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RESULTS OF THE 2004 *PIPERIA YADONII* CENSUS IN AREAS OF THE PEBBLE BEACH COMPANY'S DEL MONTE FOREST PRESERVATION AND DEVELOPMENT PLAN

PREPARED BY
ECOSYSTEMS WEST ASSOCIATES
JULY 2, 2004

PURPOSE

This report describes results for the 2004 *Piperia yadonii* census in the development, preservation, and conservation areas of Pebble Beach Company's Del Monte Forest Preservation and Development Plan.

INTRODUCTION

To inform design of proposed transplantation and enhancement programs for *Piperia yadonii* (Ecosystems West 2004), a census was initiated to document the location and density of plants within the Site MNOUV. Preliminary results from the census indicated population estimates were much greater than those documented in 1995 and 1996 surveys (Allen 1996). As a result, the census was extended to other areas of Pebble Beach Company's Del Monte Forest Preservation and Development Plan (DMF/PDP) to obtain current population estimates.

METHODS

Census

Between March 22 and June 1, 2004, each site was censused via three steps: plant marking, plant counting and patch delimiting, and surveying (Appendix A).

1. **Marking:** Crews searched each of the censused areas and marked each individual *P. yadonii* with a pin flag.

2. **Counting and patch delimiting**: Following the protocol outlined in the complete methodology (Appendix A), biologists used numbered flags to delimit patches of *P. yadonii* and counted the number of individuals within each patch.

3. **Surveying**: Crews from WWD Corporation surveyed the patches as delimited.

Table 1 shows the timing of events in each of the census areas. After the census, the number of patches, number of plants per patch, and the area of each patch (ft^2) were compiled in a spreadsheet by Zander Associates and WWD. These data and maps showing the location of individual patches were provided to Ecosystems West Associates by June 24, 2004.

Analyses

The census data were used to determine the following:

1. The number, areal extent, and density of *Piperia yadonii* in 2004 in the DMF/PDP areas.

2. The number and areal extent of *P. yadonii* in 2004 compared to the number and occupied habitat of *P. yadonii* from the surveys conducted by Allen (1996).

Table 1: Timing of the 2004 *piperia yadonii* census events in the Del Monte Forest Preservation and Development Plan Areas. Provided by Zander Associates.

Area	Marking	Counting and Patch Delimiting	Surveying
B	4/16	4/19	4/19
C	4/16	na	na
F-1	4/29, 4/30	4/30, 5/4	5/5
F-2	4/19	4/20	4/21
F-3	4/19	4/20	4/20
G	4/22	4/26 - 4/27	4/28 - 4/30
H	4/22 - 4/23	4/26 - 4/27	4/28 - 4/30
I-1	4/23, 4/27	4/28 - 4/29	4/30 - 5/4
I-2	4/16, 4/19	4/19	4/20
J	4/27 - 4/29	4/30	5/6
K	4/5, 4/12	4/13 - 4/14	4/13 - 4/15
L	4/29	4/30	5/6
M	4/2	na	na
N	3/22 - 3/24, 3/29	3/29 - 3/31	3/29 - 4/1
O	3/19, 3/29 - 4/1	4/1 - 4/6	4/1 - 4/7
U	4/2	4/8	4/12
V	4/1	4/8	4/8 - 4/12
PQR	4/14, 4/15, 4/22, 4/27,	4/14 - 4/16, 4/22, 4/26, 5/4, 5/6,	4/20, 4/22 - 4/27, 5/7 - 6/1

2004 Census

The 2004 census data were used to determine the following:

1. **Number of Individuals***:* The number of individuals observed aboveground during the spring field work. (Does not include dormant plants that my have been belowground).

2. **Areal Extent:** The total area within the delimited and surveyed patches. As described in detail in Appendix A, plants more than 3 m apart were included in separate patches. The area between patches is not included in the calculation of areal extent. Patches of plants that occupied $1m^2$ or less were counted as $1m^2$ ($10.76ft^2$). Individual plants (those without a neighbor within 3m) were assigned an area of $1ft^2$. The areal extent of patches larger than $1m^2$ was based on the area of the polygon determined in the GIS by WWD.

3. **Density:** The number of individuals per square. This was determined by dividing the number of individuals by the area in question. Within each site, piperia densities were calculated for the total patch area and the area of Monterey Pine Forest.

Comparison of 2004 Census to the 1996 Survey

Population and acreage estimates for *P. yadonii* in 2004 were related to those from the 1996 survey used in the Draft Environmental Impact Report (Jones and Stokes 2004). The data in the two efforts were collected using different methodologies. Therefore, comparisons of the population estimates and areal extent should not be used to infer change in the population of *P. yadonii* within or among sites.

RESULTS

2004 Census

Table 2 reports the number and areal extent of *P. yadonii* within each of the DMF/PDP areas censused in 2004. Table 2 also quantifies the density of *P. yadonii*, in terms of their areal extent (i.e. the area occupied by the surveyed patches) and the area of Monterey Pine Forest within each of the sites.

Table 2: Number of individuals, areal extent, and density of *Piperia yadonii* in the Del Monte Forest Preservation and Development Plan Areas in the 2004 Census.

				***Piperia* Densities**		
				within patches	**Monterey Pine Forest**	
	Individuals	**Areal Extent**			**Area**	**Density**
Site	**(N)**	**(ft2)**	**(acres)**	**(N/PatchAcres)**	**(acres)**	**(N/MPFArea)**
B	274	815	0.02	14,641	24.3	11
C	0	0	0.00	.	29.1	0
F-1	2,486	10,808	0.25	10,020	9.8	254
F-2	514	1,433	0.03	15,619	19.5	26
F-3	135	186	0.00	31,689	16.8	8
G	757	3,570	0.08	9,237	47.9	16
H	624	1,358	0.03	20,011	53.8	12
I-1	2,972	11,690	0.27	11,074	40.1	74
I-2	203	901	0.02	9,814	18.7	11
J	2,470	9,219	0.21	11,670	9.4	263
K	5,931	19,287	0.44	13,395	10.6	560
L	4	43	0.00	4,076	18.2	0
MNOUV	57,150	289,626	6.65	8,595	116.0	493
PQR	56,132	235,065	5.40	10,402	245.9	228
Total	**129,652**	**584,002**	**13.41**		**660.1**	**196**
Mean				**13095.71**		**139.66**

Comparison of 2004 Census to 1996 Surveys

Population Numbers

Across sites, current population estimates for *P. yadonii* were greater in 2004 (129,652) than in 1996 (46,146; Table 3). This difference should not be used to infer real change in population density or even in the density of aboveground individuals, as the methods used in the two surveys were very different. According to Bill Warner, a biologist who participated in the 1995-1996 *P. yadonii* surveys, a lower level of effort was used to locate individuals in the 1996 surveys than was employed in the 2004 census. This may explain, at least in part, the lower population estimates. In addition, two biologists with extensive experience working on *P. yadonii* in these sites, Bill Warner and Mike Zander, both indicated that the densities observed in field in 2004 were much greater than they have observed in previous years, suggesting 2004 may have also been a good year for *P. yadonii* expression (production of leaves).

Differences in population estimates between 1996 and 2004 were not consistent among sites. Of the 13 sites with *Piperia* present, 2004 estimates were greater for 8, but lower for 5 (Table 3). Two sites with high population estimates in 1996, MNOUV and PQR, experienced disproportionately large increases. This greater increase in large sites may be explained by the difference in methods used to count plants in the two years. Population numbers in the 1996 survey were estimated by walking through and visually estimating the number of plants, rather than flagging then counting each plant as in 2004.

Both methods do not count every individual and therefore have errors associated with their estimates. However, the error due to visual estimation is likely greater and proportional to the density of the patch (i.e. the more plants, the less accurate the estimate). In this case, observers in 1996 may have disproportionately underestimated the large patches. Two small to moderate population sites, F-2, and I-2, also exhibited above average increases, and one relatively high density site, K, did not increase as dramatically as MNOUV and PQR, however (Table 3). Site in which the marking was conducted late in the season may under estimate individual numbers as plants may have senesced prior to the census.

Table 3: Number of individual *Piperia yadonii* in the Del Monte Forest Preservation and Development Plan (DMF/PDP) areas in 1996 survey (Allen) and 2004 Census.

	1996 Individuals		2004 Individuals	
Area	**N**	**% of Total**	**N**	**% of Total**
B	425	0.9	274	0.2
C	0	0.0	0	0.0
F-1	3,864	8.4	2,486	1.9
F-2	177	0.4	514	0.4
F-3	99	0.2	135	0.1
G	1,579	3.4	757	0.6
H	966	2.1	624	0.5
I-1	2,088	4.5	2,972	2.3
I-2	32	0.1	203	0.2
J	1,612	3.5	2,470	1.9
K	4,355	9.4	5,931	4.6
L	321	0.7	4	0.0
MNOUV	14,730	31.9	57,150	44.1
PQR	15,898	34.5	56,132	43.3
Total	**46,146**	**100**	**129,652**	**100**
Average	**3,296**		**9,261**	

Areal Extent

We were unable to locate a description of the methods used to designated occupied habitat by EIP Associates based on the 1996 Allen data which documented the location of *P. yadonii* clusters. Rather than creating new, subjective rules for determining what constitutes occupied habitat, we calculated the areal extent of *P. yadonii* by summing the acreage covered by the polygons (see Methods description above). The resulting acreages are not meant to indicate the area of 'occupied habitat' or otherwise differentiate between areas that are or are not relevant to the biology of the species.

Like the numbers of individuals, the acreages of occupied habitat from Allen 1996 and the areal extent of *P. yadonii* from the 2004 census are not comparable due to the different methods used in their derivation. Table 4 presents the percentage of the total occupied habitat (1996) and areal extent (2004) that each site comprised during each sample period, allowing comparison within a given year of the proportional acreage of *P. y adonii* that each site contained.

Table 4: Occupied habitat (1996) and areal extent (2004) of *Piperia yadonii* in the Del Monte Forest Preservation and Development Plan (DMF/PDP) areas.

	Occupied Habitat 1996		Areal Extent 2004	
Area	**Acres**	**% of Total**	**Acres**	**% of Total**
B	0.6	0.42	0.02	0.14
C	0	0.00	0.00	0.00
F-1	5.7	na	0.25	1.85
F-2	1	0.70	0.03	0.25
F-3	0.4	0.28	0.00	0.03
G	11.8	8.31	0.08	0.61
H	9.1	6.41	0.03	0.23
I-1	15	10.56	0.27	2.00
I-2	0.1	0.07	0.02	0.15
J	2.6	1.83	0.21	1.58
K	5.1	3.59	0.44	3.30
L	0.6	0.42	0.00	0.01
MNOUV	41.8	29.44	6.65	49.62
PQR	48.2	33.94	5.40	40.30
Total	**142**	**95.99**	**13.410**	**100**
Average	**10.14**	**7**	**0.96**	**7**

FUTURE ANALYSES

This report does not evaluate the number, areal extent, and density of *P. yadonii* in and out of the development footprint in proposed development areas. Such analyses require maps showing the location of the patches relative to the proposed development footprint (i.e. limits of grading).

REFERENCES CITED

Allen, D. W. 1996. Results of two consecutive years of surveys for Yadon's piperia (*Piperia yadonii*) 1995 and 1996. Report prepared for Pebble Beach Company. August 1996. 11 pages and appendices.

Ecosystems West 2004. Transplantation design, enhancement, and adaptive management plan (TEAM Plan) for Yadon's Piperia for the Pebble Beach Company's Del Monte Forest Preservation and Development Plan. 47 pages and appendices.

Jones and Stokes Associates 2004. Draft Environmental Impact Report for Pebble Beach Company's Del Monte Forest Preservation and Development Plan. February 2004.

APPENDIX A:
2004 *PIPERIA YADONII* CENSUS METHODOLOGY

2004 WORK PLAN FOR THE TEAM PLAN
PROTOCOL FOR TASK 2.1
MARCH 24, 2004

Background

Task 2 of the 2004 Work Plan for the TEAM Plan is to examine horticultural processes for the transplantation project. The first step in this task (2.1) is to census the population of *Piperia yadonii* to determine the current location, spatial distribution, and density of aboveground individuals at MNOUV. This document provides the rationale and a detailed protocol for completion of this task.

Introduction

The Draft TEAM Plan outlines the steps of a program to facilitate transplantation and enhancement projects for *Piperia yadonii*. In the first year of the program, it is necessary to collect information about the habitat requirements, population distribution and density, and horticultural requirements of *P. yadonii* to design the components of the subsequent programs. Of critical need is detailed information about the spatial distribution, population size, and density of *P. yadonii* individuals in the proposed development areas. A census of *P. yadonii* will answer the following questions regarding the aboveground population:

1. What is the **abundance** of *P. yadonii* individuals in the proposed development areas?
2. What is the **location** of *P. yadonii* individuals within the proposed development areas?
3. What is the **density** of *P. yadonii* individuals within the proposed development areas?

Question 1 will address the project need for determination of the number of individuals that will be involved in the mitigation projects. Accurate and up to date abundance estimates will be used to determine details of the transplantation and enhancement programs, including the number of tubers that will be involved in the projects.

Question 2 will address the need to have current information about the location of individuals that will be involved in the transplantation projects. Though the location of colonies was mapped during the 1995/1996 census, this information is dated and does not precisely identify the location of individuals for purposes of salvage prior to development.

Question 3 will address the need for more information about the spatial configuration of *P. yadonii* within the project areas. As designed, the census to determine the abundance and location of *P. yadonii* in the proposed development areas can quantify the density of aboveground individuals within the populations. An understanding of the range of population densities at which the plant occurs will be used to inform transplantation and enhancement project design, including salvage methods (individual vs. soil based), outplanting density, and spatial separation of individuals and patches, among others.

Methods

Location

The population of *P. yadonii* within the area of work at MNOUV will be censused in order to generate precise and current information about the abundance and spatial distribution of individuals in the proposed golf course development.

Census

Timing

The census should occur during early spring (March –April), during the period of maximum visibility of aboveground individuals.

Personnel

Two teams are needed to complete this census. Biologists with experience in surveys of *P. yadonii* should lead a team of individuals with well-developed search images to identify the location of individual plants in the census. A second team of individuals experienced with the proposed development and survey skills will be responsible for marking the area of work then surveying the patches of individuals as identified by biologists (described below).

Search

To avoid inadvertent bias in searching for individuals, the search should be conducted systematically. Teams of individuals trained to detect and correctly identify *P. yadonii* should systematically walk through the entire area and mark the location of each *P. yadonii* with a colored pin flag. Though the actual time spent in each area will depend on the density of *P. yadonii*, a minimum amount of time should be spent searching with a goal of detecting a minimum of 95% of the individuals. Searchers should avoid interjecting any bias into the search, including knowledge of likely *P. yadonii* habitat conditions. For example, while trained individuals will inevitably incorporate their knowledge of conditions in which *P. yadonii* is most likely to occur, areas thought to be on-habitat" should be searched as well. While every plant will not obviously be detected, the goal is to avoid any bias in where plants are missed.

Counting and Mapping

Each individual plant should be marked with a pin flag. After each plant has been flagged in a given area, biologists should revisit the area with the team of surveyors to map the population via the following protocol.

1. **Patches**

Patches of plants are defined as all individual plants that are no more than 3 m away from the next nearest individual[1]. Put another way, all individuals within 3m of each other are in the same

[1] The minimum distance between patches was determined by biologists J. McGraw, B. Davilla, M. Zander, L. Zander, E. Avery, and B. Warner based on observations of the spatial aggregation of individual *P. yadonii* within a variety of patches in area N on March 24, 2004.

patch. Each patch of plant should be given a unique identifier (e.g. N-1, O-15, etc.), and the following information collected.

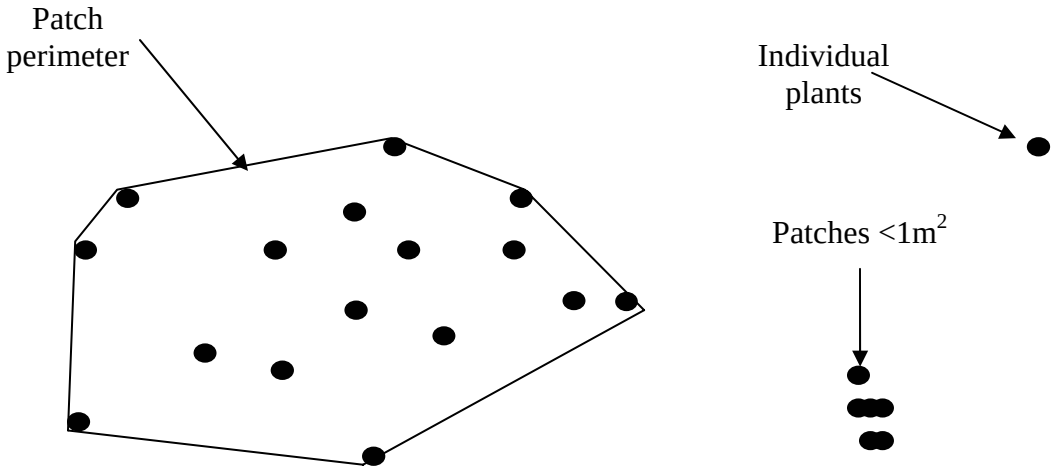
a. **Patch perimeter**: the boundary of the patch is defined as the polygon that includes all individuals by connecting points for the plants on the periphery of the population (Figure 1).

b. Patch population: the number of individuals within each patch should be counted and recorded.

2. **Patches less than 1m^2:** A minimum patch area of 1m^2 should be used. The following protocol should be used to map patches of individuals that occupy an area less than 1m^2 (e.g.1m x 1m or 0.5m x 2m).
   a. **Patch location:** Surveyors should record the location of each patch as a single point located in the center of the patch.
   b. **Patch population:** The number of individuals in the patch should be counted and recorded.

3. **Isolated individual plants**: Individual plants more than 3m away from all other plants should be censused as follows:
   a. **Location:** Surveyors should record the location of the plant as a single point
   b. **Population:** The individual should be recorded on the data sheet.

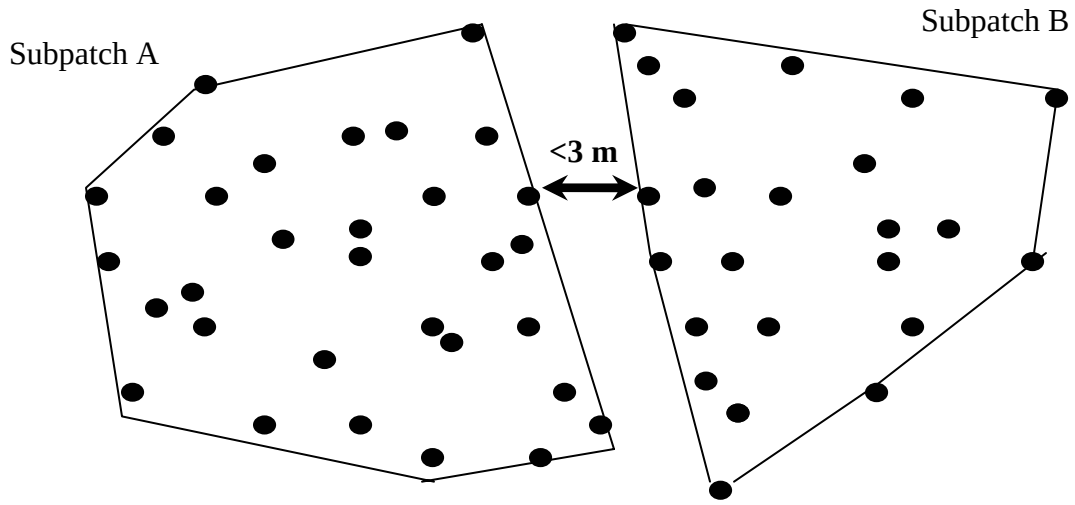
Figure 1



Special Methods for Large Patches

Patches that occupy large spatial areas (>400m^2 or so) can be divided into sub-patches for purposes of mapping the perimeter (Figure 2). Sub patches should be given unique identifiers that indicate their patch affiliation (e.g. N-1-a, N-1-b, N-1-c). The perimeter of subpatches should be determined by the biologist, using additional flagging or other means to ensure that subpatches do not overlap (i.e. same plant(s) included in more than one subpatch) and that individuals are not missed.

Figure 2



Data Recording

Data about each location (patch, subpatch, small patch, or individual) should be recorded on a data sheet. A draft data sheet has been created, but should be adapted by the biologists as needed.

Biologists and surveyors should work together to ensure the following goals are attained:

1. Patch perimeters are delimited as accurately as possible.
2. Reference points collected by surveyors are recorded such that polygons can be assembled for each patch (i.e. each point for each patch has a unique identifier, so that points from nearby patches are not confused.)
3. Count data can be readily attributable to the polygons (series of points) collected by surveyors. The unique patch identifier must be used by surveyors recording points and biologists recording counts.

Marking

A single flag or other marker should be left approximately in the center of each patch or isolated individual. The flag should be marked to identify the patch ID (e.g. N-17, O-22-E). Flags should be placed securely into the ground.

Appendix E.4

Del Monte Forest Species Lists

Table E.4-1. Special-Status Plants Documented or Having the Potential to Occur in the Del Monte Forest

Table E.4-2. Special-Status Wildlife Species Documented or Identified as Having Potential to Occur in the Del Monte Forest

Table E.4-1. Special-Status Plants Documented or Having the Potential to Occur in the Del Monte Forest

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Allium hickmanii Hickman's onion	--/--/1B	Closed-cone conifer forest, chaparral, and grasslands	Monterey Peninsula and near Jolon, Monterey County 23 occurrences in California; 17 of these occurrences are reported from Monterey County (CNDDB 2002)	April-May	MNOUV, F-3, G, H, I-1, and PQR
Arctostaphylos edmunsii var. *edmundsii* Little Sur manzanita	--/--/1B	Coastal bluff scrub and chaparral	Monterey County	Year round	
Arctostaphylos edmundsii var. *parvifolia* Hanging gardens manzanita	--/R/1B	Chaparral	Monterey County	Year round	
Arctostaphylos hookeri ssp. *hookeri* Hooker's manzanita	--/--/1B	Chaparral, closed-cone coniferous forest, and coastal scrub	Near the coast in Monterey and Santa Cruz Counties 10 occurrences in California; 6 of these occurrences are reported from Monterey County (CNDDB 2002)	Feb-May	MNOUV, Sawmill, F-1, F-2, F-3, G, H, I-1, I-2, PQR, Corp. Yard, HHNA/SFB Morse
Arctostaphylos montereyensis Toro manzanita	--/--/1B	Chaparral, oak woodland, and coastal scrub	Monterey and San Luis Obispo Counties	Year round	
Arctostaphylos pajaroensis Pajaro manzanita	--/--/1B	Sandy hills in chaparral	Monterey County	Year round	
Arctostaphylos pumila (*A. uva-ursi* var. *pumila*) ** Sandmat manzanita	--/--/1B	Closed-cone conifer forest, coastal scrub, and coastal dunes	About Monterey Bay 15 occurrences in California; all of these occurrences are reported from Monterey County (CNDDB 2002)	Year round	Areas F-2, F-3, H, I-1, PQR, Corp. Yard, HHNA/SFB Morse.

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Arctostaphylos tomentosa ssp. *bracteosa* var. *hebeclada***(!)* Shaggy-barked manzanita	--/--/--	Open, shale outcrops, 2-300 m. Also in cultivation.	Jack's Peak, near Monterey	Year round	MNOUV, Sawmill, B, F-1, F-2, F-3, G, H, I-1, I-2, J, K, PQR; Corp. Yard, Equestrian Center, HHNA/SFB Morse
Astragalus tener var. *titi** Coastal dunes milk vetch	E/E/1B	Coastal dunes	Monterey Bay and San Diego Bay	Mar-May	Shoreline west of 17-mile Drive, MPCC
*Castilleja latifolia ** Monterey Indian paintbrush	--/--/4	Coastal dunes and scrub	Central Coast	April-May	Signal Hill Dune, Area L, Indian Village, shoreline west of 17-Mile Drive, MPCC
Ceanothus cuneatus var. *rigidus ** Monterey ceanothus	--/--/4	Widespread in maritime chaparral; closed-cone conifer forest on sandy hills and flats	Monterey Peninsula	Feb-Mar	HHNA/SFB Morse
Chorizanthe rectispina Straight-awned spineflower	--/--/1B	Chaparral, oak woodland, and grassland	Coast Ranges of Monterey and San Luis Obispo Counties	Jun-Jul	
Chorizanthe robusta var. *robusta* Robust spineflower	E/--/1B	Coastal dunes and scrub on dry, sandy places below 1,000 feet	Coastal Santa Cruz and Monterey Counties	May-Sept	
Chorizanthe pungens var. *pungens* Monterey spineflower	T/--/1B	Maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland, sandy soils	Monterey Peninsula and coastal north Monterey County. 27 occurrences in California; 19 of these occurrences are reported from Monterey County (CNDDB 2002)	Apr-Jun	Signal Hill Dune, Area L, Indian Village, shoreline west of 17-Mile Drive

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Collinsia multicolor San Francisco collinsia	--/--/1B	Dry, stony and grassy slopes in coastal scrub and closed-cone coniferous forest	San Francisco County to San Mateo County	Mar-May	
Cordylanthus rigidus spp. *littoralis* Seaside bird's-beak	--/E/1B	Coastal scrub, closed-cone conifer frst, oak woodland, and chaparral on dry, sandy soils below 3,000 feet	Coast Ranges of Monterey and Santa Barbara Counties	May-Sep	
Cupressus goveniana spp. govenianam * Gowen Cypress	T/--/1B	Closed-cone coniferous forest, maritime chaparral	Monterey County 3 occurrences in California; all of these occurrences are reported from Monterey County (CNDDB 2002)		F-1, F-2, F-3; I-1, L, HHNA/ SFB Morse, Sawmill (planted), Equestrian Center, Indian Village
Cupressus macrocarpa * Monterey cypress	--/--/1B	Closed-cone coniferous forest	Monterey County 2 occurrences in California; both occurrences are reported from Monterey County (CNDDB 2002)	Year round	Along 17-mile Drive between Pescadero Point and Cypress Point, planted elsewhere throughout DMF
*Delphinium hutchinsoniae** Hutchinson's larkspur	--/--/1B	Coastal scrub, coastal prairie, and mixed evergreen forest	Monterey County	Mar-Jun	Recorded north of DMF in Pacific Grove
Delphinium umbraculorum Umbrella larkspur	--/--/1B	Cismontane woodland; usually shaded places	Monterey and San Luis Obispo Counties	April-Jun	
*Ericameria fasciculata** Eastwood's goldenbush	--/--/1B	Closed-cone conifer forest, chaparral, and coastal scrub	Monterey and Carmel Bays	Jul-Oct	HHNA/SFB Morse
Eriogonum butterworthianum Butterworth's buckwheat	--/R/1B	Chaparral	Monterey County	Jun-Jul	

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Eriogonum nortonii Pinnacles buckwheat	--/--/1B	sandy soils in chaparral, valley and foothill grassland, often on recent burns	Monterey and San Benito Counties	May-Jun	
Eriogonum parvifolium ssp. *lucidum** Point Lobos buckwheat [Note: ESHA as Smith's blue butterfly habitat only]	--/--/--	Dunes, seabluffs	Central and Southern Coast of California		Signal Hill Dune, along 17-Mile Drive in dune areas between Pescadero Point to Spanish Bay, Area L, Indian Village, MPCC
Erysimum ammophilum Coast wallflower	--/--/1B	Coastal dunes	Coastal areas of Montery and Santa Cruz County, and Santa Rosa Island; known from only 10 occurrence, nearly extirpated on the Monterey Peninsula (CNPS 2001)	Feb-Jun	
*Erysimum menziesii ssp. Menziesii** Menzies' wallflower	E/E/1B	Coastal dunes	Monterey County and from Fort Braff to north of Humboldt Bay 10 occurrences in California; 7 of these occurrences are reported from Monterey County (CNDDB 2002)	Mar-Jun	Signal Hill Dune, Indian Village, shoreline west of 17-Mile Drive, Spanish Bay dunes
Erysimum menziesii spp. *yadonii* Yadon's wallflower	E/E/1B	Coastal dunes	Monterey County	Jun-Aug	
Fritillaria liliacea Fragrant fritillary	--/--/1B	Coastal scrub and grassland; often on ultramafic soils	Sonoma County to Monterey County	Feb-Apr	Historical records near beach in southern part of DMF, possibly extirpated

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Gilia tenuiflora ssp. *Arenaria* Sand gilia	E/T/1B	Coastal dunes and scrub	Monterey Bay region 30 occurrences in California; 29 of these occurrences are reported from Monterey County (CNDDB 2002)	Apr-Jun	Signal Hill Dune, Spanish Bay dunes, MPCC
Horkelia cuneata ssp. *sericea* Kellogg's horkelia	--/--/1B	Sandy and gravelly places in coastal scrub and closed-cone coniferous forest	Along the coast from Sonoma County to Santa Barbara County	Apr-Sept	Found north of DMF in Asilomar dunes
Layia carnosa Beach layia	E/E/1B	Widely scattered stations on coastal sand dunes	Humboldt County to San Francisco County and historically to Point Concepcion 27 occurrences in California; 4 of these occurrences are reported from Monterey County (CNDDB 2002)	Apr-Jul	Signal Hill Dune, Indian Village
Layia jonesii Jones's layia	--/--/1B	Chaparral and grassland	Monterey and San Luis Obispo Counties	Mar-May	Historic record at MPCC
Lupinus tidestromii var. *tidestromii* * Tidestrom's lupine	E/E/1B	Coastal dunes	Monterey Peninsula 20 occurrences in California; 11 of these occurrences are reported from Monterey County (CNDDB 2002)	May-Jun	Signal Hill Dune, shoreline west of 17-Mile Drive, Indian village, Spanish Bay
Malacothamnus palmeri var. involucratus Carmel Valley Bush Mellow	--/--/1B	Chaparral, cismontane woodland, and coastal scrub	Monterey and San Luis Obispo Counties	May-Oct	Found north of DMF in Pacific Grove
Malacothrix saxatilis var. *arachnoidea* Carmel Valley cliff-aster	--/--/1B	Rocky open banks of chaparral and mixed evergreen forest	Monterey and Santa Barbara Counties	Jun-Dec	

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Microseris paludosa Marsh microseris	--/--/1B	Closed-cone coniferous forest, Cismontane woodland, Coastal scrub, valley and foothill grassland, <300 m	Central Coast, San Francisco Bay Area	Apr-Jun	
Pinus muricata Bishop pine*	--/--/--	Redwood forest, closed cone coniferous forest, North coastal coniferous forest, oak woodland, chaparral.	North and Central Coast of California, North San Francisco Bay Area, northern Channel Islands, northern Baja	Year-round	HHNA/SFB Morse, F-2, F-3, Equestrian Center, Sawmill (planted)
Pinus radiata Monterey Pine	--/--/1B	Closed-cone coniferous forest, cismontane woodland	Monterey, Santa Cruz, San Luis Obispo, and San Mateo Counties, Baja California, GU 5 occurrences in California; 2 of these occurrences are reported from Monterey County (CNDDB 2002)	Year-round	Occurs throughout DMF
Piperia yadonii Yadon's piperia (aka Yadon's rein orchid)	E/--/1B	Coastal bluff scrub, closed-cone coniferous forest, maritime chaparral, on sandy soils	Monterey County 20 occurrences in California; all of these occurrences are reported from Monterey County (CNDDB 2002)	May-Aug	NOUV, B, F-1, F-2, F-3, G, H, I-1, I-2, J , K, L, PQR, HHNA/SFB Morse, Crocker Grove, MPCC, Indian Village, Spyglass Hill GC, Forest Lake Reservoir
Plagiobothrys uncinatus Hooked popcornflower	--/--/1B	Chaparral and possibly grassland and cismontane woodland	Monterey and San Benito Counties	Apr-May	
Potentilla hickmanii * Hickman's potentilla (also known as Hickman's cinquefoil)	E/E/1B	Scrub, closed-cone coniferous forest and vernally mesic sites	Known from only two occurrences on the Monterey Peninsula	Apr-Aug	Indian Village

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Rhododendron macrophyllum Coast rhododendron*	--/--/--	Moist coniferous forests	North and Central California Coast, San Francisco Bay Area, Klamath Ranges in Pacific Northwest	Year round	
Rosa pinetorum Pine rose	--/--/1B	Pine woodlands and canyons	Central coast, San Francisco Bay and Southern Coast Range. 6 occurrences in California; 5 of these occurrences are reported from Monterey County	May-Jul	MNOUV, F-1, F-2, F-3, G, H, I-1, I-2, L, HHNA/SFB Morse, Corp. Yard, Indian Village
Sidalcea hickmanii spp. *hickmanii* Hickman's checkerbloom	--/--/1B	Hillsides in chaparral	Monterey County	Jun-Jul	
Sidalcea malachroides Maple-leafed checkerbloom	--/--/1B	Coastal scrub, perennial grassland, Redwood forest, Douglas-fir forest, in open, often disturbed areas, 5-2,300'	North coast and northern central coast from Humboldt County to Monterey County, Oregon	Feb-Mar	
Stebbinsoseris decipiens Santa Cruz microseris	--/--/IB	Open areas in broad-leaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, and coastal scrub, sometimes serpentinite	Monterey, Marin and Santa Cruz Counties	Apr-May	
Trifolium buckwestiorum Santa Cruz clover	--/--/1B	Moist grassy areas on margins of broad-leaved upland forest, cismontane woodland, and coastal prairie, sometimes in disturbed areas, 200-1,800'	San Francisco Bay area and central coastal California, Endemic to Santa Cruz County, also known from Monterey and Sonoma Counties	May-Oct	

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest
Trifolium polydon * Pacific Grove clover	--/R/1B	Closed-cone coniferous forest, coastal prairie, meadow	Known only from three occurrences on the Monterey Peninsula 12 occurrences in California; all of these occurrences are reported from Monterey County (CNDDB 2002)	Apr-Jun	Equestrian Center, Indian Village, MPCC, shoreline west of 17-Mile Drive
Trifolium trichocalyx * Monterey clover	E/E/1B	Closed-cone coniferous forest, openings, burned areas	Monterey County 2 occurrences in California; both of these occurrences are reported from Monterey County (CNDDB 2002)	Jun-Nov	Area G, HHNA/SFB Morse, F-2 and F-3 (specimen records)
*Xerophyllum tenax** Beargrass	--/--/--	Dry open slopes, ridges, montane coniferous forest	Central California north to British Columbia and east to Wyoming	July-August	HHNA/SFB Morse

Species [A]	Status[B] Fed/State/CNPS	Habitats	Distribution in California and Monterey County [C]	Identification Period	Occurrence in Del Monte Forest

Notes:

[A] Species identified with an * are listed as Environmentally Sensitive Habitat Areas in Appendix A of the Del Monte Forest Land Use Plan for their habitat or forest community. Species identified with a "**" are identified as ESHA for significant occurrences only.

Additional "watch list" plants (CNPS List 4) have been documented in the Del Monte Forest but are not evaluated in this EIR because they do not fit the definition of special-status species and more importantly, they occur largely within open space areas. This CNPS List 4 species include small-leaved lomatium (*Lomatium parvifolium*), adder's tongue fern (*Ophioglossum californicum*), and Gairdner's yampah (*Perideridia gairdnerii*).

! = not originally included in Proposed Project List of Potential Plants (Table E-8, Appendix E, DEIR)

[B] Status Definitions

– = no listing.

Federal

E = listed as endangered under the federal Endangered Species Act.

T = listed as threatened under the federal Endangered Species Act.

SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.

State

E = listed as endangered under the California Endangered Species Act.

R = listed as rare under the Cal. Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

– = no listing.

California Native Plant Society

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

4 = List 4 species: plants of limited distribution – a watch list.

Other

ESHA = Environmentally Sensitive Habitat Area (may be based on locally rare or significant habitats)

[C] Distribution information was obtained from the California Native Plant Society's (CNPS's) (2001) 6th Edition Inventory of Rare and Endangered Vascular Plants of California. The total number of recorded occurrences in California and in Monterey is provided for special-status plants documented in the project area and was obtained from the California Department of Fish and Games NDDB (2002)

Sources: Yadon, 2001; CNDDB 2004; CNPS 2001; County of Monterey 1997, 1995, and 1987; Ecosystems West 2004; Jones & Stokes 1996a, 1996b, 1994a, 1994b; USFWS 2002a, 2002b, Zander 2002, 2001a, 2001b, 2001c; Allen 1996, 1994a, 1994b, 1992a, 1992b;

Table E.4-2. Special-Status Wildlife Species Documented or Identified as Having Potential to Occur in the Del Monte Forest

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
		Invertebrates		
Monarch Butterfly (wintering sites) *Danaus plexippus*	--/--	Winter roosts in wind protected tree groves with nectar and water sources nearby.	Marin County south to Baja California	No aggregations have been observed, but individual butterflies observed throughout the DMF area during surveys in 1993 and 1994. Suitable habitat in Areas H, I-1, and PQR (Zander 2001).
Smith's Blue Butterfly *Euphilotes enoptes smithi*	--/E	Coastal dunes and hillsides that support seacliff buckwheat (Eriogonum parvifolium) or coast buck-wheat (Eriogonum latifolium); these plants used as a nectar source for adults and host plant for larvae	Localized populations along the immediate coast and in coastal canyons of Monterey County; single populations reported in Santa Cruz and San Mateo Counties	None observed during surveys in 2000. Suitable habitat and host plants occur in Areas M, N, and L and may occur in other dune areas like at Spanish Bay (Zander 2001).
		Amphibians		
California tiger salamander *Ambystoma californiense*	SSC/T	Favors open woodlands and grasslands; requires water for breeding and burrows or cracks in the soil for summer dormancy	Occurs only in California from the coastline to the Sierra Nevada crest and from Sonoma County to Santa Barbara County	None (Zander 2001).
California red-legged frog *Rana aurora draytonii*	SSC/T	Permanent and semi-permanent aquatic habitats, such as quiet pools of streams, marshes, and ponds with extensive vegetation.	West of Sierra-Cascade crest and along the Coast Range from Marin County south to northern Baja California	Documented in lower Seal Rock Creek, adjacent to water hazards on the Spyglass Hill golf course, and at two locations on the Proposed Golf Course. Suitable aquatic habitat exists in other areas, but these areas have not been documented as occupied in surveys to date (WRA 2002, 2003)

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
Foothill yellow-legged frog *Rana boylii*	SSC/SC	Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along the edge. Usually found near riffles with rocks and sunny banks nearby.	Occurs in the Klamath, Cascade, north Coast, south Coast, Transverse, and Sierra Nevada Ranges up to approximately 6,000 feet	None (County of Monterey 1995).
		Reptiles		
Black legless lizard *Anniella pulchra nigra*	SSC/--	Coastal dunes with native vegetation or chaparral, pine-oak woodland, or riparian areas with loose soil for burrowing	Monterey Bay region	Occurs in dune habitats at Spanish Bay. Suitable habitat in remnant dune habitat in Areas M, N, and L (Zander 2001).
Silvery legless lizard *Anniella pulchra pulchra*	SSC/SC	Habitats with loose soil for burrowing or thick duff or leaf litter; often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County with spotty occurrences in the San Joaquin Valley	Similar suitable habitat as for black legless lizard in Areas M, N, and L and at Spanish Bay and other dune areas (Zander 2001).
California horned lizard *Phrynosoma coronatum frontale*	SSC/SC	Occurs in areas with sandy soils and moderate cover	Occurs in Central Valley from Tehama County south to Tulare County and Coast Ranges from Sonoma County south to San Diego County	Suitable habitat in chaparral habitats in the Huckleberry Hill area and remnant dune habitat in areas M, N, and L, Spanish Bay and other dune areas (Zander 2001).

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
Southwestern pond turtle *Clemmys marmorata pallida*	SSC/SC	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, waterlilies, or other aquatic vegetation	Occurs along the central coast of California east to the Sierra Nevada and along the southern California coast inland to the Mojave and Sonora Deserts; range overlaps with that of the northwestern pond turtle throughout the Delta and in the Central Valley from Sacramento County to Tulare County	No records or observations (EIP 1995). Suitable habitat in water hazards and pools in creek habitat in DMF.
Birds				
Sharp-shinned hawk (nesting) *Accipiter striatus*	SSC/--	Found in riparian forests, conifer forests, and oak woodlands	Permanent resident in the Sierra Nevada, Cascade, Klamath, and north Coast Ranges, as well as along the coast in Marin, San Francisco, San Mateo, Santa Cruz, and Monterey Counties; winters over the rest of the state except at high elevations; breeds and winters throughout North America	Observed nesting in Area B in 1993. Suitable habitat in Monterey Pine Forest (Zander 2001).
Cooper's hawk (nesting) *Accipiter cooperi*	SSC/--	Nests in riparian forests and dense canopy oak woodlands; forages in open woodlands	Found in all parts of California except high altitudes in the Sierra Nevada; winters in the Central Valley, southeastern desert regions, and the plains east of the Cascade Range; permanent resident throughout the lower 48 states	Suitable habitat in Monterey Pine Forest (Zander 2001).
Golden Eagle (nesting and wintering) *Aquila chrysaetos*	SSC,FP/ --	Nest on cliffs and escarpments or in tall trees overlooking open country. Forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals	Foothills and mountains throughout California. Uncommon nonbreeding visitor to lowlands such as the Central Valley	None (Zander 2001).

Table E.4-2. Special-Status Wildlife Species Documented or Identified as Having Potential to Occur in the Del Monte Forest

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
Short-eared owl (nesting) *Asio flammeus*	SSC/--	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts	Permanent resident along the coast from Del Norte County to Monterey County although very rare in summer north of San Francisco Bay, in the Sierra Nevada north of Nevada County, in the plains east of the Cascades, and in Mono County; small, isolated populations	None (Zander 2001).
Burrowing owl (burrow sites) *Athene cunicularia*	SSC/SC	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast	None (Zander 2001).
Western snowy plover (nesting) (coastal population) *Charadrius alexandrinus nivosus*	SSC/T	Found along beaches above the high tide limit; also uses shores of salt ponds and alkali or brackish inland lakes	Intermittent nesting sites along the Pacific Coast from Washington to Baja California	The Project area lies outside of the known nesting range of the species (Zander 2001). Could be present periodically in beach areas.
Northern harrier (nesting) *Circus cyaneus*	SSC/--	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	Occurs throughout lowland California. Has been recorded in fall at high elevations	None (Zander 2001).
Black swift (nesting) *Cypseloides niger*	SSC/SC	Nests in moist crevice or cave on sea cliffs above the surf, or on cliffs behind, or adjacent to, waterfalls in deep canyons	Breeds very locally in the Sierra Nevada and Cascade Range, the San Gabriel, San Bernardino, and San Jacinto mountains, and in coastal bluffs from San Mateo county south to near San Luis Obispo county	None (Zander 2001).

Table E.4-2. Special-Status Wildlife Species Documented or Identified as Having Potential to Occur in the Del Monte Forest

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
Yellow warbler (nesting) *Dendroica petechia brewsteri*	SSC/--	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders; may also use oaks, conifers, and urban areas if they are near streamcourses	Nests throughout California except the Central Valley, the Mojave Desert region, and high altitudes in the Sierra Nevada; winters along the Colorado River and in parts of Imperial and Riverside Counties; also has small permanent populations in San Diego and Santa Barbara Counties; occurs throughout North America except in the southeast states	None (Zander 2001).
White-tailed kite (nesting) *Elanus leucurus*	SSC/SC	Common to uncommon, yearlong resident in coastal and valley lowlands. Uncommon resident of open valleys and riparian woods in Monterey County	Inhabits herbaceous and open stages of most habitats mostly in cismontane California. Has extended range and increased numbers in recent decades.	Preservation Area L and possibly elsewhere in DMF (Tenney 2003)
California horned lark *Eremophila alpestris actia*	SSC/--	Common to abundant resident in a variety of open habitats, usually where large trees and shrubs are absent. Grasslands and deserts to dwarf shrub habitats above tree line	Found throughout much of the state, less common in mountainous areas of the north coast and in coniferous or chapparal habitats	None (Zander 2001).

Table E.4-2. Special-Status Wildlife Species Documented or Identified as Having Potential to Occur in the Del Monte Forest

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
Prairie falcon (nesting) *Falco mexicanus*	SSC/--	Nests on cliffs or escarpments, usually overlooking dry, open terrain or uplands	Permanent resident in the south Coast, Transverse, Peninsular, and northern Cascade Ranges, the southeastern deserts, Inyo-White Mountains, foothills surrounding the Central Valley, and in the Sierra Nevada in Modoc, Lassen, and Plumas Counties. Winters in the Central Valley, along the coast from Santa Barbara County to San Diego County, and in Marin, Sonoma, Humboldt, Del Norte, and Inyo Counties	None (Zander 2001).
American peregrine falcon (nesting) *Falco peregrinus anatum*	E,FP/De listed, SC	Nests and roosts on protected ledges on high cliffs, usually adjacent to water sources that support large bird populations	Permanent resident on the north and south Coast Ranges; winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range; occurs along both coasts of the United States and parts of Alaska, Arizona, Colorado, and the borders of Idaho	None (Zander 2001).
Loggerhead shrike (nesting) *Lanius ludovicianus*	SSC/SC	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter	None (Zander 2001).
California brown pelican (nesting colony) *Pelecanus occidentalis californicus*	E/E	Typically in littoral ocean zones, just outside the surf line; nests on offshore islands	Present along the entire coastline, but does not breed north of Monterey County; extremely rare inland	No known to nest along DMF. Individuals found offshore.

Species	Status[a] State/Fed	Habitats	California Distribution	Occurrence in Project Area
		Mammals		
Pallid Bat *Antrozous pallidus*	SSC/--	Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts	Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations	None observed during surveys. Suitable habitat occurs near mature oaks and streams within DMF (Zander 2001).
Ringtail *Bassariscus astutus*	FP/--	Occurs primarily in riparian habitats but also known from most forest and shrub habitats from lower to mid elevations	Little information on distribution and abundance. Apparently occurs throughout the state except for the southern Central Valley and the Modoc Plateau	Suitable habitat occurs in riparian and forest habitats within the DMF (Zander 2001).
Southern sea otter *Enhydra lutris nereis*	FP/T	Coastal waters, typically within 1 km of shoreline. Often associated with kelp beds	Occurs from the vicinity of Half Moon Bay south to Gaviota, California.	Found offshore in kelp beds.
Monterey dusky-footed woodrat *Neotoma fuscipes luciana*	SSC/--	Uses habitats with moderate to dense cover and abundant dead wood for nest construction; maritime chaparral and coastal live oak woodland at Fort Ord	Restricted to Monterey County and northern San Luis Obispo County	Six active nests observed during surveys in Area PQR (Zander 2001).
Monterey shrew (aka Salinas ornate shrew) *Sorex ornatus salarius*	SSC/	Found in a variety of riparian, woodland, and upland communities where there is thick duff or downed logs	Restricted to the Monterey Bay region; historical occurrences at the mouth of the Salinas River and Moss Landing in Monterey County	No records, but subspecies is endemic to Monterey Peninsula; suitable habitat occurs in riparian and forest habitats within the DMF (Zander 2001).

Federal Status E = Endangered, T = Threatened, C = Candidate species, SC = Species of concern

State Status E = Endangered, SSC = Species of special concern, FP = Fully protected species

Sources: Sources: CNDDB 2004; County of Monterey 1997, 1995, and 1987; Jones & Stokes 1996b; USFWS 2002a, Zander 2001b; Allen 1995; Tenney 2003; Entomological Consulting Services 2000; USFWS 2002a; WRA 2003.

Appendix E.5

Mitigation Preservation Areas Outside the Del Monte Forest