
**Mus musculus*
house mouse

CANIDAE - WOLVES & FOXES
**Vulpes vulpes*
red fox
**Canis familiaris*
domestic dog

PROCYONIDAE - RACCOONS
Procyon lotor psora
raccoon

MUSTELIDAE - WEASELS, SKUNKS, & OTHERS
Mephitis mephitis holzneri
striped skunk

FELIDAE - CATS
**Felis catus*
domestic cat

1. The information in this table is derived from Agresearch (1990, Table 16). It includes species known to exist from surveys conducted in 1975 and 1988, and which are likely to continue to occur. * indicates a non-native species.

Attachment 2

Results of 1995 Spring Surveys for Birds at the Los Angeles International Airport El Segundo Dunes

ATTACHMENT 2

RESULTS OF 1995 SURVEY FOR BIRDS AT THE LOS ANGELES INTERNATIONAL AIRPORT EL SEGUNDO DUNES

Date	Surveyor	Species	Number Observed	Transect
5/12/95	Jim Jennings	American crow	3	East Transect
5/12/95	Jim Jennings	American crow	7	Middle Transect
5/12/95	Jim Jennings	American crow	3	West Transect
5/19/95	Jim Jennings	American crow	5	West Transect
5/26/95	Jim Jennings	American crow	4	East Transect
5/26/95	Jim Jennings	American crow	2	West Transect
6/2/95	Jim Jennings	American crow	30	East Transect
6/2/95	Jim Jennings	American crow	2	West Transect
6/16/95	Jim Jennings	American crow	1	Middle Transect
6/23/95	Jim Jennings	American crow	1	Middle Transect
6/23/95	Jim Jennings	American crow	1	West Transect
		TOTAL SIGHTINGS	54	
5/12/95	Jim Jennings	American kestrel	1	Middle Transect
5/12/95	Jim Jennings	American kestrel	1	West Transect
5/19/95	Jim Jennings	American kestrel	2	East Transect
5/19/95	Jim Jennings	American kestrel	1	Middle Transect
5/26/95	Jim Jennings	American kestrel	1	East Transect
5/26/95	Jim Jennings	American kestrel	2	Middle Transect
6/2/95	Jim Jennings	American kestrel	1	East Transect
6/9/95	Jim Jennings	American kestrel	1	East Transect
6/9/95	Jim Jennings	American kestrel	1	Middle Transect
6/9/95	Jim Jennings	American kestrel	1	West Transect
6/16/95	Jim Jennings	American kestrel	5	East Transect
6/16/95	Jim Jennings	American kestrel	3	Middle Transect
6/16/95	Jim Jennings	American kestrel	1	West Transect
6/23/95	Jim Jennings	American kestrel	1	East Transect
6/23/95	Jim Jennings	American kestrel	3	Middle Transect
6/23/95	Jim Jennings	American kestrel	1	West Transect
6/29/95	Jim Jennings	American kestrel	2	East Transect
6/29/95	Jim Jennings	American kestrel	2	Middle Transect
6/29/95	Jim Jennings	American kestrel	3	West Transect
		TOTAL SIGHTINGS	33	
5/12/95	Jim Jennings	Anna's hummingbird	5	East Transect
5/19/95	Jim Jennings	Anna's hummingbird	3	East Transect
5/26/95	Jim Jennings	Anna's hummingbird	1	East Transect
6/2/95	Jim Jennings	Anna's hummingbird	1	East Transect
6/9/95	Jim Jennings	Anna's hummingbird	2	East Transect
6/9/95	Jim Jennings	Anna's hummingbird	1	West Transect
6/23/95	Jim Jennings	Anna's hummingbird	1	East Transect

		TOTAL SIGHTINGS	14	
5/12/95	Jim Jennings	ash-throated flycatcher	1	Middle Transect
5/19/95	Jim Jennings	ash-throated flycatcher	1	East Transect
5/19/95	Jim Jennings	ash-throated flycatcher	1	Middle Transect
5/26/95	Jim Jennings	ash-throated flycatcher	1	East Transect
6/2/95	Jim Jennings	ash-throated flycatcher	1	Middle Transect
		TOTAL SIGHTINGS	5	
5/25/95	Steve Tabor	barn owl	1	Observed while spotlighting for nocturnal mammals
		TOTAL SIGHTINGS	1	
5/19/95	Jim Jennings	barn swallow	2	East Transect
5/19/95	Jim Jennings	barn swallow	1	Middle Transect
		TOTAL SIGHTINGS	3	
5/12/95	Jim Jennings	California towhee	3	East Transect
5/19/95	Jim Jennings	California towhee	7	East Transect
5/26/95	Jim Jennings	California towhee	5	East Transect
6/2/95	Jim Jennings	California Towhee	4	East Transect
6/9/95	Jim Jennings	California towhee	2	East Transect
6/16/95	Jim Jennings	California towhee	2	East Transect
6/23/95	Jim Jennings	California towhee	2	East Transect
6/29/95	Jim Jennings	California towhee	4	East Transect
		TOTAL SIGHTINGS	29	
6/9/95	Jim Jennings	cliff swallow	9	East Transect
6/16/95	Jim Jennings	cliff swallow	2	East Transect
6/16/95	Jim Jennings	cliff swallow	1	Middle Transect
6/29/95	Jim Jennings	cliff swallow	1	East Transect
		TOTAL SIGHTINGS	13	
5/12/95	Jim Jennings	common raven	1	West Transect
6/2/95	Jim Jennings	common raven	4	West Transect
		TOTAL SIGHTINGS	5	
5/12/95	Jim Jennings	European Starling	16	East Transect
5/12/95	Jim Jennings	European starling	43	Middle Transect
5/12/95	Jim Jennings	European starling	37	West Transect
5/19/95	Jim Jennings	European starling	40	East Transect
5/19/95	Jim Jennings	European starling	32	Middle Transect
5/19/95	Jim Jennings	European starling	39	West Transect
5/26/95	Jim Jennings	European starling	22	East Transect
5/26/95	Jim Jennings	European starling	21	Middle Transect
5/26/95	Jim Jennings	European starling	18	West Transect
6/2/95	Jim Jennings	European starling	33	East Transect
6/2/95	Jim Jennings	European starling	67	Middle Transect
6/2/95	Jim Jennings	European starling	28	West Transect
6/9/95	Jim Jennings	European starling	13	East Transect

6/9/95	Jim Jennings	European starling	37	Middle Transect
6/9/95	Jim Jennings	European starling	23	West Transect
6/16/95	Jim Jennings	European starling	33	East Transect
6/16/95	Jim Jennings	European starling	24	Middle Transect
6/16/95	Jim Jennings	European starling	52	West Transect
6/23/95	Jim Jennings	European starling	20	East Transect
6/23/95	Jim Jennings	European starling	74	Middle Transect
6/23/95	Jim Jennings	European starling	4	West Transect
6/29/95	Jim Jennings	European starling	26	East Transect
6/29/95	Jim Jennings	European starling	63	Middle Transect
6/29/95	Jim Jennings	European starling	64	West Transect
		TOTAL SIGHTINGS	831	
5/26/95	Jim Jennings	hooded oriole	2	Middle Transect
6/9/95	Jim Jennings	hooded oriole	1	West Transect
6/16/95	Jim Jennings	hooded oriole	1	West Transect
6/29/95	Jim Jennings	hooded oriole	2	Middle Transect
		TOTAL SIGHTINGS	6	
5/12/95	Jim Jennings	house finch	17	East Transect
5/12/95	Jim Jennings	house finch	5	Middle Transect
5/12/95	Jim Jennings	house finch	21	West Transect
5/19/95	Jim Jennings	house finch	11	East Transect
5/19/95	Jim Jennings	house finch	17	Middle Transect
5/26/95	Jim Jennings	house finch	15	East Transect
5/26/95	Jim Jennings	house finch	55	Middle Transect
5/26/95	Jim Jennings	house finch	38	West Transect
6/2/95	Jim Jennings	house finch	13	East Transect
6/2/95	Jim Jennings	house finch	101	Middle Transect
6/2/95	Jim Jennings	house finch	23	West Transect
6/9/95	Jim Jennings	house finch	13	East Transect
6/9/95	Jim Jennings	house finch	36	Middle Transect
6/9/95	Jim Jennings	house finch	37	West Transect
6/16/95	Jim Jennings	house finch	4	East Transect
6/16/95	Jim Jennings	house finch	12	Middle Transect
6/16/95	Jim Jennings	house finch	23	West Transect
6/23/95	Jim Jennings	house finch	9	East Transect
6/23/95	Jim Jennings	house finch	55	Middle Transect
6/23/95	Jim Jennings	house finch	24	West Transect
6/29/95	Jim Jennings	house finch	8	East Transect
6/29/95	Jim Jennings	house finch	20	Middle Transect
6/29/95	Jim Jennings	house finch	43	West Transect
		TOTAL SIGHTINGS	602	
5/26/95	Jim Jennings	house sparrow	1	West Transect
		TOTAL SIGHTINGS	1	
5/19/95	Jim Jennings	killdeer	1	East Transect

5/19/95	Jim Jennings	killdeer	2	Middle Transect
		TOTAL SIGHTINGS	3	
5/12/95	Jim Jennings	loggerhead shrike	1	East Transect
5/12/95	Jim Jennings	loggerhead shrike	4	Middle Transect
5/12/95	Jim Jennings	loggerhead shrike	2	West Transect
5/19/95	Jim Jennings	loggerhead shrike	3	East Transect
5/19/95	Jim Jennings	loggerhead shrike	1	West Transect
5/26/95	Jim Jennings	loggerhead shrike	3	East Transect
6/2/95	Jim Jennings	loggerhead shrike	4	East Transect
6/9/95	Jim Jennings	loggerhead shrike	4	East Transect
6/9/95	Jim Jennings	loggerhead shrike	1	Middle Transect
6/9/95	Jim Jennings	loggerhead shrike	1	West Transect
6/16/95	Jim Jennings	loggerhead shrike	3	Middle Transect
6/16/95	Jim Jennings	loggerhead shrike	1	West Transect
6/16/95	Jim Jennings	loggerhead shrike	3	East Transect
6/23/95	Jim Jennings	loggerhead shrike	1	East Transect
6/23/95	Jim Jennings	loggerhead shrike	2	Middle Transect
6/23/95	Jim Jennings	loggerhead shrike	1	West Transect
6/29/95	Jim Jennings	loggerhead shrike	5	East Transect
6/29/95	Jim Jennings	loggerhead shrike	2	Middle Transect
6/29/95	Jim Jennings	loggerhead shrike	2	West Transect
		TOTAL SIGHTINGS	44	
5/12/95	Jim Jennings	mouning dove	12	East Transect
5/12/95	Jim Jennings	mourning dove	16	Middle Transect
5/12/95	Jim Jennings	mourning dove	3	West Transect
5/19/95	Jim Jennings	mourning dove	32	East Transect
5/19/95	Jim Jennings	mourning dove	15	Middle Transect
5/19/95	Jim Jennings	mourning dove	6	West Transect
5/26/95	Jim Jennings	mourning dove	15	East Transect
5/26/95	Jim Jennings	mourning dove	15	Middle Transect
5/26/95	Jim Jennings	mourning dove	7	West Transect
6/2/95	Jim Jennings	mourning dove	17	East Transect
6/2/95	Jim Jennings	mourning dove	1	Middle Transect
6/9/95	Jim Jennings	mourning dove	8	East Transect
6/9/95	Jim Jennings	mourning dove	5	West Transect
6/16/95	Jim Jennings	mourning dove	18	East Transect
6/16/95	Jim Jennings	mourning dove	3	Middle Transect
6/16/95	Jim Jennings	mourning dove	2	West Transect
6/23/95	Jim Jennings	mourning dove	15	East Transect
6/23/95	Jim Jennings	mourning dove	9	Middle Transect
6/23/95	Jim Jennings	mourning dove	1	West Transect
6/29/95	Jim Jennings	mourning dove	10	East Transect
6/29/95	Jim Jennings	mourning dove	5	Middle Transect
6/29/95	Jim Jennings	mourning dove	3	West Transect
		TOTAL SIGHTINGS	213	
5/12/95	Jim Jennings	northern mockingbird	3	East Transect
5/12/95	Jim Jennings	northern mockingbird	1	West Transect
5/19/95	Jim Jennings	northern mockingbird	6	East Transect
5/19/95	Jim Jennings	northern mockingbird	3	Middle Transect
5/19/95	Jim Jennings	northern mockingbird	1	West Transect
5/26/95	Jim Jennings	northern mockingbird	5	East Transect
5/26/95	Jim Jennings	northern mockingbird	5	Middle Transect
6/2/95	Jim Jennings	northern mockingbird	7	East Transect
6/9/95	Jim Jennings	northern mockingbird	3	East Transect
6/9/95	Jim Jennings	northern mockingbird	2	Middle Transect
6/9/95	Jim Jennings	northern mockingbird	1	West Transect
6/16/95	Jim Jennings	northern mockingbird	5	East Transect
6/16/95	Jim Jennings	northern mockingbird	3	Middle Transect
6/16/95	Jim Jennings	northern mockingbird	1	West Transect
6/23/95	Jim Jennings	northern mockingbird	5	East Transect
6/23/95	Jim Jennings	northern mockingbird	1	West Transect
6/29/95	Jim Jennings	northern mockingbird	3	East Transect
6/29/95	Jim Jennings	northern mockingbird	4	Middle Transect
6/29/95	Jim Jennings	northern mockingbird	1	West Transect
		TOTAL SIGHTINGS	60	
6/16/95	Jim Jennings	northern oriole	1	East Transect
		TOTAL SIGHTINGS	1	
5/12/95	Jim Jennings	Pacific-slope flycatcher	1	East Transect
6/2/95	Jim Jennings	Pacific-slope flycatcher	1	Middle Transect
		TOTAL SIGHTINGS	2	
5/19/95	Jim Jennings	red-tailed hawk	2	East Transect
5/26/95	Jim Jennings	red-tailed hawk	1	Middle Transect
6/9/95	Jim Jennings	red-tailed hawk	1	East Transect
6/9/95	Jim Jennings	red-tailed hawk	1	Middle Transect
6/9/95	Jim Jennings	red tailed hawk	1	West Transect
6/16/95	Jim Jennings	red-tailed hawk	1	East Transect
6/16/95	Jim Jennings	red-tailed hawk	2	West Transect
6/23/95	Jim Jennings	red-tailed hawk	2	East Transect
6/23/95	Jim Jennings	red-tailed hawk	2	Middle Transect
6/23/95	Jim Jennings	red-tailed hawk	1	West Transect
6/29/95	Jim Jennings	red-tailed hawk	1	East Transect
		TOTAL SIGHTINGS	15	
5/12/95	Jim Jennings	rock dove	1	Middle Transect
5/12/95	Jim Jennings	rock dove	8	West Transect
5/19/95	Jim Jennings	rock dove	12	West Transect
5/26/95	Jim Jennings	rock dove	5	West Transect
6/9/95	Jim Jennings	rock dove	3	East Transect
6/9/95	Jim Jennings	rock dove	12	West Transect

6/16/95	Jim Jennings	rock dove		2	West Transect
6/23/95	Jim Jennings	rock dove		5	West Transect
6/29/95	Jim Jennings	rock dove		1	Middle Transect
6/29/95	Jim Jennings	rock dove		2	West Transect
		TOTAL SIGHTINGS		51	
5/12/95	Jim Jennings	rough-winged swallow		1	Middle Transect
		TOTAL SIGHTINGS		1	
5/12/95	Jim Jennings	spotted dove		1	East Transect
		TOTAL SIGHTINGS		1	
5/19/95	Jim Jennings	Townsend's warbler		2	West Transect
		TOTAL SIGHTINGS		2	
5/26/95	Jim Jennings	western wood peewee		1	East Transect
		TOTAL SIGHTINGS		1	
5/19/95	Jim Jennings	Wilson's warbler		8	East Transect
5/19/95	Jim Jennings	Wilson's Warbler		3	Middle Transect
5/19/95	Jim Jennings	Wilson's warbler		2	West Transect
		TOTAL SIGHTINGS		13	

environmental compliance
resource management planning

March 4, 1996

MEMORANDUM FOR THE RECORD
JN 1043002.M08

TO: City of Los Angeles Department of Airports
(Mr. Steve Crowther)

FROM: Sapphos Environmental
(Dr. Steve Patterson and Ms. Sharon Coe)

SUBJECT: 1995 Surveys for the El Segundo Blue Butterfly at the Los Angeles International Airport El Segundo Dunes

ATTACHMENTS: (1) Results of 1995 El Segundo Blue Butterfly Surveys of Historically-Surveyed Locations

(2) Results of 1995 El Segundo Blue Butterfly Surveys of Restored Sites

This Memorandum for the Record transmits the results of 1995 surveys for the El Segundo blue butterfly (*Euphilotes battoides allyni*) conducted by Sapphos Environmental at the Los Angeles International Airport El Segundo Dunes (Dunes).

Methods

Surveys for the El Segundo blue butterfly (ESB), a federally-listed endangered species, were conducted between late June and mid-August of 1995. Two sets of surveys were conducted. The first set of surveys were intended to approximately replicate surveys conducted on a yearly basis by Rudi Mattoni in 1984 and from 1986 to 1994 in known habitat of the ESB at the Dunes (Mattoni 1990, Mattoni 1994; Figure 1). The lifespan of an adult ESB is approximately 7 days, so to avoid double-counting of ESB, Mattoni surveyed at approximately 7-day intervals.

A second set of transects were established to survey for the ESB in areas outside the known historically-occupied habitat at the Dunes to determine whether or not the ESB had become established in areas that had undergone habitat restoration beginnning in 1987.

Surveys of Historically-Surveyed Locations

Five reproduceable transects were established by numbering individual coast buckwheat plants growing in close association with one another. Four of the transects were established along the backdune and one was established along the foredune (Figure 1). Ten surveys were conducted by Mr. Gordon Pratt between June 29 and August 29,1995. With one exception, all surveys were conducted at 7-day intervals. The number of adult males, females, and mated pairs of ESB were recorded. Larvae were also recorded, as second, third, or fouth instars.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

Surveys of Restored Sites

To evaluate the establishment of the ESB in restored locations at the Dunes, transects were established in four different settings: a relatively undisturbed site that has not undergone habitat restoration, and sites where habitat restoration was completed in the following years: between 1990-1992; 1993; and1994. A total of seven reproduceable transects were established by numbering individual coast buckwheat plants growing in close association with one another such that each transect included sites that had undergone habitat restoration in different years (Figure 1; Table 2). Three replicate surveys were conducted on August 1, 8, and 15, 1995; a survey conducted on July 27, 1995, did not include all transects. Observations of adult ESB were recorded; adults observed on plants that did not include those selected as sampling points were not included in the totals.

Results

Surveys of Historically-Surveyed Locations

A total of 1240 adults and 205 larvae were observed at 135 sampling points during surveys conducted between June 29 and August 29, 1995. These results do not represent the total population size of the ESB at the El Segundo Dunes, but rather are an index of the number of ESB observed per the number of sampling points.

Table 1:
Results of 1995 El Segundo Blue Butterfly Surveys of Historically-Surveyed Locations

Transect #	Location name	Subsite (s)*	No. of coast buckwheat clumps (=sampling points)	Total No. Adults Observed	Total No. Larvae Observed
1	"VOR backdune"	19/20	30	133	49
2	"Trailer backdune"	2/4	15	335	35
3	"nr. Sign backdune"	11/12	30	290	44
4	"nr. front gate"	1/3	30	386	71
5	"VOR foredune"	22/31, 23/24	30	96	6
				1240	205

* Transects were established on the interface between two subsites

Results of 1995 El Segundo Blue Butterfly Surveys of Restored Sites

Surveys of ESB conducted in restored habitat of the ESB resulted in observations of 31 adults; 36 additional adults were observed on plants did not include those selected as sampling points (Table 2).

Table 2:
Results of 1995 El Segundo Blue Butterfly Surveys of Restored Sites

Subsite	Transect Points	Year sub-site was restored	Date Survey Conducted			
			7/27/95	8/1/95	8/8/95	8/15/95
36N	A6-A10 B6-B10 C6-C10	1994	– – –	0 1 0	0 0 0	1 0 0
41N	D6-D10	1994	0	0	0	1
44S	E6-E10	1994	0	0	0	0
		TOTAL	**0**	**1**	**0**	**2**
13, 14	F1-F5	1993	3	0	0	0
36S	A1-A5 B1-B5 C1-C5	1993	0 4 1	2 0 1	1 1 0	0 0 1
45S	G6-G10	1993	–	0	0	0
		TOTAL	**5**	**3**	**2**	**1**
8 (north)	E1-E5	1990-1992	1	0	1	0
8 (south	D1-D5	1990-1992	3	4	2	0
6, 7	G1-G5	6 is undisturbed; 7 is 90-92	–	1	2	0

Recommendations

Repeated surveys each year along the five sites that approximate the locations surveyed by Mattoni in the late 1980's through the mid-1990's produces data that are comparable between years and therefore, is a valuable tool in monitoring changes in relative numbers of ESB at the sites surveyed. Any changes in relative numbers of ESB observed could be compared to surveys conducted at other locations where the ESB occurs (either on the Dunes, or elsewhere). In addition, the information gained contributes to the overall understanding of the sub-species. It is therefore recommended that surveys of these five transects be repeated in future years over the same period.

Surveys conducted in restored habitat indicate that ESB have colonized these areas, and it is therefore recommended that surveys be repeated in future years to monitor changes, if any, in the numbers of ESB in restored portions of the Dunes. Such results, when compared over several years, could track the rate at which the ESB colonizes areas where habitat restoration has taken place. Based on the observation of thirty-six ESB on plants that were not selected as sampling points, increasing the number of plants sampled would likely produce ________ results.

References

Mattoni, R.H.T. 1994. "El Segundo Sand Dunes Revegetation at LAX." Prepared by R.H.T. Mattoni, Agresearch, Inc., 9620 Heather Road, Beverly Hills, California, 90210. Prepared for the City of Los Angeles, Environmental Affairs Department, Contract C-86086.

Mattoni, R.H. T. 1990. "Species Diversity and Habitat Evaluation Across the El Segundo Sand Dunes at LAX." Prepared by R.H.T. Mattoni, Agresearch, Inc., 9620 Heather Road, Beverly Hills, California, 90210. Prepared for The Board of Airport Commissioners, One World Way West, Los Angeles, California, 90009.

Mattoni, R. H.T. 1990 [1992]. "The Endangered El Segundo Blue Butterfly." *The Journal of Research on the Lepidoptera*. 29(4): 277-304.

Pollard, E. 1982. Monitoring Butterfly Abundance in Relation to the Management of a Nature Reserve. *Biological Conservation*. 0006-3207/82/0024-317, pp.317-328. England: Applied Science Publishers, Ltd.

Pollard, E. 1977. "A Method for Assessing Changes in the Abundance of Butterflies." *Biological Conservation*. Volume 12. England: Applied Science Publishers, Ltd.

Sapphos Environmental. 1995a. Summary of data and field notes for 1995 surveys for El Segundo blue butterfly at El Segundo Dunes. Prepared by Hawks Biological Consulting (G. Bruyea), 1946 Prince Albert Drive, Riverside, California, for Sapphos Environmental, 50 S. DeLacey, Suite 210, Pasadena, California.

Sapphos Environmental. 1995b. Summary of results of of 1995 field surveys for El Segundo Blue butterfly at El Segundo Dunes. Prepared by Hawks Biological Consulting (G. Pratt), 1946 Prince Albert Drive, Riverside, California, for Sapphos Environmental, 50 S. DeLacey, Suite 210, Pasadena, California.

Thomas, J.A. 1983. "A Quick Method for Estimating Butterfly Numbers During Surveys." *Biological Conservation*. Volume 27: 195-211. England: Applied Science Publishers, Ltd.

3:01043-00229

El Segundo Dunes Insect Collection

Entomology Department, Los Angeles County Museum

27 January 1996

David C. Hawks
Hawks Biological Consulting
1946 Prince Albert Drive
Riverside, CA 92507
Tel. & FAX: 909-784-6951

Following are records pertinent to the Sapphos Environmental database on El Segundo Dunes insects obtained by David C. Hawks on 6 January, 1996, during a research visit to the Entomology Department of the Los Angeles County Museum of Natural History. It appears that most El Segundo Dunes (ESD) specimens, including older specimens mainly collected by Pierce and those collected by AgResearch employees (mainly D.C. Hawks) in 1987-88, are present, although poorly curated. A number of specimens are in the possession of specialists who received the material from Mattoni for identification purposes. The LACM Entomology Department plans to incorporate this material into the main collection, which will make many of the ESD specimens (especially undetermined specimens) somewhat difficult to locate in the future. However, retrieving data from these specimens, especially those considered to be sensistive, has been accomplished for the present purposes of LAX and Sapphos, to my knowledge. The primary objective of the 6 January visit was to examine all specimens of sensitive species, including those in the main LACM collection not from ESD, for phenology, life history data, and distribution (both on ESD and elsewhere). Following are telegraphic accounts for each species for which these kinds of data exist.

Psammobotys fordi Munroe. Adults all from March, all old records, all from ESD, no life history data.

Eucosma hennei Clarke. Adults from Sept. - Oct., many reared ex larvae from *Phacelia ramosissima* and *P. tanacetifolia* stems (bores through stems), old and recent ('87-'88, site 19) records, all from ESD.

Carolella busckana Comstock. Adults from Oct. - Jan. (mostly Oct. - Nov.), many reared ex larvae from galls in stems of *Encelia californica*, all old records, also known from Del Mar, S.D. Co.; San Diego; Beverly Terrace, L.A. Co. This species may be extinct on the dunes, as *E. californica* had nearly been extirpated (only a few individuals remaining) in '87-'88. However, it may be fairly widely distributed, but rarely collected, elsewhere.

Notes on "Table 1, Sensitive Species ... L. A. Airport Master Plan Area" document dated January 2, 1996:

Brennania belkini was still present as of 1995 (sightings by G. F. Pratt). Apparently doing well, as was the case in 1987-88.

Cicindela hirticollis gravida (common name: Sandy Beach Tiger Beetle) should not be considered extirpated from the ESD. I believe that any specimens labeled ESD by Pierce represents sloppy labeling as this species is strictly a beach inhabitant. He probably collected his specimens on the beach adjacent to the Dunes (not LAX property). In my experience and in the literature, adults of *C. h. gravida* are never found very far from damp beach sand, and the larvae live in burrows in the damp sand.

Eucosma hennei (note typo in "*hennai*"). Reword to say "Possibly not a sand-dune obligate." Its hostplant suggests that it may not be, but we don't know for sure.

Onychobaris langei. Only old specimens were found in the ESD collection. We may not have found it in '87-'88. Since only three specimens exist at LACM, this species may be extremely difficult to collect (and/or identify), and not necessarily sensitive.

Comadia intrusa Barnes & Benjamin. Adults from June - July, old and recent ('87-'88, sites 3, 16, 19, 54), larvae believed to bore through woody stems of *Lupinus chamissonis*, also from Santa Monica, Venice, Redondo Beach, Tujunga.

Euxoa riversii (Dyar). Adults May 1956 only, west slope ESD, netted at night visiting *Chaenactis* flowers, known to be a sand dune obligate, only 12 specimens in LACM, known from San Diego to Santa Barbara in coastal dunes.

Copablepharon sanctaemonicae Dyar. Adults June - Sept., old and recent ('87-'88, sites 3, 19), also known from Costa Mesa, Balboa, Ventura, Santa Barbara.

Trigonoscuta dorothea Pierce. Adults every month, collected on *Erysimum, Chaenactis, Phacelia, Ambrosia, Lupinus, Ericomeria*, old and recent ('87-'88, sites 3, 5, 19, 31, 32, 33), also from Playa del Rey Dunes.

Onychobaris langei Van Dyke. Aug. & Oct., Three specimens only in LACM, 2 from ESD, 1 from Manhattan Beach, collected on *Oenothera cheiranthifolia* and *Eriogonum parvifolium*.

Smicronyx celaenus Pierce. Adults in June, all from ESD, all old, collected on *Cuscuta californica*.

Smicronyx elsegundensis Pierce. Same as for *S. celaenus*.

Psammodius mcclayi Cartwright. No ESD records in LACM. Two records, Los Angeles; Newport Beach; June.

Aegialia convexa Fall. No ESD records in LACM. Records from Playa del Rey Dunes, Ventura Co. and S.L.O. Co., Jan. - Feb.

Coelus globosus. Adults Mar.- Aug., old and recent ('87-'88, sites 23, 34, 52), sand dune obligate, burrows through sand, detritivore.

Brennania belkeni (Philip). Adults May - Aug., old and recent ('87-'88, sites 1, 3, 7, 19, 22, 31, also known from Playa del Rey Dunes and Inglewood.

BASELINE INVENTORY FOR SMALL MAMMALS AND CARNIVORES AT THE LOS ANGELES AIRPORT EL SEGUNDO DUNES RESTORATION PROJECT SITE, LOS ANGELES COUNTY, CALIFORNIA

Prepared For:

Steve Patterson, Ph.D.
Sapphos Environmental
50 DeLacey Street, Suite 210
Pasadena, California 91105

(818) 683-3547

Prepared by:

Stephen P. Tabor
TWS - Certified Wildlife Biologist
BioEnvironmental Associates
4209 Lantados Street, Suite A
Bakersfield, CA 93307

(805) 831-0229

JULY 1995

EXECUTIVE SUMMARY - ABSTRACT

As part of efforts to inventory fauna of the El Segundo Dunes restoration area, we conducted small mammal trapping, spotlight surveys, and daytime transect surveys for mammals at the site during May 1995. We used 205 Sherman live traps and 12 pitfall traps to survey for small mammals.

We trapped a total of 18 small mammals during a total of 765 trapnights with Sherman live traps. Small mammal species that we captured in Sherman traps included house mouse (*Mus musculus*) and woodrat (*Neotoma lepida*). Two of the three individual woodrats captured were previously marked with metal eartags. We captured three individual woodrats at a single clump of cactus (*Opuntia* sp.) at one location within the southwest portion of the study site.

We did not capture small mammals during a 36 trap night effort with pitfall traps. We captured side blotched lizards (*Uta stansburiana*) and alligator lizard (*Gerrhonotus multicarinatus*). Pitfall traps were three gallon size plastic buckets that were buried in appropriate habitat with the rim of the bucket at the surface level of the ground. Burrows and diggings of pocket gophers (*Thomomys bottae bottae*) are common and are distributed throughout the study area. We recovered skull remains of this species from scats of red foxes at the project site.

We observed three free ranging domestic house cats (*Felis catus*), seven sightings of red fox (*Vulpes vulpes*) and one Barn Owl (*Tyto alba*) during nocturnal spotlight surveys. We recorded six red fox dens and numerous locations of red fox scat during our daytime surveys conducted for mammals at the project site. Although we observed domestic dogs (*Canis familarius*) outside but along the property boundary, we did not record this species within the project site. We did not record lagomorphs during our surveys nor did we capture *Peromyscus boylii*, *Reithrodontomys megalotis* or *Rattus norvegicus*. These species were trapped during 1993 at the project site. It is unlikely that the Pacific pocket mouse (*Perognathus longimembris pacificus*) and the ornate shrew (*Sorex ornatus salicornicus*) exist at the site in its current condition.

INTRODUCTION

PROJECT LOCATION, DESCRIPTION, AND ENVIRONMENTAL SETTING

The El Segundo Dunes restoration project area is owned by the Los Angeles International Airport and is more specifically described as an approximate 200 acre portion of the coastal dunes that is bordered on the south side by Imperial Highway, on the east side by Pershing Drive, and on the west side by Vista Del Mar Boulevard. Vista Del Mar Boulevard separates the dunes from the beach front of the Pacific Ocean (Figure 1). Sandpiper Street is located approximately 1/4 mile north of the project site but crosses the coastal dunes from Pershing Drive to Vista Del Mar Boulevard. The project site is enclosed by cyclone fencing and is under security patrol by airport authorities. The project site is "off-limits" to the general public. Efforts are ongoing to restore the dune to a native condition. Recommendations to provide quantitative monitoring of mammals, amphibians, reptiles, birds, native plant communities, and the El Segundo blue butterfly are contained within the long-term management plan for the dunes (Environmental Science Associates and Sapphos Environmental 1994). Photographs of the project site are presented in Figure 2.

The restoration area of the El Segundo Dunes is referred to as the project site within this report. The project site was a housing development until the airport purchased the land. Home owners were relocated during the late 1960s. The project site is directly under the take-off flight path of the airport and receives considerable noise levels. There are no houses or vacant buildings at the project site. A research trailer and airport directional guidance facilities currently are present at the site. Asphalt roads are present throughout the project site. Discarded household, fishing and "picnicking" trash is common along the ocean side fence of the project site.

This report presents results of surveys that we conducted for mammals during late May 1995 at the restoration site. The purpose of this report is to provide base-line information on mammals that occur currently within the restoration site.

Sensitive Wildlife Species

We identified sensitive wildlife species that have been previously recorded and/or could potentially reside on and around the vicinity of the project site (Tables 1). The tables were adapted from the Long-term management plan for the dunes (Environmental Science Associates and Sapphos Environmental 1994 and Maldonado 1994). Other sensitive wildlife species that could occur within the project site on an infrequent basis, i.e., during migration, are not included in this list. The lists were compiled using records of the California Natural Diversity Data Base (CNDDB) (CDFG 1994), and from local consulting reports (i.e, Maldonado 1994). We also used our knowledge of indigenous sensitive species distributions and habitat preferences in relation to the project area.

Figure 1. Regional location of the Los Angeles Airport El Segundo Dunes Preserve study site, Los Angeles County, California. Figure modified from Thomas Brothers Maps, 1992.

Project Site

Figure Not To Scale

Figure 2. Photographs of the Los Angeles Airport El Segundo Dunes Preserve and Habitat Restoration study site. The upper photographs are views looking north (photograph A) and south (photograph B) through coastal dune habitat on the project site. Mammal surveys that included small mammal trap lines and spotlight surveys were distributed throughout the dune habitat of the project site. Photograph C is a view of a cactus clump that was sampled for small mammal use. Pitfall traps that were used to survey for shrews are shown in photographs C and D. Photograph D is a view of a captured woodrat (*Neotoma lepida*) at a cactus clump adjacent to dense grasses in the southwest portion of the project site. A Sherman live-catch trap is shown in photograph D.

TABLE 1. List of mammals of the El Segundo Sand Dunes. Column PF indicates whether there is a record of a nearby Pleistocene fossil (P) or not (O), and R if residency is based upon foraging (F) or breeding (B). 1938/9 data from von Bloeker (Pierce 1938-1939), 1975 data from LAX EIR and 1988 is data from Mattoni, 1990, and 1993 data from Maldonado (Table modified from Mattoni, 1990).

COMMON NAME	SCIENTIFIC NAME	PF	R	1938-39	1975	1988	1993
Ornate Shrew	*Sorex ornatus salicornicus*	P	B	P	P	O	O
California Mole	*Scapanus latimanus occultus*	P	B	P	P	O	O
California Leaf-nosed Bat	*Macrotus californicus californicus*	O	F	-	O	O	-
California Myotis	*Myotis californicus californicus*	O	F	-	P	O	-
Big Brown Bat	*Eptesicus fuscus bernardinus*	O	F	-	P	O	-
Red Bat	*Lasiurus borealis teliotus*	O	F	-	P	O	-
Hoary Bat	*Lasiurus cinereus cinereus*	O	F	-	P	O	-
Pallid Bat	*Antrozous pallidus pallidus*	O	F	-	P	O	-
Mexican Free-tailed Bat	*Tadarida brasiliensis mexicana*	O	F	-	P	O	-
Western Mastiff Bat	*Eumops perotis californicus*	O	F	-	P	O	-
Desert Cottontail	*Sylvilagus audoboni sanctidiegi*	P	B	P	P	O	O
Black-tailed Jack Rabbit	*Lepus californicus bennetti*	P	B	P	P	O	O
California Ground Squirrel	*Spermophilus beecheyi beecheyi*	P	B	P	P	O	O
Botta's Pocket Gopher	*Thommomys bottae bottae*	P	B	P	P	P	P*
Pacific Pocket Mouse	*Perognathus longimembris pacificus*	O	B	P	P	O	O
Agile Kangaroo Rat	*Dipodomys agilis agilis*	P	B	P	P	O	O
Western Harvest Mouse	*Reithrodontomys megalotis limicola*	P	B	P	P	O	P
Deer Mouse	*Peromyscus maniculatus gambelii*	P	B	P	P	O	O
Brush Mouse	*Peromyscus boylii rowleri*	O	B	P	P	O	P
Southern Grasshopper Mouse	*Onychomys torridus ramona*	P	B	P	O	O	O
Dusky Footed Woodrat	*Neotoma fuscipes*	P	B	P	P	O	O
Desert Woodrat	*Neotoma lepida intermedia*	P	B	P	O	O	P
California Vole	*Microtus californicus stephensi*	P	B	O	P	P	P*
Coyote	*Canis latrans ochropus*	P	B	P	O	O	O
Gray Fox	*Urocyon cinereoargentus californicus*	P	B	O	O	O	O
Racoon	*Procyon lotor psora*	P	B	P	O	O	O
Long-tailed Weasel	*Mustela frenata latirostra*	P	F	P	P	O	O
Badger	*Taxidea taxus jeffersonii*	P	F	O	O	O	O
Western Spotted Skunk	*Spilogale gracilis phenax*	P	F	P	O	O	O
Striped Skunk	*Mephitis mephitis holzneri*	P	B	O	P	P	P*
Bobcat	*Felis rufus californicus*	P	F	P	O	O	O
California Grizzly Bear	*Ursus arctos californicus*	P	F	O	O	O	O
Mule Deer	*Odocoileus hemionus californicus*	P	F	O	O	O	O
INTRODUCED SPECIES							
Common Opossum	*Didelphis virginiana*	O	F	P	P	P	P*
House Mouse	*Mus musculus*	O	B	O	P	O	P
Norway Rat	*Rattus norvegicus*	O	B	O	P	O	P
Red Fox	*Vulpes vulpes*	O	B	O	O	P	P*
Domestic Dog	*Canis familiaris*	O	F	O	P	P	P*
Domestic Cat	*Felis catus*	O	F	O	P	P	P*

* Indicates that animals were recorded present by indirect evidence (i.e. skull fragments in owl pellets, road kills, burrows, scat or tracks).

For the purpose of this report, the term "sensitive wildlife species" refers to taxa that are listed as threatened or endangered by the United States Fish and Wildlife Service (USFWS) or the California Department of Fish and Game (CDFG 1994, USFWS 1994) and/or those species listed as California Species of Special Concern by the state of California. The section below contains brief descriptions of each of these sensitive wildlife species.

Ornate Shrew - Southern California Salt Marsh Shrew

This subspecies of the ornate shrew (*Sorex ornatus salicornicus*) is confined to coastal marshes in Los Angeles, Orange, and Ventura counties. Records for this subspecies occur in saltmarsh habitat that extends from Point Mugu, Ventura County on the North to Anaheim Bay and Newport Beach in Orange County on the south. Shrews are insectivorous and probably forage for amphipods, isopods, insects, arachnids, and other invertebrates in coastal marsh areas. The project site has habitat that is high enough in elevation to afford protection from flooding of seasonal high tides and periodic storms. However, shrews usually require moist areas and this may be a limiting factor at the project site. The status of this subspecies is currently unknown. *Sorex ornatus salicornicus* is a federal category 2 candidate species and a California species of special concern.

Pacific Pocket Mouse

This subspecies of pocket mouse (*Perognathus longimembris pacificus*) is a small bodied granivore. It will plug it's burrow during the day for conservation of inside burrow temperatures and/or for protection from predators. A reduction in suitable habitat is the main reason for declines of this subspecies. A population of approximately 40 individuals was discovered south of the project site in Orange County (Dana Point Headlands) during 1993. This subspecies is listed as a federal endangered species and is a California species of special concern.

American Badger

American badgers (*Taxidea taxus*) are medium-size, mostly nocturnal, fossorial carnivores. They inhabit arid grasslands and deserts and prey on small mammals such as ground squirrels and gophers (Ingles 1965, Burt and Grossenheider 1976). Badgers historically occurred throughout the state except for the humid northwest (Long 1973). Conversion of grasslands to agriculture, rodent and predator control programs, and deliberate killing have contributed to California badger population declines (Williams 1986). American badgers are listed as a California species of special concern and they have no federal status. They have been recorded in the fossil record at the project site (Table 1).

METHODS

We surveyed the project site (Figure 2) on 24-28 May 1995 for mammals using modifications of standard agency approved methods (CDFG 1990, Orloff 1987, Tollestrup 1976, USFWS 1989). We used guidelines found within the California Burrowing Owl Consortium (1993) to survey for burrowing owls and their sign and burrows. Specific observations of mammal species or their use of the habitat were recorded in reference to their location within the project site. Surveys were conducted to identify the following:

1. Suitability of habitat(s) to support mammals
2. Sensitive mammal species and their habitats
3. Presence of known and potential red fox (*Vulpes vulpes*) dens
4. Sightings, burrows, and "sign", of sensitive small mammal species
5. Vegetation association and habitat types
6. Habitat condition and quality
7. On-site, adjacent, and surrounding land uses

We surveyed the project site by walking parallel meandering transects spaced 30-50 ft apart in selected areas of the project site to identify and map red fox dens and sign of mammal species. Presence of species was confirmed by direct observations, or by identification of "sign" (tracks, scats, burrows) unique to a particular species. Individual survey techniques are described below.

Small Mammals

We surveyed the project site for small mammals by three methods. We set Sherman live-catch small mammal traps throughout the project site. We baited the traps with a mixture of bird seed and rolled oats at dusk and checked traps in the mornings. We placed paper towels and additional bait in the traps to provide rodents with nesting material and additional food to lessen the risk of hypothermia. Sherman traps were placed at 10-20 meter spacings along transect lines throughout the project site (Figure 3).

We also set pitfall traps in appropriate habitat to survey for shrews and voles (*Microtus* spp.) at the project site. Pitfall traps were three gallon size plastic buckets that were buried in appropriate habitat with the rim of the bucket at the surface level of the ground. Pitfall traps were checked three times each day.

We surveyed the project site by walking parallel meandering transects spaced 30-50 ft apart along small mammal trap lines throughout the project site to identify and map burrows and "sign" (tracks, scats, burrows) of small mammals at the project site.

Red Fox

We conducted daytime ground surveys for red fox dens and "sign" within the project site. We conducted surveys along transects spaced 30-50 ft apart along small mammal trapping lines (Figure 3) within the project site following modifications of the survey protocol of CDFG Approved Survey Methodologies for Sensitive Species (CDFG 1990). We recorded and mapped on a base map locations of all red fox dens recorded during our surveys along the 30-50 ft strip width along small mammal trap lines. In addition, we used knowledge gained from past experiences working with red fox dens and their "sign" (tracks, scats, etc.) in order to assess the suitability of the project site and surrounding lands to support red foxes. We classified underground burrows according to the following USFWS kit fox den definitions (USFWS 1989):

Known Den: Any existing natural den or man-made structure for which conclusive evidence or strong circumstantial evidence can be shown that the den is used or has been used at any time in the past by San Joaquin kit fox.

Potential Den: Any natural den or burrow within the species' range that has entrances of appropriate dimensions (5 to 8 inches in. diameter) to accommodate San Joaquin kit foxes for which, however, there is little to no evidence of kit fox use.

Pupping Den: Any known San Joaquin kit fox den (as defined - see above) used by kit foxes to whelp and/or rear their pups.

Atypical Den: Any known San Joaquin kit fox den that has been established in, or in association with, a man-made structure.

Additional evidence of the presence of red fox consisted of scat and tracks. Scat measuring 18-22 mm in diameter of appropriate canid shape was attributed to red fox. No other vulpid is known to inhabit the project area, and scats larger than 25 mm in diameter probably belong to coyote (*Canis latrans*) or domestic dog (*Canis familiaris*). Canid tracks up to 45 $\times$ 38 mm in size were attributed to red fox. Tracks larger than this are probably attributable to coyote or domestic dog (Muric 1974).

We conducted spotlight surveys for nocturnal mammals at the project site by driving existing roads within the project site and using a hand-held 450,000 candle power spotlight to observe wildlife species at night. Red foxes were commonly observed throughout the project site during spotlight surveys.

We did not use scent stations and/or track plate boxes (Zielinski 1993, R. Golightly - personal communication), to detect presence of red foxes on the site. Track plate boxes consist of rectangular wooden boxes with a sooted sheet metal plate that is placed on the floor of the box. White contact paper is placed onto a portion of the sooted plate. The soot on the metal plate acts a tracking medium. Mammals are attracted into the boxes by the presence of bait (sardines or commercial canned cat food, etc.) that is placed at the back of the box. The animal enters the box and walks over the sooted plate leaving its tracks on the contact paper. Because red fox sightings, dens and tracks were common throughout the project site we did not use this method.

OTHER WILDLIFE SPECIES

We surveyed for evidence of sensitive mammal species (i.e, American badger, ornate shrew, Pacific pocket mouse) while conducting daytime meandering belt transect surveys. This consisted of recording sightings of the species and/or their "sign", burrows, and nests (i.e, voles).

RESULTS AND DISCUSSION

Results of our surveys for mammals are presented below. Table 2 presents capture data for small mammals at the project site. Photographs in Figure 2 are of habitat found within the project area. Photographs C and D in Figure 2 show areas that were focused on for trapping a particular species (i.e, woodrat). Locations of mammals that we observed during our surveys, and locations of Sherman live-catch traplines and pitfall traps are presented in Figure 3.

Red Fox

We recorded six red fox dens (Figure 3) and numerous locations of red fox scat during our daytime surveys conducted for mammals at the project site. Although we observed domestic dogs (*Canis familarius*) and their scats outside but along the property boundary, we did not record this species within the project site. An abundant prey base for red fox exists at the project site. We observed remains of alligator lizard (*Gerrhonotus multicarinatus*), bird remains (species unidentified), and fast food wrappers and food scraps at one of the red fox dens.

We observed three free ranging domestic house cats (*Felis catus*), seven sightings of red fox (*Vulpes vulpes*) and one Barn Owl (*Tyto alba*) during nocturnal spotlight surveys (Figure 3). Red fox appear to be well established at the project site and may have contributed to a reduction in numbers and diversity of small mammals.

Table 2. Small mammals trapped at the El Segundo Dunes Restoration project study site during May 1995 in Los Angeles County, California.

Date	Trap Nights, Species Captured, Sex, Age, Reproductive Condition, Weight, and Location
5-25-95	150 TN (no captures, no traps sprung)
5-26-95	205 TN (3 captures, 1 species, 4 traps sprung) Mumu, male, adult, scrotal, 16.0 gr, cactus patch #1 Mumu, male, adult, nonscrotal, 15.5 gr, grid 39N Mumu, female, adult, NVP, MNP, VC, 14.0 gr, research trailer storage shed
5-27-95	205 TN (8 captures, 2 species, 9 traps sprung) Mumu, male, adult, nonscrotal, 14.0 gr, research trailer storage shed Mumu, male, adult, nonscrotal, 14.5 gr, VOR grid 19 Mumu, male, adult, nonscrotal, 17.0 gr, grid 29 Nele, female, adult, NVP, MNP, VC, 116.0 gr, cactus patch #2 (short tailed) Nele, female, adult, NVP, MNP, VC, 147.0 gr, cactus patch #2 (ET #75) Nele, female, adult, NVP, MNP, VC, 131.0 gr, cactus patch #2 (ET #100) Mumu, male, adult, scrotal, 16.0 gr, cactus patch #1 Mumu, male, adult, nonscrotal, 15.0 gr, cactus patch #1
5-28-95	205 TN (7 captures, 2 species, 7 traps sprung) Mumu, female, adult, NVP, MNP, VC, 13.5 gr, research trailer Mumu, male, adult, nonscrotal, 12.0 gr, cactus patch #1 Mumu, male, juvenile, nonscrotal, 9.0 gr, cactus patch #1 Nele, female, adult, NVP, MNP, VC, previously weighed, cactus patch #2 (ET #100) Nele, female, adult, NVP, MNP, VC, previously weighed, cactus patch #2 (short tailed) Nele, female, adult, NVP, MNP, VC, previously weighed, cactus patch #2 (ET #75) Mumu, female, NVP, MNP, VC, 12.0 gr, grid 29

Legend: Mumu - *Mus musculus*, Nele - *Neotoma lepida*, NVP - not visibly pregnant, MNP - mammae not prominent, VC - vagina closed, ET - Ear Tag (i.e., ET #75)

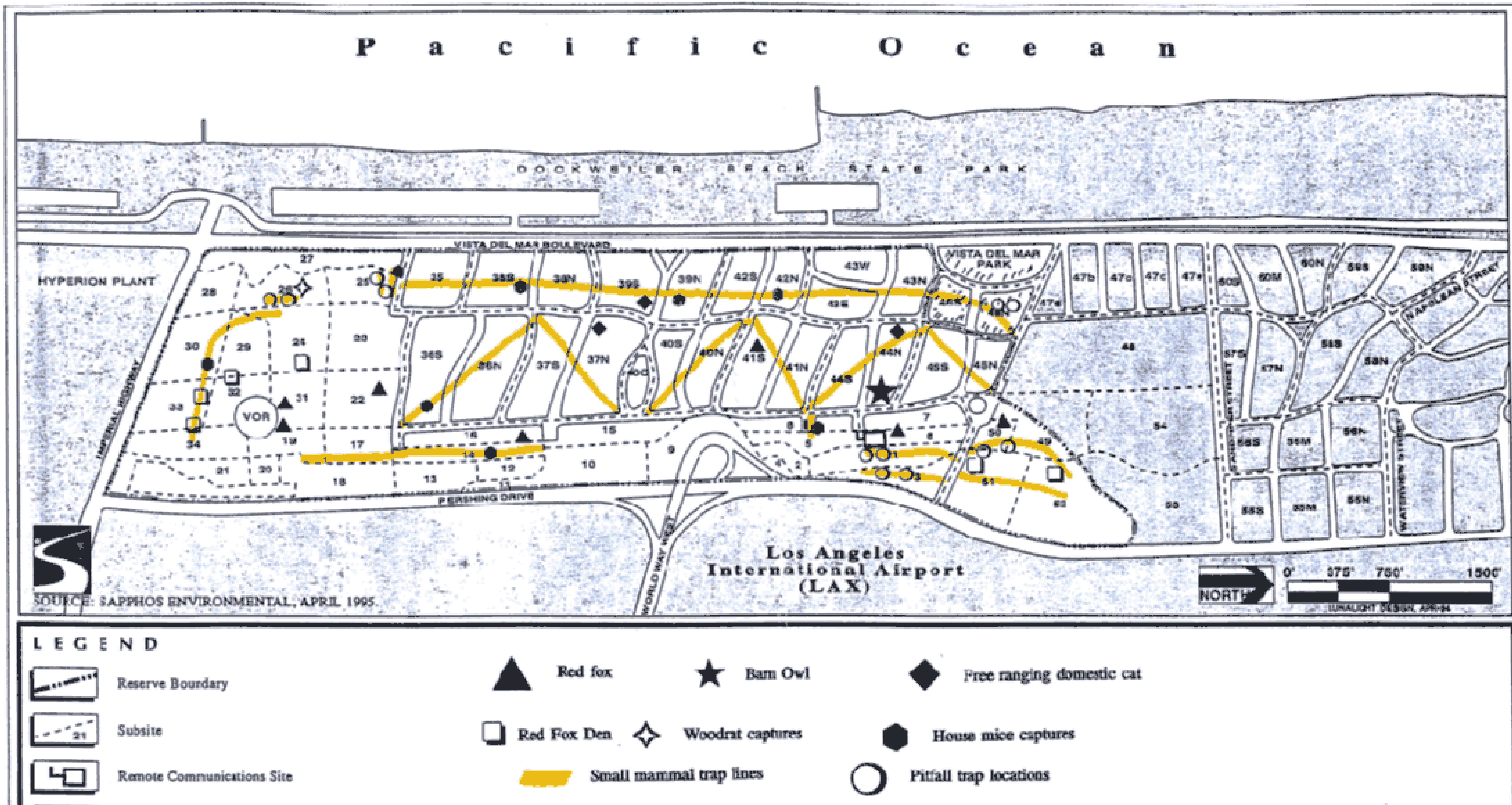


Figure 3. Locations of small mamrnal trap lines, pitfall traps, and sightings of mammals and a Barn Owl recorded during May 1995 surveys conducted for mammals at the Los Angeles Airport El Segundo Dunes Preserve and Habitat Restoration study site, Los Angeles County, California. Spotlight surveys were conducted along all existing roads within the project site. Base figure adapted from Sapphos Environmental, April 1995.

Small Mammals

We set 205 Sherman live traps and 12 pitfall traps to survey for small mammals. We trapped a total of 18 small mammals during a total of 765 trap nights with Sherman live-catch traps. Small mammal species that we captured in Sherman traps included house mouse (*Mus musculus*) and woodrat (*Neotoma lepida*). Two of the three individual woodrats captured were previously marked with metal eartags. We captured three individual woodrats at a single clump of cactus (*Opuntia* sp) at one location within the southwest portion of the study site.

We did not capture small mammals during a 36 trap night effort with pitfall traps. However, we captured side blotched lizards (*Uta stansburiana*), alligator lizard (*Gerrhonotus multicarinatus*) and numerous arthropods in pitfall traps. Pitfall traps were three gallon size plastic buckets that were buried in appropriate habitat with the rim of the bucket at the surface level of the ground.

We did not record lagomorphs during our surveys nor did we capture *Peromyscus boylii*, *Reithrodontomys megalotis* or *Rattus norvegicus* that had been trapped during 1993 at the project site. Burrows and diggings of pocket gophers (*Thomomys bottae bottae*) are common and are distributed throughout the study area. We recovered skull remains of this species and house mouse skull fragments from scats of red foxes at the project site.

It is unlikely that the Pacific pocket mouse exists at the site in its current condition. Although our trapping success was low (average over the 4 night period=2.4 percent) most of the small mammals captured were house mice (67 percent). Overall trapping success was lower during our surveys than that of Maldonado (1994) but the percent of house mouse within the species captured remained high. House mice have become established at the project site and have most likely displaced other small mammal species. House mice have been shown to be generalists and have displaced other small mammal species such as *Peromyscus* and *Reithrodontomys* (Ingles 1965).

We found no evidence of kangaroo rats inhabiting the project site. It is possible that densities of plants in some areas of the project site are limiting to kangaroo distribution. This has been shown for the giant kangaroo rat (Williams 1980).

We found no evidence of shrews at the project site during our pitfall trapping efforts. The project site has some habitat suitable for *Sorex ornatus salicornicus*. Most of the project site contains habitat that is high enough in elevation to afford protection from flooding of seasonal high tides and periodic storms. However, most shrews usually require moist areas and this may be a limiting factor at the project site as there are few locations with suitable moisture.

INCIDENTAL WILDLIFE

We recorded the following wildlife species during our surveys for mammals at the project site: raccoon (*Procyon lotor*) tracks, side-blotched lizard (*Uta stansburiana*), alligator lizard (*Gerrhonotus multicarinatus*), gopher snake (*Pituophis melanoleucus*), California horned lizard (*Phrynosoma coronatum*), Loggerhead Shrike (*Lanius ludovicianus*), Kestrel (*Falco sparverius*), House Finch (*Carpodacus mexicanus*), Mourning Dove (*Zenaida macroura*), Red-tailed Hawk (*Buteo jamaicensis*), Western Kingbird (*Tyrannus verticalis*), Cliff Swallow (*Hirundo pyrrhonota*), and killdeer (*Charadrius vociferus*). In addition, we observed scats of red fox (*Vulpes vulpes*), free-ranging domestic dog (*Canis familiaris* - along the fence of Vista Del Mar Boulevard), and domestic house cat (*Felis catus*).

LITERATURE CITED AND REFERENCES CONSULTED

Braun, S. E. 1985. Home range and activity patterns of the giant kangaroo rat, *Dipodomys ingens*. J. Mamm. 66(1):1-12.

Burt, W. B. and R. P. Grossenheider. 1976. A field guide to the mammals. Houghton Mifflin Co. Boston, MA 289 pp.

California Burrowing Owl Consortium. 1993. Burrowing owl survey protocol and mitigation guidelines. Unpubl. Rpt. by the California Burrowing Owl Consortium. 15 pp.

California Department of Fish and Game. 1980. At the crossroads, a report on the status of California's Endangered and rare fish and wildlife. (Amended July 1983). State of California Resources Agency, Sacramento, CA 147 pp.

California Department of Fish and Game. 1990. Region 4 Survey methodologies for San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, Tipton kangaroo rat, giant kangaroo rat. Compiled by R. Rempel and G. Presley.

California Department of Fish and Game. 1994. California Natural Diversity Data Base Records.

California Department of Fish and Game. 1994. Natural Diversity Data Base Special Animals. August 1994.

Cheatham, N. H. and J. R. Haller. 1975. An annotated list of California habitat types. Unpublished manuscript prepared for the University of California Natural Land and Water Reserves System. 80 pp.

Dragoo, J. W., J. R. Choate, T. L. Yates, and T. P. O'Farrell. 1990. Evolutionary and taxonomic relationships among North American arid-land foxes. J. Mamm., 71:318-332.

Environmental Science Associates and Sapphos Environmental. 1994. Long-term habitat management plan for Los Angeles Airport El Segundo Dunes.

Grinnell, J. 1932. Habitat relations of the giant kangaroo rat. J. Mamm. 13(4):305-320.

Grinnell, J. and A. H. Miller. 1944. The Distribution of the Birds of California. Cooper Ornithological Club, Berkeley, CA. 615 pp.

Hall, E. R. 1981. The Mammals of North America. J. Wiley and Sons, Inc. New York. 1181 pp.

Hanes, T. L. 1977. California chaparral. Pp. 417-469 *In*: M. G. Barbour and J. Majors (eds.) Terrestrial Vegetation of California. John Wiley and Sons, New York.

Hawbecker, A. C. 1947. Food and moisture requirements of the Nelson antelope ground squirrel. J. Mamm. 28:115-125.

Hawbecker, A. C. 1953. Environment of the Nelson antelope ground squirrel. J. Mamm. 34 (3): 324-334.

Hickman, J.C. (ed). 1993. The Jepson Manual. University of Calif. Press, Berkeley, CA. 1400 pp.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished manuscript, California Department of Fish and Game, Nongame - Heritage Program, Sacramento. 156 pp.

Ingles, L. G. 1965. Mammals of the Pacific states, California, Oregon, Washington. Stanford Univ. Press, Stanford, CA. 506 pp.

Jameson, E. W. Jr. and H. J. Peeters. 1988. California Mammals. Univ. of California Press. Berkeley, CA. 403 pp.

Laughrin, L. 1970. San Joaquin fit fox, its distribution and abundance. Wildlife Management Branch Administrative Report No. 70-2. State of California Resources Agency, Department of Fish and Game. Sacramento, CA. 19 pp.

Long, C. A. 1973. *Taxidea taxus*. Mamm. Species, 26:1-4.

Maldonado, J. 1994. A review of the status of the small mammals at the LAX El Segundo sand dunes. Unpublished Report prepared for R. Mattoni, Sapphos Environmental, Pasadena, CA. 10 pp.

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

Morrell, S. 1972. Life History of the San Joaquin Kit Fox. California Fish and Game. 58(3): 162-174.

Munz, P. A. and D. D. Keck. 1968. A California flora and supplement. University of California Press, Berkeley.

Murie, O. J. 1974. A Field Guide to Animal Tracks. Houghton Mifflin Co. Boston, MA.

O'Farrell, T. P. 1983. San Joaquin kit fox recovery plan. U. S. Fish and Wildlife Service, Sacramento, CA. 84 pp.

Orloff, S.G. 1992. Survey techniques for the San Joaquin kit fox (*Vulpes macrotis mutica*). pp 185-197 *In*: Williams, D.F., S. Byrne and T. A. Rado (eds.) Proceedings of a conference on endangered and sensitive species of the San Joaquin Valley, California, Bakersfield, CA, 10-11 December 1987. California Energy Commission, Sacramento, California. 388 pp.

Orloff, S. F. Hall, and L. Spiegel. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of its range. Cal-Nev. Wildlife Society Proceedings.

Preston, W. L. 1981. Vanishing Landscapes: Land and line in the Tulare Basin. University of California Press, Berkeley, CA.

Remsen, J. V. Jr. 1978. Bird species of special concern in California, an annotated list of declining or vulnerable bird species. Calif. Dept. of Fish and Game. Nongame Wildlife Investigations, Wildlife Management Branch Administrative Report No. 78-1. 52 pp.

Shaw, W. T. 1934. The ability of the giant kangaroo rat as a harvester and storer of seeds. J. Mamm. 15(4):275-286.

Skinner, M.W. and B.M. Pavlik. 1994. Inventory of rare and endangered vascular plants of California. California Native Plant Society Special Publ. No. 1, 5th edition, Sacramento, California. 265 pp + appendices.

Smith, J. P. and K. Berg. 1988. Inventory of rare and endangered plants of California. California Native Plant Society Special Publ. No. 4, Sacramento, California.

Stebbins, R. C. 1985. A field guide to western reptiles and amphibians, Houghton Mifflin Co. Boston, MA. 336 pp.

Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland municipal airport. The Condor 73:177-192.

Tollestrup, K. 1976. A standardized method of obtaining an index of densities of blunt-nosed leopard lizards, *Crotaphytus silus*. U.S. Fish and Wildlife Service. Unpubl. Manuscript.

U.S. Fish and Wildlife Service. 1989. Standardized recommendations for the protection of the San Joaquin kit fox, April 1989.

United States Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants. Federal Register 50(35):6184-6229.

Williams, D. F. 1980. Distribution and population status of the San Joaquin antelope squirrel and the giant kangaroo rat. Calif. Dept. of Fish and Game, Nongame Wildl. Investig. Report E-W-4, IV-10.1. 45 pp.

Williams, D. F. 1986. Mammalian species of special concern in California. Dept. of Fish and Game Wildlife Mgmt. Div., Administrative Rpt. 86-1. 112 pp.

Zarn, M. 1974. Habitat management for unique or endangered species. Burrowing owl, *Speotyto cunicularia hypugaea*, Report No. 11. Technical Note, U. S. Dept. of Interior, Bur. Land Manag. Denver, CO. 25 pp.

Zielinski, B. 1993. A survey protocol for forest carnivores in proposed management activity areas. Paper presented at the 1993 annual Western Section meeting of The Wildlife Society, Monterey, California.

SAPPHOS ENVIRONMENTAL
environmental compliance
& resource management planning

May 3, 1995

MEMORANDUM FOR THE RECORD
JN 1043-001.M06

TO:	City of Los Angeles Department of Airports (Mr. Steve Crowther)
FROM:	Sapphos Environmental (Dr. Irena Mendez, Ms. Marie Campbell, and Dr. Steven Patterson)
SUBJECT:	State of the Dunes and Recommendations for Management

EXECUTIVE SUMMARY

This Memorandum for the Record describes the status of the Los Angeles International Airport El Segundo Dunes based on results of the spring 1995 qualitative assessment completed by Sapphos Environmental. Reestablishment of a self-sustaining ecosystem supporting coastal dune plant communities to provide and protect habitat for the federal listed endangered El Segundo blue butterfly is the primary goal of the maintenance and monitoring efforts.

A number of management recommendations have been developed to address issues that are apparent as a result of the qualitative assessment. At the completion of the revegetation efforts undertaken in 1993 and 1994, substantial amounts of iceplant were left stockpiled on the Dunes and on Dunes streets. Unfortunately, the composting program was not as effective as anticipated and many of the iceplant debris piles became source areas for regeneration of this invasive non-native plant species. The City of Los Angeles Department of Airports assigned two full-time professional landscape personnel to the Dunes. Stockpiled material is being removed from the streets and fence area. Landscape personnel have been very effective in removing iceplant from approximately 20 acres during the first four months of this year. In addition, landscape personnel have used a cut and daub application of the herbicide Roundup® to several subsites containing acacia, another non-native invasive plant species. Complete removal of non-native invasive plants was not achieved during eight years of ecological restoration efforts. Although the landscape staff have made tremendous strides in controlling non-native invasive plants at the Dunes, it is anticipated that additional labor resources will be required to complete removal from all subsites.

Specific management recommendations addressed in this memorandum include continued weed abatement, clean-up of streets and fence lines, removal of non-native trees, irrigation, and restoration enhancement. Several recommended reserve management measures are described. Copies of completed data sheets for the qualitative assessment have been placed in the Dunes file in the Environmental Division office. Survey results are being entered into a Lotus Approach database for the Dunes. Finally, a schedule for implementing the monitoring program is provided.

133 Martin Alley • Pasadena, California 91105 • P.O. Box 50241 • Pasadena, California 91115-0241
Tel 626/683-3547 Fax 626/683-3548

This Memorandum for the Record documents the status of the Los Angeles International Airport El Segundo Dunes (Dunes) as of spring 1995 and makes recommendations for management based on the results of a comprehensive review of the Dunes Preserve area (Figure 1) conducted by Sapphos Environmental.

INTRODUCTION

The Dunes occupy a 302 acre site just west of Los Angeles International Airport (Airport) and constitute one of the last remaining vestiges of the once extensive southern California coastal sand dunes. Although only a fragment of their former extent, the coastal dunes area managed by the Department of Airports (DOA) contains the largest intact piece of state-designated sensitive coastal plant communities remaining in southern California and the largest area of occupied habitat for the federally endangered El Segundo Blue butterfly (ESB) (*Euphilotes battoides allyni*). Within the 302 acre Airport site, the 200 acre El Segundo Blue Butterfly Habitat Preserve has been undergoing ecological restoration since 1987. The focus of the initial ecological restoration was conservation and enhancement of occupied habitat for the El Segundo Blue butterfly (ESB). Additional restoration work between 1987 and 1994 continued conservation efforts for ESB and sought to revegetate the coastal dune plant communities.

The long-term goal of restoration and management at the Dunes is the restoration of a dynamic, functioning, self-sustaining southern California coastal sand dunes ecosystem. There are physical and biological limits to the realization of this goal, e.g., the Dunes Preserve is only a greatly reduced portion of what was once a much larger system, groundwater levels in the area have been permanently altered, the Dunes are cut off from the ocean by Dockweiller Beach and Vista del Mar Boulevard. Adjacent urban land uses make the Dunes an ecological island and influence the Dunes in myriad ways. The boundaries of the Dunes, legally important, are ecologically artificial. Many species–not all of them pests–will always be capable of migrating both directions, from the Dunes to surrounding land, and from source populations outside onto the Dunes. Given this situation, the Dunes, no matter how ecologically rich and self-reliant, will always require some management and monitoring, though certain efforts required now should decrease over time.

Recommended strategies for managing the Dunes were described in the *Long-term Habitat Management Plan for the Los Angles Airport/El Segundo Dunes* (City of Los Angeles 1994). In January 1995, Sapphos Environmental initiated a comprehensive survey of the entire Dunes Preserve area, on a subsite by subsite basis. This memorandum provides a summary of the results of that survey and recommendations for management in this year and the immediate future based on the results of the survey. Specific recommendations related to maintenance and reserve management have been developed. In addition, this memorandum provides a schedule for continued monitoring efforts including establishment of a database, quantitative surveys of the vegetation, the ESB, herpetofauna, birds, and mammals.

TABLE 1
1995 PRIORITIES FOR MAINTENANCE

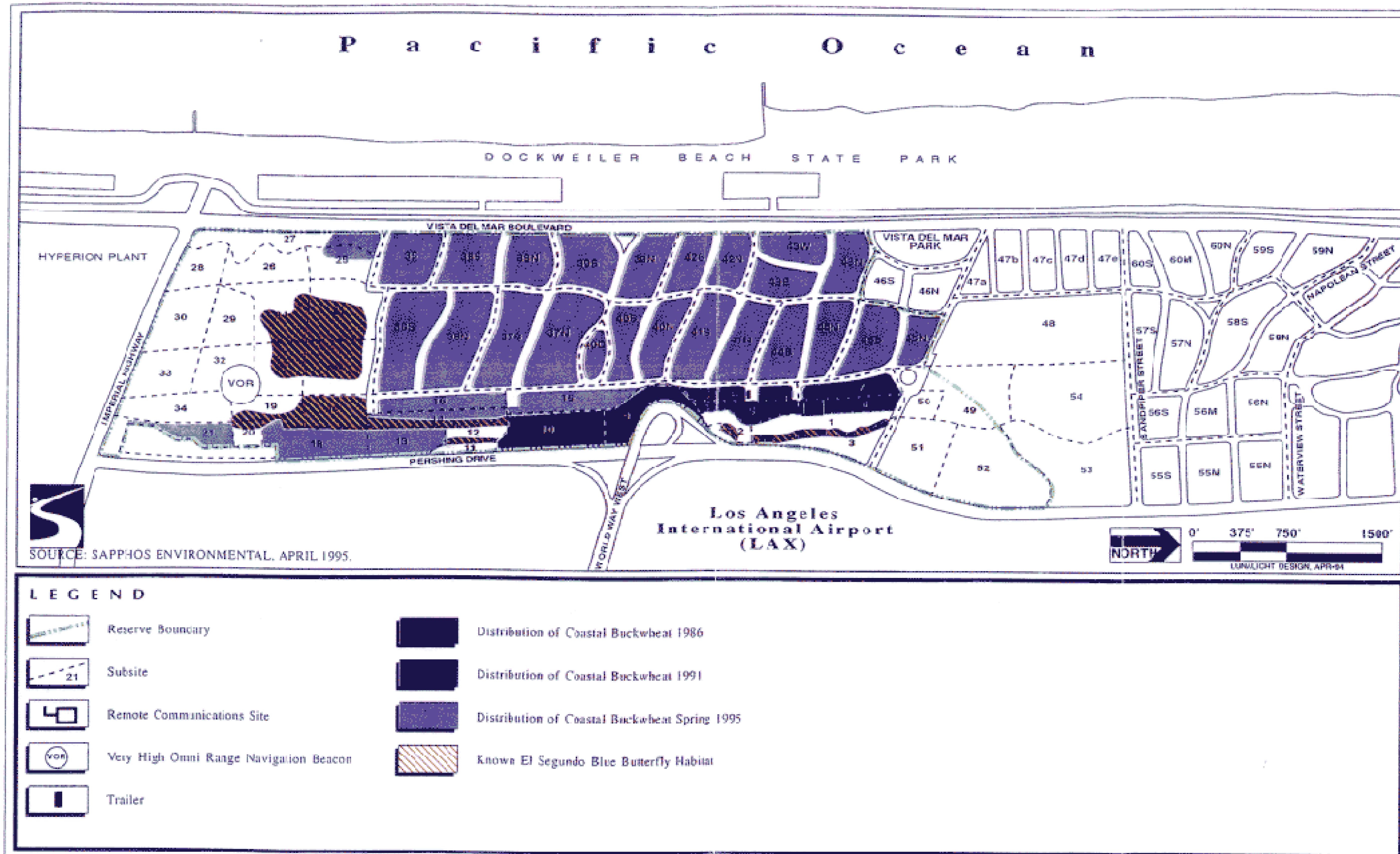
SUBSITE #	PRIORITY-1	PRIORITY-2	PRIORITY-3	PRIORITY-4	PRIORITY-5	PRIORITY-6
1					X	
2					X	
3			X			
4			X			
5						X
6						X
7						X
8						X
9	X					
10	X					
11			X			
12					X	
13	X					
14					X	
15		X				
16		X				
17					X	
18	X					
19					X	
20					X	
21	X		X			
22					X	
23					X	
24				X	X	
25					X	
26				X		
27				X		
28				X		
29				X		
30				X		
31					X	
32				X		
33				X		
34				X		
35		X				
36N		X				
36S		X				
37N		X				
37S		X				
38N		X				
38S		X				
39N		X				
39S		X				
40N		X				
40C		X				
40S		X				
41N		X				
41S		X				
42N		X				
42S		X				
43N		X				
43E		X				
43W		X				
44N		X				
44S		X				
45N		X				
45S		X				
49						X
50					X	
51			X			
52			X			

TABLE 2
OCCUPIED POTENTIALLY SUITABLE HABITAT FOR EL SEGUNDO BLUE BUTTERFLY

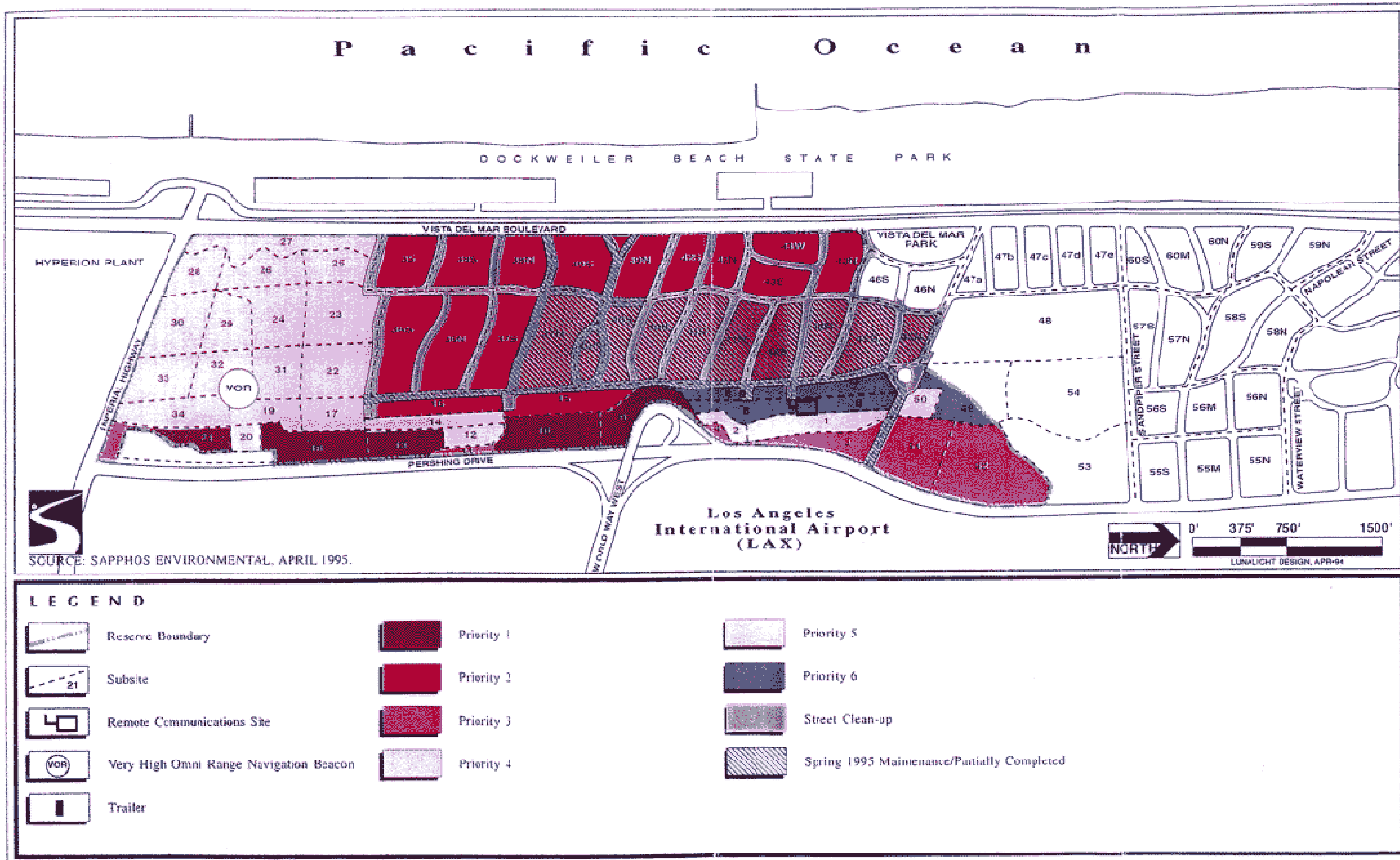
SUBSITE #	C. BUCK (1986)	C. BUCK (1991)	C. BUCK (1995)
1	X	X	
2	X	X	
3	X	X	
4	X	X	
5		X	
6		X	
7		X	
8		X	
9		X	
10		X	
11	X		
12	X		
13			X
14	X		X
15			X
16			X
17	X		
18			X
19	X		
20	X		
21			X
22	X		
23	X		
24	X		
25	X		X
26			
27			X
28			
29			
30			
31	X		
32			
33			
34	X		
35			X
36N			X
36S			X
37N			X
37S			X
38N			X
38S			X
39N			X
39S			X
40N			X
40C			X
40S			X
41N			X
41S			X
42N			X
42S			X
43N			X
43E			X
43W			X
44N			X
44S			X
45N			X
45S			X
49			X
50			
51			
52			

TABLE 3
PRIORITIZATION OF SUBSITES FOR HABITAT ENHANCEMENT/REVEGETATION

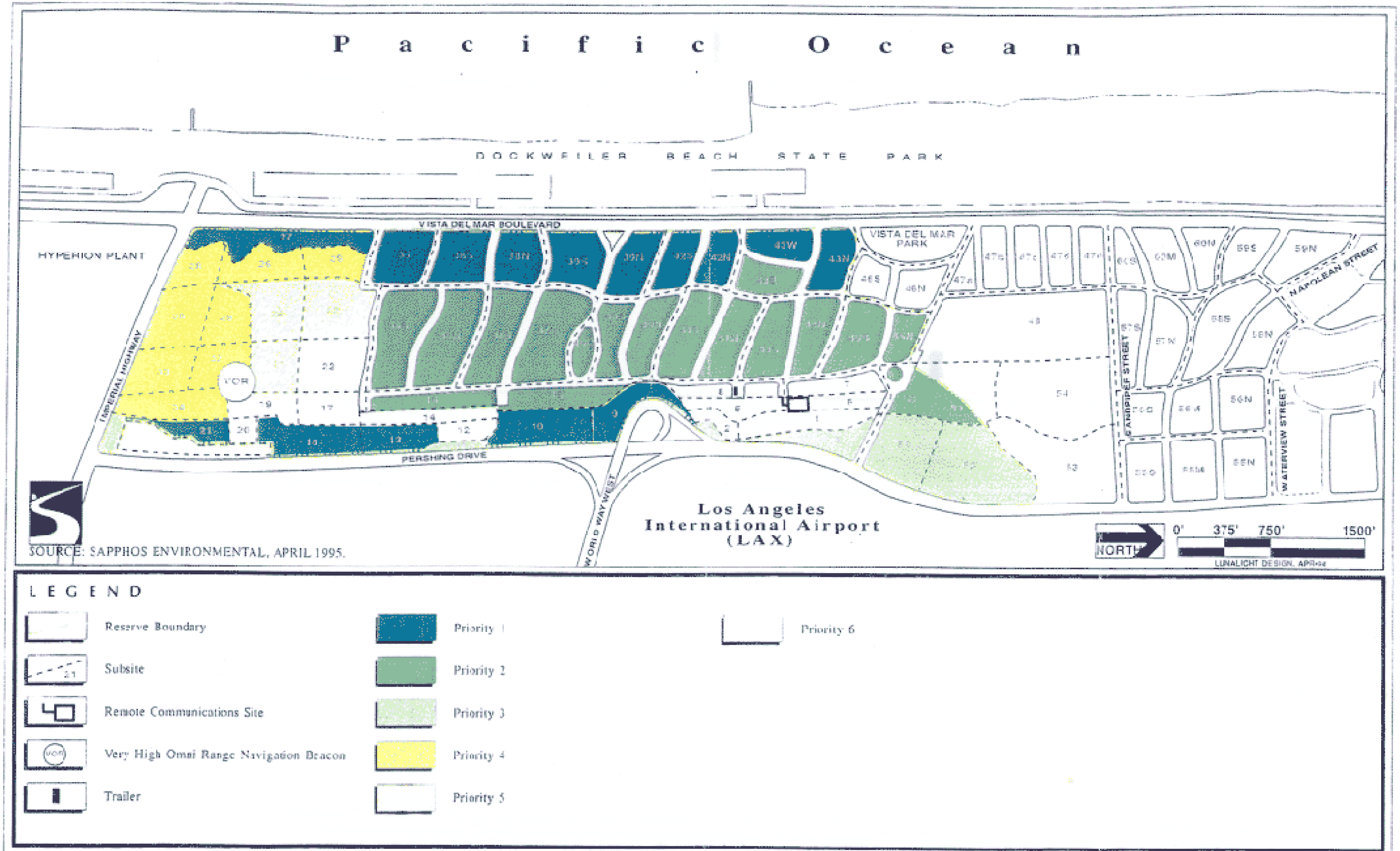
SUBSITE #	PRIORITY-1	PRIORITY-2	PRIORITY-3	PRIORITY-4	PRIORITY-5	PRIORITY-6
1						X
2						X
3			X			
4			X			
5						X
6						X
7						X
8						X
9	X					
10	X					
11			X			
12						X
13	X					
14						X
15		X				
16		X				
17						X
18	X					
19						X
20						X
21	X		X			
22						X
23					X	
24					X	
25				X		
26				X		
27	X					
28				X		
29				X		
30				X		
31					X	
32				X		
33				X		
34				X		
35	X					
36N		X				
36S		X				
37N		X				
37S		X				
38N	X					
38S	X					
39N	X					
39S	X					
40N		X				
40C		X				
40S		X				
41N		X				
41S		X				
42N	X					
42S	X					
43N	X					
43E		X				
43W	X					
44N		X				
44S		X				
45N		X				
45S		X				
49		X				
50		X				
51			X			
52			X			



Occupied and Potentially Suitable Habitat for El Segundo Blue Butterfly



1995 Priorities for Maintenance



Prioritization of Subsites for Habitat Enhancement/Revegetation

LOS ANGELES INTERNATIONAL AIRPORT EL SEGUNDO DUNES/STATE OF THE DUNES AND RECOMMENDATION FOR MANAGEMENT

STATE OF THE DUNES

Sapphos Environmental conducted a comprehensive review of the entire Dunes Preserve area on a subsite by subsite basis. All surveys were conducted on foot; in some sensitive and unstable areas surveys were conducted with binoculars. Standardized datasheets were developed and used to record information systematically. Copies of the completed datasheets have been placed in the Dunes file. Information recorded in the surveys is being transferred to an Excel spreadsheet to enhance its usefulness to DOA decision making. A sample datasheet is included as Appendix C. These surveys were *qualitative*; they focused on making a systematic judgement of the state of the Dunes that could serve as a basis for management decisions. Specifically, surveys attempted to estimate the percent of plant cover on a subsite and the percentage of that cover that was native species; to note the presence of "keystone" shrub species including coast buckwheat (*Eriogonum parvifolium*) the host plant for the ESB; to note the prevelance of weedy plant species and therefore the relative priority for maintenance; and to make a relative estimate of the need and priority of the subsite for continued plant community enhancement by seeding or planting (if and when funds become available.) Subsite boundaries are the same as those developed by Mattoni (1990). Boundaries are based primarily on the road system extant in the Dunes. Therefore, the conditions within each subsite are not necessarily uniform, either topographically or vegetatively. The results of the survey, summarized below, are averages for the subsite.

Habitat of the El Segundo Blue Butterfly

Ecological restoration at the Dunes since 1987 has continually increased potential habitat for the ESB within the Preserve area. Habitat for the ESB is associated with the presence of its host plant, coast buckwheat. Surveys conducted at the Dunes in 1984 found the distribution of ESB and coast buckwheat to be essentially the same (Figure 2; Table 2). An important element of the qualitative surveys was assessing the presence or absence of coast buckwheat. Coast buckwheat continues to be present in all subsites that have previously supported occupied habitat for ESB. In addition, coast buckwheat was noted in all 36 subsites where it had been planted as part of the ecological restoration project.

The parameters used to assess overall coast buckwheat health were the presence of round, and not curled, leaves. The presence of established seedlings from the last growing season and from prior seasons indicated successful reproduction. When these parameters were met, the buckwheat individuals were described as flourishing. The vast majority of coast buckwheat in all subsites are flourishing. The generally cool weather during the latter part of 1994 and the copious amount of seasonal rain is undoubtedly responsible for the significant growth of all of the plants present at the dunes, including the coast buckwheat. Some buckwheat showed signs of senescence, likely due to age or disease. In assessing the overall health of a population however, representatives of all stages of growth are expected to be present. The buckwheat individuals found on foredune subsites in the VOR area showed signs of stress as was indicated by curled leaves in response to the off shore flow of air which at times was great during the 1995 storms. Seedlings were observed, however, and these were flourishing.

The Presence of Invasive Plant Species

The continued removal of three groups of plants—iceplant, acacia, and California buckwheat (*Eriogonum fasciculatum*) constitutes the most important work at the Dunes if the restoration efforts of the last eight years are not to be lost (Figure 1; Table 1). Continued removal of these plants are necessary to allow the spread and recolonization of native plant species planted during restoration work.

A driving tour of the Dunes was conducted by Sapphos Environmental as a part of the January 5, 1995 start-up meeting. At that time substantial amounts of iceplant pulled during 1994 and previous seasons were observed to have been stockpiled on the subsites and adjacent streets. Iceplant piles left on-site had not completely composted and in many cases the iceplant had not only resprouted but was recolonizing the subsite. The results of the qualitative survey show iceplant present on all but 16 Preserve subsites. Over half the subsites had iceplant regenerating from stockpiled material. The subsites with the largest quantities of iceplant are those closest to the ocean (along Vista Del Mar Boulevard) and those on the backdune along Pershing Drive. Iceplant is capable of spreading from seeds in the soil as well as remnant plant material.

Seeds of acacia are present in the soil and will remain viable and continue to grow for some years. Acacia will also spread vegetatively from stumps and roots. The highest densities of acacia plants are found along backdune subsites and foredune subsites along the southern margin of the Dunes, but acacia plants were observed on 35 subsites.

California buckwheat, while native to California, is not native to the Dunes. Mattoni (1992) reported that California buckwheat represents a major threat to ESB. It appears that the high density of two moth species (*Lorita scarifica* and *Anoga* sp.) at the Dunes is attributable to the presence of California buckwheat. These moths both compete directly with ESB and support parasites of ESB. California buckwheat was observed in 12 subsites all in the backdune and prairie areas; high priority areas for its control are shown in Figure 1. The eastern borders of subsites 41S and 40N (adjacent to subsite 9) should be regularly patrolled for California buckwheat as this is the closest entry point into the foredune area.

Enhancement of Restored Coastal Dune Plant Communities

The ultimate goal of restoration efforts at the Dunes is to create self-sustaining coastal dune plant communities. A suite of five shrub species were identified by Mattoni (1990) as "keystone" species, meaning both that they are dominant elements of coast dune plant communities and that their presence should further the establishment of other species. The success of four keystone shrub species seeded or planted during recent revegetation efforts was noted during the qualitative surveys. In general many of these plants have established themselves and show signs of growth and development as indicated by their significant increase in size. Few specimens of a fifth keystone species, lemonade berry (*Rhus integrifolia*), were planted because of difficulties with propagation.

Of the keystone species planted during the most recent revegetation effort (1993-1994), coast buckwheat and California sunflower (*Encelia californica*) appear to have established themselves more successfully than coast goldenbush (*Ericameria ericoides*) or bladderpod (*Isomeris arborea*). A total of 20 subsites had evidence of supporting all four keystone species. An additional 13 subsites had at least one keystone species that was flourishing. Areas of unsuccessful revegetation were noted in portions of 15 subsites.

RECOMMENDATIONS FOR MAINTENANCE

Sapphos Environmental has developed the following recommendations for maintenance to guide continuing efforts at the Dunes. These recommendations are based on the results of the qualitative survey and are consistent with measures suggested in the *Long-term Habitat Management Plan for the Los Angeles Airport/El Segundo Dunes*.

Priorities for weed control

The proposed maintenance activities for subsites within the Dunes have been prioritized based on the potential for impacts by invasive plants on the native vegetation of recently revegetated subsites, and the importance of maintaining and enhancing ESB habitat. Figure 1 and Table 1 show the subsites associated with each priority category.

Priority 1 and 2 subsites are areas recently revegetated that contain many invasive plants which endanger the restoration planting.

Priority 1. Five subsites support dense stands of large acacias (most in the second year of growth and capable of producing seed), regenerating iceplant piles, and non-native buckwheat in quantities that pose severe direct competition with recent restoration planting.

Priority 2. These areas are similar to Priority 1 areas but generally have less intense infestations of weedy species.

Priority 3 and 4 subsites have had either no restoration or little and relatively unsuccessful restoration. They need work, but because recent revegetation efforts are not in danger, they are assigned lower priority than 1 and 2.

Priority 3. These six coastal prairie subsites contain California buckwheat which must be removed.

Priority 4. Nine subsites on the southern end of the Dunes have not be subject to restoration or enhancement activities. There are numerous large acacias which should be removed, but since no restoration plantings are in immediate danger, these areas have received a lower priority.

Priority 5 and 6 subsites are areas in relatively good condition. Because these areas have a high percentage of native plants they need less intensive weeding, but they will require extra care in the implementation of that weeding.

Priority 5. These 11 subsites are the least disturbed on the Dunes. It is recommended they be patrolled on a yearly basis and any invasive species removed. Weeding in these subsites should be conducted by an environmental monitor or landscape workers under direct supervision of the monitor.

Priority 6. These 5 subsites were revegetated in 1991 and are today in good overall condition. Like Priority 5 subsites, these areas should be patrolled yearly by an environmental monitor or a landscape worker under the direct supervision of the monitor and any invasive species encountered should be carefully removed.

Street and fence line cleanup. It is expected that cleanup of streets and fencelines can be conducted concurrently with weed control efforts. Dead vegetation and debris stockpiled during the 1993-1994 revegetation effort remains on some of the streets at the Dunes in addition to fence line areas along Pershing Drive and Vista Del Mar Blvd.

Labor Resources

The City of Los Angeles Department of Airports (DOA) assigned two full time landscape personnel to perform landscape maintenance at the Dunes. The Airport landscape staff has been periodically assisted by juvenile delinquent crews available through the County of Los Angeles. Landscape personnel have systematically removed iceplant piles, pulled living iceplant, and pulled or cut and daubed with herbicide acacias from fourteen of the sixty-one subsites within the Dunes Preserve area. These subsites equal approximately 20 acres or about 10 percent of the total area. However, areas with the heaviest infestations remain to be addressed. The landscape crew has also cleaned dead vegetation and debris from streets within the Dunes, greatly improving the general appearance of the Dunes as seen from Vista Del Mar Boulevard. Juvenile crews have removed dead vegetation and non-native buckwheat from backdune subsites along Pershing Drive. This has greatly enhanced the appearance of the backdune as seen from Pershing Drive.

The optimum situation for weed control would be for all sites to be patrolled and weeded twice each year. This would prevent extensive regeneration and thereby reduce the work required in each weeding period. Successful reestablishment of native plant material is dependent on an aggressive weed control program. Annual weeding of each subsite prior to seed production by native annuals would favor the reestablishment of those species. Supplemental weed removal at the end of the summer could again reduce competition. If weeding of iceplant and spraying of acacia and California buckwheat is done well and consistently, the labor required should decrease over the next several years. Weeding each subsite once each year should be adequate to begin to effect long-term control; a longer return time would likely mean that labor requirements would remain high and control elusive. The Dunes have never received even annual return to each subsite for weeding. At their current rate of weeding, the two-person landscape crew at the Dunes will require between two to three years to complete their coverage.

Supplemental labor resources are required to complete weed removal objectives at the Dunes. This labor could be provided in a number of ways–through the use of additional maintenance staff, hiring temporary workers, or through the use of volunteers. Each of these options require adequate supervision by qualified personnel, but the latter two would require higher levels. There are other good reasons to consider the use of volunteers; an effective volunteer program could serve to build community involvement and goodwill for the Airport. If DOA did decide to utilize volunteers it would be important to develop protocols to ensure that a volunteer program work efficiently and in keeping with the DOA's overall needs and goals. Regardless, it is strongly recommended that some additional labor be provided at the Dunes this year.

Removal of non-native trees

The removal of non-native trees remaining on the Dunes is recommended for two reasons. First, the trees serve as habitat for starlings and tree removal should exclude these pest birds from the site. Second, the presence of non-native trees is basically incompatible with the overall goal of creating a fully restored coastal dune ecosystem. If the decision is made to remove the trees it should be accomplished in the fall to minimize impacts to nesting bird species. Tree removal will require heavy equipment and personnel properly trained in its use. A survey should be conducted prior to work to determine areas where the use of heavy equipment would cause excessive impacts to the Dunes. In those areas, the determination may be made to leave the trees. An environmental monitor should be present during tree removal activities.

Irrigation

Supplemental irrigation of revegetated subsites may be needed during the next two to five years. During the 1993-1994 revegetation effort an irrigation system was installed which consisted of a semi-permanent grid of sprinkler bases and movable heads. The system remains in place at the present time, however, it has received no maintenance for over 10 months and will probably require refurbishment before it can be used again. Furthermore, the status of water sources for different sections of the Dunes remains unclear since the Department of Water and Power has intermittently worked on the water mains at the Dunes during the transition period between the 1993-1994 contract and the 1995 contract. These issues need to be addressed in order to have a secure source of water for supplemental irrigation of Dune subsites. A map of approved DOA water lines available for use at the Dunes is needed for Sapphos Environmental to evaluate the adequacy of the existing irrigation system. It is also recommended that DOA evaluate opportunities to deliver "grey water" to the Dunes as part of the LAX Master Plan.

While the ability to provide supplemental irrigation is important, irrigation is also problematic as it tends to encourage the growth of non-native plants. The heavy rains of winter 1994/1995 are believed to have provided sufficient water to render supplemental irrigation unnecessary for the remainder of this year (1995). However, the need for supplemental irrigation will be a focus of summer observation and surveys.

Enhancement

Recommended habitat enhancement areas are shown in Figure 3 and described in Appendix B. Those areas most in need of revegetation due to either the lack of survival of previous plantings or the need to plant native stock in areas now covered with iceplant and other invasive species received the highest priorities.

Implementation of any enhancement efforts will require:

- On-site collection of seed
- On-site propagation of native plant material as stock material from seed and by cuttings (assumes LAX has materials available to reestablish, maintain, and operate a nursery).

Habitat enhancement using on-site propagated container stock could be accomplished by:

- LAX landscape crew
- Juvenile crews under the supervision of an environmental monitor
- Supplemental labor reserves under the supervision of an environmental monitor
- Volunteer crews under the supervision of an environmental monitor
- Sapphos environmental monitors

To minimize supplemental irrigation, all plantings and broadcast of seed should be carried out at the onset of the first winter rains (October to December of 1995 would be the next suitable opportunity). The feasibility of conducting enhancement efforts at a subsite is contingent on prior removal of weeds.

Further revegetation or enhancement of Dune subsites is not an element of the Scope of Services to be provided by Sapphos Environmental for 1995. Should DOA wish to conduct enhancement efforts these will need to be implemented within the currently scheduled monitoring efforts (Tuesday or Thursday). Sapphos is willing to provide limited *pro bono* services to supervise juvenile crews or volunteers involved in enhancement efforts, as our schedule allows.

Coastal prairie. Coastal prairies subsites between the back dune and Pershing Drive have not been successfully restored. Many small plants of the native bunch grass *Nassella* (= *Stipa*) were planted, but this is an inadequate response to the problems of the area. The prairie area has received extensive disturbance in past years and while commitment was made to the Coastal Commission to restore the prairie, it will require considerable thought and work to effectively revegetate. Originally the area supported a mixture of grasslands and vernal pools, ecological system not uncommonly found behind coastal dunes.

Restoration of the prairie area, while probably difficult, has numerous benefits to recommend it. This is a major area of infestation by California buckwheat. Effectively revegetation to exclude California buckwheat would benefit the ESB and reduce maintenance requirements. A restored prairie would provide attractive wildflower displays in many years. If vernal pools or other temporary wetlands could be recreated, the benefits for wildlife at the Dunes would be substantial.

RECOMMENDATIONS FOR RESERVE MANAGEMENT

Communication, Scheduling, and Coordination of Activities

Status reports. Sapphos Environmental continues to prepare biweekly status reports to document ongoing maintenance and monitoring efforts at the Dunes. The status reports have proven to be an effective means of summarizing completed maintenance and monitoring activities and providing recommendations for future activities. Memoranda for the Record have been used to describe issues requiring immediate attention. In the interest of maximizing field time available for maintenance and monitoring efforts, these issues will be increasingly documented in the "Recommendations" and "Lessons Learned" portion of the status reports. The status reports and memoranda completed to date have frequently generated ongoing dialogue directed toward resolving identified issues. Sapphos Environmental will continue to send a copy of the status report to Mr. Steve Crowther and Ms. Lori Cansler of DOA. It is our understanding that Mr. Crowther will forward a copy of the status report to the Airport Maintenance Superintendent (Mr. David Waldner), the Park Maintenance Supervisor (Mr. Melvin Jones), and the Superintendent of Operations (Mr. Richard Croul). Sapphos Environmental will forward a copy of the monitoring report to the U.S. Fish and Wildlife Service (Mr. Chris Nagano). Representatives of environmental organizations requesting copies of the status reports have been referred to the DOA Environmental Division (Mr. Steve Crowther).

Scheduling and coordination. The importance of coordinating maintenance activities in the Dunes was emphasized in DOA memorandum from Lloyd W. Klefstad to Airport Maintenance Supervisors and Superintendents (dated March 1, 1995). The memorandum correctly emphasizes the importance of protecting the Dunes which contains occupied habitat for the federally endangered ESB. All maintenance crews have been directed to inform the Landscape Maintenance Supervisor (Mr. Melvin Jones) prior to performing any work in the Dunes. In turn, it is the Landscape Maintenance Supervisor's responsibility to notify the environmental monitor. There were several instances in late April 1995 when the communication procedure broke down. These lapses in coordination resulted in removal of suitable habitat for the ESB in close proximity to known occupied habitat. It is important that the procedures established by Mr. Klefstad be adhered to avoid unauthorized "incidental take" of ESB or its habitat which is subject to civil and criminal penalties pursuant to the federal Endangered Species Act.

To further facilitate this communication process, it is recommended that a written weekly or monthly schedule of operations and maintenance activities be forwarded to Sapphos Environmental (as environmental monitor at the Dunes) and posted at the trailer.

Non-preserve use. In addition to operations and maintenance activities there are a variety of other uses of the Dunes. These auxiliary activities include police exercises on Dunes' streets, a bomb disposal site, motion picture and television filming, and various utility corridors. All parties undertaking activities that will be confined to street areas within the Dunes should be provided with a standard briefing sheet addressing the sensitivity of the Dunes. All activities that involve incursions into natural areas within the Dunes should be coordinated with the environmental monitor. Where such activities have the potential to disturb natural habitat they should be scheduled for times when the environmental monitor will be present on-site (normally Tuesdays and Thursday during 1995). Monitoring of DOA operations and maintenance activities falls within the scope of the existing

contract. Monitoring of non-DOA activities is beyond the scope of the existing contract. All costs for such activities should be born by the project proponent (Average cost of environmental monitoring is $325.00 for an 8-hour day).

Ground-disturbing activities within the Dunes are of particular concern because of their potential to result in "incidental take" of ESB, displace restored plant communities, and create source areas for non-native vegetation. It is recommended that all requests to conduct ground-disturbing activities (e.g., utility corridor work, such as last year's installation of a fiber optic line) be reviewed by DOA Environmental Division. It is recommended that Environmental Division require the presence of an environmental monitor during the course of all ground-disturbing activities. In addition, the top six inches of surface material should be scraped and stockpiled prior to any excavation. All excavations should be backfilled and the surface material replaced. The project proponent should be required to revegetate all disturbed areas to the specifications of a standard revegetation protocol.

The bomb disposal site has been of particular concern due to its location within the ecological restoration area. This type of land use is basically incompatible with management of an ecological reserve. During the most recent maintenance activities related to the bomb disposal site (April 1995), sand material was harvested from the adjacent restoration area (Subsite No. 41 N). Remnant debris from the maintenance activities was discarded into the same area. DOA Environmental Division has indicated that the Dunes is the only suitable area at LAX for this activity. Sapphos Environmental recommends that this land use compatibility issue be reevaluated in the LAX Master Plan document currently under preparation. Should it be determined that the Dunes is the only feasible location for the bomb disposal area, relocation of the bomb disposal area to a more suitable location should be evaluated. There is a large concrete triangle located at the intersection of Rindge and Ocean Vista Boulevard (at the northern margin of the Dunes) that appears to be potentially suitable to accommodate the bomb disposal site.

Management of the Urban/Natural Area Interface Zone

The existing interface zone between the Dunes and adjacent urban land uses is approximately 2.5 miles long. A thorough site characterization was undertaken of the urban interface zone during the Spring of 1995. The area surveyed included the strip along the outside margin of the fence that surrounds the Dunes; the median in the streets that surround the Dunes; and the planted area bordering the far margin of Pershing Drive, World Way Drive, Imperial Boulevard, Vista del Mar Boulevard, and Sandpiper Street where they parallel the margin of the Dunes. The urban/natural interface zone includes primarily landscaped non-native plant material and ruderal plant material. Some native species are present in limited quantities. Of particular concern is the presence of California buckwheat, acacia, iceplant, chrysanthenum and other non-native invasive plant material. While it is understood that these areas are in part intended to be landscaped areas that are aesthetically pleasing, the presence of non-native invasive plant material in these areas will significantly increase the maintenance activities on the Dunes and hamper the success of the ecological restoration efforts. It is also understood that much of the urban/natural interface zone is controlled by agencies other than DOA. Given these constraints the following efforts are recommended:

- It is recommended that DOA replace all California buckwheat, acacia, and iceplant on lands controlled by DOA (within the urban/natural interface zone) with species that would not pose a threat to occupied ESB habitat or the success of ecological restoration efforts at the Dunes.

- It is recommended that DOA consider landscaping the perimeter of the Dunes with plant material native to the Dunes. This perimeter could be designed as a walkway/trail. Native Dunes species should be selected for this landscaping but species selection and planting schemes could be used that would present a more "landscaped" appearance than that of natural dune scrub. One possibility would be to create curves in the fenceline where the public could view representative examples of coastal prairie, backdune, foredune, and coastal strand vegetation. The incorporation of plant material native to the Dunes would serve as a buffer to surrounding landscape areas and could serve as an interpretive element for educational purposes, as well.

  Local landscape architecture schools could be approached to use the site as a class project and produce a number of alternative designs for consideration. It should be recognized that this sort of planting would require maintenance; it would not be self-sustaining.

  Many of the negative comments about the appearance of the Dunes have been directed at the areas where trash and dead plant material have accumulated along the fence. The clean-up of these areas already underway is a productive first step to a more attractive site. The coastal prairie area that borders Pershing Drive has not been successfully revegetated; if restored, this area in many years would provide attractive displays of wildflowers.

- Identify parties controlling all land parallel to the Dunes fenceline; street medians that surround the Dunes, and street easements (landscape edges) on Pershing Drive, World Way West, Imperial Highway, Vista del Mar Boulevard, and Sandpiper Street where they parallel the margin of the Dunes. Send a notification letter to each controlling jurisdiction explaining the sensitivity of the Dunes and the presence of habitat for the federally endangered ESB. Request that acacia, iceplant, California buckwheat, and chrysanthemum be replaced by native and/or noninvasive drought tolerant landscape plant material. Among the native plants recommended in the *Long-term Habitat Management Plan for Los Angeles Airport/El Segundo Dunes* that should be considered for these are narrow-leaved goldenbush, California encelia, deerweed, lemonadeberry, coastal prickly pear, and California poppy.

- The gated entry to the Dunes represents another location where a series of elevated bed or other landscape plan could be developed to serve as an interpretive element for the Dunes.

Facilities

It is recommended that DOA consider the importance of supporting an onsite facility to house the Preserve management activities and landscape personnel responsible for maintenance and monitoring. The current facility has proven difficult to secure. An onsite facility is important to house the calendar of activity, a telephone (and answering machine), a computer (where data can be logged as collected), a library of information related to the Dunes, research protocols, maintenance protocols, and monitoring protocols. The roof of the existing interim facility leaks making it unsuitable to house records or computer. Security is also of concern.

Security

The issue of locks on Dunes access gates has already been addressed by memorandum (S. Crowther, March 21, 1995) and is currently being persued by DOA personnel. Sapphos Environmental concurs with the recommended solution replacing the existing locks with four locks: DOA, FAA, SCAQMD and Sapphos.

Research Protocols/Supervision Protocols

Sapphos Environmental recommends that a standard set of protocols be established to guide research and volunteer activities at the Dunes. Given its sand substrate, the Dunes will always be a relatively fragile ecosystem; people in the Dunes will always need to exercise care. Further, a large portion of the Dunes is still in the early stages of ecological restoration which renders it especially vulnerable to impacts from humans. The Dunes are not sufficiently recovered to support large-scale collection of seed or plant material. Proposals to conduct this type of activity should be carefully scrutinized to assess the potential impact on the Dunes and the merits of the proposed collections. Protection of the Dunes can be accomplished by incorporation of suitable research and supervision protocols. It is important for all research and volunteer programs to be carefully coordinated. Sapphos Environmental recognizes the importance of providing research and volunteer opportunities at the Dunes. However, our current scope of services does not include supervision of these extracurricular activities. To that extent, it is important that these activities be carefully coordinated and scheduled at times when the environmental monitor will be present. Sapphos Environmental recommends that DOA institute the following standard protocols for research and volunteer activities:

- All requests to conduct research or volunteer activities should be submitted in writing to DOA Environmental Division at least two weeks prior to desired activity.

- DOA should review all requests to conduct research and volunteer activities to ensure that they will not have an adverse impact on the Dunes. Particular emphasis should be placed on ensuring that there is no conflict between research projects and standardized transect lines established for long-term monitoring of the Dunes.

- All potential researchers should be requested to submit an *Access Information Form for Field Activities at the Dunes*, a map of proposed study plots or transect lines, and an *Abstract of the Proposed Research* (See Enclosure 1).

- All researchers should be required to submit copies of field data sheets on a weekly basis and a copy of all draft and final documents resulting from those studies.

- Volunteer programs should be scheduled on a day when the environmental monitor will be present or arrangements made to have a docent present who has been trained by an environmental monitor.

- DOA approved plant material and seed collection activities should be subject to environmental monitoring. The project proponent should be required to provide written documentation of how seed and plant material was used and survival data of plantings.

STATUS AND SCHEDULE OF MONITORING ACTIVITIES

One important facet of this year's scope of work at the Dunes is the establishment of baseline monitoring data for biological systems there and the creation of a database and file to hold that data and make it readily available for future reference. All monitoring protocols follow the recommendations of the *Long-term Habitat Management Plan for the Los Angeles Airport/El Segundo Dunes*.

Monitoring

Monitoring called for in the Sapphos Environmental scope of services includes the following:

- semi-annual qualitative survey of Preserve area
- annual monitoring of the El Segundo Blue butterfly
- establishment of standard transects and protocols for quantitative monitoring of vegetation, reptiles and amphibians, birds, and mammals
- Audubon Christmas Bird Count
- Audubon Christmas in Spring Bird Count

Qualitative surveys. The first qualitative survey was completed in mid-April and the results are reported in this Memorandum for the Record. The second survey is scheduled to begin in late August. It is anticipated that future surveys will require less time to complete than the first one. The second survey will focus on characterizing the state of the subsites at the end of the summer dry season, before winter rains begin.

ESB monitoring. The monitoring period for the ESB is mid-June to late August when the butterflies are flying. Sapphos Environmental has retained qualified entomologists to conduct surveys for ESB. Mr. Frank Hovore will oversee the surveys and Mr. David Hawks will conduct most of them. Sapphos Environmental and Mr. Hovore have coordinated with the U.S. Fish and Wildlife Service (Mr. Chris Nagano) regarding protocols for the surveys and will continue to do so. The survey protocol use will be the Polland walk-count method. The transect route used in past years will be used with the addition of additional stratified transect lines to assess potential populations outside the original (1986) core

distribution. All survey protocols will be described in writing and all field notes forwarded to DOA for its files.

Quantitative vegetation survey. Permanent transects will be established in a set of stratified sample areas representative of the variation in dune structure and management history. Sample areas will include undisturbed foredune, disturbed foredune, undisturbed backdune, and disturbed backdune, and grassland (prairie) areas. Data recorded will include species encountered and percent cover. Surveys will be conducted by Sapphos Environmental botanists. Quantitative surveys for vegetation are scheduled to begin in early June.

Reptiles and amphibians. A survey of reptiles and amphibians will be conducted based on survey guidelines established by the Southern California Coastal Sage Scrub Scientific Review Panel. Permanent transect lines will be established and their location mapped. Three replicates of the transect will be run this year to establish a baseline. In future years only one replicate will be required. Surveys will be conducted by Sapphos Environmental wildlife biologists. Surveys for reptiles and amphibians will begin the second week of May and continue approximately every two weeks until completed.

Birds. Avifauna surveys at the Dunes will be of two types. Baseline quantitative information on the numbers and composition of breeding and migratory bird species will be compiled using survey guidelines established by the Southern California Coastal Sage Scrub Scientific Review Panel. Eight replicates will be completed. Abundance codes and breeding codes will be recorded for each species. Second, species lists will be established following National Audubon Society guidelines. A Christmas bird count was conducted on January 7, 1995. A Christmas in Spring count will be undertaken in June. Bird surveys will be conducted by Sapphos Environmental wildlife biologists. Quantitative surveys will begin the second week of May and continue approximately once a week until completion.

Mammals. Sapphos Environmental is currently reassessing the need for and desired results of mammal surveys at the Dunes. Wildlife ecologists qualified to conduct mammals surveys, including night trapping of small mammals are being contacted to select an appropriate surveyor. These surveys will be scheduled and completed in the near future.

Establishment of Dunes database and files

In order to facilitate understanding and management of Dunes' ecosystems appropriate attention needs to be directed to data management. Sapphos Environmental recommends, and has begun to implement, a series of actions that address this issue.

(1) All data, maintenance records, and published work related to the Dunes are being compiled into files. These files will be housed at the Preserve Management trailer when security and weatherproofing concerns have been addressed. At present they are housed in the Sapphos Environmental office. As additional information is located, copies are made and placed in this file. DOA has established centralized files with Environmental Division to house a duplicate set of these files.

(2) A trial-run database using about half the data collected in the qualitative survey has been established using Lotus Approach software. While information will be retrievable from a range of queries, the two primary organizing categories will be subsite and species. After further testing, the rest of the

information from the qualitative surveys will be fully entered into the database. As additional monitoring efforts proceed this summer, their results will be entered into the database. Eventually, earlier data available from the main restoration phase (e.g., planting schemes and species lists, etc.) will be entered. The objective this year is to *establish* the database, and thus a repository that can grow into the future. The database will eventually be housed at the Preserve management facility. A copy of the file will be provided to the DOA annually.

(3) It is anticipated that the database could become quite large, and contain more information than the essentials useful in management decision making. Therefore, it is proposed to create a separate spreadsheet (using Excel) which would contain pertinent information about each subsite that would focus particularly on management-relevant information. A first version of such a spreadsheet has been created and was used to produce Table 1 describing the results of the qualitative survey. A disk copy of the Dunes Excel file is being forwarded along with this memorandum. As new information is added, copies will be provided to DOA.

Maintenance notebook

Sapphos Environmental will prepare a loose-leaf notebook for the assistance of the maintenance personnel. This notebook will contain photographs and descriptions of important pests and native species at the Dunes including coast buckwheat, California buckwheat, acacia, iceplant, gophers, and red fox. It is recommended that DOA make copies of this notebook and distribute to landscape personnel assigned to the Dunes. The maintenance notebook should be updated annually.

APPENDIX A

RECOMMENDED PROTOCOLS FOR PLANT PEST CONTROL

California Buckwheat

California buckwheat is a coastal sage and chaparral species adapted to crown sprout after fire. The blooming period extends from April through October. This non-native buckwheat is to be cut and daubed with a full-strength application of Roundup® once a year between March and June. This will debilitate the rootstock until eventually resprouting will no longer be a problem. Cutting can be done with clippers. Clipped material should be collected and removed off-site. Once off-site, the cut material can be chipped and used for LAX landscaping purposes. LAX Maintenance Staff have been trained in the proper use of the herbicide Roundup® and therefore have the expertise to effectively eradicate California buckwheat at the Dunes.

Acacia

The two species of *Acacia* found at the Dunes are species introduced from Australia. *A. cyclops* has shallow roots and can reach up to 15 feet in height. It blooms once a year during the spring (March). Seed production occurs every other year, or every year when conditions are favorable. *A. retinoides* is a tree which can reach 20 feet in height with deep and strongly anchored roots. Seedlings require several seasons of growth before they are mature enough to bloom. Blooming occurs intermittently from April through October. When conditions are favorable, as they are at the Dunes, this species can produce seed yearly. The eradication of both species of acacia will require cutting and daubing with 100% Roundup® each spring. Acacia removal on backdune subsites will entail moving the cut material down the backdune to Pershing Drive where it can then be hauled away. To facilitate movement, an effective approach is to pick an appropriate path (avoiding native vegetation) and lay down wood planks to use as walkways and as support for acacia-laden tarps.

Acacia removal on southern foredune sites along Vista Del Mar Boulevard can be treated in the same way. However, the use of planks may not be necessary due to the proximity of the trees to the road. Acacia removal on remote foredune subsites located in the VOR area will require leaving the cut material on-site. These acacias are located in subsites far removed from the network of streets and hauling the cut material would cause significant impact to the Dunes. The use of planks is not a practical alternative due to the long distances involved. A practical solution is to cut the material to a small size and to pile it on-site and thereby making useful habitat for reptiles.

LAX Maintenance Staff have been trained in the proper use of the herbicide Roundup® and therefore have the expertise to effectively control both species of acacia at the Dunes.

Iceplant

Many species of iceplant have been introduced to Southern California from South Africa for use in landscaping. They have also been used as slope stabilizers under the notion that they prevent erosion.

In actuality they are very shallow rooted and readily give way under heavy rain. There are at least ten species of iceplant found at the Dunes, but two species are most common. Most iceplant species have succulent leaves and brightly colored flowers. They are perennial plants that aggressively spread by forming extensive mats, precluding the presence of other plants. Due to the fact that they are shallow-rooted, they can be pulled from the ground with relative ease. On foredune and backdune subsites, iceplant removal will require care as these areas contain recently planted native plants. An effective approach is to pick an appropriate path (avoiding native vegetation) leading to the iceplant to be removed and lay down wood planks to use as a walkway.

The use of walkways has the added benefit of minimally disturbing the substrate and therefore not providing an opportunity for the invasion of other weedy species which rely on substrate disturbance to establish themselves. Iceplant can then be loaded onto tarps, dragged to the street, and loaded on a truck for removal off-site. The removal of iceplant on backdune subsites can be done in a similar manner as for foredune subsites. Planks to be used as walkways and to support iceplant-laden tarps can be directed towards Pershing Drive to facilitate the hauling process. Removing the iceplant off-site will be key to the long-term control of this invasive species. If not already present, a compost facility could be constructed at the maintenance yard, to compost the iceplant removed from the Dunes. When properly composted, this material makes a high quality mulch that can be used for landscaping projects on airport grounds.

Iceplant removal can be accomplished by LAX Maintenance Staff, and juvenile crews, supplemental labor reserves and volunteers, the latter three under the supervision of an environmental monitor.

Other Non-native Vegetation

Other non-native and invasive plant species occur at the Dunes which compete directly with the native vegetation. To enable the native vegetation to grow and reproduce unimpeded, the non-native species require removal. These species will need to be addressed on a case by case basis. The removal of exotic grasses and mustard, erodium and Russian thistle need only be done in the proximity of native plants where it is clear that the native plants are being encroached upon. Weeding in a 1-2 foot wide circumference around the base of the plant will aid native colonization. Weeds can be bagged on-site, then collected and hauled off-site. Arundo eradication will require cutting and daubing with Roundup® and removal off-site. Planks may not be necessary due to the proximity of the arundo to the street.

The removal of non-native weedy species can be accomplished by LAX Maintenance Staff, and juvenile crews, supplemental labor reserves and volunteers, the latter three under the supervision of an environmental monitor.

PRIORITIES AND PROTOCOLS FOR ENHANCEMENT

Table B-1 summarizes additional habitat enhancement measures recommended for the Dunes. Those areas most in need of revegetation due to either the lack of survival of previous plantings or the need to plant native stock in areas now covered with iceplant and other invasive species received the highest priorities.

Priority 1. There are 15 Dune subsites which have been designated priority 1. They are comprised of backdune subsites which are also priority 1 for maintenance activities and foredune subsites which are priority 2 for maintenance activities and therefore contain significant numbers of acacias and substantial iceplant. Once these non-native species are removed there will be a need to plant native vegetation in their place. Some of the native plant species planted on these subsites during the most recent revegetation effort did not survive and the bare areas were overtaken by weedy species such as non-native grasses and exotic mustards in addition to iceplant. These areas also need to be planted with the appropriate native species.

Priority 2. There are 18 Dune subsites which have been designated as priority 2. They are comprised of foredune subsites which make up the central portion of the Preserve. These subsites were found to contain significantly less iceplant and acacias than those subsites closer to the ocean and therefore will require enhancement to a lesser degree.

Priority 3. The 5 subsites consisting of coastal prairie fragments have been designated as priority 3. They have also been designated as priority 3 for maintenance activities. They contain significant numbers of California buckwheat. These prairie fragments require planting with nodding needle grass and other prairie species.

Priority 4. There are 8 foredune subsites in the VOR area designated as priority 4 for enhancement. Any enhancement should be done via the broadcast of perennial and annual native seed and will require the establishment of experimental test plots with appropriate control plots. Results from the experimental plots can then be used as guidelines for future broadcast of native seed and for priority 5 areas described below. These subsites were not included in earlier revegetation efforts.

Priority 5. There are 3 foredune subsites in the VOR area which historically have been the least impacted and therefore require very little enhancement. Enhancement of these subsites will require the broadcast of perennial and annual native seed following guidelines established using results from the experimental broadcast of native seed in priority 4 areas.

Priority 6 There are 12 subsites which require no enhancement at the present time.

Implementation of any enhancement efforts will require:

- On-site collection of seed. Perennial species requiring collection include coast buckwheat, California sunflower, bladderpod, poppy, and California-aster. Annual species requiring collection include pin cushion, popcorn flower, and dove lupine.
- On-site propagation of native plant material as stock material from seed and by cuttings (assumes LAX has materials available to reestablish, maintain, and operate a nursery).
- Broadcast of keystone perennial seed on selected test plots.

Habitat enhancement using on-site propagated container stock could be accomplished by:

- LAX landscape crew
- Juvenile crews under the supervision of an environmental monitor
- Supplemental labor reserves under the supervision of an environmental monitor
- Volunteer crews under the supervision of an environmental monitor
- Sapphos environmental monitors

Estimates of labor/hours assume a plant density of 400-500/plants per acre and a planting rate of 10 plants per hour.

To minimize supplemental irrigation, all plantings and broadcast of seed is to be carried out at the onset of the first winter rains (1995/1996).

TABLE B-1

PRIORITIES AND PROTOCOLS FOR ENHANCEMENT

SUBSITE #	PRIORITY	PROTOCOL	LABOR/HOURS	CREW
1	6	-	-	-
2	6	-	-	-
3	3	1	30	1-5
4	3	1	20	1-5
5	6	-	-	-
6	6	-	-	-
7	6	-	-	-
8	6	-	-	-
9	1	1	50	1-5
10	1	1	50	1-5
11	3	1	25	1-5
12	6	-	-	-
13	1	1	60	1-5
14	6	-	-	-
15	2	1	5	1-5
16	2	1	5	1-5
17	6	-	-	-
18	1	1	60	1-5
19	6	-	-	-
20	6	-	-	-
21	1 + 3	1	60	1-5
22	6	-	-	-
23	5	2	4	5
24	5	2	4	5
25	4	2	4	5
26	4	2	4	5
27	1	1	20	1-5, 5
28	4	2	4	5
29	4	2	4	5
30	4	2	4	5
31	5	2	4	5
32	4	2	4	5
33	4	2	4	5
34	4	2	4	5
35	1	1	15	1-5
36N	2	1	20	1-5
36S	2	1	20	1-5
37N	2	1	20	1-5
37S	2	1	20	1-5
38N	1	1	15	1-5
38S	1	1	15	1-5
39N	1	1	20	1-5
39S	1	1	20	1-5
40N	2	1	5	1-5
40C	2	1	5	1-5
40S	2	1	5	1-5
41N	2	1	5	1-5
41S	2	1	5	1-5
42N	1	1	10	1-5
42S	1	1	10	1-5
43N	1	1	20	1-5
43E	2	1	5	1-5
43W	1	1	10	1-5
44N	2	1	5	1-5
44S	2	1	5	1-5
45N	2	1	5	1-5
45S	2	1	5	1-5
49	2	1	10	1-5
50	2	1	10	1-5
51	3	1	150	1-5
52	3	1	150	1-5

APPENDIX C
Los Angeles/El Segundo Dunes Qualitative Survey Form

LOS ANGELES/EL SEGUNDO DUNES QUALITATIVE SURVEY
By Subsite

Date:______________

Surveyed by:______________

Subsite #:______________

Fore/ Back -dune (circle one)

1. Condition of substrate (sandy? or degree of contamination with yard soil):

2. Estimate of total plant cover (%total/%native):

3. Keystone shrubs:

	R	I	C	A
Buckwheat				
Encelia				
Happlopappus				
Isomeris				
(Rhus)				

4. Self-sustaining perennials:

	R	I	C	A
Phacelia				
Croton				
Camissonia				
Lotus				
Burbush				
Bush lupine				

5. Weedy species:

	R	I	C	A
Ice plant				
Acacia				
Brassica spp.				
Erodium spp.				
Exotic grasses				
Russian thistle				
Star thistle				

Notes:

ENCLOSURE 1:
Research and Access Forms

CITY OF LOS ANGELES DEPARTMENT OF AIRPORTS
ABSTRACT OF PROPOSED RESEARCH

Submit to:

Mr. Steve Crowther
Environmental Division
City of Los Angeles Department of Airports
1 World Way, Room 219
Los Angeles, California 90045

1. Project Title:

2. Name(s) of Researcher(s) and Affiliation(s):

3. Sources and Amounts of Funds:

4. Collecting Permit Number (if applicable)(include copies of permits and MOU's):

5. Starting Date of the Project: | 6. Completion Date of the Project:

7. Research Abstract: (a) Purpose of the research effort, including research questions that are being addressed, proposed sampling protocol, field marking of sampling areas, frequency of sampling, and methods of analysis; (b) Reason for using the Dunes as a study site; (c) Description of coordination of research effort with the California Department of Fish and Game and the U.S. Fish and Wildlife Service; and (d) Anticipated Presentation of Final Data (e.g. scientific journal, agency report, master's thesis)

(Use Additional Sheets, If Necessary)

8. Signature of Principal Investigator:

CITY OF LOS ANGELES DEPARTMENT OF AIRPORTS

ACCESS INFORMATION FORM FOR FIELD ACTIVITIES AT LAX EL SEGUNDO DUNES

Field Period Covering: ______

Project Title: ______

Authorization to Conduct Research Provided By: ______

Phone Number: ______

Project Manager: ______

Affiliation: ______

Address: ______

Phone Number: ______

Vehicle License Plate Numbers	Field Personnel Name(s)	Phone Number(s)	Date(s)[1]	Location[2]	Purpose[3]

[1]Ind cate the precise dates of proposed field work at the Dunes.

[2]Please identify all research areas where you will be located and access rou es on attached map.

[3]Please describe why it is necessary to conduct research in these areas