Baseline Inventory -
Lands of the Presidio of San Francisco, CA
Michael Vasey, Principal Investigator August 1, 1996

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BiBKey

TABLE 1

Terrestrial Natural Communities Occuring On or Formerly On the Presidio (Holland, 1986)

1. **Northern Foredunes (21210)**

Dunes back from the ocean shore somewhat stablized by an assemblage of species such as *Ambrosia chamissonis*, *Abronia latifolia*, *Leymus mollis*, *Camissonia cheiranthifolia*, and *Cakile maritima*. Crissy Field and Baker's Beach present good examples.

2. **Central Dune Scrub (21320)**

Dense coastal scrub back from the immediate coast and into the interior characterized by a rich assemblage of shrubs, subshrubs, and herbs such as *Ericameria ericoides*, *Lupinus chamissonis*, *Lupinus arboreus*, *Artemisia pyncnocephala*, *Amsinckia spectabilis*, *Marah fabaceous*, and *Eryssimum franciscanum*. Sandy coastal bluffs above north Baker's Beach are good example.

3. **Northern Coastal Bluff Scrub (31100)**

A low scrub and herbaceous community that occupies steep slopes and cliffsides along the immediate coast. Characterized by species such as *Dudleya farinosa*, *Achillaea millefolium*, *Arabis blepharophylla*, *Eriogonum latifolium*, *Angelica hendersonii*, *Piperia elegans*, and *Eriophyllum staechadifolium*. Prominent on serpentine coastal bluffs from Baker's Beach around to Fort Point.

4. **Northern Coastal Scrub (32100)**

A scrub community on more gentle slopes with soil accumulation characterized by species such as *Baccharis pilularis*, *Ceanothus thyrsiflorus*, *Heteromeles arbutifolia*, *Eriophyllum staechadifolium*, *Scrophularia californica*, and *Chloragalum pomeridianum*. Upper slopes of coastal bluffs from Baker's Beach to Fort Point grading into Coastal Terrace Prairie and Central Dune Scrub.

5. **Central Maritime Chaparral** (37C20)*

A scrub community that may once have occupied sandy or rocky uplands on the Presidio. An extension of a form of chaparral more characteristic of Monterey area. *Arctostaphylos tomentosa* ssp. *crustacea* is characteristic and still occurs near Lake Merced. *Arctostaphylos hookeri* ssp. *ravenii* would have been a member. No longer present.

6. **Coastal Terrace Prairie** (41100)

A native perennial grassland that occupies ocean-facing coastal bluffs and rocky headlands. The characterization of this grassland as a coastal "terrace" community is not appropriate for the Presidio or a number of locations along the northern San Francisco Peninsula where dense, perennial grasses occupy rocky coastal headlands (e.g. San Pedro Point in Pacifica, San Pedro Mountain, San Bruno Mountain, Sweeney Ridge, and Mt. Davidson in San Francisco). Nonetheless, species composition is similar to that described by Holland and this grassland probably is an expression of the dense, perennial grasslands that dominate coastal prairies along the northern California coast. Characteristic species on the Presidio include grasses such as *Deschampsia caespitosa* ssp. *holciformis*, *Danthonia californica*, *Festuca rubra*, *Melica torreyanum*, and *Koeleria macrantha* as well as numerous perennial and annual herbs such as *Hesperolinon congestum*, *Dichelostemma capitatum*, *Iris douglasiana*, *Triphysaria floribunda*, and *Grindelia hirsutula* ssp. *maritima*. Grading into Northern Coastal Scrub, larger stands highly restricted on Presidio coastal bluffs above Baker's Beach (Raven manzanita site).

7. **Serpentine Bunchgrass** (42130)

A perennial grassland occurring on serpentine slopes that are more interior and protected from direct maritime exposure. Common native grasses include *Nasella pulchra*, *Elymus glaucus*, *Koeleria macrantha*, *Bromus carinatus* and *Hordeum brachyantherum*. Characteristic herbs and geophytes include *Chloragalum pomeridianum*, *Triteleia laxa*, *Allium dichlamydeum*, *Clarkia franciscana*, *Monardella villosa*, and

Camissonia ovata. Occurring as open glades in the cultural forest, as in the grasslands that surround Inspiration Point.

8. **Non-Native Grassland (42200)**

This is a vaguely described natural community that by definition is dominated by non-indigenous annual grass species such as *Avena barbata*, *Bromus hordaceous*, *Hordeum murinum* var. *leporinum*, and *Lolium multiflorum*. It also includes numerous indigenous herbaceous species such as *Eschschoolzia californica*, *Claytonia perfoliata*, *Eriogonum latifolium* and *Cardionema ramossissima*, and other common shrubs and subshrubs scattered as individuals or clumps. On the Presidio, these communities are generally characteristic of areas that have been graded or otherwise disturbed by human action and they occur sporadically at various locations.

9. **Wildflower Field (42300)**

Holland acknowledges that his is a "grab bag of herb-dominated (community) types noted for conspicuous annual wildflower displays". On the Presidio, dune wildflower fields are the most conspicuous of this kind of assemblage. These occur in large and small sandy gaps in what historically would have been either Central Dune Scrub or Central Maritime Chaparral. Characteristic species include *Lessingia germanorum*, *Gilia capitata* ssp *chamissonis*, *Croton californicum*, *Chorizanthe cuspidata* var. *cuspidata*, *Camissonia micrantha*, *Cardionema ramosissima*, and *Crypantha leiocarpa*. Another sandy wildflower field of particular interest occurs on the Presidio Golf Course driving range where a dominant herb is *Lasthenia minor*. An interesting serpentine wildflower field occurs in an abandoned quarry site at Inspiration Point. Barren serpetine soil supports annual stands of annual and perenial herbs such as*Lasthenia californica*, *Layia platyglossa*, *Lepidium nitidum*, *Sisyrhincium bellum*, and *Plantago erecta*, as well as native grasses such as *Poa secunda* and *Danthonia californica*. All three of these assemblages appear to be dependent on disturbance regimes and, in the absence of the appropriate kinds of disturbance, species characteristic of this artificial community type may be at risk.

10. Freshwater Seep (45400)

Perennial moist areas where groundwater seeps to the surface domiated by associations of perennial herbs, such as sedges and rushes. There are numerous seeps on the Presidio and they are highly variable. Seeps at the base of coastal bluffs harbor salt tolerant species such as *Scirpus cernuus*, *Juncus leseurii*, and the rare coastal thistle, *Cirsium andrewsii*. More interior freshwater seeps host such species as *Juncus effusus* ssp. *brunneas*, *Scirpus americanus*, *Equisetum hymenale*, *Oenanthe sarmentosa*, *Epilobium ciliatum* ssp. *watsonii*, and *Mimulus guttatus*. Perennially moist swales in grassland or forest host several *Carex* species. This variable community is an important source of species diversity on the Presidio.

11. Northern Coastal Salt Marsh (52110)*

Based on early collections and historical data, there was evidentally a tidal wetland in a lagoon behind the dunes at Crissy Field. Currently missing species from the Presidio such as *Frankenia grandifolia*, *Jaumea carnosa*, *Limonium californicum*, *Glaux maritima* and *Heliotropium curvasissimum*were probably collected from this community. Possibly, other common tidal marsh species were not collected from the area. This community is no longer present on the Presidio although management plans call for a restoration of the Crissy Field wetland.

12. Coastal Freshwater Marsh (52410)

There is a small version of Coastal Freshwater Marsh along the northern and eastern shores of Mountain Lake. This community is characterized by dense stands of *Scirpus californicus*.

13. Vernal Marsh (52500)*

As characterized by Holland, these are seasonally inundated shores and depressions "Similar to Vernal Pools (44000), sharing many species with them, often flowering behind the retreating water's edge as the marsh dries". In his discussion of mudwort (*Limosella aquatica*), Howell et al. (1958) mentions that it occurred on "borders of drying and vernally moist

hollows" and that in reference to this species on the Presidio, Katherine Brandegee (1892) stated that "These pools are being filled with sand in the process of grading the tract and the locality will soon be destroyed". Mudwort, and other species found in these habitats such as *Rorippa curvisiliqua* and *Lycopus americanus* , are no longer present on the Presidio. These species were particularly mentioned from the vicinity of Mountain Lake but this community is no longer present on the Presidio.

14. Central Coast Live Oak Riparian Forest (61220)

A segment along the north bank of the central reach of Lobos Creek hosts a stand of coast live oak (*Quercus agrifolia*) that approximates Holland's description of this type of community. The understory of this open forest includes such species as *Equisetum hymenale* ssp. *affine, Pteridium aquilinum* var. *pubescens, Rubus ursinus* and other shade tolerant herbs and shrubs.

15. Central Coast Arroyo Willow Riparian Forest (61230)

Dense, somewhat tall deciduous forests dominated by *Salix lasiolepis* but including other shrubby or tree species such as *Salix lucida* ssp. *lasiandra* and *Myrica californica.* On the Presidio,this forest type occurs along the central reach of Lobos Creek and the northern shore of Mountain Lake. It harbors some of the richest wetland species diversity on the Presidio including such species as *Scirpus microcarpus, Athurium felix-femina, Cornus sericeous, Eleocharus microstachya,* several *Juncus* species, and *Veronica americana.*

16. Central Coast Riparian Scrub (63200)

As described by Holland, this community probably does not exist on the Presidio although it was ascribed to an open thicket of willows surrounding a perennial spring near the Public Service Hospital (Polygon 563). That site presents a rich wetland area with some standing water and wet swales in its vicinity. One of these swales contains the only known San Francisco population of *Juncus falcata* (according to P. Rubtzoff).

17. Coast Live Oak Woodland (71160)

As a community, the Presidio probably no longer supports true Coast Live Oak Woodland, atlthough there are some areas on the Presidio where one or a few coast live oaks (*Quercus agrifolia*) occur with other native species in associations that could broadly be construed as resembling this type. This woodland and denser stands of oaks culminating in Coast Live Oak Forest were apparently a prominent feature on the Presidio. Howell (1958) mentions the persistence of "small groves in the southern part of the Presidio" but such groves were not apparent during the survey.

18. California Bay Forest (81200)*

Dense stands of California bay laurel (*Umbellularia californica*) in a mix with coast live oak, toyon (*Heteromeles arbutifolia*), madrone (*Arbutus menziesii*), and California buckeye (*Aesculus californica*) occur along the inland side of San Francisco Bay and these forests are still present on the Bay side of southern Marin County, and a small San Francisco County remnant persists on Yerba Buena Island (pers. comm., Michael Wood). Early descriptions of the Presidio mention "a fringe of California laurel" (Behr 1891) and Menzies noted scrubby stands of oaks (*Quercus agrifolia*) and dwarf horse chestnuts (*Aesculus californica*) (Howell et al. 1958). These forest elements are no longer present on the Presidio.

19. Coast Live Oak Forest (81310)*

Large groves of live oaks that are more open than dense California bay forests and open Coast Live Oak Woodlands. It is hard to say whether this community was present or not but, like the Coast Live Oak Forest on bay side slopes such as in San Bruno, it may well have been.

20. Non-Indigenous Forest

This is not a Holland community type, however, this is the most dominant natural vegetation presently occurring on the Presidio. Non-Indigenous Forests are characterized by introduced tree species such as *Eucalyptus globulus, Pinus radiata,* and *Cupressus macrocarpus.* Non-Indigenous Forests

harbor high numbers of introduced species but they also host many remnant indigenous species. In fact, some indigenous species - such as the rein orchid (*Piperia elegans*) - appear to have adapted to some of these forest stands and are more abundant under the forest canopy than out in open indigenous natural communities. This survey, and others since, have disclosed that these forests are quite diverse and it is difficult to generalize about their understory assemblages.

Status of Historic Indigenous Species on the Presidio					
Howell Taxa	**Jepson Taxa**	**Type**	**L.F.**	**Wetland**	**Notes**
Abronia latifolia	Abronia latifolia		PH		
Abronia umbellata	Abronia umbellata		PH		
Acaena californica	Acaena pinnatifida var. californica		PH		
Achillea borealis	Achillea millefolium	X	PH		
Achyracaena mollis	Achyracaena mollis		PH		
Agoseris apargioides	Agoseris apargioides var. apargioides		PH		
	Agrostis densiflora		PG		
Agrostis exarata var. pacifica	Agrostis exarata		PG		
	Agrostis hallii		PG		
Allium dichlamydeum	Allium dichlamydeum	X	G		
Franseria chamissonis	Ambrosia chamissonis	X	SS		
Amsinckia spectabilis	Amsinckia spectabilis var. spectabilis		AH		
Anaphalis margaritacea	Anaphalis margaritacea		PH		
Angelica hendersonii	Angelica hendersonii				
Alchemilla occidentalis	Aphanes occidentalis		PH		
Arabis blepharophylla	Arabis blepharophylla	X	PH		
Arabis glabra	Arabis glabra		AH		
Arbutus menziesii	Arbutus menziesii		T		
Arctostaphylos franciscana	Arctostaphylos hookeri ssp. ravenii	X	S		
Armeria maritima var. californica	Armeria maritima var. californica		PH		
Artemisia douglasiana	Artemisia douglasiana				
Artemisia pycnocephala	Artemisia pycnocephala	X	SS		
Aster chilensis	Aster chilensis		SS		
Astragalus nuttallii	Astragalus nuttallii	X	PH		
Athyrium filix-femina	Athyrium filix-femina		F	W	
Atriplex hastata	Atriplex triangularis		PH	W	
Baccharis douglasii	Baccharis douglasii		SS	W	
Baccharis pilularis	Baccharis pilularis		S		
Brodiaea elegans	Brodiaea elegans		G		
Bromus carinatus	Bromus carinatus var. carinatus		PG		
Bromus maritimus	Bromus carinatus var. maritimus		PG		
Cakile maritima	Cakile maritima		AH		
Convolvulus occidentalis var. purpuratus	Calystegia occidentalis ssp. fulcrata		V		
Convolvulus subacaulis	Calystegia subacaulis		PH		
Oenothera cheiranthifolia	Camissonia cheiranthifolia		PH		
Oenothera contorta	Camissonia contorta		AH		
Oenothera micrantha	Camissonia micrantha		AH		
Oenothera ovata	Camissonia ovata		PH		
Dentaria integrifolia var. californica	Cardamine californica var. californica		PH		

Howell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
Cardamine oligosperma	Cardamine oligosperma		AH		
Cardionema ramosissimum	Cardionema ramosissimum		PH		
Carex densa	Carex densa		PH	W	
Carex gracilior	Carex gracilior		PH	W	
Carex harfordii	Carex harfordii		PH	W	
Carex obnupta	Carex obnupta		PH	W	
Carex subbracteata	Carex subbracteata		PH	W	
Carex tumulicola	Carex tumulicola		PH	W	
Mesembryanthemum chilense	Carpobrotus chilensis		PH		
Orthocarpus densiflorus	Castilleja densiflora ssp. densiflora		PH		
Castilleja latifolia	Castilleja latifolia	X	PH		
Castilleja latifolia var. wightii	Castilleja wightii		PH		
Ceanothus thyrsiflorus	Ceanothus thyrsiflorus	X	T		
	Centaurium muhlenbergii		AH		
	Cerastium fontanum ssp. vulgare		AH		
Chenopodium californicum	Chenopodium californicum		PH		
pomeridianum var. divaricatum	Chlorogalum pomeridianum var. divaricatum		G		
Chorizanthe cuspidata	Chorizanthe cuspidata	X	AH		
Cirsium andrewsii	Cirsium andrewsii		PH	W	
Cirsium occidentale	Cirsium occidentale		PH		
Clarkia franciscana	Clarkia franciscana	X	AH		
Montia perfoliata	Claytonia perfoliata		AH		
Erigeron canadensis	Conyza canadensis		AH		
Cornus californica	Cornus sericea ssp. sericea		S	W	
Corylus cornuta var. californica	Corylus cornuta var. californica	X	S		Not reported in Howell from Presidio, Collected by Chamisso
Tillaea erecta	Crassula connata		AH		
Croton californicus	Croton californicus	X	PH		
Cryptantha leiocarpa	Cryptantha leiocarpa		AH		
Cuscuta californica	Cuscuta californica var. californica		AH		
Cyperus eragrostis	Cyperus eragrostis		PH	W	
Danthonia californica	Danthonia californica var. californica		PG		
Daucus pusillus	Daucus pusillus		PH		
Deschampsia caespitosa ssp. holciformis	Deschampsia cespitosa ssp. holciformis		PG		
Brodiaea pulchella	Dichelostemma capitatum		G		
Dichondra repens	Dichondra donnelliana		PH		
Distichlis spicata	Distichlis spicata		PG		
	Dryopteris arguta		F		

Howell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
Echeveria farinosa	Dudleya farinosa	X	PH		
Eleocharis macrostachya	Eleocharis macrostachya		PH	W	
Elymus glaucus	Elymus glaucus	X	PG		
Epilobium paniculatum	Epilobium brachycarpum		AH		
Epilobium watsonii var. franciscanum	Epilobium ciliatum ssp. watsonii		PH	W	
Equisetum hyemale var. elatum	Equisetum hyemale ssp. affine		PH	W	
Equisetum telmateia var. braunii	Equisetum telmateia ssp. braunii		PH	W	
Haplopappus ericoides	Ericameria ericoides	X	S		
Erigeron glaucus	Erigeron glaucus	X	PH		
Eriogonum latifolium	Eriogonum latifolium		PH		
Eriophyllum confertiflorum	Eriophyllum confertiflorum		SS		
staechadifolium	Eriophyllum staechadifolium	X	SS		
Erysimum franciscanum	Erysimum franciscanum	X	PH		
Eschscholzia californica	Eschscholzia californica	X	PH		
Solidago occidentalis	Euthamia occidentalis		PH		
Festuca rubra	Festuca rubra		PG		
Fragaria chiloensis	Fragaria chiloensis		PH		
Fritillaria lanceolata	Fritillaria affinis		G		
Galium nuttallii	Galium porrigens		V		
Gilia capitata ssp. chamissonis	Gilia capitata ssp. chamissonis	X	AH		
Gnaphalium californicum	Gnaphalium californicum		PH		
	Gnaphalium canescens ssp. beneolens		SS		
Gnaphalium purpureum	Gnaphalium purpureum		AH		
Gnaphalium ramosissimum	Gnaphalium ramosissimum		PH		
Gnaphalium chilense	Gnaphalium stramineum		AH		
Grindelia maritima	Grindelia hirsutula var. maritima	X	PH		
	Grindelia stricta		PH		
Helenium puberulum	Helenium puberulum	X	PH	W	
Heracleum maximum	Heracleum lanatum		PH		
	Hesperevax sparsiflora		AH		
	Hesperolinum congestum		AH		
Photinia arbutifolia	Heteromeles arbutifolia		T		
Hordeum brachyantherum	Hordeum brachyantherum		PG		
Potentilla californica	Horkelia californica	X	PH		
Iris douglasiana	Iris douglasiana		G		
Iris longipetala	Iris longipetala		G		
Juncus bufonius	Juncus bufonius		AH		
Juncus effusus var. brunneus	Juncus effusus var. brunneus		PH	W	
Juncus falcatus	Juncus falcatus		PH	W	
Juncus leseurii	Juncus lesueurii		PH	W	

ell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
ncus occidentalis	Juncus occidentalis	X	PH	W	
Juncus patens	Juncus patens		PH	W	
Juncus phaeocephalus	Juncus phaeocephalus		PH	W	
Koeleria gracilis	Koeleria macrantha	X	PG		
Baeria chrysostoma	Lasthenia californica		AH		
Baeria minor	Lasthenia minor		AH		
	Layia platyglossa		AH		
Lathyrus vestitus ssp bolanderi	Lathyrus vestitus var. vestitus		V		
Lepidium nitidum	Lepidium nitidum		AH		
Lessingia germanorum	Lessingia germanorum	X	AH		
Elymus mollis	Leymus mollis		PG		
Elymus pacificus	Leymus pacificus		PG		
Elymus triticoides	Leymus triticoides		PG		
Linaria canadensis	Linaria canadensis		AH		
Lomatium caruifolium	Lomatium caruifolium		PH		
Lomatium dasycarpum	Lomatium dasycarpum		PH		
Lonicera hispidula var. vacillans	Lonicera hispidula var. vacillans		V		Historic record from Presidio Area
nicera involucrata var. bourii	Lonicera involucrata var. ledebourii		S		
tus scoparius	Lotus scoparius		SS		
Lotus strigosus	Lotus strigosus		AH		
Lotus subpinnatus	Lotus wrangelianus		AH		
Lupinus arboreus	Lupinus arboreus	X	S		
Lupinus bicolor	Lupinus bicolor	X	PH		
Lupinus chamissonis	Lupinus chamissonis	X	S		
Lupinus nanus	Lupinus nanus		AH		
Lupinus variicolor	Lupinus variicolor	X	AH		
Luzula multiflora	Luzula comosa		PH		
Lythrum hyssoipifolia	Lythrum hyssoipifolium		PH		
Madia sativa	Madia sativa		AH		
Marah fabaceus	Marah fabaceus		V		
Melica torreyana	Melica torreyana		PG		
Microseris bigelovii	Microseris bigelovii		AH.		
Mimulus aurantiacus	Mimulus aurantiacus		SS		
Mimulus guttatus var. grandis	Mimulus guttatus		PH	W	
Arenaria pusilla	Minuartia pusilla		AH		
Monardella villosa	Monardella villosa		SS		No list for Presidio
Myrica californica	Myrica californica	X	S		
a lepida	Nasella lepida		PG		
upa pulchra	Nasella pulchra		PG		

Howell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
Nemophila pedunculata	Nemophila pedunculata		AH		No list for Presidio
Osmaronia cerasiformis	Oemleria cerasiformis		S		
Oenanthe sarmentosa	Oenanthe sarmentosa		PH	W	
	Osmorhiza chilensis		PH		
Paronychia franciscana	Paronychia franciscana		PH		
Pityrogramma triangularis	Pentagramma triangularis		F		
Perideria kelloggii	Perideria kelloggii		PH		
Phacelia californica	Phacelia californica	X	PH		
Phacelia distans	Phacelia distans		PH		
Phalaris californica	Phalaris californica		PG		
Habenaria greenei	Piperia elegans		G		
Plantago erecta	Plantago erecta		AH		
Plantago juncoides var. californica	Plantago maritima		PH		
Plantago subnuda	Plantago subnuda		PH		
Poa douglasii	Poa douglasii		PG		Not reported from Presidio
Poa scabrella	Poa secunda		PG		
Polycarpon tetraphyllum	Polycarpon tetraphyllum		AH		
Polygonum paronychia	Polygonum paronychia	X	PH		
Polygonum punctatum	Polygonum punctatum	X	PH	W	
Polypodium californicum	Polypodium californicum		F		
Polypodium scouleri	Polypodium scouleri	X	F		
Polystichum munitum	Polystichum munitum		F		
Potentilla egedii	Potentilla anserina ssp. pacifica		PH		
Prunus illicifolia	Prunus illicifolia		S		Not reported from Presidio
Psilocarphus tenellus	Psilocarphus tenellus var. tenellus		AH		
Pteridium aquilinum	Pteridium aquilinum var. pubescens		F		
Pterostegia drymarioides	Pterostegia drymarioides		AH		
Quercus agrifolia	Quercus agrifolia		T		
Ranunculus californicus	Ranunculus californicus		PH		
Rhamnus californica	Rhamnus californica		S		
Ribes sanguineum var. glutinosum	Ribes sanguineum var. glutinosum		S		
Rosa californica	Rosa californica		S		
Rubus ursinus	Rubus ursinus		V		
Rumex salicifolius var. crassus	Rumex salicifolius var. crassus	X	PH		
Salix lasiolepis	Salix lasiolepis		T	W	
Salix lasiandra	Salix lucida ssp. lasiandra		T	W	
Sanicula arctopoides	Sanicula arctopoides		AH		
Sanicula bipinnatifida	Sanicula bipinnatifida		PH		
Sanicula crassicaulis	Sanicula crassicaulis		PH		

[illegible]well Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
[illegible]reja douglasii	Satureja douglasii	X	PH		
Scirpus olneyi	Scirpus americanus		PH	W	
Scirpus californicus	Scirpus californicus		PH	W	
Scirpus cernuus var. californicus	Scirpus cernuus var. californicus		PH	W	
Scirpus microcarpus	Scirpus microcarpus		PH	W	
Scrophularia californica	Scrophularia californica	X	PH		
Senecio aronicoides	Senecio aronicoides		PH		
Sidalcea malvaeflora	Sidalcea malvaeflora		PH		
Silene verecunda	Silene verecunda ssp. verecunda	X	AH		
Sisyrinchium bellum	Sisyrinchium bellum		G		
Solanum douglasii	Solanum douglasii		SS		
Solanum umbelliferum	Solanum umbelliferum	X	SS		
Solidago spathulata	Solidago spathulata		PH		
Spergularia macrotheca	Spergularia macrotheca var. macrotheca		PH		
Spiranthes romanoffiana	Spiranthes romanoffiana		G		
Stachys rigida	Stachys ajugoides var. rigida		PH		
	Symphoricarpos mollis		S		
Tanacetum camphoratum	Tanacetum camphoratum	X	PH		
Rhus diversiloba	Toxicodendron diversilobum		S		
Trifolium amplectens	Trifolium depauperatum var. truncatum		PH		
[illegible]ifolium tridentatum	Trifolium willdenovii		PH		
[illegible]olium wormskjoldii	Trifolium wormskioldii		PH	W	
Orthocarpus floribundus	Triphysaria floribunda	X	PH		
Orthocarpus pusillus	Triphysaria pusilla		PH		
Brodiaea laxa	Triteleia laxa		G		
Typha latifolia	Typha latifolia		PH	W	
Microseris linearifolia	Uropappus lindleyi		AH		
Urtica holosericea	Urtica dioica ssp. holosericea		PH	W	
Veronica ameriacana	Veronica ameriacana		PH	W	
linearis	Vicia americana var. americana		PH	W	
Vicia gigantea	Vicia gigantea		PH		
Viola adunca	Viola adunca		PH		
Festuca facifica; Festuca reflexa	Vulpia microstachys		AG		
Wyethia angustifolia	Wyethia angustifolia		PH		
	Total = 228 Surviving Species				
Aesculus californica	Aesculus californica		T		
Agrostis microphylla	Agrostis microphylla		PG		
Arenaria paludicola	Arenaria paludicola		PH		
Astragalus gambellianus	Astragalus gambellianus		PH		
Atriplex californica	Atriplex californica		PH		
[illegible]triplex leucophylla	Atriplex leucophylla		PH		
[illegible]olla filiculoides	Azolla filiculoides	X	A	W	

Howell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
Berula erecta	Berula erecta		PH		
Calandrinia ciliata	Calandrinia ciliata		AH		
Convolvulus soldanella	Calystegia soldanella		PH		
Carex brevicaulis	Carex brevicaulis		PH	W	
Carex globosa	Carex globosa		PH	W	
Castilleja franciscana	Castilleja subinclusa var. franciscana		PH		
Cerastium arvense var. maximum	Cerastium arvense		PH		
Ceratophyllum demersum	Ceratophyllum demersum	X	PH	W	
Chenopodium ambrosioides	Chenopodium ambrosioides		PH		
Chenopodium multifidum	Chenopodium multifidum		PH		
Cirsium brevistylum	Cirsium brevistylum		PH		
Cirsium quercetorum	Cirsium quercetorum		PH		
Montia spathulata var. tenuifolia	Claytonia exigua ssp. exigua		AH		
Collinsia bartsiaefolia var. hirsuta	Collinsia bartsifolia		AH		
Tillaea aquatica	Crassula aquatica		A	W	around Mountain Lake
Cuscuta salina var. major	Cuscuta salina var. major		AH		
Danthonia californica var. americana	Danthonia californica var. americana		PG		
Eleocharis acicularis	Eleocharis acicularis		PH	W	
Eleocharis rostellata	Eleocharis rostellata	X	PH	W	
Elymus virescens	Elymus glaucus ssp. virescens		PG		
Euphorbia crenulata	Euphorbia crenulata		PH		
Filago californica	Filago californica		AH		
Frankenia grandifolia	Frankenia grandifolia	X	PH	W	Salt marsh
Garrya elliptica	Garrya elliptica		S		
Gilia clivorum	Gilia clivorum		AH		
Glaux maritima	Glaux maritima		PH	W	Lagoon strand
Thelypodium lasiophyllum	Guillenia lemmonii		PH		
Heliotropium curassavicum var. oculatum	Heliotropium curassavicum var. oculatum		PH		
Heterocodon rariflorum	Heterocodon rariflorum		AH		
Hydrocotyle ranunculoides	Hydrocotyle ranunculoides		A	W	
Hydrocotyle verticiliata	Hydrocotyle verticiliata	X	A	W	Sandy spring above golf course
Isoetes nuttallii	Isoetes nuttallii		PH	W	Sandy spring near golf course
Jaumea carnosa	Jaumea carnosa	X	PH	W	Tidal marsh
Layia hieracioides	Layia hieracioides		AH		

well Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
mna gibba	Lemna gibba		A	W	
Lemna minima	Lemna miniscula		A	W	
Lemna minor	Lemna minor		A	W	
Lilaea scilloides	Lilaea scilloides		PH	W	
Limonium californicum	Limonium californicum		PH	W	
Limosella aquatica	Limosella aquatica	X	PH	W	hollows at Mountain Lake
Linanthus androsaceus	Linanthus androsaceus		AH		
Linanthus grandiflorus	Linanthus grandiflorus		AH		
Lycopus americanus	Lycopus americanus		PH	W	Vernal marsh strand
Madia gracilis	Madia gracilis		AH		
Meconella linearis	Meconella linearis		AH		
Melica imperfecta var. refracta	Melica imperfecta	X	PG		
Microseris douglasii	Microseris douglasii		AH		
Microseris paludosa	Microseris paludosa		AH		
Myriophyllum exalbescens	Myriophyllum sibiricum		A	W	
Najas guadalupensis	Najas guadalupensis	X	A	W	
Navarretia squarrosa	Navarretia squarrosa	X	AH		
mophila menziesii	Nemophila menziesii		AH		
phar polysepalum	Nuphar luteum ssp. polysepalum		A	W	
Orobanche fasciculata	Orobanche fasciculata		PH		
Oxalis pilosa	Oxalis albicans ssp. pilosa		PH		
Phacelia malvaefolia	Phacelia malvifolia	X	PH		
Allocarya chorisiana	Plagiobothrys chorisianus	X	AH		
Allocarya diffusa	Plagiobothrys diffusus	X	AH		
Platystemon californicus	Platystemon californicus		AH		
Poa pratensis	Poa pratensis		PG		
Poa unilateralis	Poa unilateralis	X	PG		
Polygonum coccineum	Polygonum amphibium var. emersum		PH		
Polygonum lapathifolium	Polygonum lapathifolium		PH		
Potamogeton illinoensis	Potamogeton illinoensis		A	W	
Potamogeton pusillus var. minor	Potamogeton pusillus		A	W	
Potentilla glandulosa	Potentilla glandulosa		PH		
Potentilla millegrana	Potentilla rivalis var. millegrane		PH		
Ranunculus aquatilis var. capillaceus	Ranunculus aquatilis var. capillaceus		A	W	Vernal marsh strand species
Rorippa curvisiliqua	Rorippa curvisiliqua		AH	W	Vernal strand species
umex fueginus	Rumex maritimus		PH	W	Vernal strand speces
umex salicifolius	Rumex salicifolius (var. salicifolius?)		PH		

Howell Taxa	Jepson Taxa	Type	L.F.	Wetland	Notes
Sisyrinchium californicum	Sisyrinchium californicum		G	W	Mountain Lake
Stachys ajugoides	Stachys ajugoides var. ajugoides		PH	W	Vernal marsh
Stachys bullata	Stachys bullata		PH		
Stephanomeria virgata	Stephanomeria virgata		AH		
Symphoricarpos rivularis	Symphoricarpos albus var. laevigatus		PH		
Trifolium amplectens (var. truncatum?)	Trifolium depauperatum var. truncatum		AH		
Trifolium fucatum	Trifolium fucatum		AH		
Trifolium gracilentum	Trifolium gracilentum		AH		
Trifolium macraei	Trifolium macraei		AH		
Trifolium microcephalum	Trifolium microcephalum		AH		
Trifolium microdon	Trifolium microdon		AH		
Orthocarpus erianthus	Triphysaria eriantha ssp. eriantha		AH		
Orthocarpus erianthus var. roseus	Triphysaria eriantha ssp. rosea		AH		
Orthocarpus faucibarbatus ssp. albidus	Triphysaria versicolor ssp. versicolor		AH		
Umbellularia californica	Umbellularia californica	X	T		
Caucalis microcarpa	Yabea microcarpa		PH		
Zigadenus fremontii	Zigadenus fremontii		G		
	Total Missing Species = 95				
	Total Past and Present Indigenous Presidio Species = 323				
	Per Cent Surviving Indigenous Species = 71%				
	Type = Type Specimen Collected on Presidio				
	L.F. = Life Form				
	A = Aquatic				
	AG = Annual Grass				
	AH = Annual Herb				
	F = Fern				
	G = Geophyte				
	PG = Perennial Grass				
	PH = Perennia Herb				
	S = Shrub				
	SS = Sub-shrub				
	T = Tree				
	V = Vine				
	W = Wetland Species				

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		Polygons Surveyed							
Polygon	**Natural Community**	**Substrate**	**Wetlands?**	**Plan Area**	**Acres**	**Ind**	**N-Ind**	**Tot**	**Ind Ratio**
4	North Coastal Bluff Scrub	Serpentine		Fort Point	2.76	28	11	39	0.72
8	North Coastal Scrub	Serpentine		Fort Point	1.85	25	7	32	0.78
14	North Coastal Scrub	Serpentine		Fort Point	3.62	40	42	82	0.49
35	North Coastal Bluff Scrub	Serpentine		Fort Point	0.83	20	8	28	0.71
40	Northern Foredune	Sand		Crissy Field	2.05	8	19	27	0.30
45	Serpentine Bunchgrass Prairie	Serpentine		Fort Point	0.96	25	21	46	0.54
54	Northern Foredune	Sand		Crissy Field	0.61	5	17	22	0.23
62	North Coastal Scrub	Serpentine	Wetlands	Fort Point	0.48	27	14	41	0.66
66	North Coastal Scrub	Serpentine	Wetlands	Fort Point	0.74	14	15	29	0.48
161	North Coastal Bluff Scrub	Serpentine		Coastal Bluffs	0.29	18	5	23	0.78
180	North Coastal Bluff Scrub	Serpentine		Coastal Bluffs	0.54	18	5	23	0.78
263	Coastal Terrace Prairie	Serpentine		Coastal Bluffs	1.37	37	9	46	0.80
266	Coastal Terrace Prairie	Serpentine		Coastal Bluffs	0.92	53	33	86	0.62
273	Central Coast Dune Scrub	Sand		Coastal Bluffs	10.10	64	49	113	0.57
281	Non-Native Grasslands	Serpentine	Wetlands	Coastal Bluffs	1.41	12	12	24	0.50
302	Central Coast Dune Scrub	Sand		Coastal Bluffs	5.54	54	29	83	0.65
319	Northern Foredune	Sand		Coastal Bluffs	2.17	21	26	47	0.45
341	Wildflower Field	Sand		Coastal Bluffs	0.88	22	13	35	0.63
353	Central Coast Dune Scrub	Sand		Presidio Forest	0.34	15	12	27	0.56
354	Wildflower Field	Sand		Presidio Forest	1.44	20	11	31	0.65
366	Central Coast Dune Scrub	Sand		Coastal Bluffs	7.68	23	16	39	0.59
379	Northern Foredune	Sand		Coastal Bluffs	4.22	22	20	42	0.52
391	Wildflower Field	Sand		Coastal Bluffs	0.28	11	2	13	0.85
428	Central Coast Dune Scrub	Sand		Presidio Forest	2.02	17	15	32	0.53
436	Wildflower Field	Sand		Presidio Forest	0.34	16	11	27	0.59
502	Coastal Live Oak Woodland	Serpentine	Wetlands	Presidio Forest	0.14	13	4	17	0.76
538	Non-Native Grasslands	Sand		PHS Hospital	3.09	19	18	37	0.51
543	Central Coast Dune Scrub	Sand		PHS Hospital	2.17	17	6	23	0.74
552	Central Coast Dune Scrub	Sand		Presidio Forest	0.52	17	22	39	0.44

Table 3

Polygon	Natural Community	Substrate	Wetlands?	Plan Area	Acres	Ind	N-Ind	Tot	Ind Ratio
557	Wildflower Field	Sand		PHS Hospital	0.34	12	3	15	0.80
563	Central Coast Riparian Scrub	Sand	Wetlands	PHS Hospital	0.47	15	9	24	0.63
570	Non-Native Grasslands	Sand		PHS Hospital	1.40	8	9	17	0.47
578	Wildflower Field	Sand		PHS Hospital	0.94	17	7	24	0.71
585	Coastal Live Oak Woodland	Sand		PHS Hospital	0.57	17	6	23	0.74
586	Wildflower Field	Sand		Presidio Hill	0.39	11	5	16	0.69
587	Coastal Live Oak Woodland	Sand		Presidio Hill	0.19	6	4	10	0.60
588	Non-Native Grasslands	Sand		PHS Hospital	0.87	8	8	16	0.50
594	Wildflower Field	Sand		Presidio Hill	3.32	6	19	25	0.24
595	Central Coast Arroyo Willow Forest	Sand	Wetlands	Presidio Hill	2.50	19	14	33	0.58
598	Wildflower Field	Sand		PHS Hospital	0.80	16	21	37	0.43
607	Central Coast Dune Scrub	Sand		Lobos Creek	1.39	26	30	56	0.46
623	Central Freshwater Marsh	Sand		Presidio Hill	1.37	4	6	10	0.40
625	Central Coast Dune Scrub	Sand		Lobos Creek	1.56	18	10	28	0.64
633	Central Coast Dune Scrub	Sand		Presidio Hill	0.50	7	10	17	0.41
643	Central Coast Live Oak Riparian Fores	Sand	Wetlands	Lobos Creek	1.31	9	11	20	0.45
644	Serpentine Bunchgrass Prairie	Serpentine		Presidio Forest	1.81	41	23	64	0.64
648	Non-Native Grasslands	Sand		Lobos Creek	5.02	18	32	50	0.36
649	Wildflower Field	Sand		Lobos Creek	0.90	21	11	32	0.66
652	Non-Native Grasslands	Sand		Lobos Creek	0.99	10	6	16	0.63
653	Central Coast Arroyo Willow Forest	Sand	Wetlands	Lobos Creek	5.41	18	9	27	0.67
676	North Coastal Bluff Scrub	Serpentine		Coastal Bluffs	0.19	15	8	23	0.65
677	Serpentine Bunchgrass Prairie	Serpentine		Presidio Forest	5.41	42	37	79	0.53
679	Wildflower Field	Serpentine		Presidio Forest	0.63	23	13	36	0.64
680	Serpentine Bunchgrass Prairie	Serpentine	Wetlands	Presidio Forest	0.91	52	56	108	0.48
674A	North Coastal Bluff Scrub	Serpentine	Wetlands	Coastal Bluffs	9.20	54	29	83	0.65
674B	North Coastal Bluff Scrub	Serpentine	Wetlands	Coastal Bluffs	10.30	46	14	60	0.77
674C	North Coastal Bluff Scrub	Serpentine	Wetlands	Coastal Bluffs	7.96	62	28	90	0.69
675A	North Coastal Scrub	Serpentine	Wetlands	Coastal Bluffs	5.62	54	38	92	0.59
675B	North Coastal Scrub	Serpentine	Wetlands	Coastal Bluffs	5.31	40	22	62	0.65
675C	North Coastal Scrub	Serpentine	Wetlands	Coastal Bluffs	4.91	34	18	52	0.65
C119	Non-Indigenous Forest	Sand		Coastal Bluffs	2.10	21	16	37	0.57

Polygon	Natural Community	Substrate	Wetlands?	Plan Area	Acres	Ind	N-Ind	Tot	Ind Ratio
C131	Non-Indigenous Forest	Serpentine		Presidio Forest	12.60	21	51	72	0.29
C139	Non-Indigenous Forest	Serpentine		Presidio Forest	0.80	9	22	31	0.29
C140	Non-Indigenous Forest	Sand		Presidio Forest	0.40	14	18	32	0.44
CP(675)	Non-Indigenous Forest	Serpentine	Wetlands	Coastal Bluffs	1.98	15	7	22	0.68
CP170	Non-Indigenous Forest	Sand		Lobos Creek	20.50	22	24	46	0.48
E(14)	Non-Indigenous Forest	Serpentine	Wetlands	Fort Point	1.42	5	10	15	0.33
E130	Non-Indigenous Forest	Serpentine		Presidio Forest	4.60	10	19	29	0.34
E201	Non-Indigenous Forest	Sand		Presidio Hill	5.90	8	27	35	0.23
P120	Non-Indigenous Forest	Sand		Coastal Bluffs	2.60	22	13	35	0.63
P135	Non-Indigenous Forest	Serpentine		Presidio Forest	5.60	28	28	56	0.50

Table 4

Polygons Surveyed								
Polygon	**Natural Community**	**Substrate**	**Wetlands?**	**Acres**	**Ind**	**Non-Ind**	**Total**	**Ind Ratio**
595	Central Coast Arroyo Willow For	Sand	Wetlands	2.50	19	14	33	0.58
653	Central Coast Arroyo Willow For	Sand	Wetlands	5.41	18	9	27	0.67
Total = 2				**7.91**	**18.5**	**11.50**	**30.00**	**0.62**
273	Central Coast Dune Scrub	Sand		10.10	64	49	113	0.57
302	Central Coast Dune Scrub	Sand		5.54	54	29	83	0.65
353	Central Coast Dune Scrub	Sand		0.34	15	12	27	0.56
366	Central Coast Dune Scrub	Sand		7.68	23	16	39	0.59
428	Central Coast Dune Scrub	Sand		2.02	17	15	32	0.53
543	Central Coast Dune Scrub	Sand		2.17	17	6	23	0.74
552	Central Coast Dune Scrub	Sand		0.52	17	22	39	0.44
607	Central Coast Dune Scrub	Sand		1.39	26	30	56	0.46
625	Central Coast Dune Scrub	Sand		1.56	18	10	28	0.64
633	Central Coast Dune Scrub	Sand		0.50	7	10	17	0.41
Total = 10				**31.82**	**25.8**	**19.90**	**45.70**	**0.56**
643	Central Coast Live Oak Riparian	Sand	Wetlands	1.31	9	11	20	0.45
Total = 1				**1.31**	**9**	**11**	**20**	**0.45**
563	Central Coast Riparian Scrub	Sand	Wetlands	0.47	15	9	24	0.63
Total = 1				**0.47**	**15**	**9**	**24**	**0.63**
623	Central Freshwater Marsh	Sand		1.37	4	6	10	0.40
Total = 1				**1.37**	**4**	**6**	**10**	**0.40**
585	Coastal Live Oak Woodland	Sand		0.57	17	6	23	0.74
587	Coastal Live Oak Woodland	Sand		0.19	6	4	10	0.60
Total = 2				**0.76**	**11.5**	**5.00**	**16.50**	**0.67**
40	Northern Foredune	Sand		2.05	8	19	27	0.30
54	Northern Foredune	Sand		0.61	5	17	22	0.23
319	Northern Foredune	Sand		2.17	21	26	47	0.45
379	Northern Foredune	Sand		4.22	22	20	42	0.52
Total = 4				**9.05**	**14**	**20.5**	**34.5**	**0.37**
341	Wildflower Field	Sand		0.88	22	13	35	0.63

Table 4

Polygon	Natural Community	Substrate	Wetlands?	Acres	Ind	Non-Ind	Total	Ind Ratio
354	Wildflower Field	Sand		1.44	20	11	31	0.65
391	Wildflower Field	Sand		0.28	11	2	13	0.85
436	Wildflower Field	Sand		0.34	16	11	27	0.59
557	Wildflower Field	Sand		0.34	12	3	15	0.80
578	Wildflower Field	Sand		0.94	17	7	24	0.71
586	Wildflower Field	Sand		0.39	11	5	16	0.69
594	Wildflower Field	Sand		3.32	6	19	25	0.24
598	Wildflower Field	Sand		0.80	16	21	37	0.43
649	Wildflower Field	Sand		0.90	21	11	32	0.66
Total = 10				**9.63**	**15.2**	**10.30**	**25.50**	**0.62**
Total = 31	**Total Indigenous Sandy Communities**			**62.32**				
C119	Non-Indigenous Forest	Sand		2.10	21	16	37	0.57
CP170	Non-Indigenous Forest	Sand		20.50	22	24	46	0.48
C140	Non-Indigenous Forest	Sand		0.40	14	18	32	0.44
E201	Non-Indigenous Forest	Sand		5.90	8	27	35	0.23
P120	Non-Indigenous Forest	Sand		2.60	22	13	35	0.63
Total = 5				**31.50**	**17.4**	**19.6**	**37**	**0.47**
538	Non-Native Grasslands	Sand		3.09	19	18	37	0.51
570	Non-Native Grasslands	Sand		1.40	8	9	17	0.47
588	Non-Native Grasslands	Sand		0.87	8	8	16	0.50
648	Non-Native Grasslands	Sand		5.02	18	32	50	0.36
652	Non-Native Grasslands	Sand		0.99	10	6	16	0.63
Total = 5				**11.37**	**12.60**	**14.60**	**27.20**	**0.49**
Total = 10	**Total Non-Indigenous Sandy Natural Communities**			**42.87**				
Total = 41	**Total Sandy Natural Communties**			**105.19**				
502	Coastal Live Oak Woodland	Serpentine	Wetlands	0.14	13	4	17	0.76
Total = 1				**0.14**	**13**	**4**	**17**	**0.76**

Table 4

Polygon	Natural Community	Substrate	Wetlands?	Acres	Ind	Non-Ind	Total	Ind Ratio
263	Coastal Terrace Prairie	Serpentine		1.37	37	9	46	0.80
266	Coastal Terrace Prairie	Serpentine		0.92	53	33	86	0.62
Total = 2				**2.29**	**45.00**	**21.00**	**66.00**	**0.71**
4	North Coastal Bluff Scrub	Serpentine		2.76	28	11	39	0.72
35	North Coastal Bluff Scrub	Serpentine		0.83	20	8	28	0.71
161	North Coastal Bluff Scrub	Serpentine		0.29	18	5	23	0.78
180	North Coastal Bluff Scrub	Serpentine		0.54	18	5	23	0.78
674A	North Coastal Bluff Scrub	Serpentine	Wetlands	5.62	54	29	83	0.65
674B	North Coastal Bluff Scrub	Serpentine	Wetlands	5.31	46	14	60	0.77
674C	North Coastal Bluff Scrub	Serpentine	Wetlands	4.91	62	28	90	0.69
676	North Coastal Bluff Scrub	Serpentine		0.19	15	8	23	0.65
Total = 8				**20.45**	**32.63**	**13.50**	**46.13**	**0.72**
8	North Coastal Scrub	Serpentine		1.85	25	7	32	0.78
14	North Coastal Scrub	Serpentine		3.62	40	42	82	0.49
62	North Coastal Scrub	Serpentine	Wetlands	0.48	27	14	41	0.66
66	North Coastal Scrub	Serpentine	Wetlands	0.74	14	15	29	0.48
675A	North Coastal Scrub	Serpentine	Wetlands	9.20	54	38	92	0.59
675B	North Coastal Scrub	Serpentine	Wetlands	10.30	40	22	62	0.65
675C	North Coastal Scrub	Serpentine	Wetlands	7.96	34	18	52	0.65
Total = 7				**34.15**	**33.43**	**22.29**	**55.71**	**0.61**
45	Serpentine Bunchgrass Prairie	Serpentine		0.96	25	21	46	0.54
644	Serpentine Bunchgrass Prairie	Serpentine		1.81	41	23	64	0.64
677	Serpentine Bunchgrass Prairie	Serpentine		5.41	42	37	79	0.53
680	Serpentine Bunchgrass Prairie	Serpentine	Wetlands	0.91	52	56	108	0.48
Total = 4				**9.09**	**40.00**	**34.25**	**74.25**	**0.55**
679	Wildflower Field	Serpentine		0.63	23	13	36	0.64
Total = 1				**0.63**	**23**	**13**	**36**	**0.64**
Total = 23	**Total Serpentine Indigenous Natural Communities**			**66.75**				
C131	Non-Indigenous Forest	Serpentine		12.60	21	51	72	0.29
C139	Non-Indigenous Forest	Serpentine		0.80	9	22	31	0.29

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Grindelia stricta	Perennial Herb	Dune	0	1	1
Lasthenia minor	Annual Herb	Dune	0	1	1
Leymus pacificus	Perennial Grass	Dune	0	1	1
Nemophila pedunculata	Annual Herb	Dune	0	1	1
Poa douglasii	Perennial Grass	Dune	0	1	1
Symphoricarpos mollis	Shrub	Dune	0	1	1
Veronica americana	Vine	Dune	0	1	1
Total = 4					
Angelica hendersonii	Perennial Herb	Serpentine	12	0	12
Arabis blepharophylla	Perennial Herb	Serpentine	12	0	12
Ranunculus californicus	Annual Herb	Serpentine	12	0	12
Allium dichlamydeum	Perennial Herb	Serpentine	11	0	11
Triteleia laxa	Geophyte	Serpentine	10	0	10
Sisyrinchium bellum	Geophyte	Serpentine	9	0	9
Vicia gigantea	Annual Grass	Serpentine	9	0	9
Nasella pulchra	Perennial Grass	Serpentine	8	0	8
Sidalcea malvaeflora	Perennial Herb	Serpentine	8	0	8
Calystegia occidentalis ssp. fulcrata	Perennial Herb	Serpentine	7	0	7
Fritillaria affinis	Geophyte	Serpentine	5	0	5
Hordeum brachyantherum	Perennial Grass	Serpentine	5	0	5
Sanicula arctopoides	Perennial Herb	Serpentine	5	0	5
Sanicula bipinnatifida	Perennial Herb	Serpentine	5	0	5
Aster chilensis	Perennial Herb	Serpentine	4	0	4
Clarkia franciscana	Annual Herb	Serpentine	4	0	4
Deschampsia cespitosa ssp. holciformis	Perennial Grass	Serpentine	4	0	4
Festuca rubra	Perennial Grass	Serpentine	4	0	4
Heracleum lanatum	Perennial Herb	Serpentine	4	0	4
Koeleria macrantha	Perennial Grass	Serpentine	4	0	4
Lasthenia californica	Annual Herb	Serpentine	4	0	4
Lomatium caruifolium	Perennial Herb	Serpentine	4	0	4
Lonicera involucrata var. ledebourii	Shrub	Serpentine	4	0	4
Monardella villosa var. villosa	Sub-Shrub	Serpentine	4	0	4
Nasella lepida	Perennial Grass	Serpentine	4	0	4
Poa secunda	Perennial Grass	Serpentine	4	0	4
Agrostis exarata	Perennial Grass	Serpentine	3	0	3
Carex tumulicola	Perennial Herb	Serpentine	3	0	3
Eriophyllum confertiflorum var. confertiflorum	Sub-Shrub	Serpentine	3	0	3
Gnaphalium purpureum	Annual Herb	Serpentine	3	0	3
Perideridia kelloggii	Perennial Herb	Serpentine	3	0	3
Plantago subnuda	Perennial Herb	Serpentine	3	0	3
Solanum umbelliferum	Sub-Shrub	Serpentine	3	0	3
Spergularia macrotheca var. macrotheca	Perennial Herb	Serpentine	3	0	3
Trifolium depauperatum var. truncatum	Annual Herb	Serpentine	3	0	3
Trifolium wormskioldii	Perennial Herb	Serpentine	3	0	3
Viola adunca	Perennial Herb	Serpentine	3	0	3

Species	Life Form	Substrate	Serp	Dune	Total
Acaena pinnatifida var. californica	Perennial Herb	Serpentine	2	0	2
Aphanes occidentalis	Perennial Herb	Serpentine	2	0	2
Arctostaphylos hookeri ssp. ravenii	Shrub	Serpentine	2	0	2
Artemisia douglasiana	Perennial Herb	Serpentine	2	0	2
Brodeia elegans ssp. elegans	Geophyte	Serpentine	2	0	2
Calystegia subacaulis	Perennial Herb	Serpentine	2	0	2
Camissonia ovata	Perennial Herb	Serpentine	2	0	2
Cardamine californica var. integrifolia	Perennial Herb	Serpentine	2	0	2
Carex densa	Perennial Herb	Serpentine	2	0	2
Castilleja densiflora ssp. densiflora	Perennial Herb	Serpentine	2	0	2
Corylus cornuta ssp. californica	Shrub	Serpentine	2	0	2
Cyperus eragrostis	Perennial Herb	Serpentine	2	0	2
Daucus pusillus	Annual Herb	Serpentine	2	0	2
Equisetum telmateia ssp. braunii	Perennial Herb	Serpentine	2	0	2
Hesperevax sparsiflora	Annual Herb	Serpentine	2	0	2
Hesperolinon congestum	Annual Herb	Serpentine	2	0	2
Horkelia californica	Perennial Herb	Serpentine	2	0	2
Iris longipetala	Geophyte	Serpentine	2	0	2
Layia platyglossa	Annual Herb	Serpentine	2	0	2
Lomatium dasycarpum ssp. dasycarpum	Perennial Herb	Serpentine	2	0	2
Psilocharpos tenellus var. tenellus	Annual Herb	Serpentine	2	0	2
Scirpus americanus	Perennial Herb	Serpentine	2	0	2
Spiranthes romanoffiana	Geophyte	Serpentine	2	0	2
Agrostis densiflora	Perennial Grass	Serpentine	1	0	1
Agrostis hallii	Perennial Grass	Serpentine	1	0	1
Arbutus menziesii	Tree	Serpentine	1	0	1
Atriplex triangularis	Perennial Herb	Serpentine	1	0	1
Baccharis douglasii	Sub-Shrub	Serpentine	1	0	1
Bromus carinatus var. carinatus	Perennial Grass	Serpentine	1	0	1
Carex gracilior	Perennial Herb	Serpentine	1	0	1
Carex subbracteata	Perennial Herb	Serpentine	1	0	1
Centaurium venustum	Annual Herb	Serpentine	1	0	1
Chenopodium californicum	Perennial Herb	Serpentine	1	0	1
Cirsium andrewsii	Perennial Herb	Serpentine	1	0	1
Helenium puberulum	Perennial Herb	Serpentine	1	0	1
Juncus occidentalis	Perennial Herb	Serpentine	1	0	1
Lotus wrangelianus	Annual Herb	Serpentine	1	0	1
Lupinus nanus	Annual Herb	Serpentine	1	0	1
Melica torreyana	Perennial Grass	Serpentine	1	0	1
Minuartia pusilla	Annual Herb	Serpentine	1	0	1
Pentagramma triangularis	Fern	Serpentine	1	0	1
Phalaris californica	Perennial Grass	Serpentine	1	0	1
Polypodium scouleri	Fern	Serpentine	1	0	1
Potentilla anserina ssp. pacifica	Perennial Herb	Serpentine	1	0	1
Prunus illicifolia	Shrub	Serpentine	1	0	1

Baseline Inventory of Terrestrial Vegetation on Natural Lands of the Presidio of San Francisco, California

Final Report

Michael Vasey, Principal Investigator

August 1, 1996

Introduction

The Presidio of San Francisco is a landmark of international significance. It provides the southern gateway into one of the largest natural harbors in the world. Its serpentine bluffs anchor the Golden Gate Bridge, symbol of the Golden State of California and one of the planet's most cosmopolitan cities. Looking out over San Francisco from the Marin Headlands, the Presidio stands out like a green jewel shining between the Farallons and the Bay, a bastion of nature defying the checkerboard of dwellings and streets that dominate the City's urbanized landscape.

Ironically, the Presidio's natural lands have survived not because of their value as park land but rather because of a rich history of military occupation of the site from the time of the first Spanish settlement on the shores of San Francisco Bay in 1775. The northern San Francisco peninsula was clearly a very different environment back then. The Presidio occupies the northernmost tip of this peninsula, which itself is the northern third of of the Santa Cruz Mountains, a discrete mountain range extending south from the Golden Gate to the Pajaro River in Monterey County and defined on the east by South San Francisco Bay and the Santa Clara Valley and on the west by northern Monterey Bay and a rocky stretch of Pacific Ocean coast north of Santa Cruz to Fort Funston (Figure 1).

The northern tip of the San Francisco peninsula, at about the latitude of northern Montara Ridge and San Andreas Lake in San Mateo County, becomes narrow (about six miles wide) and low (less than two thousand foot elevation). North of Montara Mountain, the landscape is broken up into smaller and lower hills. San Bruno Mountain is the largest of these discrete uplands and the Presidio is part of the northernmost and smallest of these hills. Caught between the broad South San Francisco Bay and the Pacific Ocean, this region is highly maritime. Fog, salt spray, and high winds shape its vegetation patterns. Towering conifer forests that dominate

the lower Santa Cruz Mountains disappear. The landscape of the northern peninsula is more insular, like the islands of Southern California, and it is characterized by low, wind-sculpted vegetation draping over its topographic contours.

San Francisco's hills were once covered by large stands of northern coastal scrub and coastal prairie. There were thickets of maritime chaparral on its sandy and rocky uplands, particularly on serpentine hillsides. Coast live oak forest, enlivened by buckeyes, California laurel, and madrono, swept down its arroyos and occupied protected pockets on the leeward side of hills by the bay. Wetlands were abundant all over the peninsula. These included tidal marsh, freshwater marsh, riparian forest, seasonal wetlands, springs, lakes, seeps, and sag ponds. Howell et al.(1958) provides a botanical window into this environment through his review of historical plant collections from San Francisco, including the Presidio. Clark (1959) has assembled historical commentary on the setting.

Morioka (1992) provides a well researched visual depiction of this landscape. Western San Francisco was dominated by one of the largest active dune systems along the Pacific Coast. The northern active dunes were of late Pleistocene age and swept north from Lake Merced to Point Lobos and then east over a gap between the San Miguel Hills and Presidio uplands to San Francisco Bay. A southern area around Lake Merced and down Colma Creek valley was comprised of a more ancient, stablized dune system from earlier in the Pleistocene (about 1 million years old). These southern dunes hosted a form of maritime chaparral more like that found today around Monterey Bay. These sandy deposits overlay a much older and complex geological environment along the tectonically active San Andreas fault with its many associated fracture zones. Uplands in San Francisco are dominated by rocks and substrates associated with the middle Mesozoic Franciscan Formation, a former segment of oceanic floor upended by the collision of the Pacific Plate and the North American plate. These rock layers include sandstone, shale, greenstone, chert, and serpentine in a jumbled and folded tectonically-influenced mosaic.

This diverse geologic and climatic picture is consistent with the northern San Francisco peninsula's setting in the Bay Area, a highly variable region characterized by the ocean's moderating climatic influence and the inland extension of this maritime influence because of the San Francisco Bay estuary's long reach into the Great Valley. The Bay Area has long been recognized as an area of high endemism in California (Stebbins and Major, 1965; Raven and Axelrod, 1978). It hosts both relictual species and those that have evolved more recently because of

opportunities like those provided by the climatic oscillations of the Pleistocene. The northern San Francisco peninsula provided habitat for many species of northern affinity that require cool and moist conditions as well as for species of southern affinity adapted to more arid and dry conditions, as were found in the open exposures of the dune "desert" that inhabited San Francisco's interior slopes. These diverse environments, and San Francisco's physical and climatic isolation from the rest of the Santa Cruz Mountains, provided ample opportunity for evolutionary processes to operate and many distinctive taxa originated in this northern peninsular landscape.

The Presidio was an important part of this setting, and it has become even more important today because of its natural lands. These lands harbor some of the best examples of San Francisco's remaining indigenous dune, wetland, and serpentine natural communities. Small remnants of other parts of San Francisco's indigenous landscape still persist but they are few and imperiled by exotic invasive species and isolation from rejuvinating historical processes such as wind exposure and fire. Some species, such as the Xerces blue butterfly and franciscan manzanita (*Arctostaphylos franciscana* Eastw.) are already extinct in the wild and many other species are threatened with extinction or extirpation of their local populations. There are currently eleven special status plant species recognized on Presidio natural lands. Of these, one species is endemic to the Presidio (Raven manzanita). One (Presidio clarkia) is restricted to the Peninsula on the Presidio but also is found in the East Bay. Another central coast endemic was previously widespread on the peninsula but is now restricted to the Presidio (San Franciso owl's clover). Another species (San Francisco lessingia) is an endemic of the northern San Francisco peninsula and was formerly widespread throughout its open sandy habitats. Today, the Presido hosts five of its six remaining small populations. These and several other species provide mute testiment to the importance of the Presidio as an outstanding evolutionary setting and refuge for San Francisco's vanishing biota.

The Presidio covers only 2.36 square miles, or 1480 acres, which is approximately five percent of San Francisco's total 45 square mile area (Adams 1993; GGNRA 1993). Of these 1480 acres, approximately 700 acres have been developed and support up to 870 buildings, many holding historic significance. Of the remaining 780 acres, approximately 158 acres consist of landscaped grounds associated with the Presidio's infrastructure. Based upon the successful establishment of Golden Gate Park in the 1870's, in 1883, Major W.A. Jones inspired the Army to undertake a massive program to establish a cultural forest on the Presidio's natural lands (Jones

1883). This forest now consists of up to 400,000 non-indigenous trees. Many different species were utilized in this massive forestation effort but the survivors of these plantings are primarily blue gum (*Eucalyptus globulus*), Monterey cypress (*Cupressus marcrocarpus*), and Monterey pine (*Pinus radiata*). Jones and Stokes, Assoc. (1991) detail the status of this so-called "historical forest" which currently occupies approximately 457 acres. The remaining estimated 165 acres are characterized by a scattered mosaic of indigenous natural communities (such as central coast dune scrub, northern coastal scrub, coastal prairie, various wetlands, and coast live oak forest) as well as non-native grasslands. For the purpose of the remainder of this presentation, the Presidio's "natural lands" shall include the combination of this cultural forest, non-native grasslands and remnant indigenous natural vegetation, totaling approximately 622 acres.

Aside from its value as a refugium for surviving remnants of San Francisco's natural heritage, the Presidio also has cultural significance in the realm of California's natural sciences, and particularly with respect to its botanical history. The establishment of a Spanish fort at the Presidio in 1776 created conditions that later contributed to the Presidio becoming the type locality for many native California flowering plants. Some of these collections are of very widespread species (e.g. the California poppy, Eschscholzia californica) while others turned out to be hightly restricted endemics (e.g. San Francisco lessingia, Lessingia germanorum). Howell et. al (1958) mentions that the first species described from the San Francisco area was the yellow bush lupine (Lupinus arboreus), a common inhabitant of the Presidio, that was collected by naturalist Archibald Menzies during a San Francisco visit by the Vancouver Expedition in 1792. Geary (1979) details a total of eighty two species that were collected on and about the Presidio by two European naturalists, Chamisso and Eschscholtz, in October, 1816 during the voyage of the Rurik and on a later visit in November, 1824 by Eschscholtz during the voyage of the Enterprise. Both expeditions were under the command of Captain Otto von Kotzebue of the Russian navy. Forty three of these species were new to science. Many of these species still bear scientific names derived in honor of these early explorers.

As explained by Geary (1979), Eastwood (1944) was the first to analyse the Chamisso and Eschscholtz collections. She found that the first expedition yielded 69 species. Among them were two new genera and 33 new species. Escholtz collected another 13 species in 1824 and 3 (including the yellow bush lupine) had already been described, while 10 were additional new species. Geary (1979) located 58 of these 82 species that were known from the Presidio area. There are at least 45 of these species

still in existence on the Presidio today - a remarkable fact given that approximately 90% of the Presidio's landscape has been modified and that its natural lands are isolated by urban neighborhoods except for a narrow band of coastal bluffs that connect it to Point Lobos. Other type specimens collected from the Presidio bring the total number to 58. To serve as the type locality for 58 plant species is a rare distinction for any temperate locality in the world and it is another reason to value the Presidio's remaining stands of indigenous vegetation.

Following the Spanish and Mexican-American historical periods (1776 - 1848), the Presidio's natural lands were managed by a federal agency, the Department of Defense (DOD) under the auspices of the U.S. Army. For the most part, management of these lands took the form of benign neglect. Most natural areas were off limits to the public and therefore protected from excessive human disturbance. However, the issue of sensitive species protection drew attention to the Presidio after passage of federal and state endangered species protection acts in the early 1970's. The Presidio hosts one of California's rarest plants, the Raven manzanita (Arctostaphylos hookeri ssp. ravenii), of which there is only one known surviving individual under natural conditions. The Presidio clarkia (Clarkia franciscana) was thought to be restricted to the Presidio until the middle 1980's when a population was discovered in the serpentine grasslands of the East Bay's Redwood Regional Park. These outstandingly rare and endangered species attracted serious attention and began a long term relationship between the Army, wildlife protection agencies, and native plant protection activitists.

Also in the early 1970's, Representative Phillip Burton engineered the creation of the Golden Gate National Recreational Area (GGNRA). According to Adams (1993), Burton recognized that the Presidio would be vulnerable to base closure and he constructed some legislation that would give the National Park the first option on the property in that eventuality. After the park's establishment, the Army agreed to allow the park to manage some of the Presidio's largest natural areas on the heights above Baker Beach, Fort Point, and around to the Crissy Field dunes. The Base Closure Act of 1988 listed the Presidio as a candidate for closure. The clause allowing the National Park Service to have the right to pursue a transfer of this property was invoked. It became increasingly apparent that the Presidio's natural lands would eventually fall under the jurisdiction of the GGNRA. Native plant activists had already established a voluntary program of rare plant conservation on the Presidio with the permission of the Army. Particularly noteworthy were the early efforts of Sue Smith, then the conservation chair of the Yerba Buena Chapter of the California

Native Plant Society (CNPS). Natural resource managers from the GGNRA began to work with these knowledgable volunteers to gain information on the design and implementation of a long term resource conservation strategy. Innovative programs, such as Greg Archbald's volunteer Habitat Restoration Group, began to take place on park-managed Presidio property.

The early 1990's saw a flurry of activity on the Presidio's natural lands. The public began to use these lands more frequently for recreation. New trails developed that ran through the center of important remnant natural areas, as in the serpentine grasslands at Inspiration Point. Jones and Stokes, Assoc. (1991) prepared a forest management plan for the cultural forest areas. Terry Thomas, natural resource manager of the GGNRA, perceived a need for more baseline information to build an appropriate natural resource management strategy. An opportunity for funding part of this effort was presented by the Department of Defense's Legacy Natural Heritage Program. This new program was designed to provide funding to research institutions to develop information on sensitive natural resources on Department of Defense properties for the purpose of resource management. San Francisco State University's new Conservation Biology Program offered a potential partner to assist in this effort. Accordingly, grant applications were prepared and submitted to have San Francisco State conduct a baseline survey of the terrestrial vegetation of the Presidio. After several delays, the project officially began in early 1993.

The goals of this project were to:

1. conduct field surveys documenting the presence or absence of vascular plant species in the natural lands of the Presidio with a particular focus on indigenous plant communities;

2. map the presence or absence of these species on a GIS-based image depicting the indigenous plant communities of the Presidio;

3. collect voucher specimens to be identified, catalogued, mounted, labeled and turned over to the GGNRA for a reference collection;

4. photograph as many of the vascular plants and natural communities occurring on the Presidio as possible so that these images can be maintained in a catalogued collection for educational and reference purposes.

5. involve students at San Francisco State in hands-on field research for both funding support and experiential learning; and

6. provide a final report documenting the findings of this survey.

This document is intended to fulfill the last of these project requirements.

Methods

Initial efforts were made to contact all known individuals with detailed information regarding Presidio plant species distribution. Sue Smith of the CNPS was particularly helpful in this regard. The draft Forest Management Plan (Jones and Stokes, Assoc. 1991) contained maps which, in conjunctions with aerial photographs of the Presidio provided by the Army, helped to identify natural areas to be surveyed. The Army also contributed CAD images of the Presidio which were obtained and provided to the San Francisco State GIS Lab for possible assistance in building the GIS map. A fully digitized version of the Jones and Stokes Forest Management Plan map, however, had not been produced.

The over-arching goal of this project was to conduct a baseline inventory of Presidio vascular plant species and to systematically map their presence on the Presidio for future reference. Baseline inventories are the first step in identifying conservation strategies and implementing these strategies through appropriate funding, monitoring and adaptive management activities. The state of the art in conducting baseline inventories is still in an active state of development. Ideally, inventories should provide a baseline insight into what is where and, ideally, how much. The "how much" part of the equation, however, can require substantial resources and careful statistical design to produce reliable results. The "how much", therefore, can become a constraint to the amount of area that is actually sampled. Since some vascular plant species occupy fine scale habitats in small, scattered sites (e.g. freshwater seeps), random sampling can miss these species and result in an underestimate of their presence. Another approach is to sacrifice the "how much" data by concentrating on a focussed survey for species in all of their likely localities. This is known as the "searching" technique which is a standard method associated with developing local floras.

Stohlgren et al. (199?) discuss the status of biotic inventories in U.S. National Parks. They identify 5 inventory techniques, including systematic sampling, stratified random sampling, searching, gradient studies, and

indicator species. They surveyed 252 parks and point out that small national parks are particularly lacking in baseline inventories. Further, fewer than 30 of these parks had inventories thought to be over 95% complete for any biological group. Inventories conducted on these parks were evaluated for geographic, ecological, and taxonomic completeness. Highest scores for inventories were accorded to those that covered a full geographic, ecological, and taxonomic representation. These authors evaluate the pros and cons of the different inventory techniques mentioned above. They note that there is no "off-the-shelf" sampling designs and techniques for optimizing geographic+ecological+taxonomic completeness in biotic inventories and that trade-offs are in fact inevitable. They ultimately conclude that "An important component of future inventory work will be developing and testing hybrid sampling designs (between methods cited above) to address those questions (raised about different methods chosen)".

The method ultimately selected for this survey combined a geographically and ecologically systematic searching technique covering all indigenous natural communities that could be identified on the Presidio and a representative sampling of non-indigenous vegetation such as cultural forest stands. Further, as much as possible, surveys were made of these sites at different times of the year so that a full list of species per stand could be identified. These stands of natural communities are, for the most part, discrete, an average of about 3 acres in size, and relatively easy to identify. Begining in January, 1993, the principal investigator and an assistant graduate student, Ms. Isabelle DeGeoffrey, began visiting all known or suspected indigenous natural area sites and a randomly selected group of non-indigneous natural areas. Species lists were generated for each area based upon a fine scale mosaic of grasslands and scrub patches located in relatively discrete vegetation stands. While conducting these surveys, representative taxa (except for special status species) were collected for specimens and photographs of species and habitats were obtained. Specimens were later pressed, dried, logged in, and stored for later mounting. Slides were inventoried as they were developed.

These vegetation stands were later subjectively assigned a Holland (1986) vegetation type and mapped on a Geographic Information System by another hired student, Ms. Marcia Semanoff-Irving. Species lists were ultimately aggregated for each area covered by polygons identified in the survey to produce a master list per polygon. At the time, a decision was made by park management to build the GIS map around the previously produced Forest Management Plan map originally created by Dr. Joe McBride from Berkeley. This was because another management plan was

contracted to Jones and Stokes, Assoc. to follow up on their former plan and there was perceived to be some urgency to getting the natural vegetation map to Jones and Stokes for their project in a form that would be complementary to their efforts. This effort included digitizing the Forest Management Plan polygons as well as natural vegetation polygons identified by aerial photography and ground surveys.

During the course of this inventory, survey efforts were enhanced considerably by the assistance of Peter Rubtzoff of the California Academy of Sciences who was of particular benefit to locating Presidio wetlands and identifying wetland species. Further, a number of graduate students volunteered at different times to come out to the Presidio with the Principal Investigator to participate in surveys, collections, and photographing Presidio natural areas.

Later, unidentified specimens were evaluated either at San Francisco State or at the California Academy of Sciences and these specimens were mounted for a permanent collection to be turned over to the GGNRA. All unidentified specimens were then added to the lists that were being developed for each sampled polygon. The actual distribution of these species in other surveyed polygons may be underestimated, however, because they were not recognized at the times of the surveys.

Another device that was developed to help identify and search for species on the Presidio was an analysis of the Flora of San Francisco (Howell et al., 1958). This work reported on collections of vascular plants from the Presidio and other parts of San Francisco during the historic past. All collections identified from the Presidio were abstracted from this document and nomenclature was updated to that of the Jepson Manual (Hickman et al. 1993). This made possible a highly informative comparison of historic species presence to those surviving species identified during this inventory.

A master matrix of 389 indigenous and non-indigenous species (rows) by 71 polygons (columns) was then created using Excel database software. Attribute data for each species included life form, whether or not the species is restricted to wetland habitats, and substrate on which the species was observed. Areas for each polygon were computed automatically using the GIS. A few polygons had to be artificially created (polygons 674 and 675 were each divided into three similar size areas) so that the size of the polygons could be kept in the range of other sampling units. All polygons were then assigned to one of two soil types derived from either sandy dune substrates or serpentine clay substrates. Further, the species

were then analysed by whether or not historic or other evidence suggests that they are indigenous or non-indigenous. Finally, polygons in different general Holland natural communities were grouped and analysed for different soil types. Further, wetland status and life form attributes were then analysed for each species on different soil types, in different communities, and so on.

Although not measuring or estimating numbers of individuals of species per polygon, his method nonetheless did provide some interesting distributional information and a binary data base (presence/absence) that may be of further value for ordinating the relationships of polygons to each other and testing their subjective vegetation classification. This work is underway and not reported as part of this analysis. However, by noting the recurrence of a species in one or more polygons surveyed, this does provide insight into where the species occurs on the Presidio, how widespread it is, and the extent to which it is found with common associates, thus suggesting distinct communities. It also provides a means of comparing the species richness of different kinds of natural communities. Further, because the localities of all of these species are mapped in reasonably small and often discrete sample units, this does provide more valuable information than a basic "species list" for the entire Presidio and this should assist in developing more sophisticated analyses for more specific purposes in the future.

In short, this method is somewhat of a "hybrid" approach, as suggested by Stohlgren et al. (1994?). in which systematic taxonomic searching was conducted of all or most of the geographic and ecological areas on the Presidio and species presence/absence was recorded in these sample units. Future searches of these areas could be conducted periodically to determine if these species are still present or if, as is likely given the rarity of many species, they will be disappearing with time.

Findings

Historical Vegetation on the Presidio

The Presidio of today is a reflection of its past and present ecological context. That context has been dramatically shaped for slightly more than 200 years by the influence of post-Spanish settlement and modern development but there are still many vestiges of surviving indigenous natural communities. Holland (1986) provides a preliminary description of California's terrestrial natural communities. Although these communities contain plants, animals, fungi, and a host of micro-organisms, natural

communities can most easily be described on the basis of vascular plant species. These species occur in assemblages that create a fine scale mosaic of form and structure supporting other kinds of organisms. Further, these assemblages are finely tuned to topography, substrate, moisture patterns, and a variety of ecological processes that occur through time. Since vascular plant species are generally visible to the human eye, they can be observed and recorded with comparative ease. Also, specimens of these species were among the first scientific collections and the presence of indigenous natural communities can be interpreted from early artistic renderings of the Presidio's historic setting.

Although Holland's descriptive natural communities are somewhat coarse-grained because of California's exceptionally high level of local species diversity, they nonetheless provide a framework around which patterns of this natural diversity can be interpreted. This survey documented 14 of Holland's terrestrial natural communities still present to some degree on the Presidio. On the basis of other evidence, including early descriptions, historical collections, and present geomorphic context, another 5 of Holland's natural communities were likely present but now appear to be extirpated. Table 1 briefly describes these 19 terrestrial natural communities.

Vegetation patterns on the Presidio have historically been determined by various factors. The Presidio's isolation and severe maritime influence have been alluded to in the Introduction. At a finer scale, the Presidio's landscape is divided into to two dominant features that are largely confined to its two hydrologic basins, the Lobos Basin and the Marina Basin. These two basins are separated by a tectonic fracture zone that travels in a northwest direction from approximately the Arguello Boulevard gate along an upland divide to coastal bluffs at the northern margin of Baker's Beach. The Lobos Basin watershed is dominated by sandy substrates that are part of a late Quaternary dune system which overlay the majority of western San Francisco. These dunes swept up the Lobos Basin watershed from Baker's Beach and climbed the divide to its crest at Rob Hill and then converged with an arm of dune sand spilling over from Ocean Beach along the southern margin of the Presidio. The upland ridge that defines the western boundary of the Marina Basin is largely composed of serpentine of the middle Mesozoic Franciscan Formation. This serpentine rock weathers into fine clays. This ridge was apparently effective in blocking dune sands from covering Tennessee Hollow and its northern rocky uplands. These serpentine substrates are the dominant feature along the Presidio's northern coastal uplands and interior slopes that surround the Marina Basin watershed.

Raven and Axelrod (1978) describe some of the unusual characteristics of serpentine that are known to stimulate high concentrations of endemics in areas dominated by this rock type. One of these features is that serpentines are often highly fractured and their fine clays are remarkably effective at retaining percolated groundwater. This situation often results in numerous seeps and springs that occur in serpentine uplands. The Presidio presents a classic example of this phenomenon. Overlaying this situation, however, is a more unusual phenomenon involving the wind-driven build-up of sands from the massive dune system that once occupied western San Francisco. In the Lobos Basin, these dunes dammed up perennial seeps and springs that occur along the southwestern slopes of the Presidio's serpentine divide. The result was Mountain Lake, Lobos Creek, and other spring-fed dune seeps in the Lobos Basin (Howell et al., 1958). The northeastern slopes of this divide also produced perennial wetlands draining down valleys such as Tennessee Hollow and out of the Fort Scott highlands. These seeps, springs, and streams drained into a tidally influenced coastal lagoon in the area currently occupied by Crissy Field air strip. Consequently, a wide array of natural wetlands occupied both dune areas of Lobos Basin and the serpentine slopes and lowlands of the Marina Basin.

In non-wetland areas of the sandy Lobos Basin and its extension over the low southern saddle of the Presidio east of Arguello Boulevard, the following Holland natural communities were likely prominent: Northern Foredune (21210) near the mouth of Lobos Creek and extending north to the cliffs; Central Dune Scrub (21320) extending up sandy inland dunes east towards Mountain Lake and beyond; large and small Wildflower Field (42300) gaps in the Central Dune Scrub created by sand blow-outs, shifting dunes, and other wind and storm related dune-field disturbances; and Coast Live Oak Woodland (71160) in protected, stablized dune areas. Wetlands in the Lobos Basin must have been very rich. They presently include Central Coast Live Oak Riparian Forest (61220) along Lobos Creek; Coastal Freshwater Marsh (52410) and Central Coast Arroyo Willow Forest (61230) fringing Mountain Lake; and Central Coast Riparian Scrub (63200) in seep areas and along parts of Lobos Creek. Another wetland community once associated with this landscape now appears to be gone, namely the Vernal Marsh (52500) which occurred in swales and along the sandy margins of wetlands such as Mountain Lake that were wet in the winter and dry in the summer.

North of Baker's Beach, eroded serpentine cliffsides rise above upland dunes and the northwestern slopes of this portion of the Presidio

divide contain deep soils and direct exposure to maritime winds, salt spray, and fog. These ocean facing uplands still contain large stands of Northern Coastal Scrub (32100) and smaller patches of Coastal Terrace Prairie (41100). Steeply eroded cliffsides below these two natural communities host large expanses of the Northern Coastal Bluff Scrub (31100) natural community. These coastal bluff communities also contain Freshwater Seep (45400) communities and moist arroyos contain Central Coast Riparian Scrub (63200). The eastern side of this serpentine divide runs south from Fort Point to the southern Presidio entrance at Arguello Boulevard. Uplands along the eastern portion of the ridge are protected from direct martime influences. The upper portions of this rocky ridge must have once contained large areas of Serpentine Bunchgrass (42130) prairie. Gaps of bare soil within this grassland would have occurred due to slides and fires. These gaps must have supported rich serpentine Wildflower Fields (42300), which still tenuously persist today at the quarry site on Inspiration Point. Another natural community that may well have been present on exposed rocky uplands, and possibly on upland stablized dune sites as well, is the Northern Maritime Chaparral (37010). Although some species that probably occupied this community still persist, the community itself no longer appears to be present. Eroded cliffsides on the eastern portion of this serpentine divide also must have contained Northern Coastal Bluff Scrub (31100) while Northern Coastal Scrub was no doubt prominent as part of the forest, grassland, and scrub mosaic that occupied the Marina Basin watershed.

Wetlands in the Marina Basin are now largely gone, as are the Coast Live Oak Forest (81310) and California Bay Forest (81204) that ranged up its arroyos and fringed its lowland flood plains. Near El Polin Spring, there is still a vestige of Coast Live Oak Riparian Forest (61220) and Central Coast Riparian Scrub (63200) occupies portions of the stream drainage down Tennessee Hollow towards Crissy Field. The large tidal lagoon is now gone and with it the Northern Coastal Salt Marsh (52110) that must have been present in this area. Freshwater springs and seeps still occur at various places along the eastern base of this divide and these host small riparian and other wetland communities. Another prominent feature of the Marina Basin was a second major Northern Foredune (21210) natural community between the coastal lagoon and San Francisco Bay. Remnants of this Northern Foredune community still persist today.

One of the best means of reconstructing this pre-European landscape mosaic is by examining the record of historical vascular plant collections on and about the Presidio. Table 2 presents the results of an analysis of species historically reported from the Presidio by Howell et al. (1958)

compared to those located during this survey. This table suggests that at least 312 vascular plant taxa once occurred throughout the Presidio's natural habitats. Although less than 10% of the Presidio's indigenous natural communities are still present, this survey located 228 of these taxa, or approximately 73% of these historic species. Of the 84 taxa that were not sighted during the survey, 13 are aquatic species. This survey did not specifically cover freshwater aquatic species and therefore a separate effort should be made to assess the status of aquatic vascular plants in Presidio wetlands. Nonetheless, both Mountain Lake and Lobos Creek do not appear superficially to harbor the kind of rich freshwater aquatic communities that these collections suggest once existed in Presidio wetlands.

Several other missing species, such as *Hydrocotyle verticillata, Crassula aquatica, Lycopus americanus, Rumex maritimus, Limosella aquatica,* and *Stachys ajugoides var. ajugoides*, were reported by early botanists such as Katherine Brandegee as occuring in the now vanished Vernal Marsh habitats. Likewise, salt tolerant wetland species such as *Frankenia grandifolia* and *Jaumea carnosa* must have been present in the Presidio's Northern Coastal Salt Marsh formerly located in the vicinity of Crissy Field. Trees such as the California buckeye (*Aesculus californica*) and California bay laurel (*Umbellularia californica*) were likely part of a fringe of mixed evergreen forest in the more protected areas of the Marina Basin. Although some of the species that must have made up these communities are still present, these indigenous forests are also basically non-existent on the Presidio today. Most likely, these forests provided fuel and building materials for Spanish, Mexican, and later early American soldiers and they were possibly extinquished before Major Jones ever began his reforestation project in the late 1800's. The report of silk tassle (*Garrya elliptica*) from the Presidio, combined with the current relict presence of the Raven manzanita (*Arctostaphylos hookeri* ssp. *ravenii*), suggests the former presence of maritime chaparral.

Another large number of missing species are annual (29) and perennial (27) herbaceous wildflowers that probably once dotted the Presidio's serpentine grasslands and dune wildflower fields with colorful blossoms during wet springs. Some of these species may still be present and Table 2 should serve as a watch list for future vascular plant surveys on the Presidio. However, it is likely that many Presidio populations of these species have been extirpated as their open habitat has been lost and fragmented. Further, despite the relatively high percentage of indigenous natives currently persisting on the Presidio, these apparent species losses may foreshadow a trend of species erosion on the Presidio that could

accelerate rapidly given the minimum amount of natural habitat remaining in this area. Based upon the classic species/area curve pioneered by MacArthur and Wilson (1963), a 90% reduction in area should result in a 50% reduction in number of species. If the number of remnant Presidio species were to approach 50% of its baseline 312, then this would equal approximately 156. Subtracting 156 from the 228 species located during this survey, we might theoretically expect approximately 72 more vascular plant species to disappear from the Presidio in the relatively near future unless more natural habitat is created or remaining natural communities are carefully managed to maximize species persistence.

Granted, the issue of potential species degradation on the Presidio is much more complex than this simplistic, although often robust, species/area model. A particular complicating factor is the large number of non-indigenous species that have been either introduced or naturalized on Presidio lands. This survey located 161 non-indigenous species, many of which are highly invasive. Various combinations of these species are located in all of the remnant natural communities on the Presidio, and in some cases the numbers of non-indigenous species in natural areas are greater than those that are indigenous. Of these 161 species, several are introduced California native plants, such as the coast redwood, big leaf maple, douglas fir, Monterey pine, Moneterey cypress, and *Ceanothus griseus*. Many other species are garden escapes. Most, however, are highly vagile "weed" species that are well known to constitute threats to indigenous habitat and native species. Conversely, although indigenous species generally dominate remnant natural communities, substantial numbers of these indigenous species were also found in non-indigenous habitats, such as introduced forests and disturbed, non-native grasslands. Several of these indigenous species appear to be adapting to their new environments. Consequently, species assemblages on the Presidio today are being shuffled and shaped by a host of historic processes and modern influences (including introduced species) that have been overlaid on the area by human management during the past two centuries.

Surviving Indigenous Species and their Natural Communities

This report summarizes the findings of a baseline inventory of terrestrial natural communities that occur on Presidio lands. The specific objective of the survey was to identify as many species as possible in mapped polygons representing the Presidio's remnant indigenous communities as well as investigating a representative array of non-native grasslands and non-indigenous forest stands. Altogether, 71 polygons were surveyed and species lists were developed for each of these areas. Figure 2

identifies the location of each of these polygons. These 71 polygons covered a total of approximately 210 acres. In all, 228 indigenous species (including infra-specific taxa) and 161 non-indigenous species were recorded from these sites resulting in a total of 389 species considered in this analysis. Table 3 lists these 71 polygons and includes attribute data for each polygon including substrate, presence or absence of wetlands, acreage, number of indigenous species, number of non-indigenous species, total species, and ratio of indigenous species to total species. Each polygon also is correlated to Planning Areas that have been identified in a proposed General Management Plan (GGNRA 1993) for the Presidio. Appendix 1 provides a complete list of these species including their indigenous versus non-indigenous status, life form, wetland status, and all of the polygons in which they were recorded. While this survey may have overlooked some species that occur on Presidio natural lands, it is likely that the great majority were identified.

The Presidio's contemporary natural communities have been variously altered from their pre-European conditions. A significant factor has been the large number of non-indigenous species introduced into the Presidio's natural landscape. Approximately 41% of the species pool in natural areas on the Presidio is currently composed of these so-called "exotics". Without question, these species are in an on-going interactive relationship with the Presidio's indigenous flora and all natural communities are currrently affected, and will be so in the future.

As a means of assessing the current status of the Presidio's indigenous vegetation, this section filters out the non-indigenous species from each survey site and focuses in on species that the historic analysis indicates were likely present before European American settlement. These species almost certainly dominated the Presidio's prehistoric natural areas and provide the core of species groups that help to define the natural communities described by Holland and depicted in Figure 2. Plotting their frequency and distribution in the Presidio's various natural areas provides some insight into the current condition of these species and the natural areas that they occupy.

As discussed in the Historical Vegetation section, natural communities on the Presidio historically occupied either sandy habitats of dune origin, particularly in the Lobos Basin, or serpentine-derived clay uplands, cliffsides exposed to the ocean or serpentine slopes on the bay side watershed of the Marina Basin. Both dune habitats and serpentine habitats hosted specially adapted species that are largely or exclusively restricted to one soil type or the other. These suites of specialized species are useful

for identifying the Presidio's remnant natural communities. As depicted in Table 4, this survey sampled 41 polygons totalling 105.2 acres on sandy substrates. Natural communities on serpentine substrates were surveyed on a total of 30 polygons over a total area covering 95.2 acres. Of the 228 putative indigenous species identified through the historical vegetation analysis, 182 were found at least once on serpentine and 139 were found at least once on sandy substrates. Of these, 94 species were recorded on both substrates, 45 were found only on sandy substrates, and 89 were found only on serpentine-derived soils.

Table 5 lists these species and ranks them in descending order by the number of polygons in which they were found. This table illustrates a core of indigenous species, starting with the most frequently encountered species - the California poppy (*Eschscholzia californica*) occurring on 55 polygons, that are widespread throughout the Presidio. Eleven of these species occur in over half of the polygons surveyed. They are tolerant of both sandy conditions and serpentine soils and establish in most of the Presidio's natural communities, both indigenous and non-indigenous. These are the hardiest of the Presidio's surviving natives and, true to form, they are also among the most common native species elsewhere along the central California coast. These includes species such as poison oak (*Toxicodendron diversilobum*), coyote bush (*Baccharis pilularis*), toyon (*Heteromeles arbutifolia*), manroot (*Marah fabaceous*), coast buckwheat (*Eriogonum latifolium*), yarrow (*Achillea millefolium*), polypody fern (*Polypodium californicum*), and so on. Because of their wide amplitude, however, they are not particularly useful for classifying the Presidio's remnant indigenous natural communities.

Table 5 also illustrates the most widespread species occurring in sandy environments. Although 8 of these species occur once or twice in serpentine polygons, they are clearly most frequently encountered as part of the dune natural communities. *Ericameria ericoides, Phacelia distans, Lotus scoparius, Cardionema ramosissimum, Gilia capitata ssp. chamisonis, Camissonia cheiranthifolia, Polygonum paronychia, Leymus triticoides, Lupinus chamissonis, Amsinckia spectabilis, Cardamine oligosperma, Chorizanthe cuspidata, Lessingia germanorum,* and *Croton californicus* are important species in this group. Widespread species largely restricted to serpentine environments include *Iris douglasiana, Ranunculus californicus, Allium dichlymideum, Arabis blepharophylla, Triteleia laxa, Lupinus variicolor, Angelica hendersonii, Sisyrinchium bellum,* and *Nasella pulchra.*

Table 5 conversely illustrates some of the least frequently encountered species, although some of these species may not have been apparent at times of the year when the majority of survey work was done or they simply weren't recognized during the survey. Clearly restricted taxa occurring on serpentines include *Hesperevax sparsiflora, Iris longipetala, Layia platyglossa, Lomatium dasycarpum, Viola adunca, Plantago subnuda, Juncus phaeocephalus, J. falcatus, Lonicera hispidula var. vacillans, Arctostaphylos hookeri ssp. ravenii, Centaurium venustum, Corylus cornuta ssp. californica, Hesperolinon congestum, Spiranthes romanzoffiana, Wyethia angustifolia, Osmorhiza chilensis, Arbutus menziesii, Baccharis douglassii, Cirsium andrewsii, Helenium puberulum, Polypodium scouleri, Prunus illicifolia, Senecio aronicoides,* and *Tryphysaria floribunda.* Some of these species, such as *Viola adunca*, were once widespread and prominent on the Presidio serpentines. Their current highly restricted status does not bode well for their likely long term survival. Highly restricted Presidio species occuring in sandy habitats include *Cuscuta californica, Cirsium occidentale, Cornus sericea, Nemophila pedunculata, Salix lucida ssp lasiandra, Abronia umbellata, Astragalus nuttallii, Castilleja latifolia, Euthamia occidentalis, Lasthenia minor, Poa douglasii, Veronica americana, and Scirpus californicus.* It will be noted that this suite of species is not among those normally considered "rare", such as *Lessingia germanorum* and *Chorizanthe cuspidata.* In fact, a number of the most highly restricted species on the Presidio are relatively widespread elsewhere. This is probably a reflection of the limitation of their remaining habitats at the Presidio (e.g. marsh conditions for *Scirpus californicus* and foredune conditions for *Abronia umbellata*).

Table 6 arrays these natural communities by area. The two largest areas of indigenous natural communities are Northern Coastal Scrub (34.1 acres), on serpentine, and Central Dune Scrub (31.8 acres) on sandy substrates. Northern Coastal Scrub dominates the stable serpentine bluffs ranging from Battery Chamberlain north to the Fort Point vicinity. It is a relatively continuous stand so that three of the polygons have been defined somewhat arbitrarily as 675A, 675B, and 675C. Consversely, Central Dune Scrub is more fragmented, occupying 10 discrete polygons with the three largest polygons concentrated in the area northeast of Baker's Beach. Areas of Non-Indigenous Forest cover the next largest areas and represent a small sample of the total acreage covered by these introduced natural communities. In number and area, these sample forest polygons are almost evenly divided between sandy and serpentine substrates.

Northern Coastal Bluff Scrub is the next most extensive indigenous natural community, covering approximately 20.4 acres. This vegetation is relatively continuous along the steep bluffs facing the ocean and more fragmented on the bay side and more interior upland cliffsides. Sandy, disturbed Non-Native Grasslands occur on 5 disconnected polygons covering 11.4 acres. Three other indigenous communities each cover approximately 9 acres. These are dune Wildflower Fields, Serpentine Bunchgrass, and Northern Foredune. Dune Wildflower Fields are an "early successional" species association of the Central Dune Scrub, generally occupying large and small disturbance gaps in the scrub. This is a highly fragmented system with only two polygons covering more than one acre out of the 10 polygons surveyed. Northern Foredune communities are divided into two locations - Baker's Beach (2 polygons totalling 6.4 acres) and the Crissy Field dunes (2 polygons totalling 2.7 acres).

Two different phases of native perennial grassland are represented by Serpentine Bunchgrass, made up of 4 polygons totalling 9.1 acres, and CoastalTerrace Prairie, which occupies only about 2.3 acres in 2 relatively intact stands. Both natural communities are restricted to serpentine substrates. Coastal Terrace Prairie occupies rocky, ocean-facing coastal bluffs. These bluffs are buffeted by persistent winds, salt spray, and fog. Coastal Terrace Prairie interfaces with the Northern Coastal Scrub and might be considered an association of that natural community. Serpentine Bunchgrass prairie occupies more protected, bay-side uplands as exemplified by the grasslands of Inspiration Point near the southern boundary of the Presidio. These grasslands have been historically drier, less windy and sunnier than maritime coastal bluffs. A small .6 acre serpentine barren was created at a quarry site at Inspiration Point. This barren is classified as a serpentine Wildflower Field since it is dominated by annual and perennial herbs. The total amount of vegetation classified as Coast Live Oak Woodland occupies less than one acre. Although *Quercus agrifolia* lends an aspect of Coast Live Oak Woodland to scattered sites on the Presidio, typical stands of this vegetation and characteristic understory associates found in other parts of the central California coast range are not truly present on the Presidio, despite historical accounts suggesting that groves of coast live oaks were formerly prominent.

Wetlands on the Presidio are variable in size and character. The northern margin of Mountain Lake and the central reach of Lobos Creek constitute approximately 7.9 acres of Central Coast Arroyo Willow Riparian Forest. Another 1.3 acres along Lobos Creek was classified as Central Coast Live Oak Riparian Forest. A serpentine seep area near El

Polin Spring occupies only .1 acre classified as Coast Live Oak Woodland. A fringe of Coastal Freshwater Marsh occupies about 1.3 acres around the east side of Mountain Lake. A small .5 acre patch of Central Coast Riparian Scrub occurs at a sandy spring near the Marine Hospital. Almost all of these riparian woodlands and wetlands are on sandy substrates and they constitute about 12.4 acres. Serpentine natural communities, however, present numerous small springs and seeps scattered throughout 13 of the 30 serpentine polygons surveyed. These small wetlands occupy little area but provide a rich source of species diversity in their specialized habitats. Eight of the Northern Coastal Bluff Scrub and Northern Coastal Scrub polygons contain seeps, and coastal bluff polygons often contain numerous wetlands of this nature.

Table 7 arrays these natural communities in descending order by numbers of indigenous species occurring in each polygon. One might predict that the larger, relatively intact polygons consisting of natural communities such as Northern Coastal Scrub and Central Dune Scrub would present the largest number of indigenous species per polygon. This, however, does not prove to be the case. Indeed, two of the smallest polygons totalling only 2.3 acres contain Coastal Terrace Prairie which, on average, hosts the largest number of species of any natural community surveyed (45). Serpentine Bunchgrass is next with an average of 40 species per polygon. Northern Coastal Scrub and Northern Coastal Bluff Scrub each present an average of 32 species per polygon. The .6 acre serpentine Wildflower Field presented a relatively large number of 23 indigenous species. Clearly, although the Presidio's dune flora is priceless as a remaining representative of San Francisco's lost dune ecosystem, indigenous serpentine natural communities are intrinsically more species rich than polygons hosting natural communities on sandy substrates.

Of the dune-based natural communities, Central Dune Scrub does present the largest average number of indigenous species per polygon at 26. The closely associated dune wildflower fields average approximately 15 indigenous species per polygon. The richest indigenous riparian woodland is Central Coast Arroyo Willow Forest, averaging 19 indigenous species per polygon. Northern Foredune natural communities contain an average of 14 indigenous species and a number of these are highly restricted. Interestingly, this community also presents the lowest indigenous species per total species ratio (.37) of any other (including Non-Native Grassland and Non-Indigenous Forest). This is perhaps because these dune sands are open and have been historically highly disturbed by past human recreation. Consequently, a relatively large number of introduced exotic species have become established in these dune systems.

Another interesting feature suggested by Table 7 is that both serpentine and sandy Non-Indigenous Forests host on average (15 and 17 respectively) more indigenous species per polygon than Non-Native Grasslands (13 for sandy substrates and 12 for serpentine substrates). Also, average numbers of indigenous species in Non-Indigenous Forests are comparable to specialized indigenous natural communities such as dune Wildflower Fields and Northern Foredunes. Nonetheless, as will be seen in Table that the majority of the indigenous species that occur in these Non-Indigenous forests represent the hardy natives illustrated in Table 5. Further, these forests contain considerably more total area than more geographically restricted natural communities. Lastly, the indigenous-total species ratio for Non-Indigenous Forests is low at .47 for sandy forests and .41 for serpentine forests while Non-Native Grasslands are slightly higher at .49 for sandy grasslands and .50 for one serpentine grassland. These low indigenous species ratios reflect the large number of introduced non-indigenous species that dominate both Non-Indigenous Forests and Non-Native Grasslands.

Table 8 portrays a matrix of wetland species found on the Presidio and the polygons in which they are located. The species are arrayed in descending order of abundance and the polygons in descending order of total wetland species per polygon. The arroyo willow (*Salix lasiolepis*) is the most widespread wetland species and this reflects its tolerance for marginally wet habitats or those with near surface groundwater. Four rushes (*Juncus lesuerii, J. bufonius, J. patens, and J. effusus* var. *brunneus*) are also relatively widespread. Conversely, six sedge species (*Carex tumulicula, C. densa, C. obnupta, C. gracilior, C. harfordii*, and *C. subbracteata*) are relatively limited in their distribution, the latter three each occuring in only one polygon. The central coast endemic *Cirsium andrewsii* is likewise highly restricted to serpentine seeps in polygon 674A, a small but rich wetland locality which also hosts the only anomalous Presidio occurence of*Typha latifolia.* The richest existing indigenous wetland on the Presidio is the stand of Central Coast Arroyo Willow Forest along the northern margin of Mountain Lake. The serpentine seep areas (polygons 502 and 680) near El Polin Spring at Inspiration Point are also rich in wetland species, as is the Central Coast Riparian Scrub near the Marine Hospital (polygon 563) and the Central Coast Arroyo Willow Forest along the central reach of Lobos Creek (polygon 595). Other local seeps and swales host between 2 to 7 indigenous wetland species, several highly restricted. As described in Howell et al. (1958), San Francisco's formerly rich freshwater wetlands have largely vanished and the rich

diversity of these remnant wetlands on the Presidio is of special significance.

Another way of viewing these patterns of diversity is to examine the different kinds of vascular plant life forms that occupy different natural communities on the Presidio. Table 9 arranges life form composition of indigenous and non-indigenous communities by substrate type (dune or serpentine). This table illustrates some of the key differences between indigenous species occupying dune and serpentine natural communities.

Indigenous annual grasses are generally missing from both sets of communities, a finding consistent with the general lack of native annual grass species in the California flora. On average, dune natural communities have a slightly larger number of annual herbs (13.3 to 11.2), perhaps a reflection of the higher frequency of small and large gaps in dune scrub and also the lesser fertility of dune soils. High frequency of disturbance in dune communities due to storm-driven blow outs and other scouring events would have provided many gaps for annual herbs to exploit because of these processes. Serpentine communities conversely present on average over one and one-half times as many perennial herbs as dune communities (30.5 to 18.2), three times as many perennial grasses (7.3 to 2.7), four times as many geophytes (5.3 to 1.3), more ferns (2.8 to 1.8), and about the same number of shrubs, subshrubs, vines, and trees. This species richness of perennial grasses, perennial herbs, and monocot geophytes in serpentine communities is most likely a reflection of the stable clay soils that underly perennial grassland and coastal scrub. It is also a reflection of the many small wetlands on the Presidio's serpentines that range from brackish cliffside seeps near the base of coastal bluffs to protected hillside seeps near El Polin Spring near the Presidio's southern boundary.

Tables 10 - 21 lay out a species by polygon matrix for all of the natural communities listed in Table 5 with species arrayed in descending order of their abundance in each polygon. Life form, substrate preference, and wetland status are additional attributes associated with each species. Collectively, these tables provide baseline data for each polygon and lend insight into the most successful and most restricted indigenous species found in each natural community polygon. Indicator species for indigenous natural communities are asterisked. These tables allow detailed examination of the trends summarized in Tables 4 through 8 and they should be useful for future surveys and baseline ecological research into the status of these natural communities.

Status of Non-Indigenous Species on Presidio Natural Areas

The concentration of non-indigenous species on Presidio natural lands is somewhat high compared to other natural areas on the San Francisco peninsula. For example, according to Thomas (1961) the Santa Cruz Mountains hosts approximately 1799 taxa of which 1246 (.69) taxa are considered indigenous and 553 non-indigenous (.31). McClintock et al. (1990) identified 659 taxa on the near by San Bruno Mountain of which 404 (.61) are considered indigenous and 255 (.39) non-indigenous. Of the 389 taxa identified on the Presidio during this survey, 228 are considered indigenous (.59) and 161 (.41) non-indigenous. The Presidio's slightly higher non-indigenous ratio is likely due to the Presidio's long history of human disturbance, relatively small patches of remaining natural habitat, and the many different horticultural species that have escaped and naturalized since their introduction to Presidio gardens.

It is likely that the majority of the 161 non-indigenous species located during this survey are not a major threat to indigenous species. Clearly, however, several of these species do constitute a factor of major concern for the conservation of the Presidio's biota and some appear to be particularly problematic for maintaining the integrity of vulnerable indigenous natural communities. This survey did not address abundance data for these species, however, one insight concerning the status of non-indigenous species that can be drawn from this survey pertains to the distribution of these species. Hypothetically, the more widespread a non-indigenous species, the more it potentially could constitute a threat to indigenous species.

Table 22 arrays the 161 non-indigenous species in descending order by total number of polygons in which the species was observed. This table also indicates the number of polygons in sandy versus serpentine substrates in which the species was found. This table reveals that the most widespread non-indigenous species is the sea fig, *Carprobrotus edulis*, found on a total of 42 polygons. Note, however, that the majority of these polygons (30) consist of sandy substrates, suggesting that this species is particularly a potential problem for sandy natural communities. Three annual herbs are also widespread - *Raphanus sativa, Rumex acetosella*, and *Stellaria media* - however, of these, only wild radish (*Raphanus sativa*) is likely to pose a significant threat. The most widespread annual grasses are *Bromus diandrus* , occurring more often on sandy substrates, and *Hordeum murinum* ssp. *leporinum*, occurring more often on serpentine substrates.

The most widespread non-indigenous tree on survey sites is the Monterey cypress (*Cupressus macrocarpus*), a California native introduced to the Presidio as part of the reforestation program in the late 1800's. This species has clearly spread throughout much of the Presidio and it could possibly have a profound long term impact on Presidio grasslands, scrub and coastal bluff communities as it continues to convert these communities to conifer forest.

The case of the Monterey cypress is similar to that of the Monterey pine (Pinus radiata), which was also planted widely during the historic reforestation. Five other California native trees that originally did not occupy the Presidio have also become established. Coast redwood (Sequoia sempervirens) and Douglas fir (Pseudotsuga menziesii) occur in the serpentine areas near Inspiration Point. A lone big leaf maple (Acer macrophyllum) occurs near El Polin Spring and a lone red alder (Alnus rubra) occupies the central reach of Lobos Creek. Another introduced California native is *Ceanothus griseus*. This shrubby wild lilac has naturalized in Central Dune Scrub and Northern Coastal Scrub on the bluffs above Baker's Beach and Battery Chamberlain. It is a native to similar environments both south in the Monterey area and north along the Sonoma coast. These introduced native species pose special management issues. To what extent should non-indigenous native species be encouraged or discouraged? Each species will need to be individually evaluated and placed in the context of over all goals to conserve the indigenous biological diversity of the Presidio.

As revealed by Table 23, an interesting comparison can be made between indigenous and non-indigenous species in terms of substrate preference. The indigenous flora contains several species that appear to have a special preference for either serpentine or sandy substrates. Indigenous species found only on serpentines numbered 89 (39% of the surveyed taxa) and 45 taxa (20%) were only found on sandy substrates. Indigenous species found on both substrates numbered 94, or 41% of the surveyed taxa. Given that introduced species have theoretically not had time to evolve special substrate preferences on the Presidio, one might expect that there would be few if any non-indigenous species with substrate preferences. Altogether, 40 (25%) of the non-indigenous species were only found on serpentine substrates while 29 (18%) were only found on sandy substrates. Few of these species, however, appear to be widespread on either substrate and this "restriction" is more likely an artifact. Nonetheless, there may be certain non-indigenous species that are specially adapted to either sandy or serpentine clay soils. This may be the case with such species as *Tetragonia tetragonioides, Hedypnois cretica,* and *Conicosia*

pugiformis for sandy substrates and *Cotoneaster pannosa, Erechtites glomeratus, Rumex crispus* and *Hypochaeris radicata* on serpentines.

Another way of assessing the influence of non-indigenous species on the Presidio is to compare the numbers of non-inigenous species identified on individual polygons compared to total species number. Again, one might expect that intact indigenous natural communities should have a lower number of non-indigenous species per polygon than the converse. Table 24 arrays each polygon in descending order by ratio of non-indigenous species to total species per polygon. This table reveals that natural communities on sandy substrates, with the exception of Non-Indigenous Forest polygons on serpentines, have the highest non-indigenous species ratios. This might suggest that indigenous natural communities on sandy substrates are more vulnerable to invasion by introduced species than those that occur on serpentine. On the other hand, Table 25 arrays each polygon in descending order based on the total number of non-indigenous species per polygon. In this instance, with the exception of Central Dune Scrub, several of the indigenous natural communities that occupy serpentines have the highest number of introduced species per polygon. Serpentine natural communities carry a much higher level of indigenous species richness than sandy communities and this keeps the non-indigenous species ratio relatively low, however, in absolute numbers, these serpentine communities harbor the highest numbers of introduced exotics.

Clearly, these tables suggest that all remnant natural communities on the Presidio are vulnerable to invasion and establishment of non-indigenous species. Several highly invasive species have already been recognized and have been mapped on the Presidio. More detailed analysis of abundance of non-indigenous species needs to be generated so that particularly pernicious species can be managed appropriately. This survey suggests that some non-indigenous species, such as annual grasses and wild radish, are very widespread and should be evaluated for potential impact to indigneous species.

Summary of Findings and Implications for Conservation Strategies

Although the San Francisco Presidio landscape is relatively small in area, it is still remarkably rich in vascular plant species diversity and the Presidio's record of historical observations and specimen collections provides an excellent context in which to evaluate the current status of its terrestrial vegetation. Of the Presidio's estimated 780 acres of open space (GGNRA 1993), approximately 622 acres are in uncultivated natural lands,

or roughly (42%) of the Presidio's 1480 acres Approximately 467 (31%) acres of these natural lands, however, are covered by Non-Indigenous Forest. Another 26 acres of these natural lands are covered by Non-Native Grassland. Consequently, as of this survey, about 139 acres of indigenous natural communities (9%) remain relatively intact and much of this remnant indigenous habitat is fragmented and influenced in varying degrees by human disturbance and invasive non-indigenous species.

The Presidio once hosted a conservative estimate of 312 indigenous species. This survey identified 228 indigenous species still present on the Presidio and, while a number of the 84 missing taxa may still be present because they were overlooked, this 27% decline in species richness probably does reflect a significant trend of species attrition. If the general species-area relationship principle is applied to the Presidio (for every 90% loss of area, expect a 50% reduction in species), we might well anticipate that at least another 23% (72 species) are at risk of extirpation. Many of these species are not local endemics but rather more widespread representatives of species that occupy habitats that have largely disappeared on the Presidio and elsewhere along the central California coast (e.g. wetlands).

This analysis identified three major sources of indigenous species richness on the Presidio. The greatest amount of species diversity is associated with habitats that occur on serpentine substrates. Out of the 228 indigenous species observed, 182 species (80%) were found occurring on serpentine and, of these, 89 (39%) were only found on serpentine. Many species restricted to Presidio serpentines are annual herbs, perennial herbs, perennial grasses, and geophytes. These species are characteristic of some of the most highly restricted remnant indigenous natural communities on the Presidio, in particular Coastal Terrace Prairie on ocean-facing bluffs and Serpentine Bunchgrass prairie on more protected bay-facing slopes. These communities occupy less than 12 acres (about 9% of the remnant indigenous natural communities) and yet present the highest average number of indigenous species per polygon (45 and 40 species respectively). Several of the Presidio's rarest plants (e.g. the Raven manzanita, Presidio clarkia, Marin dwarf flax, and San Francisco owl's clover) are serpentine endemics in these grasslands. Clearly, conservation of serpentine communities, and especially grassland communities, must be a high priority on the Presidio.

The second major source of species richness on the Presidio is vegetation which occupies sandy substrates derived from western San Francisco's formerly extensive dune system. These sandy habitats were

found to host 139 indigenous species (61%) of which 45 (20%) were only found on sandy substrates. Although indigenous natural communities on sandy substrates contain substantially less species richness than those found in serpentine habitats, many of these species and their natural communities are highly restricted, particularly now that much of San Francisco's former dune ecosystems are gone. These species and habitats are therefore also of particular conservation value.

The third important source of indigenous species richness on the Presidio is wetland vegetation. Wetland indigenous species were found in 32 of the polygons surveyed (45%) and total in number 36 (16%). This reflects the fact that although wetlands are widely distributed throughout Presidio natural areas, they are generally very restricted in area. The Presidio is one of the last refugia for San Francisco's once widespread and richly diverse wetlands. These wetland species, therefore, also possess special conservation value because of their biogeographic and habitat value.

If another baseline inventory were to be conducted one hundred years from now, how many of the Presidio's current 228 indigenous species would still be present? Although this is a rhetorical question, the answer predictably will depend upon the kind of conservation strategy that is formulated and implemented by the GGNRA in the coming decades. What would be an optimal strategy to protect the Presidio's current indigenous species assemblage? First and foremost, such a strategy would require a clearly stated goal declaring that the protection of these species is a top priority. Secondly, it will have to be committed to not only protecting the scattered remnants of natural communities that currently exist, but to expanding and linking these natural communities through ecological restoration and active stewardship. Based upon the species-area relationship and other conservation biology principles, it is evident that dozens of indigenous species are currently vulnerable to extirpation if such an active approach is not taken.

In Saving Nature's Legacy, Noss and Cooperrider (1994) provide a contemporary view of the application of conservation biology principles to protecting indigenous natural diversity. In a critique of Yellowstone National Park, they pose the question: "How can we protect our premier national park? The solution, they suggest, "is essentially the same as for the Everglades or any other park we might name: the entire regional landscape must be managed in a coordinated fashion toward the objective of native biodiversity conservation". Noss and Cooperrider identify four major objectives

consistent with the overarching goal of maintaining native biological diversity. They are:

1. Represent, in a system of protected areas, all native ecosystem types and seral stages across their natural range of variation;

2. Maintain viable populations of all native species in natural patterns of abundance and distribution;

3. Maintain ecological and evolutionary processes, such as disturbance regimes, hydrological processes, nutrient cycles, and biotic interactions;

4. Manage landscapes and communities to be responsive to short-term and long-term environmental change and to maintain the evolutionary potential of the biota.

Noss and Cooperrider also caution against trying to integrate the conservation of cultural diversity into the goal of conserving natural diversity, noting that these two goals can be and often are at cross-purposes. In short, Noss and Cooperrider emphasize that the core of a successful native biodiversity conservation strategy is to build all future resource management activities around the central theme of conserving indigenous natural communities and their constituent species.

A Draft Master Plan for the Presidio (GGNRA, 1993) outlines proposed future plans for the management of this new national park. This is the primary working document for the GGNRA today as details of the Presidio's acquisition and future operations are worked out. This document is grounded in a vision of the Presidio as:

> "a global center for exchanging ideas on critical environmental and social challenges. The site will become an environmental laboratory, a major focus of research and learning, and a demonstration area for ways to improve the quality of life."

Objectives of the park are to promote stewardship and sustainability, cross-cultural and international cooperation, community service and restoration, and health and scientific discovery. Resource management priorities include historic building rehabilitation, cultural landscape preservation, archelogical investigation, collection conservation, open space expansion, native habitat enhancement, historic forest restoration, and water resource management.

Of these eight priorities, only two - native habitat enhancement and water resource management - directly address the issue of conserving the Presidio's indigenous biological diversity. Plans for native plant enhancement include some exciting possibilities, such as restoring the riparian corridor of Tennesee Hollow, establishing a tidally influenced wetland at Crissy Field, and restoring riparian ecosystems along Lobos Creek. Restoration of natural communities on sandy substrates, such as Central Dune Scrub and dune Wildflower Field, are already underway and offer great promise for the long term conservation of these ecosystems. Plans for open space expansion could also be of conservation value if geared towards indigenous habitat restoration. Likewise, cultural landscape preservation and historic forest restoration could potentially benefit indigenous natural diversity if these practices are built around the goal of conserving the Presidio's indigenous species and habitats. On the other hand, if conserving indigenous biological diversity is not given high priority, then historic forest restoration and cultural landscape preservation will likely have a detrimental impact on the potential for acheiving long term conservation of the Presidio's rich mosaic of indigenous diversity.

As cited above, the GGNRA envisions the Presidio to represent an international model for ecological sustainability. Volunteer-driven site stewardship and habitat restoration programs are already demonstrating the great social value and biological value of enlightened management of rare natural habitats embedded in an urban matrix. The Presidio's rich ecosystems and distinctive endemic species provide a great opportunity to show the world how ecosystem management in an urban environment can maintain indigenous species diversity, provide educational opportunities, and be compatible with sustainable communities. However, as suggested by Noss and Cooperrider (1994), this will only be possible if the over-arching goal of the Presidio's natural landscape management is the conservation of its indigenous biological diversity. The reason, quite simply, is that indigenous species and habitats are currently in a state of progressive degradation because of habitat fragmentation, ecosystem conversion (e.g from grassland to forest), and pressures from invasive exotic species.

In this context, the Presidio's current General Management Plan - while innovative in many important ways - nonetheless falls short as a long term conservation strategy to sustain many of the Presidio's indigenous species and prevent the progressive trend of species decline demonstrated by this baseline inventory. The central

weakness of the current plan relates to the goal of restoring the so-called historical forest by replanting non-indigenous trees, particularly in the planning area identified as the Presidio Forest (Figure 3).

Referring back to the vegetation map generated by this survey (Figure 2) and in Table 4, note that the planning area with the highest concentration of species diversity and natural community diversity is referred to as Coastal Bluffs. This planning area is being effectively linked to restoration efforts along Lobos Creek and the western part of the Presidio Hill planning area. Consequently, natural communities that occupy sandy substrates have decent prospects for long term conservation as a smooth and relatively contiguous gradient of dune communities will be conserved and restored. On the other hand, another hot spot of biological diversity on the Presidio is the southeastern portion of the Presidio Forest planning area. This site hosts important stands of Serpentine Bunchgrass prairie. This area, along with small remnants of Coastal Terrace Prairie, harbor the richest concentrations of indigenous species on the Presidio. Unfortunately, the current plan will keep these two imperiled systems, as well as serpentine grasslands in the Fort Point area, permanently isolated from each other. The planned efforts to expand serpentine grasslands at Inspiration Point are constrained and may well not be adequate to preserve the richness of these grassland elements.

Historically, the upland divide between the Lobos Basin and the Marina Basin must have harbored a mosaic of Serpentine Bunchgrass prairie on the protected lee side of the ridge grading into Coastal Terrace Prairie on the windward, coastal bluff side of the ridge and also consisted of pockets of Northern Coastal Scrub, Central Maritime Chaparral, and Coast Live Oak Forest in appropriate sites. Currently, this divide is dominated by the historical forest begun by Major Jones over a century ago. There are few structures along the crest of the divide and it has been identified as a low activity open space area in the current plan. This divide also provides a patchwork of sandy and serpentine substrates that grade into both basins, as well as a number of small seeps. A logical alternative to the proposal to re-plant the historical forest would be to allow this artificial forest to be degraded and removed through time and to replace it with indigenous species and natural communities. Over time, this would enable an effective natural corridor to exist between the serpentine grasslands of Inspiration Point and rich natural areas in the Coastal

Bluffs planning area. Aside from promoting serpentine grassland, restoration efforts could include planting groves of Coast Live Oak forest and attempting to re-introduce some form of maritime chaparral along rocky portions of the divide. Another hundred years from now would witness populations of native grasses, perennial herbs, and geophytes increasing and becoming linked into one much larger system than the current situation permits or that would be promoted by the current plan. Such a linkage would have great benefits for promoting the long term viability of the Presidio's serpentine grasslands.

Recent wind storms have demonstrated significant problems associated with having large forest trees growing on the ridgelines of the Presidio. These forests create a major long term maintenance problem, pose potential danger to recreational users, and they also cause a profound disruption of the ecological processes that have helped to shape the Presidio's indigenous biota. A more ecologically responsible and fiscally sound plan for the Presidio's historical forest would be to confine it to protected, landscaped sites associated with buildings and high activity zones. This would allow the gradual phase out of this artificial vegetation and provide space for the establishment of presently vulnerable indigenous species. Ultimately, if the 437 acres of current historical forest could be largely replaced by native vegetation, this would be the singlemost important thing that could be done to insure long term viability of Presidio species, and particularly the species-rich serpentine natural communities.

Other important planning areas for conserving indigenous natural diversity include Fort Point, Presidio Hill, and the Public Health Service Hospital. Fortunately, Fort Point has been identified as an important conservation site, particularly its serpentine bluffs and seeps. However, attention should also be paid to the serpentine grasslands and seeps on the east side of the Planning Area looking over Crissy Field. Presidio Hill contains two very important natural areas - the golf course and Mountain Lake. Mountain Lake was once very rich floristically and now, except for the riparian forest at the north end of the lake, it is relatively depauperate. Nonetheless, it is a very important ecological resource and does figure prominently in future natural resource management plans. As the water quality of the lake improves, consideration should be given to re-establishing some of the aquatic species that once were found on the Presidio. Also, if certain strand areas could be protected from disturbance and

increased, possibly something resembling the former Vernal Marsh community could be recreated. Practical constraints prevented the golf course from being fully surveyed, however, an important wildflower field was identified on the driving range which hosts the only San Francisco locality for *Lasthenia minor*. Also, several small seep areas and small sandy wilflower field sites were observed in areas marginal to the fairways. Certainly it would be feasible and ideal if uncultivated natural areas surrounding the golf course could be gradually converted to indigenous species. These areas could phase into the Presidio Forest conversion effort and provide large areas of contiguous native communities. The Public Health Service Hospital Planning Area also contains some excellent remnants of indigenous dune communities and these provide a natural link to Lobos Creek, the Presidio Forest uplands, and potential natural areas of the golf course on Presidio Hill.

Based upon this survey, it appears that the Presidio harbors eleven special status species. Of these, the most prominent is the Raven's manzanita (Arctostaphylos hookeri ssp. ravenii), a federally listed endanered species. One individual survives in the wild, however, clones of this individual have now been planted near the original shrub, in polygon 263 across Lincoln Blvd to the north, and in the Serpentine Bunchgrass polygon 677 near Inspiration Point (not observed during the survey). Unfortunately, these plantings will almost certainly eventually threaten several other rare and threatened species that occupy the highly limited Coastal Terrace Prairie. This would not be such a problem if there were a great deal more serpentine grassland habitat restored, as is being suggested above for the Presidio Forest Planning Area. Likewise, virtually all of the other special status serpentine species (*Triphysaria floribundus, Hesperolinon congestum, Grindelia hirsutula ssp. maritima, Clarkia franciscana, Arabis blepharophylla,* and *Erysimum franciscanum*) would benefit by a greatly expanded serpentine grassland. With regard to special status species that occupy dune substrates (e.g. *Lessingia germanorum, chorizanthe cuspidata,* and *Silene verecunda* ssp. *verecunda*), current restoration efforts and research projects are well underway to insure the persistence of these rare but relatively stable species.

Insuring the long term conservation of the Presidio's rich indigenous vascular plant species is a goal that is desireable in the context of the GGNRA's vision of this park as an internationally prominent model of urban sustainability. This study suggests that

many indigenous plant species are in jeopardy of being lost despite their current limited persistence in numerous special habitats found throughout the Presidio's landscape. Based upon modern principles of conservation biology, the most robust strategy for the long term conservation of indigenous species is to gradually phase out the large amount of area now occupied by artificial forests and replace it with indigenous species and natural communities. In particular, a broad corridor should be established along the upland divide between Inspiration Point and the coastal bluffs above Baker's Beach. This would create a connection between the Inspiration Point "hot spot" and the remnant coastal prairie near the junction of Kobbe Avenue and Lincoln Boulevard. A suggestion in the management plan to reduce use of the Presidio's water consumption could result in more water being available to rejuvenate the Presidio's rich wetland communities and this would also be highly advisable.

As suggested by Noss and Cooperrider (1994), the most important principle is to apply a long term, landscape approach to managing the Presidio's natural areas with the over-arching goal of conserving its biological diversity. This baseline inventory will hopefully be of some assistance to identifying areas that need further research and for providing the basis to establish a long term monitoring program designed to track the ecological health and persistence of the Presidio's species assemblage. If future natural and cultural resource management decisions on the Presidio are truly built around the desire to protect its indigenous biological systems, then there is ample opportunity to move the Presidio in the direction of its goal of attaining ecological sustainability and serving as a model effort. Efforts to maintain it as an artificially planted park covered by introduced forest trees, on the other hand, will likely doom the Presidio's remarkable indigenous species diversity to progressive degradation or a future intensive management regime focusing on small remnant "museums" of rare species.

If a national park dedicated to the protection of indigenous biodiversity and founded on the principle of ecological sustainability cannot provide for its indigenous species, then where will we be able to expect such places to exist in the not too distant future?

Polygon	Natural Community	Substrate	Wetlands?	Acres	Ind	Non-Ind	Total	Ind Ratio
E(14)	Non-Indigenous Forest	Serpentine	Wetlands	1.42	5	10	15	0.33
E130	Non-Indigenous Forest	Serpentine		4.60	10	19	29	0.34
P135	Non-Indigenous Forest	Serpentine		5.60	28	28	56	0.50
CP(675)	Non-Indigenous Forest	Serpentine	Wetlands	1.98	15	7	22	0.68
Total = 6				**27.00**	**14.67**	**22.83**	**37.50**	**0.41**
281	Non-Native Grasslands	Serpentine	Wetlands	1.41	12	12	24	0.50
Total = 1				**1.41**	**12**	**12**	**24**	**0.50**
Total = 7	**Total Serpentine Non-Indigenous Natural Communities**			**28.41**				
Total = 30	**Total Serpentine Natural Communities**			**95.16**				
Total Indigenous Natural Communities				**129.07**				
Total Non-Indigenous Natural Communities				**71.28**				
Total Natural Communities Surveyed				**200.35**				

Species Per Number of Polygons on Serpentine, Dune, and Both Substrates					
Species	**Life Form**	**Substrate**	**Serp**	**Dune**	**Total**
Eschscholzia californica	Annual Herb	Both	16	28	44
Rubus ursinus	Vine	Both	20	22	42
Toxicodendron diversilobum	Shrub	Both	20	22	42
Baccharis pilularis	Shrub	Both	20	20	40
Lupinus arboreus	Shrub	Both	10	28	38
Achillea millefolium	Perennial Herb	Both	21	14	35
Marah fabaceus	Vine	Both	10	24	34
Eriogonum latifolium	Perennial Herb	Both	17	16	33
Claytonia perfoliata	Annual Herb	Both	10	21	31
Heteromeles arbutifolia	Shrub	Both	21	9	30
Pteridium aquilinum var. pubescens	Fern	Both	8	21	29
Chlorogalum pomeridianum var. divaricatum	Geophyte	Both	21	6	27
Fragaria chiloensis	Perennial Herb	Both	16	8	24
Scrophularia californica ssp. californica	Perennial Herb	Both	15	9	24
Solanum douglasii	Sub-Shrub	Both	11	13	24
Polypodium californicum	Fern	Both	17	5	22
Stachys ajugoides var. rigida	Perennial Herb	Both	17	4	21
Eriophyllum staechadifolium	Sub-Shrub	Both	14	6	20
Ericameria ericoides	Shrub	Both	1	18	19
Iris douglasiana	Geophyte	Both	17	1	18
Phacelia distans	Annual Herb	Both	2	16	18
Salix lasiolepis	Tree	Both	11	7	18
Bromus carinatus var. maritimus	Perennial Grass	Both	8	9	17
Lotus scoparius	Sub-Shrub	Both	2	15	17
Mimulus aurantiacus	Sub-Shrub	Both	9	8	17
Dudleya farinosa	Perennial Herb	Both	12	4	16
Camissonia cheiranthifolia ssp. cheiranthifolia	Perennial Herb	Both	2	13	15
Gnaphalium stramineum	Annual Herb	Both	7	8	15
Polygonum paronychia	Perennial Herb	Both	2	12	14
Anaphalis margaritacea	Perennial Herb	Both	7	6	13
Lupinus variicolor	Perennial Herb	Both	11	2	13
Rhamnus californica	Shrub	Both	6	7	13
Cardamine oligosperma	Annual Herb	Both	1	11	12
Crassula connata	Annual Herb	Both	4	8	12
Leymus triticoides	Perennial Grass	Both	1	11	12
Amsinckia spectabilis var. spectabilis	Annual Herb	Both	1	10	11
Ceanothus thyrsiflorus	Shrub	Both	9	2	11
Danthonia californica	Perennial Grass	Both	8	3	11
Elymus glaucus	Perennial Grass	Both	9	2	11
Erigeron glaucus	Perennial Herb	Both	8	3	11
Grindelia hirsutula var. maritima	Perennial Herb	Both	9	1	10
Juncus lesueurii	Perennial Herb	Both	7	3	10
Oemlaria cerasiformis	Shrub	Both	8	2	10

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Plantago erecta	Annual Herb	Both	7	3	10
Sanicula crassicaulis	Perennial Herb	Both	8	2	10
Agoseris apargioides var. apargioides	Perennial Herb	Both	3	6	9
Piperia elegans	Geophyte	Both	8	1	9
Castilleja wightii	Perennial Herb	Both	7	1	8
Juncus bufonius	Perennial Herb	Both	6	2	8
Juncus patens	Perennial Herb	Both	7	1	8
Lathyrus vestitus var. vestitus	Vine	Both	7	1	8
Madia sativa	Annual Herb	Both	5	3	8
Phacelia californica	Perennial Herb	Both	6	2	8
Polystichum munitum	Fern	Both	6	2	8
Rumex salicifolius	Perennial Herb	Both	6	2	8
Quercus agrifolia	Tree	Both	2	6	8
Artemisia pycnocephala	Sub-Shrub	Both	2	5	7
Armeria maritima var. californica	Perennial Herb	Both	4	2	6
Galium porrigens	Vine	Both	5	1	6
Juncus effusus var. brunneus	Perennial Herb	Both	4	2	6
Lotus strigosus	Annual Herb	Both	4	2	6
Lupinus bicolor	Annual Herb	Both	1	5	6
Cakile maritima	Annual Herb	Both	1	4	5
Dichelostemma capitatum	Geophyte	Both	3	2	5
Dichondra donnelliana	Perennial Herb	Both	4	1	5
Luzula comosa	Perennial Herb	Both	4	1	5
Plantago maritima	Perennial Herb	Both	4	1	5
Polycarpon tetraphyllum	Annual Herb	Both	2	3	5
Rosa californica	Shrub	Both	4	1	5
Epilobium ciliatum ssp. watsonii	Perennial Herb	Both	2	2	4
Equisetum hyemale ssp. affine	Perennial Herb	Both	1	3	4
Mimulus guttatus	Perennial Herb	Both	3	1	4
Myrica californica	Tree	Both	1	3	4
Oenanthe sarmentosa	Perennial Herb	Both	2	2	4
Pterostegia drymarioides	Annual Herb	Both	2	2	4
Ribes sanguinem var. glutinosum	Shrub	Both	3	1	4
Satureja douglasii	Perennial Herb	Both	3	1	4
Scirpus cernuus	Perennial Herb	Both	3	1	4
Solidago spathulata ssp. spathulata	Perennial Herb	Both	3	1	4
Distichlis spicata	Perennial Grass	Both	2	1	3
Erysimum franciscanum	Perennial Herb	Both	2	1	3
Juncus phaeocephalus	Perennial Herb	Both	2	1	3
Juncus falcatus	Perennial Herb	Both	2	1	3
Lepidium nitidum	Annual Herb	Both	1	2	3
Lonicera hispidula var. vacillans	Vine	Both	2	1	3
Lythrum hyssoipifolia	Annual Herb (W)	Both	2	1	3
Paronychia franciscana	Perennial Herb	Both	2	1	3
Scirpus microcarpus	Perennial Herb	Both	1	2	3

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Carex obnupta	Perennial Herb	Both	1	1	2
Epilobium brachycarpum	Annual Herb	Both	1	1	2
Microseris bigelovii	Annual Herb	Both	1	1	2
Osmorhiza chilensis	Perennial Herb	Both	1	1	2
Triphysaria pusilla	Annual Herb	Both	1	1	2
Total = 93					
Cardionema ramosissimum	Perennial Herb	Dune	0	16	16
Gilia capitata ssp. chamissonis	Annual Herb	Dune	0	14	14
Lupinus chamissonis	Shrub	Dune	0	10	10
Chorizanthe cuspidata	Annual Herb	Dune	0	9	9
Croton californicus	Perennial Herb	Dune	0	7	7
Ambrosia chamissonis	Sub-Shrub	Dune	0	6	6
Camissonia micrantha	Annual Herb	Dune	0	6	6
Lessingia germanorum	Annual Herb	Dune	0	6	6
Leymus mollis	Perennial Grass	Dune	0	5	5
Scirpus californicus	Perennial Herb	Dune	1	4	5
Abronia latifolia	Perennial Herb	Dune	0	4	4
Arabis glabra	Perennial Herb	Dune	0	4	4
Cryptantha leiocarpa	Annual Herb	Dune	0	4	4
Tanacetum camphoratum	Perennial Herb	Dune	0	4	4
Uropappus lindleyi	Annual Herb	Dune	0	4	4
Camissonia contorta	Annual Herb	Dune	0	3	3
Gnaphalium californicum	Perennial Herb	Dune	0	3	3
Linaria canadensis	Annual Herb	Dune	0	3	3
Silene verecunda ssp. verecunda	Perennial Herb	Dune	0	3	3
Athyrium filix-femina	Fern	Dune	0	2	2
Carpobrotus chilensis	Perennial Herb	Dune	0	2	2
Cirsium occidentale	Perennial Herb	Dune	0	2	2
Cornus sericea ssp. sericea	Shrub (W)	Dune	0	2	2
Cuscuta californica var. californica	Annual Herb	Dune	0	2	2
Gnaphalium canescens ssp. beneolens	Perennial Herb	Dune	0	2	2
Polygonum punctatum	Perennial Herb	Dune	0	2	2
Salix lucida ssp. lasiandra	Tree	Dune	0	2	2
Urtica dioica ssp. holosericea	Perennial Herb	Dune	0	2	2
Abronia umbellata	Perennial Herb	Dune	0	1	1
Achyrachaena mollis	Perennial Herb	Dune	0	1	1
Astragalus nuttallii	Perennial Herb	Dune	0	1	1
Carex harfordii	Perennial Herb	Dune	0	1	1
Castilleja latifolia	Perennial Herb	Dune	0	1	1
Cerastium fontanum ssp. vulgare	Annual Herb	Dune	0	1	1
Conyza canadensis	Annual Herb	Dune	0	1	1
Dryopteris arguta	Fern	Dune	0	1	1
Eleocharis microstachya	Perennial Herb	Dune	0	1	1
Euthamia occidentalis	Sub-Shrub	Dune	0	1	1
Gnaphalium ramossissimum	Perennial Herb	Dune	0	1	1

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Grindelia stricta	Perennial Herb	Dune	0	1	1
Lasthenia minor	Annual Herb	Dune	0	1	1
Leymus pacificus	Perennial Grass	Dune	0	1	1
Nemophila pedunculata	Annual Herb	Dune	0	1	1
Poa douglasii	Perennial Grass	Dune	0	1	1
Symphoricarpos mollis	Shrub	Dune	0	1	1
Veronica americana	Vine	Dune	0	1	1
Total = 4[illegible]					
Angelica hendersonii	Perennial Herb	Serpentine	12	0	12
Arabis blepharophylla	Perennial Herb	Serpentine	12	0	12
Ranunculus californicus	Annual Herb	Serpentine	12	0	12
Allium dichlamydeum	Perennial Herb	Serpentine	11	0	11
Triteleia laxa	Geophyte	Serpentine	10	0	10
Sisyrinchium bellum	Geophyte	Serpentine	9	0	9
Vicia gigantea	Annual Grass	Serpentine	9	0	9
Nasella pulchra	Perennial Grass	Serpentine	8	0	8
Sidalcea malvaeflora	Perennial Herb	Serpentine	8	0	8
Calystegia occidentalis ssp. fulcrata	Perennial Herb	Serpentine	7	0	7
Fritillaria affinis	Geophyte	Serpentine	5	0	5
Hordeum brachyantherum	Perennial Grass	Serpentine	5	0	5
Sanicula arctopoides	Perennial Herb	Serpentine	5	0	5
Sanicula bipinnatifida	Perennial Herb	Serpentine	5	0	5
Aster chilensis	Perennial Herb	Serpentine	4	0	4
Clarkia franciscana	Annual Herb	Serpentine	4	0	4
Deschampsia cespitosa ssp. holciformis	Perennial Grass	Serpentine	4	0	4
Festuca rubra	Perennial Grass	Serpentine	4	0	4
Heracleum lanatum	Perennial Herb	Serpentine	4	0	4
Koeleria macrantha	Perennial Grass	Serpentine	4	0	4
Lasthenia californica	Annual Herb	Serpentine	4	0	4
Lomatium caruifolium	Perennial Herb	Serpentine	4	0	4
Lonicera involucrata var. ledebourii	Shrub	Serpentine	4	0	4
Monardella villosa var. villosa	Sub-Shrub	Serpentine	4	0	4
Nasella lepida	Perennial Grass	Serpentine	4	0	4
Poa secunda	Perennial Grass	Serpentine	4	0	4
Agrostis exarata	Perennial Grass	Serpentine	3	0	3
Carex tumulicula	Perennial Herb	Serpentine	3	0	3
Eriophyllum confertiflorum var. confertiflorum	Sub-Shrub	Serpentine	3	0	3
Gnaphalium purpureum	Annual Herb	Serpentine	3	0	3
Perideridia kelloggii	Perennial Herb	Serpentine	3	0	3
Plantago subnuda	Perennial Herb	Serpentine	3	0	3
Solanum umbelliferum	Sub-Shrub	Serpentine	3	0	3
Spergularia macrotheca var. macrotheca	Perennial Herb	Serpentine	3	0	3
Trifolium depauperatum var. truncatum	Annual Herb	Serpentine	3	0	3
Trifolium wormskioldii	Perennial Herb	Serpentine	3	0	3
Viola adunca	Perennial Herb	Serpentine	3	0	3

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Acaena pinnatifida var. californica	Perennial Herb	Serpentine	2	0	2
Aphanes occidentalis	Perennial Herb	Serpentine	2	0	2
Arctostaphylos hookeri ssp. ravenii	Shrub	Serpentine	2	0	2
Artemisia douglasiana	Perennial Herb	Serpentine	2	0	2
Brodeia elegans ssp. elegans	Geophyte	Serpentine	2	0	2
Calystegia subacaulis	Perennial Herb	Serpentine	2	0	2
Camissonia ovata	Perennial Herb	Serpentine	2	0	2
Cardamine californica var. integrifolia	Perennial Herb	Serpentine	2	0	2
Carex densa	Perennial Herb	Serpentine	2	0	2
Castilleja densiflora ssp. densiflora	Perennial Herb	Serpentine	2	0	2
Corylus cornuta ssp. californica	Shrub	Serpentine	2	0	2
Cyperus eragrostis	Perennial Herb	Serpentine	2	0	2
Daucus pusillus	Annual Herb	Serpentine	2	0	2
Equisetum telmateia ssp. braunii	Perennial Herb	Serpentine	2	0	2
Hesperevax sparsiflora	Annual Herb	Serpentine	2	0	2
Hesperolinon congestum	Annual Herb	Serpentine	2	0	2
Horkelia californica	Perennial Herb	Serpentine	2	0	2
Iris longipetala	Geophyte	Serpentine	2	0	2
Layia platyglossa	Annual Herb	Serpentine	2	0	2
Lomatium dasycarpum ssp. dasycarpum	Perennial Herb	Serpentine	2	0	2
Psilocharpos tenellus var. tenellus	Annual Herb	Serpentine	2	0	2
Scirpus americanus	Perennial Herb	Serpentine	2	0	2
Spiranthes romanoffiana	Geophyte	Serpentine	2	0	2
Agrostis densiflora	Perennial Grass	Serpentine	1	0	1
Agrostis hallii	Perennial Grass	Serpentine	1	0	1
Arbutus menziesii	Tree	Serpentine	1	0	1
Atriplex triangularis	Perennial Herb	Serpentine	1	0	1
Baccharis douglasii	Sub-Shrub	Serpentine	1	0	1
Bromus carinatus var. carinatus	Perennial Grass	Serpentine	1	0	1
Carex gracilior	Perennial Herb	Serpentine	1	0	1
Carex subbracteata	Perennial Herb	Serpentine	1	0	1
Centaurium venustum	Annual Herb	Serpentine	1	0	1
Chenopodium californicum	Perennial Herb	Serpentine	1	0	1
Cirsium andrewsii	Perennial Herb	Serpentine	1	0	1
Helenium puberulum	Perennial Herb	Serpentine	1	0	1
Juncus occidentalis	Perennial Herb	Serpentine	1	0	1
Lotus wrangelianus	Annual Herb	Serpentine	1	0	1
Lupinus nanus	Annual Herb	Serpentine	1	0	1
Melica torreyana	Perennial Grass	Serpentine	1	0	1
Minuartia pusilla	Annual Herb	Serpentine	1	0	1
Pentagramma triangularis	Fern	Serpentine	1	0	1
Phalaris californica	Perennial Grass	Serpentine	1	0	1
Polypodium scouleri	Fern	Serpentine	1	0	1
Potentilla anserina ssp. pacifica	Perennial Herb	Serpentine	1	0	1
Prunus illicifolia	Shrub	Serpentine	1	0	1

Table 5

Species	Life Form	Substrate	Serp	Dune	Total
Senecio aronicoides	Perennial Herb	Serpentine	1	0	1
Trifolium willdenovii	Annual Herb	Serpentine	1	0	1
Triphysaria floribunda	Annual Herb	Serpentine	1	0	1
Typha latifolia	Perennial Herb	Serpentine	1	0	1
Vicia americana var. americana	Perennial Herb	Serpentine	1	0	1
Vulpia microstachys	Perennial Herb	Serpentine	1	0	1
Wyethia angustifolia	Perennial Herb	Serpentine	1	0	1
Total = 89					

Table 6

	Natural Communities Arrayed in Descending Order by Total Area						
Substrate	**Natural Communities**	**# Polygons**	**Area**	**# Ind**	**# N-Ind**	**Total**	**Ind/Tot**
Serpentine	Northern Coastal Scrub	7	34.15	33	22	56	0.61
Sand	Central Coast Dune Scrub	10	31.82	26	20	46	0.56
Sand	Non-Indigenous Forest	5	31.50	17	20	37	0.47
Serpentine	Non-Indigenous Forest	6	27.00	15	23	38	0.41
Serpentine	Northern Coastal Bluff Scrub	8	20.45	33	14	46	0.72
Sand	Non-Native Grasslands	5	11.37	13	15	27	0.49
Sand	Wildflower Field	10	9.63	15	10	26	0.62
Serpentine	Serpentine Bunchgrass	4	9.09	40	34	74	0.55
Sand	Northern Foredune	4	9.05	14	21	35	0.37
Sand	Central Coast Arroyo Willow Forest	2	7.91	19	12	30	0.62
Serpentine	Coastal Terrace Prairie	2	2.29	45	21	66	0.71
Serpentine	Non-Native Grasslands	1	1.41	12	12	24	0.50
Sand	Central Freshwater Marsh	1	1.37	4	6	10	0.40
Sand	Central Coast Live Oak Riparian Forest	1	1.31	9	11	20	0.45
Sand	Coastal Live Oak Woodland	2	0.76	12	5	17	0.67
Serpentine	Wildflower Field	1	0.63	23	13	36	0.64
Sand	Central Coast Riparian Scrub	1	0.47	15	9	24	0.63
Serpentine	Coastal Live Oak Woodland	1	0.14	13	4	17	0.76

Table 7

Natural Communities Arrayed by Average Number of Indigenous Species Per Polygon							
Substrate	**Natural Communities**	**# Polygons**	**Area**	**# Ind**	**# Non**	**Total**	**Ind/Tot**
Serpentine	Coastal Terrace Prairie	2	2.29	45	21	66	0.71
Serpentine	Serpentine Bunchgrass	4	9.09	40	34	74	0.55
Serpentine	Northern Coastal Scrub	7	34.15	33	22	56	0.61
Serpentine	Northern Coastal Bluff Scrub	8	20.45	33	14	46	0.72
Sand	Central Coast Dune Scrub	10	31.82	26	20	46	0.56
Serpentine	Wildflower Field	1	0.63	23	13	36	0.64
Sand	Central Coast Arroyo Willow Forest	2	7.91	19	12	30	0.62
Sand	Non-Indigenous Forest	5	31.50	17	20	37	0.47
Sand	Wildflower Field	10	9.63	15	10	26	0.62
Sand	Central Coast Riparian Scrub	1	0.47	15	9	24	0.63
Serpentine	Non-Indigenous Forest	6	27.00	15	23	38	0.41
Sand	Northern Foredune	4	9.05	14	21	35	0.37
Serpentine	Coastal Live Oak Woodland	1	0.14	13	4	17	0.76
Sand	Non-Native Grasslands	5	11.37	13	15	27	0.49
Serpentine	Non-Native Grasslands	1	1.41	12	12	24	0.50
Sand	Coastal Live Oak Woodland	2	0.76	12	5	17	0.67
Sand	Central Coast Live Oak Riparian Forest	1	1.31	9	11	20	0.45
	Central Freshwater Marsh	1	1.37	4	6	10	0.40

Table 8

	Matrix of Wetland Species per Polygon Arrayed in Descending Order by Number of Polygons																																		
			Polygons																																		
Species	Life Form	Total	653	502	680	563	595	66	674A	CP-675	14	281	4	62	538	644	674C	623	674B	45	266	273	302	543	598	633	643	648	675A	675C	679	C131	C139	E201	
Salix lasiolepis	Tree	18	X		X	X	X	X	X		X		X	X		X	X	X	X	X		X				X			X					X	
Juncus lesueurii	Perennial Herb	10	X	X	X	X			X	X	X				X	X	X																		
Juncus bufonius	Perennial Herb	8	X	X	X				X					X		X												X		X					
Juncus patens	Perennial Herb	8		X	X	X				X	X	X																			X	X			
Juncus effusus var. brunneus	Perennial Herb	6	X	X	X	X						X				X											X								
Equisetum hyemale ssp. affine	Perennial Herb	4					X				X				X																				
Mimulus guttatus	Perennial Herb	4	X		X			X					X														X								
Myrica californica	Tree	4	X				X								X				X																
Oenanthe sarmentosa	Perennial Herb	4	X		X		X	X																											
Scirpus cernuus	Perennial Herb	4		X		X			X					X																					
Solidago spathulata ssp. spathulata	Perennial Herb	4															X				X		X							X					
Carex tumulicula	Perennial Herb	3		X						X		X																							
Juncus phaeocephalus	Perennial Herb	3				X			X								X																		
Juncus falcatus	Perennial Herb	3		X		X						X																							
Lythrum hyssoipifolium	Annual Herb	3	X		X							X																							
Scirpus microcarpus	Perennial Herb	3	X		X		X																												
Urtica dioica ssp. holosericea	Perennial Herb	3											X																						
Athyrium filix-femina	Fern	2	X				X																	X	X										
Carex densa	Perennial Herb	2						X		X																									
Carex obnupta	Perennial Herb	2		X			X																												
Cornus sericea ssp. sericea	Shrub	2					X								X																				
Cyperus eragrostis	Perennial Herb	2						X					X																						
Equisetum telmateia ssp. braunii	Perennial Herb	2			X						X																								
Polygonum punctatum	Perennial Herb	2	X				X																												
Salix lucida ssp. lasiandra	Tree	2	X			X																													
Scirpus americanus	Perennial Herb	2		X				X																											
Scirpus californicus	Perennial Herb	2	X															X																	
Carex gracilior	Perennial Herb	1								X																									
Carex harfordii	Perennial Herb	1				X																													
Carex subbracteata	Perennial Herb	1		X																															
Cirsium andrewsii	Perennial Herb	1							X																										
Eleocharis microstachya	Perennial Herb	1	X																																
Helenium puberulum	Perennial Herb	1												X																					
Juncus occidentalis	Perennial Herb	1								X																									
Potentilla anserina ssp. pacifica	Perennial Herb	1						X																											
Typha latifolia	Perennial Herb	1							X																										
	Total per Polygon		14	10	10	9	9	7	7	6	5	5	4	4	4	4	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 9

Life Form of Indigenous and Non-Indigenous Species Occupying Natural Communities

	Indigenous Species	**AG**	**AH**	**PG**	**PH**	**G**	**F**	**SS**	**S**	**V**	**T**	**(W)**	**SUM**
Serp	North Coastal Bluff Scrub	0	12	10	44	6	3	9	11	4	2	11	101
Serp	North Coastal Scrub	0	10	8	43	8	4	6	10	6	2	15	97
Dune	Coastal Dune Scrub	0	18	7	35	4	4	6	12	3	2	3	91
Serp	Serpentine Bunchgrass	1	16	9	39	7	2	4	5	4	1	1	88
Serp	Coastal Terrace Prairie	0	15	9	16	5	2	2	8	3	1	1	61
Serp	Serpentine Non-Ind Forest	0	3	5	23	8	4	1	6	3	0	7	53
Dune	Dune Wildflower Field	0	20	2	11	2	2	4	7	2	0	0	50
Dune	Dune Non-Ind Forest	0	11	3	16	1	2	5	7	3	1	2	49
Dune	Dune Native Woodland	0	6	1	23	0	2	3	6	2	4	25	47
Dune	Dune Non-Native Grass	0	18	1	12	1	1	3	7	2	1	6	46
Dune	Northern Foredune	0	7	2	12	0	0	4	4	0	0	0	29
	Avg. Number per Life Form	**0.08**	**11.41**	**4.78**	**22.99**	**3.52**	**2.18**	**3.94**	**6.97**	**2.69**	**1.17**	**5.96**	
	Non-Indigenous Species												
Dune	Coastal Dune Scrub	17	33	4	18	0	0	0	4	2	6	1	84
Serp	Serpentine Bunchgrass	19	24	2	17	0	0	0	4	3	10	2	79
Serp	Serpentine Non-Ind Forest	13	20	2	20	0	0	1	6	3	9	1	74
Serp	North Coastal Scrub	12	30	3	13	0	0	1	7	3	4	1	73
Dune	Dune Non-Ind Forest	13	18	5	13	0	0	0	2	3	4	1	58
Serp	North Coastal Bluff Scrub	10	21	4	13	0	0	0	4	2	3	3	57
Dune	Dune Non-Native Grass	7	23	1	10	0	0	0	1	3	4	0	49
Dune	Northern Foredune	11	18	2	9	0	0	0	0	1	1	1	42
Serp	Coastal Terrace Prairie	11	15	2	6	0	0	0	1	1	2	1	38
Dune	Dune Wildflower Field	10	18	0	7	0	0	0	1	0	2	0	38
Dune	Dune Native Woodland	6	11	2	9	0	0	0	0	4	4	3	36
	Avg. Number per Life Form	**11.73**	**21.00**	**2.45**	**12.27**	**0.00**	**0.00**	**0.18**	**2.73**	**2.27**	**4.45**	**1.27**	**57.09**

	Annual Grass	AG		Fern	F								
	Annual Herb	AH		Sub-Shrub	SS								
	Perennial Grass	PG		Shrub	S								
	Perennial Herb	PH		Vine	V								
	Geophyte	G		Tree	T								
				(Wetland)	(W)								
				Total	SUM								

Table 10

Special Status Species on the Presidio							
Special Status Species	**CNPS**	**CAL**	**FED**	**Presidio Status**			
Arctostaphylos hookeri ssp. ravenii	1B	CE	FE	Surviving individual robust; clones spreading			
Clarkia franciscana	1B	CE	FE	Well established along Lincoln Blvd and at Inspiration Point			
Hesperolinon congestum	1B	CT	PT	Very rare on serpentine knoll bisected by Lincoln Blvd			
Lessingia germanorum	1B	CE	C1	Well established in few large sandy openings of dune scrub			
Chorizanthe cuspidata var. cuspidata	1B		C2	Well established in large and small sandy gaps in dune scrub			
Erysimum franciscanum	4		C2	Well established on bluffs and dunes north of Baker's Beach			
Grindelia hirsutula var. maritima	1B		C2	Well established in serpetine grassland			
Silene verecunda ssp. verecunda	1B		C2	Rare but well established on inland dunes			
Triphysaria floribunda	1B		C2	Extremely rare, verging on extirpation			
Arabis blepharophylla	4		C3c	Well established on serpentine coastal bluffs			
Castilleja latifolia	4			Rare, stable dunes at north end of Baker's Beach			
Cirsium andrewsii	4			Very rare in serpentine seep area on coastal bluff			
	1B	**Plants Rare, Threatened, or Endangered in California and Elsewhere**					
	4	**Plants of Limited Distribution**					
	CE	**California Listed as Endangered**					
	CT	**California Listed as Threatened**					
	FE	**Federally Listed as Endangered**					
	PE	**Federally Proposed as Endangered**					
	PT	**Federally Proposed as Threatened**					
	C1	**Federal Candidate To Be Proposed**					
	C2	**Federal Candidate with Insufficient Data for Proposal**					
	C3c	**Federal Candidate Proposed but Considered Too Widespread**					

TAB[illegible]11

Indigenous Species Occurring in the Northern Foredune Natural Community

LIFE FORM	SPECIES		POLYGONS			
		Total	40	54	319	379
Annual Herb	Cakile maritima	4	X	X	X	X
Perennial Grass	Leymus mollis	4	X	X	X	X
Perennial Herb	Camissonia cheiranthifolia ssp. chei	4	X	X	X	X
Sub-Shrub	Ambrosia chamissonis	4	X	X	X	X
Perennial Herb	Abronia latifolia	3	X		X	X
Annual Herb	Camissonia micrantha	2			X	X
Annual Herb	Eschscholzia californica	2			X	X
Annual Herb	Gnaphalium stramineum	2			X	X
Annual Herb	Polycarpon tetraphyllum	2			X	X
Perennial Herb	Achillea millefolium	2			X	X
Perennial Herb	Erigeron glaucus	2			X	X
Perennial Herb	Fragaria chiloensis	2			X	X
Perennial Herb	Rumex salicifolius	2	X	X		
Perennial Herb	Tanacetum camphoratum	2			X	X
Shrub	Baccharis pilularis	2			X	X
Shrub	Lupinus arboreus	2			X	X
Sub-Shrub	Artemisia pycnocephala	2			X	X
Annual Herb	Lepidium nitidum	1	X			
Annual Herb	Lupinus bicolor	1				X
Perennial Grass	Distichlis spicata	1			X	
Perennial Herb	Abronia umbellata	1	X			
Perennial Herb	Anaphalis margaritacea	1				X
Perennial Herb	Armeria maritima var. californica	1			X	
Perennial Herb	Eriogonum latifolium	1				X
Perennial Herb	Phacelia californica	1			X	
Shrub	Ericameria ericoides	1				X
Shrub	Lupinus chamissonis	1				X
Sub-Shrub	Solanum douglasii	1			X	
Number of Species per Polygon			**8**	**5**	**21**	**22**

TABLE 11

Indigenous Life Form Spectrum on Northern Foredune Natural Communities

Annual Grass	0
Annual Herb	7
Perennial Grass	2
Perennial Herb	12
Geophyte	0
Fern	0
Sub-Shrub	4
Shrub	4
Vine	0
Tree	0
(Wetland)	0
Total	**29**

Indigenous Species Occurring in Central Dune Scrub Natural Communities

LIFE FORM	SPECIES		POLYGONS										
		Total	273	302	353	366	428	543	552	607	625	633	Total
Shrub	Lupinus arboreus	10	X	X	X	X	X	X	X	X	X	X	10
Vine	Marah fabaceus	9	X	X	X	X	X	X	X	X	X		9
Annual Herb	Eschscholzia caiifornica	9	X	X	X	X	X	X	X	X	X		9
Shrub	Rubus ursinus	8	X	X	X	X	X	X	X		X		8
Shrub	Toxicodendron diversilobum	8	X	X		X	X	X	X	X	X		8
Fern	Pteridium aquilinum var. pubescens	8	X	X		X	X	X	X	X	X		8
Shrub	Baccharis pilularis	7	X	X	X	X	X	X		X			7
Perennial Herb	Achillea millefolium	6	X	X	X	X	X	X					6
Annual Herb	Claytonia perfoliata	6		X	X	X	X	X		X			6
Sub-Shrub	Solanum douglasii	5	X	X		X				X		X	5
Shrub	Ericameria ericoides	5	X	X		X		X			X		5
Shrub	Heteromeles arbutifolia	5		X			X		X	X		X	5
Perennial Herb	Cardionema ramosissimum	5	X	X		X				X	X		5
Perennial Herb	Eriogonum latifolium	5	X	X		X		X			X		5
Perennial Herb	Polygonum paronychia	5	X	X	X	X	X						5
Perennial Herb	Scrophularia californica ssp. californica	5	X	X		X		X			X		5
Perennial Grass	Leymus triticoides	5	X	X					X	X	X		5
Annual Herb	Amsinckia spectabilis var. spectabilis	5	X	X	X		X			X			5
Annual Herb	Cardamine oligosperma	5	X			X	X	X		X			5
Annual Herb	Phacelia distans	5		X				X	X	X	X		5
Sub-Shrub	Lotus scoparius	4	X	X						X	X		4
Sub-Shrub	Mimulus aurantiacus	4	X					X		X	X		4
Shrub	Lupinus chamissonis	4	X	X					X	X			4
Shrub	Rhamnus californica	4	X	X		X		X					4
Perennial Herb	Fragaria chiloensis	4	X	X		X	X						4
Perennial Grass	Bromus carinatus var. maritimus	4	X	X						X	X		4
Annual Herb	Gilia capitata ssp. chamissonis	4		X					X	X	X		4

TABLE 12

LIFE FORM		SPECIES		POLYGONS										
			Total	273	302	353	366	428	543	552	607	625	633	Total
Annual Herb		Gnaphalium stramineum	4	X	X		X				X			4
Sub-Shrub		Eriophyllum staechadifolium	3	X	X								X	3
Perennial Herb		Agoseris apargioides var. apargioides	3	X				X		X				3
Perennial Herb		Anaphalis margaritacea	3	X	X						X			3
Perennial Herb		Arabis glabra	3	X	X		X							3
Perennial Herb		Camissonia cheiranthifolia	3	X	X			X						3
Perennial Herb		Gnaphalium californicum	3	X	X					X				3
Perennial Herb		Stachys ajugoides var. rigida	3	X	X	X								3
Geophyte		Chlorogalum pomeridianum	3	X	X		X							3
Fern		Polypodium californicum	3	X	X	X								3
Annual Herb		Chorizanthe cuspidata	3	X	X							X		3
Annual Herb		Crassula connata	3	X	X						X			3
Tree		Quercus agrifolia	2						X				X	2
Tree	(W)	Salix lasiolepis	2	X									X	2
Shrub		Ceanothus thyrsiflorus	2	X	X									2
Shrub		Oemlaria cerasiformis	2	X	X									2
Perennial Herb		Cirsium occidentale	2	X	X									2
Perennial Herb		Croton californicus	2		X		X							2
Perennial Herb		Dudleya farinosa	2	X	X									2
Perennial Herb		Gnaphalium canescens ssp. beneolens	2		X					X				2
Perennial Herb		Lupinus variicolor	2	X			X							2
Perennial Herb		Tanacetum camphoratum	2	X	X									2
Perennial Grass		Danthonia californica	2		X						X			2
Perennial Grass		Elymus glaucus	2		X					X				2
Annual Herb		Linaria canadensis	2	X	X									2
Annual Herb		Madia sativa	2		X					X				2
Annual Herb		Pterostegia drymarioides	2	X	X									2
Vine		Galium porrigens	1	X										1
Vine		Lathyrus vestitus var. vestitus	1	X										1
Sub-Shrub		Ambrosia chamissonis	1	X										1

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LIFE FORM		SPECIES		POLYGONS										
			Total	273	302	353	366	428	543	552	607	625	633	Total
Sub-Shrub		Artemisia pycnocephala	1	X										1
Shrub		Ribes sanguinem var. glutinosum	1		X									1
Shrub		Rosa californica	1		X									1
Perennial Herb		Abronia latifolia	1	X										1
Perennial Herb		Armeria maritima var. californica	1	X										1
Perennial Herb		Astragalus nuttallii	1	X										1
Perennial Herb		Carpobrotus chilensis	1								X			1
Perennial Herb		Castilleja latifolia	1	X										1
Perennial Herb		Castilleja wightii	1	X										1
Perennial Herb		Dichondra donnelliana	1							X				1
Perennial Herb		Erigeron glaucus	1	X										1
Perennial Herb		Erysimum franciscanum	1	X										1
Perennial Herb		Gnaphalium ramossissimum	1			X								1
Perennial Herb		Grindelia hirsutula var. maritima	1	X										1
Perennial Herb		Luzula comosa	1		X									1
Perennial Herb		Phacelia californica	1	X										1
Perennial Herb		Sanicuia crassicaulis	1								X			1
Perennial Herb		Satureja douglasii	1			X								1
Perennial Herb	(W)	Scirpus californicus	1										X	1
Perennial Herb	(W)	Solidago spathulata ssp. spathulata	1		X									1
Perennial Grass		Leymus mollis	1	X										1
Perennial Grass		Leymus pacificus	1									X		1
Perennial Grass		Poa douglasii	1	X										1
Geophyte		Dichelostemma capitatum	1	X										1
Geophyte		Iris douglasiana	1		X									1
Geophyte		Piperia elegans	1	X										1
Fern		Dryopteris arguta	1			X								1
Fern		Polystichum munitum	1			X								1
Annual Herb		Cuscuta californica var. californica	1	X										1
Annual Herb		Epilobium brachycarpum	1	X										1

TABLE 12

LIFE FORM		SPECIES		POLYGONS										
			Total	273	302	353	366	428	543	552	607	625	633	Total
Annual Herb		Microseris bigelovii	1					X						1
Annual Herb		Plantago erecta	1		X									1
Annual Herb		Polycarpon tetraphyllum	1	X										1
Annual Herb		Uropappus lindleyi	1								X			1
		Number of Species per Polygon		64	54	15	23	17	17	17	26	18	7	

Indigenous Life Forms in Central Dune Scrub Natural Communities

Annual Grass	0
Annual Herb	18
Perennial Grass	7
Perennial Herb	35
Geophyte	4
Fern	4
Sub-Shrub	6
Shrub	12
Vine	3
Tree	2
(Wetland)	3
Total	**91**

TABLE 13

Indigenous Species Occurring in Northern Coastal Bluff Scrub Natural Communities

LIFE FORM		SPECIES		POLYGONS							
			Total	4	35	161	180	674A	674B	674C	676
Perennial Herb		Dudleya farinosa	8	X	X	X	X	X	X	X	X
Perennial Herb		Achillea millefolium	7		X	X	X	X	X	X	X
Shrub		Heteromeles arbutifolia	6	X	X			X	X	X	X
Perennial Herb		Angelica hendersonii	6			X	X	X	X	X	X
Perennial Herb		Arabis blepharophylla	6	X		X	X	X	X		X
Perennial Herb		Erigeron glaucus	6			X	X	X	X	X	X
Perennial Herb		Eriogonum latifolium	6		X	X	X	X	X		X
Geophyte		Piperia elegans	6	X		X	X	X	X	X	
Sub-Shrub		Eriophyllum staechadifolium	5	X				X	X	X	X
Sub-Shrub		Mimulus aurantiacus	5	X	X			X	X	X	
Shrub		Baccharis pilularis	5		X	X	X		X	X	
Shrub		Toxicodendron diversilobum	5	X	X			X	X	X	
Perennial Herb		Castilleja wightii	5			X	X	X	X	X	
Perennial Herb		Fragaria chiloensis	5	X				X	X	X	X
Perennial Herb		Stachys ajugoides var. rigida	5	X				X	X	X	X
Geophyte		Chlorogalum pomeridianum var. divaricatum	5	X	X			X	X	X	
Geophyte		Iris douglasiana	5	X				X	X	X	X
Fern		Polypodium californicum	5	X		X	X		X	X	
Vine		Rubus ursinus	4		X			X	X	X	
Vine		Vicia gigantea	4	X				X	X	X	
Tree	(W)	Salix lasiolepis	4	X				X	X	X	
Sub-Shrub		Solanum douglasii	4	X				X	X	X	
Shrub		Ceanothus thyrsiflorus	4	X		X	X				X
Perennial Herb		Anaphalis margaritacea	4	X				X	X	X	
Perennial Herb		Calystegia occidentalis ssp. fulcrata	4			X	X	X	X		
Perennial Herb		Grindelia hirsutula var. maritima	4		X	X	X	X			
Perennial Herb		Scrophularia californica ssp. californica	4	X				X	X	X	

TABLE 13

LIFE FORM		SPECIES		POLYGONS							
			Total	4	35	161	180	674A	674B	674C	676
Fern		Polystichum munitum	4	X				X	X	X	
Annual Herb		Eschscholzia californica	4	X				X	X	X	
Annual Herb		Gnaphalium stramineum	4					X	X	X	X
Annual Herb		Ranunculus californicus	4			X	X		X	X	
Vine		Lathyrus vestitus var. vestitus	3					X	X	X	
Perennial Herb		Allium dichlamydeum	3		X					X	X
Perennial Herb		Armeria maritima var. californica	3					X		X	X
Perennial Herb		Lupinus variicolor	3					X	X	X	
Perennial Herb		Phacelia californica	3			X	X		X		
Perennial Herb		Plantago maritima	3					X	X	X	
Perennial Herb		Plantago subnuda	3					X	X	X	
Perennial Herb		Rumex salicifolius	3					X	X	X	
Perennial Herb		Satureja douglasii	3			X	X		X		
Perennial Herb		Spergularia macrotheca var. macrotheca	3					X	X	X	
Annual Herb		Gnaphalium purpureum	3					X	X	X	
Vine		Marah fabaceus	2					X		X	
Sub-Shrub		Lotus scoparius	2					X		X	
Shrub		Lupinus arboreus	2	X						X	
Shrub		Rhamnus californica	2	X					X		
Shrub		Ribes sanguinem var. glutinosum	2						X	X	
Perennial Herb		Acaena pinnatifida var. californica	2			X	X				
Perennial Herb		Agoseris apargioides var. apargioides	2					X		X	
Perennial Herb		Camissonia cheiranthifolia ssp. cheiranthifoli	2					X		X	
Perennial Herb		Erysimum franciscanum	2			X	X				
Perennial Herb	(W)	Juncus phaeocephalus	2					X		X	
Perennial Herb	(W)	Juncus lesueurii	2					X		X	
Perennial Herb		Sanicula crassicaulis	2	X						X	
Perennial Grass		Distichlis spicata	2						X	X	
Geophyte		Fritillaria affinis	2					X		X	
Annual Herb		Claytonia perfoliata	2					X	X		

LIFE FORM		SPECIES		POLYGONS							
			Total	4	35	161	180	674A	674B	674C	676
Annual Herb		Lotus strigosus	2						X	X	
Annual Herb		Phacelia distans	2					X		X	
Annual Herb		Pterostegia drymarioides	2					X		X	
Tree	(W)	Myrica californica	1						X		
Sub-Shrub		Artemisia pycnocephala	1							X	
Sub-Shrub		Baccharis douglasii	1							X	
Sub-Shrub		Eriophyllum confertiflorum	1		X						
Sub-Shrub		Monardella villosa var. villosa	1		X						
Sub-Shrub		Solanum umbelliferum	1							X	
Shrub		Corylus cornuta ssp. californica	1	X							
Shrub		Ericameria ericoides	1							X	
Shrub		Lonicera involucrata var. ledebourii	1					X			
Shrub		Oemlaria cerasiformis	1	X							
Perennial Herb		Aphanes occidentalis	1							X	
Perennial Herb		Atriplex triangularis	1					X			
Perennial Herb	(W)	Cirsium andrewsii	1					X			
Perennial Herb	(W)	Cyperus eragrostis	1	X							
Perennial Herb		Epilobium ciliatum ssp. watsonii	1							X	
Perennial Herb		Heracleum lanatum	1	X							
Perennial Herb	(W)	Juncus bufonius	1					X			
Perennial Herb	(W)	Mimulus guttatus	1	X							
Perennial Herb		Polygonum paronychia	1							X	
Perennial Herb		Sanicula bipinnatifida	1		X						
Perennial Herb	(W)	Scirpus cernuus	1					X			
Perennial Herb	(W)	Solidago spathulata ssp. spathulata	1							X	
Perennial Herb		Trifolium wormskioldii	1							X	
Perennial Herb	(W)	Typha latifolia	1					X			
Perennial Herb		Viola adunca	1							X	
Perennial Grass		Agrostis densiflora	1						X		
Perennial Grass		Agrostis exarata	1							X	

TABLE 13

LIFE FORM	SPECIES		POLYGONS							
		Total	4	35	161	180	674A	674B	674C	676
Perennial Grass	Bromus carinatus var. maritimus	1					X			
Perennial Grass	Danthonia californica	1		X						
Perennial Grass	Elymus glaucus	1						X		
Perennial Grass	Festuca rubra	1					X			
Perennial Grass	Melica torreyana	1		X						
Perennial Grass	Nasella pulchra	1		X						
Perennial Grass	Poa secunda	1		X						
Geophyte	Sisyrinchium bellum	1		X						
Geophyte	Triteleia laxa	1		X						
Fern	Pteridium aquilinum var. pubescens	1	X							
Annual Herb	Cakile maritima	1							X	
Annual Herb	Crassula connata	1							X	
Annual Herb	Daucus pusillus	1					X			
Annual Herb	Psilocharpos tenellus var. tenellus	1					X			
	Total Species per Polygon		29	20	18	18	55	46	62	15

Indigenous Life Forms in Northern Coastal Bluff Scrub

Annual Grass	0
Annual Herb	12
Perennial Grass	10
Perennial Herb	44
Geophyte	6
Fern	3
Sub-Shrub	9
Shrub	11
Vine	4
Tree	2
(Wetland)	11
Total Species	**0**

Indigenous Species Occurring in Northern Coastal Scrub Communities

LIFE FORM		SPECIES		POLYGONS					
			Total	8	14	62W	66W	675A	675B	675C
Sub-Shrub		Eriophyllum staechadifolium	7	X	X	X	X	X	X	X
Shrub		Baccharis pilularis	7	X	X	X	X	X	X	X
Shrub		Heteromeles arbutifolia	7	X	X	X	X	X	X	X
Shrub		Toxicodendron diversilobum	7	X	X	X	X	X	X	X
Perennial Herb		Scrophularia californica ssp. californica	7	X	X	X	X	X	X	X
Vine		Rubus ursinus	6		X	X	X	X	X	X
Perennial Herb		Achillea millefolium	6	X	X	X		X	X	X
Geophyte		Chlorogalum pomeridianum	6	X	X	X		X	X	X
Geophyte		Iris douglasiana	6	X	X	X		X	X	X
Shrub		Lupinus arboreus	5	X	X	X		X		X
Shrub		Oemlaria cerasiformis	5	X	X			X	X	X
Perennial Herb		Angelica hendersonii	5	X	X			X	X	X
Perennial Herb		Eriogonum latifolium	5	X		X		X	X	X
Perennial Herb		Fragaria chiloensis	5		X	X		X	X	X
Perennial Herb		Lupinus variicolor	5		X	X		X	X	X
Perennial Herb		Stachys ajugoides var. rigida	5	X	X			X	X	X
Fern		Polypodium californicum	5	X		X		X	X	X
Annual Herb		Eschscholzia californica	5	X	X	X		X	X	
Vine		Galium porrigens	4	X				X	X	X
Vine		Marah fabaceus	4	X	X				X	X
Vine		Vicia gigantea	4		X			X	X	X
Tree	(W)	Salix lasiolepis	4		X	X	X	X		
Shrub		Ceanothus thyrsiflorus	4	X	X			X	X	
Annual Herb		Ranunculus californicus	4	X				X	X	X
Sub-Shrub		Mimulus aurantiacus	3			X	X			X
Sub-Shrub		Solanum douglasii	3		X			X		X
Shrub		Lonicera involucrata var. ledebourii	3		X				X	X
Perennial Herb		Anaphalis margaritacea	3					X	X	X

TABLE 14

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Perennial Herb		Arabis blepharophylla	3					X	X	X
Perennial Herb		Phacelia californica	3		X			X	X	
Perennial Herb		Sidalcea malvaeflora	3		X				X	X
Geophyte		Fritillaria affinis	3					X	X	X
Sub-Shrub		Solanum umbelliferum	2	X					X	
Shrub		Rhamnus californica	2					X		X
Shrub		Rosa californica	2	X	X					
Perennial Herb		Allium dichlamydeum	2			X		X		
Perennial Herb		Artemisia douglasiana	2	X				X		
Perennial Herb		Calystegia occidentalis ssp. fulcrata	2					X	X	
Perennial Herb		Castilleja wightii	2					X	X	
Perennial Herb		Dudleya farinosa	2					X	X	
Perennial Herb		Erigeron glaucus	2					X	X	
Perennial Herb		Heracleum lanatum	2	X	X					
Perennial Herb		Luzula comosa	2						X	X
Perennial Herb		Sanicula crassicaulis	2		X			X		
Perennial Herb		Viola adunca	2					X	X	
Geophyte		Hordeum brachyantherum	2		X			X		
Geophyte		Sisyrinchium bellum	2		X			X		
Fern		Pteridium aquilinum var. pubescens	2		X			X		
Annual Herb		Claytonia perfoliata	2		X				X	
Annual Herb		Lotus strigosus	2					X		X
Annual Herb		Plantago erecta	2					X		X
Vine		Lathyrus vestitus var. vestitus	1							X
Vine		Lonicera hispidula var. vacillans	1		X					
Tree		Arbutus menziesii	1						X	
Sub-Shrub		Artemisia pycnocephala	1		X					
Sub-Shrub		Monardella villosa var. villosa	1			X				
Shrub		Corylus cornuta ssp. californica	1		X					
Perennial Herb		Armeria maritima var. californica	1					X		

TABLE 14

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Perennial Herb		Aster chilensis	1			X				
Perennial Herb		Cardamine californica var. integrifolia	1						X	
Perennial Herb	(W)	Carex densa	1				X			
Perennial Herb	(W)	Cyperus eragrostis	1				X			
Perennial Herb	(W)	Equisetum hyemale ssp. affine	1		X					
Perennial Herb	(W)	Equisetum telmateia ssp. braunii	1		X					
Perennial Herb		Grindelia hirsutula var. maritima	1			X				
Perennial Herb	(W)	Helenium puberulum	1			X				
Perennial Herb	(W)	Juncus bufonius	1			X				
Perennial Herb	(W)	Juncus lesueurii	1		X					
Perennial Herb	(W)	Juncus patens	1		X					
Perennial Herb	(W)	Mimulus guttatus	1				X			
Perennial Herb	(W)	Oenanthe sarmentosa	1				X			
Perennial Herb		Plantago maritima	1					X		
Perennial Herb	(W)	Potentilla anserina ssp. pacifica	1				X			
Perennial Herb		Rumex salicifolius	1		X					
Perennial Herb		Sanicula arctopoides	1						X	
Perennial Herb	(W)	Scirpus americanus	1				X			
Perennial Herb	(W)	Scirpus cernuus	1			X				
Perennial Herb		Senecio aronicoides	1					X		
Perennial Herb	(W)	Solidago spathulata ssp. spathulata	1							X
Perennial Grass		Bromus carinatus var. maritimus	1					X		
Perennial Grass		Danthonia californica	1					X		
Perennial Grass		Deschampsia cespitosa ssp. holciformis	1					X		
Perennial Grass		Elymus glaucus	1					X		
Perennial Grass		Festuca rubra	1					X		
Perennial Grass		Leymus triticoides	1						X	
Perennial Grass		Nasella pulchra	1			X				
Perennial Grass		Phalaris californica	1					X		
Geophyte		Iris longipetala	1			X				

TABLE 14

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Geophyte		Piperia elegans	1					X		
Geophyte		Triteleia laxa	1					X		
Fern		Pentagramma triangularis	1			X				
Fern		Polystichum munitum	1	X						
Annual Herb		Cardamine oligosperma	1						X	
Annual Herb		Crassula connata	1		X					
Annual Herb		Gnaphalium stramineum	1					X		
Annual Herb		Polycarpon tetraphyllum	1					X		
Annual Herb		Psilocharpos tenellus var. tenellus	1		X					
		Total Species per Polygon		32	55	27	14	55	41	34

Indigenous Life Forms Occurring in Northern Coastal Scrub

Annual Grass	0
Annual Herb	10
Perennial Grass	8
Perennial Herb	43
Geophyte	8
Fern	4
Sub-Shrub	6
Shrub	10
Vine	6
Tree	2
(Wetland)	15
Total	**97**

TABLE 15

Indigenous Species Occurring in Coastal Terrace Prairie Communities

LIFE FORM		SPECIES	POLYGONS		
			Total	263	266
Perennial Herb		Achillea millefolium	2	X	X
Perennial Grass		Agrostis exarata	2	X	X
Perennial Herb		Arabis blepharophylla	2	X	X
Shrub		Arctostaphylos hookeri ssp. ravenii	2	X	X
Perennial Grass		Bromus carinatus var. maritimus	2	X	X
Geophyte		Chlorogalum pomeridianum var. divaricatum	2	X	X
Perennial Grass		Danthonia californica	2	X	X
Perennial Grass		Deschampsia cespitosa ssp. holciformis	2	X	X
Geophyte		Dichelostemma capitatum	2	X	X
Perennial Herb		Dudleya farinosa	2	X	X
Perennial Grass		Elymus glaucus	2	X	X
Sub-Shrub		Eriophyllum staechadifolium	2	X	X
Annual Herb		Eschscholzia californica	2	X	X
Perennial Grass		Festuca rubra	2	X	X
Perennial Herb		Fragaria chiloensis	2	X	X
Annual Herb		Gnaphalium stramineum	2	X	X
Perennial Herb		Grindelia hirsutula var. maritima	2	X	X
Annual Herb		Hesperolinon congestum	2	X	X
Geophyte		Iris douglasiana	2	X	X
Vine		Lathyrus vestitus var. vestitus	2	X	X
Perennial Herb		Lupinus variicolor	2	X	X
Perennial Grass		Nasella lepida	2	X	X
Perennial Grass		Nasella pulchra	2	X	X
Fern		Polypodium californicum	2	X	X
Fern		Pteridium aquilinum var. pubescens	2	X	X
Perennial Herb		Sidalcea malvaeflora	2	X	X
Perennial Herb		Stachys ajugoides var. rigida	2	X	X
Shrub		Toxicodendron diversilobum	2	X	X
Geophyte		Triteleia laxa	2	X	X
Vine		Galium porrigens	1		X
Vine		Rubus ursinus	1		X
Tree		Quercus agrifolia	1		X
Sub-Shrub		Eriophyllum confertiflorum var. confertiflorum	1		X
Shrub		Baccharis pilularis	1		X
Shrub		Ceanothus thyrsiflorus	1		X
Shrub		Heteromeles arbutifolia	1		X
Shrub		Lupinus arboreus	1		X
Shrub		Oemlaria cerasiformis	1		X
Shrub		Rhamnus californica	1	X	
Perennial Herb		Allium dichlamydeum	1		X
Perennial Herb		Angelica hendersonii	1		X

TABLE 15

LIFE FORM		SPECIES	POLYGONS		
			Total	263	266
Perennial Herb		Aster chilensis	1		X
Perennial Herb		Chenopodium californicum	1	X	
Perennial Herb		Eriogonum latifolium	1	X	
Perennial Herb		Luzula comosa	1	X	
Perennial Herb		Polygonum paronychia	1		X
Perennial Herb	(W)	Solidago spathulata ssp. spathulata	1		X
Perennial Grass		Koeleria macrantha	1	X	
Geophyte		Spiranthes romanoffiana	1		X
Annual Herb		Amsinckia spectabilis var. spectabilis	1	X	
Annual Herb		Clarkia franciscana	1		X
Annual Herb		Claytonia perfoliata	1	X	
Annual Herb		Hesperevax sparsiflora	1		X
Annual Herb		Lasthenia californica	1		X
Annual Herb		Lotus wrangelianus	1		X
Annual Herb		Lupinus bicolor	1		X
Annual Herb		Lupinus nanus	1		X
Annual Herb		Microseris bigelovii	1		X
Annual Herb		Plantago erecta	1		X
Annual Herb		Polycarpon tetraphyllum	1	X	
Annual Herb		Triphysaria floribunda	1		X
		Total Species per Polygon		37	53

Indigenous Life Forms Occurring in Coastal Terrace Prairie

Annual Grass	0
Annual Herb	15
Perennial Grass	9
Perennial Herb	16
Geophyte	5
Fern	2
Sub-Shrub	2
Shrub	8
Vine	3
Tree	1
(Wetland)	1
Total	**61**

Indigenous Species Occurring in Serpentine Bunchgrass Natural Communities

LIFE FORM		SPECIES	POLYGONS				
			Total	45	644	677	680W
Vine		Rubus ursinus	4	X	X	X	X
Geophyte		Chlorogalum pomeridianum var. divaricatum	4	X	X	X	X
Annual Herb		Eschscholzia californica	4	X	X	X	X
Vine		Marah fabaceus	3	X	X	X	
Tree	(W)	Salix lasiolepis	3	X	X		X
Shrub		Baccharis pilularis	3	X		X	X
Shrub		Heteromeles arbutifolia	3	X	X	X	
Shrub		Toxicodendron diversilobum	3		X	X	X
Perennial Herb		Achillea millefolium	3		X	X	X
Perennial Herb		Allium dichlamydeum	3	X	X		X
Perennial Herb		Eriogonum latifolium	3		X	X	X
Perennial Herb		Lomatium caruifolium	3		X	X	X
Perennial Herb		Sanicula arctopoides	3		X	X	X
Perennial Herb		Sanicula bipinnatifida	3		X	X	X
Perennial Grass		Elymus glaucus	3		X	X	X
Perennial Grass		Koeleria macrantha	3	X	X		X
Perennial Grass		Nasella pulchra	3	X	X		X
Geophyte		Sisyrinchium bellum	3	X	X		X
Geophyte		Triteleia laxa	3	X	X		X
Annual Herb		Plantago erecta	3		X	X	X
Annual Herb		Ranunculus californicus	3		X	X	X
Sub-Shrub		Monardella villosa var. villosa	2	X	X		
Sub-Shrub		Solanum douglasii	2	X			X
Shrub		Lupinus arboreus	2	X	X		
Perennial Herb		Camissonia ovata	2			X	X
Perennial Herb		Castilleja densiflora ssp. densiflora	2		X		X
Perennial Herb		Dichondra donnelliana	2			X	X

TABLE 16

LIFE FORM		SPECIES	POLYGONS				
			Total	45	644	677	680W
Perennial Herb		Horkelia californica	2			X	X
Perennial Herb	(W)	Juncus bufonius	2		X		X
Perennial Herb	(W)	Juncus effusus var. brunneus	2		X		X
Perennial Herb	(W)	Juncus lesueurii	2		X		X
Perennial Herb		Paronychia franciscana	2			X	X
Perennial Herb		Perideridia kelloggii	2	X		X	
Perennial Herb		Sidalcea malvaeflora	2			X	X
Perennial Herb		Stachys ajugoides var. rigida	2			X	X
Perennial Herb		Trifolium wormskioldii	2		X		X
Perennial Grass		Bromus carinatus var. maritimus	2		X		X
Perennial Grass		Danthonia californica	2		X		X
Perennial Grass		Nasella lepida	2		X		X
Perennial Grass		Poa secunda	2		X		X
Perennial Grass		Hordeum brachyantherum	2		X	X	
Fern		Polypodium californicum	2		X	X	
Fern		Pteridium aquilinum var. pubescens	2			X	X
Annual Herb		Clarkia franciscana	2		X		X
Annual Herb		Claytonia perfoliata	2		X	X	
Annual Herb		Crassula connata	2			X	X
Annual Herb		Lasthenia californica	2		X	X	
Annual Herb		Trifolium depauperatum var. truncatum	2		X	X	
Vine		Lathyrus vestitus var. vestitus	1			X	
Vine		Vicia gigantea	1	X			
Sub-Shrub		Eriophyllum confertiflorum var. confertifloru	1	X			
Sub-Shrub		Mimulus aurantiacus	1	X			
Shrub		Rosa californica	1			X	
Perennial Herb		Acaena pinnatifida var. californica	1				X
Perennial Herb		Aphanes occidentalis	1			X	
Perennial Herb		Arabis blepharophylla	1			X	

LIFE FORM		SPECIES	POLYGONS				
			Total	45	644	677	680W
Perennial Herb		Calystegia occidentalis ssp. fulcrata	1	X			
Perennial Herb		Calystegia subacaulis	1		X		
Perennial Herb		Cardamine californica var. integrifolia	1				X
Perennial Herb	(W)	Equisetum telmateia ssp. braunii	1				X
Perennial Herb		Fragaria chiloensis	1	X			
Perennial Herb		Grindelia hirsutula var. maritima	1	X			
Perennial Herb	(W)	Juncus patens	1				X
Perennial Herb		Lomatium dasycarpum ssp. dasycarpum	1				X
Perennial Herb		Lupinus variicolor	1			X	
Perennial Herb		Luzula comosa	1			X	
Perennial Herb	(W)	Mimulus guttatus	1				X
Perennial Herb	(W)	Oenanthe sarmentosa	1				X
Perennial Herb		Rumex salicifolius	1			X	
Perennial Herb		Sanicula crassicaulis	1			X	
Perennial Herb	(W)	Scirpus microcarpus	1				X
Perennial Herb		Scrophularia californica ssp. californica	1			X	
Perennial Herb		Wyethia angustifolia	1	X			
Perennial Herb	(W)	Vicia americana var. americana	1			X	
Perennial Grass		Agrostis hallii	1	X			
Geophyte		Brodeia elegans ssp. elegans	1				X
Geophyte		Dichelostemma capitatum	1		X		
Geophyte		Iris douglasiana	1			X	
Geophyte		Iris longipetala	1			X	
Annual Herb	(W)	Lythrum hyssoipifolia	1				X
Annual Herb		Centaurium venustum	1				X
Annual Herb		Daucus pusillus	1				X
Annual Herb		Hesperevax sparsiflora	1				X
Annual Herb		Layia platyglossa	1		X		
Annual Herb		Madia sativa	1	X			

TABLE 15

LIFE FORM		SPECIES	POLYGONS				
			Total	45	644	677	680W
Annual Herb		Minuartia pusilla	1			X	
Annual Herb		Trifolium willdenovii	1		X		
Annual Grass		Vulpia microstachys	1				X
		Total Species Per Polygon		25	41	42	52

Indigenous Life Forms Occurring in Serpentine Bunchgrass Communities

Annual Grass	1
Annual Herb	16
Perennial Grass	9
Perennial Herb	39
Geophyte	7
Fern	2
Sub-Shrub	4
Shrub	5
Vine	4
Tree	1
(Wetland)	1
Total	**88**

Indigenous Species Occurring in the Dune Wildflower Field Natural Community

LIFE FORM		SPECIES	POLYGONS									
			Total	341	354	391	436	55[illegible]	578	586	598	649
Sub-Shrub		Lotus scoparius	7	X	X	X		X	X		X	X
Shrub		Ericameria ericoides	7	X	X	X	X	X	X		X	
Fern		Pteridium aquilinum var. pubescens	7	X	X		X	X	X	X		X
Annual Herb		Eschscholzia californica	7	X	X		X		X	X	X	X
Shrub		Lupinus arboreus	6		X		X	X	X	X		X
Perennial Herb		Cardionema ramosissimum	6	X		X		X	X		X	X
Annual Herb		Phacelia distans	6		X	X			X	X	X	X
Shrub		Toxicodendron diversilobum	5	X			X	X	X	X		
Perennial Herb		Camissonia cheiranthifolia	5			X	X	X			X	X
Perennial Herb		Eriogonum latifolium	5	X		X		X	X		X	
Perennial Herb		Polygonum paronychia	5	X	X	X	X	X				
Annual Herb		Claytonia perfoliata	5		X		X		X		X	X
Annual Herb		Gilia capitata ssp. chamissonis	5				X		X	X	X	X
Annual Herb		Lessingia germanorum	5		X			X	X		X	X
Vine		Marah fabaceus	4		X		X			X		X
Shrub		Baccharis pilularis	4				X			X	X	X
Shrub		Lupinus chamissonis	3	X		X					X	
Perennial Herb		Croton californicus	3			X		X				X
Perennial Grass		Leymus triticoides	3					X		X		X
Annual Herb		Camissonia micrantha	3	X	X							X
Annual Herb		Chorizanthe cuspidata	3	X		X						X
Annual Herb		Crassula connata	3	X	X				X			
Vine		Rubus ursinus	2		X		X					
Shrub		Heteromeles arbutifolia	2	X			X					
Perennial Herb		Achillea millefolium	2	X	X							

TABLE 17

Perennial Herb	Agoseris apargioides var. apargioides	2		X				X			
Perennial Herb	Silene verecunda ssp. verecunda	2	X		X						
Annual Herb	Lupinus bicolor	2					X		X		
Annual Herb	Amsinckia spectabilis var. spectabilis	2		X							X
Annual Herb	Camissonia contorta	2		X							X
Annual Herb	Cryptantha leiocarpa	2	X	X							
Annual Herb	Plantago erecta	2					X		X		
Annual Herb	Uropappus lindleyi	2	X	X							
Sub-Shrub	Solanum douglasii	1				X					
Sub-Shrub	Artemisia pycnocephala	1	X								
Sub-Shrub	Mimulus aurantiacus	1	X								
Shrub	Symphoricarpos mollis	1							X		
Perennial Herb	Achyrachaena mollis	1	X								
Perennial Herb	Dudleya farinosa	1	X								
Perennial Herb	Fragaria chiloensis	1				X					
Perennial Grass	Bromus carinatus var. maritimus	1									X
Geophyte	Chlorogalum pomeridianum var. divaric	1					X				
Geophyte	Dichelostemma capitatum	1							X		
Fern	Polypodium californicum	1	X								
Annual Herb	Cardamine oligosperma	1				X					
Annual Herb	Cuscuta californica var. californica	1									X
Annual Herb	Linaria canadensis	1									X
Annual Herb	Lotus strigosus	1					X				
Annual Herb	Madia sativa	1						X			
Annual Herb	Nemophila pedunculata	1		X							
	Total Species Per Polygon		22	20	11	16	12	17	11	16	21

Indigenous Life Forms in Dune Wildflower Field Natural Communities

Annual Grass	0
Annual Herb	20
Perennial Grass	2
Perennial Herb	11
Geophyte	2
Fern	2
Sub-Shrub	4
Shrub	7
Vine	2
Tree	0
(Wetland)	0
Total	**50**

TABLE 18

Indigenous Species Occurring in the Dune Wildflower Field Natural Community

LIFE FORM	SPECIES		POLYGONS								
		Total	341	354	391	436	557	578	586	598	649
Sub-Shrub	Lotus scoparius	7	X	X	X		X	X		X	X
Shrub	Ericameria ericoides	7	X	X	X	X	X	X		X	
Fern	Pteridium aquilinum var. pubescens	7	X	X		X	X	X	X		X
Annual Herb	Eschscholzia californica	7	X	X		X		X	X	X	X
Shrub	Lupinus arboreus	6		X		X	X	X	X		X
Perennial Herb	Cardionema ramosissimum	6	X		X		X	X		X	X
Annual Herb	Phacelia distans	6		X	X			X	X	X	X
Shrub	Toxicodendron diversilobum	5	X			X	X	X	X		
Perennial Herb	Camissonia cheiranthifolia	5			X	X	X			X	X
Perennial Herb	Eriogonum latifolium	5	X		X		X	X		X	
Perennial Herb	Polygonum paronychia	5	X	X	X	X	X				
Annual Herb	Claytonia perfoliata	5		X		X		X		X	X
Annual Herb	Gilia capitata ssp. chamissonis	5				X		X	X	X	X
Annual Herb	Lessingia germanorum	5		X			X	X		X	X
Vine	Marah fabaceus	4		X		X			X		X
Shrub	Baccharis pilularis	4				X			X	X	X
Shrub	Lupinus chamissonis	3	X		X					X	
Perennial Herb	Croton californicus	3			X		X				X
Perennial Grass	Leymus triticoides	3					X		X		X
Annual Herb	Camissonia micrantha	3	X	X							X
Annual Herb	Chorizanthe cuspidata	3	X		X						X
Annual Herb	Crassula connata	3	X	X				X			
Vine	Rubus ursinus	2		X		X					
Shrub	Heteromeles arbutifolia	2	X			X					
Perennial Herb	Achillea millefolium	2	X	X							
Perennial Herb	Agoseris apargioides var. apargioides	2		X					X		
Perennial Herb	Silene verecunda ssp. verecunda	2	X		X						
Annual Herb	Lupinus bicolor	2						X		X	

LIFE FORM	SPECIES		POLYGONS								
		Total	341	354	391	436	557	578	586	598	649
Annual Herb	Amsinckia spectabilis var. spectabilis	2		X							X
Annual Herb	Camissonia contorta	2		X							X
Annual Herb	Cryptantha leiocarpa	2	X	X							
Annual Herb	Plantago erecta	2						X		X	
Annual Herb	Uropappus lindleyi	2	X	X							
Sub-Shrub	Solanum douglasii	1				X					
Sub-Shrub	Artemisia pycnocephala	1	X								
Sub-Shrub	Mimulus aurantiacus	1	X								
Shrub	Symphoricarpos mollis	1								X	
Perennial Herb	Achyrachaena mollis	1	X								
Perennial Herb	Dudleya farinosa	1	X								
Perennial Herb	Fragaria chiloensis	1				X					
Perennial Grass	Bromus carinatus var. maritimus	1									X
Geophyte	Chlorogalum pomeridianum var. divaricatum	1						X			
Geophyte	Dichelostemma capitatum	1								X	
Fern	Polypodium californicum	1	X								
Annual Herb	Cardamine oligosperma	1				X					
Annual Herb	Cuscuta californica var. californica	1									X
Annual Herb	Linaria canadensis	1									X
Annual Herb	Lotus strigosus	1						X			
Annual Herb	Madia sativa	1							X		
Annual Herb	Nemophila pedunculata	1		X							

TABLE 18

Indigenous Life Forms in Dune Wildflower Field Natural Communities

Annual Grass	0
Annual Herb	20
Perennial Grass	2
Perennial Herb	11
Geophyte	2
Fern	2
Sub-Shrub	4
Shrub	7
Vine	2
Tree	0
(Wetland)	0
Total	**50**

Indigenous Species in Serpentine Wildflower Field Natural Community			
Life Form	**Wet**	**Species**	**POLYGONS**
			679
Annual Herb		Clarkia franciscana	X
Annual Herb		Eschscholzia californica	X
Annual Herb		Lasthenia californica	X
Annual Herb		Layia platyglossa	X
Annual Herb		Lepidium nitidum	X
Annual Herb		Plantago erecta	X
Annual Herb		Trifolium depauperatum var. truncatum	X
Annual Herb		Triphysaria pusilla	X
Geophyte		Chlorogalum pomeridianum var. divaric	X
Geophyte		Sisyrinchium bellum	X
Geophyte		Triteleia laxa	X
Perennial Grass		Danthonia californica	X
Perennial Grass		Elymus glaucus	X
Perennial Grass		Nasella pulchra	X
Perennial Grass		Poa secunda	X
Perennial Herb		Allium dichlamydeum	X
Perennial Herb		Calystegia subacaulis	X
Perennial Herb		Eriogonum latifolium	X
Perennial Herb	(W)	Juncus bufonius	X
Perennial Herb		Lomatium caruifolium	X
Perennial Herb		Lomatium dasycarpum ssp. dasycarpum	X
Perennial Herb		Sanicula arctopoides	X
Perennial Herb		Sanicula bipinnatifida	X
		Total Species Per Polygon	**23**

Indigenous Life Forms Found in Serpentine Wildflower Field Natural Community

Annual Grass	0
Annual Herb	8
Perennial Grass	4
Perennial Herb	8
Geophyte	3
Fern	0
Sub-Shrub	0
Shrub	0
Vine	0
Tree	0
(Wetland)	0
Total	**23**

Table 20

Indigenous Species Occurring in the Dune Non-Native Grasslands

LIFE FORM	SPECIES	POLYGONS						
		Total	594	538	570	588	648	652
Annual Herb	Eschscholzia californica	4		X	X	X	X	
Shrub	Lupinus arboreus	4		X		X	X	X
Annual Herb	Claytonia perfoliata	4	X	X	X	X		
Vine	Marah fabaceus	3		X	X	X		
Vine	Rubus ursinus	3		X	X		X	
Perennial Herb	Cardionema ramosissimum	2					X	X
Perennial Herb	Eriogonum latifolium	2				X		X
Shrub	Baccharis pilularis	2		X	X			
Shrub	Toxicodendron diversilobum	2		X		X		
Sub-Shrub	Lotus scoparius	2				X	X	
Annual Herb	Cardamine oligosperma	2	X		X			
Annual Herb	Lupinus bicolor	2	X				X	
Sub-Shrub	Solanum douglasii	2	X				X	
Annual Herb	Amsinckia spectabilis var. spectabilis	1					X	
Annual Herb	Camissonia contorta	1					X	
Annual Herb	Camissonia micrantha	1					X	
Annual Herb	Cerastium fontanum ssp. vulgare	1					X	
Annual Herb	Chorizanthe cuspidata	1						X
Annual Herb	Crassula connata	1					X	
Annual Herb	Cryptantha leiocarpa	1						X
Annual Herb	Gilia capitata ssp. chamissonis	1						X
Annual Herb	Gnaphalium stramineum	1		X				
Annual Herb	Lepidium nitidum	1					X	
Annual Herb	Lessingia germanorum	1						X
Annual Herb	Lotus strigosus	1					X	
Annual Herb	Phacelia distans	1						X
Annual Herb	Triphysaria pusilla	1					X	
Fern	Polystichum munitum	1		X				
Geophyte	Chlorogalum pomeridianum	1			X			
Perennial Grass	Bromus carinatus var. maritimus	1					X	

Table 20

LIFE FORM		SPECIES		POLYGONS					
			Total	594	538	570	588	648	652
Perennial Herb		Achillea millefolium	1		X				
Perennial Herb		Croton californicus	1						X
Perennial Herb	(W)	Equisetum hyemale ssp. affine	1		X				
Perennial Herb		Fragaria chiloensis	1		X				
Perennial Herb	(W)	Juncus bufonius	1					X	
Perennial Herb	(W)	Juncus lesueurii	1		X				
Perennial Herb		Paronychia franciscana	1					X	
Perennial Herb		Scrophularia californica ssp. californica	1		X				
Perennial Herb		Stachys ajugoides var. rigida	1		X				
Perennial Herb	(W)	Urtica dioica ssp. holosericea	1		X				
Shrub		Ericameria ericoides	1				X		
Shrub		Heteromeles arbutifolia	1		X				
Shrub		Rhamnus californica	1			X			
Shrub (W)	(W)	Cornus sericea ssp. sericea	1		X				
Sub-Shrub		Ambrosia chamissonis	1						X
Tree	(W)	Myrica californica	1		X				
		Total Species per Polygon		4	19	8	8	18	10

Indigenous Life Forms Occurring in the Dune Non-Native Grasslands

Annual Grass	0
Annual Herb	18
Perennial Grass	1
Perennial Herb	12
Geophyte	1
Fern	1
Sub-Shrub	3
Shrub	7
Vine	2
Tree	1
(Wetland)	6
Total	**46**

	Indigenous Species in Serpentine Non-Native Grassland		
Life Form		**Species**	**Polygon**
			281W
Perennial Herb		Aster chilensis	X
Perennial Grass		Bromus carinatus var. maritimus	X
Perennial Herb	(W)	Carex tumulicula	X
Perennial Herb		Epilobium ciliatum ssp. watsonii	X
Perennial Herb		Fragaria chiloensis	X
Perennial Herb	(W)	Juncus effusus var. brunneus	X
Perennial Herb	(W)	Juncus falcatus	X
Perennial Herb	(W)	Juncus patens	X
Annual Herb (W)	(W)	Lythrum hyssoipifolia	X
Annual Herb		Madia sativa	X
Shrub		Ribes sanguinem var. glutinosum	X
Vine		Rubus ursinus	X
		Total Species Per Polygon	**12**

Indigenous Life Forms in Serpentine Non-Native Grassland

Annual Grass	0
Annual Herb	2
Perennial Grass	1
Perennial Herb	7
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	1
Tree	0
(Wetland)	5
Total	**12**

Table 22

Indigenous Species Occurring in the Dune Native Woodland Natural Communities

LIFE FORM		SPECIES		POLYGONS					
			Total	585	587	595	653	643	563
Vine		Rubus ursinus	6	X	X	X	X	X	X
Tree		Quercus agrifolia	4	X	X	X		X	
Vine		Marah fabaceus	3	X		X		X	
Tree	(W)	Salix lasiolepis	3			X	X		X
Shrub		Baccharis pilularis	3	X				X	X
Shrub		Lupinus arboreus	3	X		X			X
Shrub		Toxicodendron diversilobum	3	X	X			X	
Fern		Pteridium aquilinum var. pubescens	3	X	X			X	
Tree	(W)	Myrica californica	2			X	X		
Tree	(W)	Salix lucida ssp. lasiandra	2				X		X
Sub-Shrub		Mimulus aurantiacus	2	X				X	
Sub-Shrub		Solanum douglasii	2		X	X			
Shrub		Ericameria ericoides	2	X				X	
Perennial Herb	(W)	Equisetum hyemale ssp. affine	2			X		X	
Perennial Herb	(W)	Juncus effusus var. brunneus	2				X		X
Perennial Herb	(W)	Juncus lesueurii	2				X		X
Perennial Herb	(W)	Oenanthe sarmentosa	2			X	X		
Perennial Herb	(W)	Polygonum punctatum	2			X	X		
Perennial Herb	(W)	Scirpus microcarpus	2			X	X		
Perennial Herb		Achillea millefolium	2	X					X
Perennial Herb		Epilobium ciliatum ssp. watsonii	2				X		X
Perennial Herb		Scrophularia californica ssp. californica	2	X		X			
Fern (W)	(W)	Athyrium filix-femina	2			X	X		
Annual Herb		Cardamine oligosperma	2	X					X
Annual Herb		Eschscholzia californica	2	X		X			
Sub-Shrub		Euthamia occidentalis	1			X			
Shrub (W)	(W)	Cornus sericea ssp. sericea	1			X			
Shrub		Rhamnus californica	1	X					

Indigenous Species Occurring in Native Woodland Natural Communities

LIFE FORM		SPECIES	POLYGON
			502W
Tree		Quercus agrifolia	X
Shrub		Prunus illicifolia	X
Perennial Herb	(W)	Juncus effusus var. brunneus	X
Perennial Herb	(W)	Juncus falcatus	X
Perennial Herb	(W)	Juncus lesueurii	X
Perennial Herb	(W)	Juncus patens	X
Perennial Herb	(W)	Scirpus cernuus	X
Perennial Herb	(W)	Carex obnupta	X
Perennial Herb	(W)	Carex subbracteata	X
Perennial Herb	(W)	Carex tumulicula	X
Perennial Herb	(W)	Juncus bufonius	X
Perennial Herb	(W)	Scirpus americanus	X
Annual Herb		Epilobium brachycarpum	X
Annual Herb		Madia sativa	X
		Total Species Per Polygon	**14**

Indigenous Life Forms Occurring in Serpentine Native Woodlands

Annual Grass	0
Annual Herb	2
Perennial Grass	0
Perennial Herb	10
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	0
Tree	1
(Wetland)	10
Total	**14**

Table 24

Indigenous Species Occurring in Dune Non-Indigenous Forest Communities

LIFE FORM		SPECIES		POLYGON				
			Total	C119	CP170	C140	E201	P120
Vine		Marah fabaceus	5	X	X	X	X	X
Annual Herb		Claytonia perfoliata	5	X	X	X	X	X
Shrub		Toxicodendron diversilobum	4	X		X	X	X
Annual Herb		Eschscholzia californica	4	X	X	X		X
Vine		Rubus ursinus	3			X	X	X
Shrub		Lupinus arboreus	3		X	X		X
Perennial Herb		Cardionema ramosissimum	3	X	X			X
Perennial Grass		Bromus carinatus var. maritimus	3	X	X			X
Annual Herb		Gilia capitata ssp. chamissonis	3		X	X		X
Annual Herb		Phacelia distans	3	X		X		X
Sub-Shrub		Lotus scoparius	2	X	X			
Sub-Shrub		Solanum douglasii	2			X	X	
Shrub		Baccharis pilularis	2		X			X
Shrub		Ericameria ericoides	2	X				X
Shrub		Lupinus chamissonis	2	X	X			
Perennial Herb		Anaphalis margaritacea	2		X			X
Perennial Herb		Eriogonum latifolium	2	X				X
Perennial Herb		Polygonum paronychia	2	X				X
Perennial Grass		Leymus triticoides	2		X	X		
Fern		Pteridium aquilinum var. pubescens	2	X				X
Annual Herb		Amsinckia spectabilis var. spectabilis	2		X	X		
Annual Herb		Chorizanthe cuspidata	2	X				X
Vine		Lonicera hispidula var. vacillans	1			X		
Tree	(W)	Salix lasiolepis	1				X	
Sub-Shrub		Artemisia pycnocephala	1	X				
Sub-Shrub		Eriophyllum staechadifolium	1					X
Sub-Shrub		Mimulus aurantiacus	1		X			
Shrub		Heteromeles arbutifolia	1		X			
Shrub		Rhamnus californica	1				X	
Perennial Herb		Achillea millefolium	1	X				
Perennial Herb		Agoseris apargioides var. apargioides	1		X			
Perennial Herb		Arabis glabra	1					X

Tab' 4

LIFE FORM		SPECIES	POLYGON					
			Total	C119	CP170	C140	E201	P120
Perennial Herb		Camissonia cheiranthifolia ssp. cheiranth	1	X				
Perennial Herb		Carpobrotus chilensis	1		X			
Perennial Herb		Croton californicus	1	X				
Perennial Herb		Dudleya farinosa	1					X
Perennial Herb		Osmorhiza chilensis	1			X		
Perennial Herb		Sanicula crassicaulis	1		X			
Perennial Herb	(W)	Scirpus californicus	1			X		
Perennial Herb		Scrophularia californica ssp. californica	1				X	
Perennial Herb		Silene verecunda ssp. verecunda	1	X				
Perennial Grass		Danthonia californica	1		X			
Geophyte		Chlorogalum pomeridianum	1					X
Fern		Polypodium californicum	1					X
Annual Herb		Cardamine oligosperma	1		X			
Annual Herb		Crassula connata	1		X			
Annual Herb		Cryptantha leiocarpa	1	X				
Annual Herb		Gnaphalium stramineum	1		X			
Annual Herb		Uropappus lindleyi	1	X				
		Total Species Per Polygon		21	22	14	8	22

Indigenous Life Forms in Dune Non-Indigenous Forest Communities

Annual Grass	0
Annual Herb	11
Perennial Grass	3
Perennial Herb	16
Geophyte	1
Fern	2
Sub-Shrub	5
Shrub	7
Vine	3
Tree	1
(Wetland)	2
Total	**49**

Table 25

Indigenous Species Occurring in Serpentine Non-Indigenous Forests

	LIFE FORM		SPECIES	POLYGON					
				Total	C139	E(14)	E130	P135	CP(675)W
1	Vine		Rubus ursinus	4			X	X	X
1	Shrub		Baccharis pilularis	4	X		X	X	
1	Shrub		Heteromeles arbutifolia	4	X	X		X	
1	Shrub		Toxicodendron diversilobum	3		X		X	
1	Perennial Herb		Achillea millefolium	3				X	X
1	Perennial Herb	(W)	Juncus patens	3	X				X
1	Perennial Herb		Sanicula crassicaulis	3	X			X	
1	Perennial Herb		Scrophularia californica ssp. californica	3		X	X	X	
1	Perennial Herb		Stachys ajugoides var. rigida	3			X	X	
1	Geophyte		Chlorogalum pomeridianum var. divaric	3			X	X	
1	Geophyte		Iris douglasiana	3				X	X
1	Fern		Polypodium californicum	3			X	X	
1	Annual Herb		Claytonia perfoliata	3			X	X	
1	Sub-Shrub		Solanum douglasii	2			X		
1	Perennial Herb		Dichondra donnelliana	2	X				X
1	Perennial Herb		Fragaria chiloensis	2			X		X
1	Geophyte		Sisyrinchium bellum	2	X				
1	Geophyte		Triteleia laxa	2	X			X	
1	Annual Herb		Madia sativa	2	X				X
1	Vine		Lonicera hispidula var. vacillans	1				X	
1	Vine		Marah fabaceus	1				X	
1	Shrub		Oemlaria cerasiformis	1		X			
1	Shrub		Rhamnus californica	1				X	
1	Shrub		Rosa californica	1				X	
1	Perennial Herb		Agoseris apargioides var. apargioides	1				X	
1	Perennial Herb		Allium dichlamydeum	1				X	
1	Perennial Herb		Aster chilensis	1				X	

Tab 25

	LIFE FORM		SPECIES	POLYGON					
				Total	C139	E(14)	E130	P135	CP(675)W
1	Perennial Herb	(W)	Carex densa	1					X
1	Perennial Herb	(W)	Carex gracilior	1					X
1	Perennial Herb	(W)	Carex tumulicula	1					X
1	Perennial Herb		Eriogonum latifolium	1				X	
1	Perennial Herb		Grindelia hirsutula var. maritima	1				X	
1	Perennial Herb		Heracleum lanatum	1		X			
1	Perennial Herb	(W)	Juncus lesueurii	1					X
1	Perennial Herb	(W)	Juncus occidentalis	1					X
1	Perennial Herb		Osmorhiza chilensis	1				X	
1	Perennial Herb		Perideridia kelloggii	1				X	
1	Perennial Herb		Rumex salicifolius	1					
1	Perennial Herb	(W)	Scirpus californicus	1					
1	Perennial Herb		Sidalcea malvaeflora	1					
1	Perennial Grass		Bromus carinatus var. carinatus	1				X	
1	Perennial Grass		Bromus carinatus var. maritimus	1					
1	Perennial Grass		Danthonia californica	1				X	
1	Perennial Grass		Deschampsia cespitosa ssp. holciformis	1					X
1	Perennial Grass		Elymus glaucus	1				X	
1	Geophyte		Brodeia elegans ssp. elegans	1	X				
1	Geophyte		Hordeum brachyantherum	1				X	
1	Geophyte		Piperia elegans	1					X
1	Geophyte		Spiranthes romanoffiana	1					X
1	Fern		Polypodium scouleri	1			X		
1	Fern		Polystichum munitum	1					
1	Fern		Pteridium aquilinum var. pubescens	1					
1	Annual Herb		Ranunculus californicus	1					
53			**Total Species per Polygon**		9	5	10	28	15

Table 25

Indigenous Life Forms Occurring in Serpentine Non-Indigenous Forests

Annual Grass	0
Annual Herb	3
Perennial Grass	5
Perennial Herb	23
Geophyte	8
Fern	4
Sub-Shrub	1
Shrub	6
Vine	3
Tree	0
(Wetland)	7
Total	53

Table 26

Non-Indigenous Species Arrayed by Decreasing Number of Polygons in Which Observed

Species Occurring on Both Substrates

Life Form	Species	Subst	Serp	Dune	Total
Perennial Herb	Carpobrotus edulis	Both	12	30	42
Annual Herb	Raphanus sativus	Both	15	23	38
Annual Herb	Rumex acetosella	Both	15	19	34
Annual Herb	Stellaria media	Both	14	20	34
Annual Grass	Bromus diandrus	Both	12	21	33
Perennial Herb	Plantago lanceolata	Both	19	14	33
Tree	Cupressus macrocarpa	Both	19	13	32
Annual Grass	Hordeum murinum ssp. leporinum	Both	12	20	32
Annual Herb	Sonchus oleraceus	Both	14	15	29
Tree	Pinus radiata	Both	13	15	28
Perennial Herb	Oxalis pes-carpae	Both	8	17	25
Annual Grass	Avena fatua	Both	8	16	24
Annual Herb	Galium aparine	Both	10	14	24
Annual Herb	Geranium dissectum	Both	9	14	23
Vine	Senecio mikanoides	Both	13	10	23
Annual Herb	Vicia sativa	Both	11	12	23
Annual Grass	Avena barbata	Both	10	10	20
Annual Herb	Carduus pycnocephalus	Both	12	7	19
Perennial Herb	Conium maculatum	Both	10	8	18
Annual Grass	Lolium perenne	Both	9	9	18
Annual Herb	Anagallis arvensis	Both	12	4	16
Perennial Herb	Conicosia pugioniformis	Both	1	15	16
Tree	Eucalyptus globulus	Both	7	9	16
Vine	Hedera helix	Both	8	8	16
Annual Herb	Malva parviflora	Both	5	11	16
Annual Herb	Medicago polymorpha	Both	6	10	16
Perennial Herb	Plantago coronopus	Both	6	10	16
Tree	Acacia longifolia	Both	10	5	15
Annual Herb	Poa annua	Both	7	8	15
Perennial Herb	Hypochaeris radicata	Both	13	1	14
Perennial Grass	Cortaderia jubata	Both	10	3	13
Annual Herb	Erodium cicutarium	Both	8	5	13
Annual Grass	Holcus lanatus	Both	11	2	13
Annual Herb	Senecio vulgaris	Both	6	7	13
Annual Herb	Hypochaeris glabra	Both	3	9	12
Annual Grass	Lolium multiflorum	Both	7	5	12
Annual Herb	Anthriscus caucaulis	Both	4	7	11
Annual Grass	Vulpia bromoides	Both	5	6	11
Annual Herb	Cotula australis	Both	5	5	10
Annual Herb	Gnaphalium luteo-album	Both	4	6	10

Life Form		Species	Subst	Serp	Dune	Total
Annual Herb		Melilotus indica	Both	5	5	10
Perennial Herb		Brassica nigra	Both	6	3	9
Annual Grass		Briza maxima	Both	3	6	9
Annual Grass	(W)	Polypogon monspeliensis	Both	5	3	8
Annual Grass		Bromus hordaceus	Both	5	2	7
Shrub		Ceanothus griseus	Both	5	2	7
Annual Herb		Cirsium vulgare	Both	5	2	7
Vine		Rubus discolor	Both	3	4	7
Annual Herb		Rumex pulcher	Both	4	3	7
Perennial Herb		Senecio elegans	Both	3	4	7
Annual Herb		Silene gallica	Both	5	2	7
Perennial Herb	(W)	Zantedeschia aethiopica	Both	4	3	7
Annual Grass		Aira caryophylla	Both	5	1	6
Annual Grass		Bromus stamineus	Both	4	2	6
Annual Herb		Cerastium glomeratum	Both	2	4	6
Annual Grass		Dactylis glomerata	Both	4	2	6
Perennial Herb		Lobularia maritima	Both	3	3	6
Shrub		Myoporum laetum	Both	4	2	6
Perennial Grass	(W)	Agrostis gigantea	Both	4	1	5
Perennial Grass		Allium triquetrum	Both	3	2	5
Annual Grass		Briza minor	Both	3	2	5
Annual Herb		Cakile edulenta	Both	1	4	5
Perennial Herb		Convolvulus arvensis	Both	2	3	5
Annual Grass		Cynosorus echinatus	Both	4	1	5
Perennial Grass		Ehrharta erecta	Both	1	4	5
Annual Herb		Polygonum arenastrum	Both	3	2	5
Perennial Herb		Tropaeolum majus	Both	3	2	5
Perennial Herb		Bellis perennis	Both	2	2	4
Annual Herb		Erodium moschatum	Both	2	2	4
Annual Herb		Euphorbia peplus	Both	1	3	4
Perennial Grass		Festuca arundinacea	Both	1	3	4
Perennial Herb		Foeniculum vulgare	Both	2	2	4
Shrub		Lavatera arborea	Both	1	3	4
Perennial Herb		Rorippa nasturtium-aquaticum	Both	3	1	4
Perennial Herb		Silybum marianum	Both	3	1	4
Perennial Herb		Taraxacum officinale	Both	2	2	4
Perennial Herb		Vinca major	Both	3	1	4
Tree		Acacia mearnsii	Both	1	2	3
Perennial Grass	(W)	Agrostis viridis	Both	2	1	3
Annual Herb		Chrysanthemum coronarium	Both	2	1	3
Perennial Herb		Lathyrus latifolius	Both	2	1	3
Annual Grass		Lolium temulentum	Both	1	2	3
Annual Grass		Vulpia myuros var. hirsuta	Both	1	2	3
Annual Herb		Brassica rapa	Both	1	1	2
Annual Herb		Chamomilla suaveolens	Both	1	1	2

Table 26

Life Form		Species	Subst	Serp	Dune	Total
Annual Herb		Chenopodium murale	Both	1	1	2
Tree		Eucalyptus polyanthemos	Both	1	1	2
Annual Herb		Lactuca saligna	Both	1	1	2
Vine		Muehlenbeckia complexa	Both	1	1	2
Shrub		Pittosporum crassifolium	Both	1	1	2
Annual Grass		Polypogon interruptus	Both	1	1	2
Annual Herb		Rumex conglomeratus	Both	1	1	2
Total = 92						
		Dune Species				
Perennial Herb		Tetragonia tetragonioides	Dune	0	7	7
Annual Herb		Hedypnois cretica	Dune	0	5	5
Annual Herb		Erodium botrys	Dune	0	4	4
Annual Grass		Vulpia myuros var myuros	Dune	0	4	4
Perennial Grass		Ammophila arenaria	Dune	0	3	3
Annual Herb		Malva nicaeensis	Dune	0	3	3
Perennial Herb		Solanum aviculare	Dune	0	3	3
Annual Herb		Spergularia arvensis ssp. arvensis	Dune	0	3	3
Annual Herb		Capsella bursa-pastoris	Dune	0	2	2
Perennial Herb		Hirschfeldia incana	Dune	0	2	2
Annual Grass		Lagurus ovatus	Dune	0	2	2
Annual Herb		Trifolium repens	Dune	0	2	2
Annual Herb		Veronica filiformis	Dune	0	2	2
Annual Herb		Vicia villosa	Dune	0	2	2
Tree	(W)	Alnus rubra	Dune	0	1	1
Annual Grass		Anthoxanthum oderatum	Dune	0	1	1
Annual Grass		Bromus catharticus	Dune	0	1	1
Annual Herb		Chenopodium multifidum	Dune	0	1	1
Annual Herb		Conyza floribunda	Dune	0	1	1
Annual Grass		Cynodon dactylon	Dune	0	1	1
Annual Herb		Geranium pusillum	Dune	0	1	1
Annual Grass		Hordeum vulgare	Dune	0	1	1
Perennial Herb		Mentha spicata	Dune	0	1	1
Perennial Herb		Nasturtium officionalis	Dune	0	1	1
Perennial Herb		Oxalis rubra	Dune	0	1	1
Annual Grass		Panicum acuminatum	Dune	0	1	1
Annual Grass		Panicum miliaceum	Dune	0	1	1
Perennial Herb		Parietaria judaica	Dune	0	1	1
Annual Herb		Rumex obtusifolius	Dune	0	1	1
Total = 29						
		Serpentine Species				
Shrub		Cotoneaster pannosa	Serp	11	0	11
Perennial Herb		Erechtites glomeratus	Serp	6	0	6
Annual Herb		Rumex crispus	Serp	6	0	6
Shrub		Genista monspessulanus	Serp	5	0	5
Perennial Herb		Plantago major	Serp	4	0	4

Life Form		Species	Subst	Serp	Dune	Total
Annual Herb	(W)	Cotula coronopifolia	Serp	3	0	3
Shrub		Cytisus scoparius	Serp	3	0	3
Subshrub		Echium candicans	Serp	3	0	3
Annual Herb	(W)	Erechtites minima	Serp	3	0	3
Tree		Pseudotsuga menziesii	Serp	3	0	3
Tree		Sequoia sempervirens	Serp	3	0	3
Annual Herb		Sinapis arvensis	Serp	3	0	3
Tree		Acacia retinodes	Serp	2	0	2
Shrub		Coprosma repens	Serp	2	0	2
Perennial Herb		Daucus carota	Serp	2	0	2
Annual Grass		Hordeum marinum ssp gussoneanu	Serp	2	0	2
Perennial Herb		Oxalis incarnata	Serp	2	0	2
Perennial Herb		Ranunculus muricatus	Serp	2	0	2
Annual Herb		Scandix pecten-veneris	Serp	2	0	2
Tree		Acacia verticillata	Serp	1	0	1
Tree	(W)	Acer macrophyllum	Serp	1	0	1
Perennial Grass		Agrostis capillaris	Serp	1	0	1
Perennial Grass		Agrostis tenuis	Serp	1	0	1
Perennial Herb		Borago officinalis	Serp	1	0	1
Shrub		Callistemon citrinus	Serp	1	0	1
Annual Herb		Centranthus ruber	Serp	1	0	1
Annual Herb		Coronopus didymus	Serp	1	0	1
Shrub		Escallonia macrantha	Serp	1	0	1
Annual Herb		Filago gallica	Serp	1	0	1
Annual Herb		Fumaria parviflora	Serp	1	0	1
Annual Herb		Geranium molle	Serp	1	0	1
Perennial Herb		Geranium robertianum	Serp	1	0	1
Perennial Grass		Hainardia cylindrica	Serp	1	0	1
Annual Herb		Lotus corniculatus	Serp	1	0	1
Annual Herb		Malva sylvestris	Serp	1	0	1
Tree	(W)	Salix babylonica	Serp	1	0	1
Tree		Sequoiadendron giganteum	Serp	1	0	1
Annual Herb		Spergularia rubra	Serp	1	0	1
Perennial Herb		Torilis arvensis	Serp	1	0	1
Perennial Herb		Tradescantia fluminensis	Serp	1	0	1
Total = 40						

Polygons Arrayed in Descending Order by Non-Indigenous/Total Ratio								
	Polygon	Natural Community	Substrate	Area	Ind	N-Ind	Total	N-Ind/Tot
1	54	Northern Foredune	Sand	0.61	5	17	22	0.77
1	E201	Non-Indigenous Forest	Sand	5.9	8	27	35	0.77
1	594	Wildflower Field	Sand	3.32	6	19	25	0.76
1	C139	Non-Indigenous Forest	Serpentine	0.8	9	22	31	0.71
1	C131	Non-Indigenous Forest	Serpentine	12.6	21	51	72	0.71
1	40	Northern Foredune	Sand	2.05	8	19	27	0.70
1	E(14)	Non-Indigenous Forest	Serpentine	1.42	5	10	15	0.67
1	E130	Non-Indigenous Forest	Serpentine	4.6	10	19	29	0.66
1	648	Non-Native Grasslands	Sand	5.02	18	32	50	0.64
1	623	Central Freshwater Marsh	Sand	1.37	4	6	10	0.60
1	633	Centra Dune Scrub	Sand	0.5	7	10	17	0.59
1	598	Wildflower Field	Sand	0.8	16	21	37	0.57
1	552	Central Dune Scrub	Sand	0.52	17	22	39	0.56
1	C140	Non-Indigenous Forest	Sand	0.4	14	18	32	0.56
1	319	Northern Foredune	Sand	2.17	21	26	47	0.55
1	643	Central Coast Live Oak Riparian Forest	Sand	1.31	9	11	20	0.55
1	607	Central Dune Scrub	Sand	1.39	26	30	56	0.54
1	570	Non-Native Grasslands	Sand	1.4	8	9	17	0.53
	CP170	Non-Indigenous Forest	Sand	20.5	22	24	46	0.52
	680	Prairie	Serpentine	0.91	52	56	108	0.52
1	66	North Coastal Scrub	Serpentine	0.74	14	15	29	0.52
1	14	North Coastal Scrub	Serpentine	3.62	40	42	82	0.51
1	P135	Non-Indigenous Forest	Serpentine	5.6	28	28	56	0.50
1	281	Non-Native Grasslands	Serpentine	1.41	12	12	24	0.50
1	588	Non-Native Grasslands	Sand	0.87	8	8	16	0.50
1	538	Non-Native Grasslands	Sand	3.09	19	18	37	0.49
1	379	Northern Foredune	Sand	4.22	22	20	42	0.48
1	428	Central Dune Scrub	Sand	2.02	17	15	32	0.47
1	677	Prairie	Serpentine	5.41	42	37	79	0.47
1	45	Prairie	Serpentine	0.96	25	21	46	0.46
1	353	Centra Dune Scrub	Sand	0.34	15	12	27	0.44
1	273	Central Dune Scrub	Sand	10.1	64	49	113	0.43
1	C119	Non-Indigenous Forest	Sand	2.1	21	16	37	0.43
1	595	Willow Forest	Sand	2.5	19	14	33	0.42
1	675A	North Coastal Scrub	Serpentine	9.2	54	38	92	0.41
1	366	Central Dune Scrub	Sand	7.68	23	16	39	0.41
1	436	Wildflower Field	Sand	0.34	16	11	27	0.41
1	587	Coastal Live Oak Woodland	Sand	0.19	6	4	10	0.40
1	266	Coastal Terrace Prairie	Serpentine	0.92	53	33	86	0.38
1	563	Central Coast Riparian Scrub	Sand	0.47	15	9	24	0.38
	652	Non-Native Grasslands	Sand	0.99	10	6	16	0.38
	341	Wildflower Field	Sand	0.88	22	13	35	0.37

Table 27

	Polygon	Natural Community	Substrate	Area	Ind	N-Ind	Total	N-Ind/Tot
1	P120	Non-Indigenous Forest	Sand	2.6	22	13	35	0.37
1	679	Wildflower Field	Serpentine	0.63	23	13	36	0.36
1	644	Prairie	Serpentine	1.81	41	23	64	0.36
1	625	Centra Dune Scrub	Sand	1.56	18	10	28	0.36
1	675B	North Coastal Scrub	Serpentine	10.3	40	22	62	0.35
1	354	Wildflower Field	Sand	1.44	20	11	31	0.35
1	302	Central Dune Scrub	Sand	5.54	54	29	83	0.35
1	674A	North Coastal Bluff Scrub	Serpentine	5.62	54	29	83	0.35
1	676	North Coastal Bluff Scrub	Serpentine	0.19	15	8	23	0.35
1	675C	North Coastal Scrub	Serpentine	7.96	34	18	52	0.35
1	649	Wildflower Field	Sand	0.9	21	11	32	0.34
1	62	North Coastal Scrub	Serpentine	0.48	27	14	41	0.34
1	653	Willow Forest	Sand	5.41	18	9	27	0.33
1	CP(675)	Non-Indigenous Forest	Serpentine	1.98	15	7	22	0.32
1	586	Wildflower Field	Sand	0.39	11	5	16	0.31
1	674C	North Coastal Bluff Scrub	Serpentine	4.91	62	28	90	0.31
1	578	Wildflower Field	Sand	0.94	17	7	24	0.29
1	35	North Coastal Bluff Scrub	Serpentine	0.83	20	8	28	0.29
1	4	North Coastal Bluff Scrub	Serpentine	2.76	28	11	39	0.28
1	543	Centra Dune Scrub	Sand	2.17	17	6	23	0.26
1	585	Coastal Live Oak Woodland	Sand	0.57	17	6	23	0.26
1	502	Coastal Live Oak Woodland	Serpentine	0.14	13	4	17	0.24
1	674B	North Coastal Bluff Scrub	Serpentine	5.31	46	14	60	0.23
1	8	North Coastal Scrub	Serpentine	1.85	25	7	32	0.22
1	161	North Coastal Bluff Scrub	Serpentine	0.29	18	5	23	0.22
1	180	North Coastal Bluff Scrub	Serpentine	0.54	18	5	23	0.22
1	557	Wildflower Field	Sand	0.34	12	3	15	0.20
1	263	Coastal Terrace Prairie	Serpentine	1.37	37	9	46	0.20
1	391	Wildflower Field	Sand	0.28	11	2	13	0.15

Table 28

Polygons Arrayed in Descending Order by Number of Non-Indigenous per Polygon

	Polygon	Natural Community	Substrate	Area	Ind	N-Ind	Total	N-Ind/Tot
1	680	Prairie	Serpentine	0.91	52	56	108	0.52
1	C131	Non-Indigenous Forest	Serpentine	12.6	21	51	72	0.71
1	273	Central Dune Scrub	Sand	10.1	64	49	113	0.43
1	14	North Coastal Scrub	Serpentine	3.62	40	42	82	0.51
1	675A	North Coastal Scrub	Serpentine	9.2	54	38	92	0.41
1	677	Prairie	Serpentine	5.41	42	37	79	0.47
1	266	Coastal Terrace Prairie	Serpentine	0.92	53	33	86	0.38
1	648	Non-Native Grasslands	Sand	5.02	18	32	50	0.64
1	607	Central Dune Scrub	Sand	1.39	26	30	56	0.54
1	302	Central Dune Scrub	Sand	5.54	54	29	83	0.35
1	674A	North Coastal Bluff Scrub	Serpentine	5.62	54	29	83	0.35
1	P135	Non-Indigenous Forest	Serpentine	5.6	28	28	56	0.50
1	674C	North Coastal Bluff Scrub	Serpentine	4.91	62	28	90	0.31
1	E201	Non-Indigenous Forest	Sand	5.9	8	27	35	0.77
1	319	Northern Foredune	Sand	2.17	21	26	47	0.55
1	CP170	Non-Indigenous Forest	Sand	20.5	22	24	46	0.52
1	644	Prairie	Serpentine	1.81	41	23	64	0.36
1	C139	Non-Indigenous Forest	Serpentine	0.8	9	22	31	0.71
	552	Central Dune Scrub	Sand	0.52	17	22	39	0.56
	675B	North Coastal Scrub	Serpentine	10.3	40	22	62	0.35
1	598	Wildflower Field	Sand	0.8	16	21	37	0.57
1	45	Prairie	Serpentine	0.96	25	21	46	0.46
1	379	Northern Foredune	Sand	4.22	22	20	42	0.48
1	594	Wildflower Field	Sand	3.32	6	19	25	0.76
1	40	Northern Foredune	Sand	2.05	8	19	27	0.70
1	E130	Non-Indigenous Forest	Serpentine	4.6	10	19	29	0.66
1	C140	Non-Indigenous Forest	Sand	0.4	14	18	32	0.56
1	538	Non-Native Grasslands	Sand	3.09	19	18	37	0.49
1	675C	North Coastal Scrub	Serpentine	7.96	34	18	52	0.35
1	54	Northern Foredune	Sand	0.61	5	17	22	0.77
1	C119	Non-Indigenous Forest	Sand	2.1	21	16	37	0.43
1	366	Central Dune Scrub	Sand	7.68	23	16	39	0.41
1	66	North Coastal Scrub	Serpentine	0.74	14	15	29	0.52
1	428	Central Dune Scrub	Sand	2.02	17	15	32	0.47
1	595	Willow Forest	Sand	2.5	19	14	33	0.42
1	62	North Coastal Scrub	Serpentine	0.48	27	14	41	0.34
1	674B	North Coastal Bluff Scrub	Serpentine	5.31	46	14	60	0.23
1	341	Wildflower Field	Sand	0.88	22	13	35	0.37
1	P120	Non-Indigenous Forest	Sand	2.6	22	13	35	0.37
1	679	Wildflower Field	Serpentine	0.63	23	13	36	0.36
	281	Non-Native Grasslands	Serpentine	1.41	12	12	24	0.50
	353	Centra Dune Scrub	Sand	0.34	15	12	27	0.44

Table 28

	Polygon	Natural Community	Substrate	Area	Ind	N-Ind	Total	N-Ind/Tot
1	643	Riparian Forest	Sand	1.31	9	11	20	0.55
1	436	Wildflower Field	Sand	0.34	16	11	27	0.41
1	354	Wildflower Field	Sand	1.44	20	11	31	0.35
1	649	Wildflower Field	Sand	0.9	21	11	32	0.34
1	4	North Coastal Bluff Scrub	Serpentine	2.76	28	11	39	0.28
1	E(14)	Non-Indigenous Forest	Serpentine	1.42	5	10	15	0.67
1	633	Centra Dune Scrub	Sand	0.5	7	10	17	0.59
1	625	Centra Dune Scrub	Sand	1.56	18	10	28	0.36
1	570	Non-Native Grasslands	Sand	1.4	8	9	17	0.53
1	563	Central Coast Riparian Scrub	Sand	0.47	15	9	24	0.38
1	653	Willow Forest	Sand	5.41	18	9	27	0.33
1	263	Coastal Terrace Prairie	Serpentine	1.37	37	9	46	0.20
1	588	Non-Native Grasslands	Sand	0.87	8	8	16	0.50
1	676	North Coastal Bluff Scrub	Serpentine	0.19	15	8	23	0.35
1	35	North Coastal Bluff Scrub	Serpentine	0.83	20	8	28	0.29
1	CP(675)	Non-Indigenous Forest	Serpentine	1.98	15	7	22	0.32
1	578	Wildflower Field	Sand	0.94	17	7	24	0.29
1	8	North Coastal Scrub	Serpentine	1.85	25	7	32	0.22
1	623	Central Freshwater Marsh	Sand	1.37	4	6	10	0.60
1	652	Non-Native Grasslands	Sand	0.99	10	6	16	0.38
1	543	Centra Dune Scrub	Sand	2.17	17	6	23	0.26
1	585	Coastal Live Oak Woodland	Sand	0.57	17	6	23	0.26
1	586	Wildflower Field	Sand	0.39	11	5	16	0.31
1	161	North Coastal Bluff Scrub	Serpentine	0.29	18	5	23	0.22
1	180	North Coastal Bluff Scrub	Serpentine	0.54	18	5	23	0.22
1	587	Coastal Live Oak Woodland	Sand	0.19	6	4	10	0.40
1	502	Coastal Live Oak Woodland	Serpentine	0.14	13	4	17	0.24
1	557	Wildflower Field	Sand	0.34	12	3	15	0.20
1	391	Wildflower Field	Sand	0.28	11	2	13	0.15

Non-Indigenous Species Occurring in Northern Foredune Natural Communities							
LIFE FORM		**SPECIES**		**POLYGONS**			
			Freq.	**40**	**54**	**319**	**379**
Annual Herb		Hedypnois cretica	4	X	X	X	X
Annual Herb		Medicago polymorpha	4	X	X	X	X
Annual Herb		Raphanus sativus	4	X	X	X	X
Annual Grass		Bromus diandrus	4	X	X	X	X
Annual Grass		Hordeum murinum ssp. leporinum	4	X	X	X	X
Perennial Herb		Carpobrotus edulis	3		X	X	X
Perennial Herb		Plantago coronopus	3	X	X		X
Perennial Herb		Plantago lanceolata	3	X	X		X
Perennial Herb		Tetragonia tetragonioides	3		X	X	X
Annual Herb		Sonchus oleraceus	3	X	X		X
Perennial Herb		Conicosia pugioniformis	2			X	X
Perennial Herb		Convolvulus arvensis	2	X	X		
Perennial Herb		Lobularia maritima	2			X	X
Perennial Herb		Oxalis pes-carpae	2	X	X		
Perennial Herb		Senecio elegans	2			X	X
Annual Herb		Anagallis arvensis	2			X	X
Annual Herb		Cakile edulenta	2			X	X
Annual Herb		Carduus pycnocephalus	2	X		X	
nnual Herb		Hypochaeris glabra	2	X	X		
nnual Herb		Malva nicaeensis	2	X	X		
Annual Herb		Melilotus indica	2			X	X
Annual Herb		Poa annua	2	X		X	
Annual Grass		Avena barbata	2	X	X		
Annual Grass		Avena fatua	2			X	X
Annual Grass		Lolium perenne	2	X		X	
Vine		Senecio mikanoides	1	X			
Tree		Cupressus macrocarpa	1			X	
Perennial Grass	(W)	Agrostis gigantea	1			X	
Perennial Grass		Ammophila arenaria	1				X
Annual Herb		Chamomilla suaveolens	1	X			
Annual Herb		Chrysanthemum coronarium	1	X			
Annual Herb		Erodium botrys	1		X		
Annual Herb		Erodium cicutarium	1			X	
Annual Herb		Geranium pusillum	1			X	
Annual Herb		Gnaphalium luteo-album	1			X	
Annual Herb		Stellaria media	1			X	
Annual Grass		Bromus hordaceus	1			X	
Annual Grass		Cynodon dactylon	1		X		
Annual Grass		Hordeum vulgare	1			X	
Annual Grass		Lagurus ovatus	1				X
nnual Grass		Lolium multiflorum	1			X	

Table 29

LIFE FORM		SPECIES		POLYGONS			
			Freq.	40	54	319	379
Annual Grass		Vulpia bromoides	1				X
		Total Species Per Polygon		19	17	26	20
Non-Indigenous Life Forms Occurring in Northern Foredune Natural Communities							
		Annual Grass	11				
		Annual Herb	18				
		Perennial Grass	2				
		Perennial Herb	9				
		Geophyte	0				
		Fern	0				
		Sub-Shrub	0				
		Shrub	0				
		Vine	1				
		Tree	1				
		(Wetland)	1				
		Total	**42**				

Table 30

'on-Indigenous Species Occurring in Coastal Ter. ace Prairie Communities

LIFE FORM		SPECIES		POLYGON	
			Freq.	263	266.
Perennial Herb		Plantago lanceolata	2	X	X
Annual Herb		Anagallis arvensis	2	X	X
Annual Grass		Bromus hordaceus	2	X	X
Annual Grass		Lolium perenne	2	X	X
Vine		Senecio mikanoides	1		X
Tree		Cupressus macrocarpa	1		X
Tree		Pinus radiata	1		X
Shrub		Cotoneaster pannosa	1		X
Perennial Herb		Brassica nigra	1		X
Perennial Herb		Carpobrotus edulis	1		X
Perennial Herb		Erechtites glomeratus	1		X
Perennial Herb		Hypochaeris radicata	1		X
Perennial Herb		Silybum marianum	1	X	
Perennial Grass	(W)	Agrostis gigantea	1		X
Perennial Grass		Cortaderia jubata	1		X
Annual Herb		Carduus pycnocephalus	1		X
Annual Herb		Cirsium vulgare	1		X
Annual Herb		Erodium cicutarium	1	X	
Annual Herb		Galium aparine	1	X	
Annual Herb		Geranium dissectum	1		X
Annual Herb		Hypochaeris glabra	1		X
Annual Herb		Medicago polymorpha	1		X
Annual Herb		Melilotus indica	1		X
Annual Herb		Raphanus sativus	1		X
Annual Herb		Rumex acetosella	1		X
Annual Herb		Rumex crispus	1		X
Annual Herb		Silene gallica	1		X
Annual Herb		Sonchus oleraceus	1		X
Annual Herb		Vicia sativa	1		X
Annual Grass		Aira caryophylla	1		X
Annual Grass		Avena barbata	1	X	
Annual Grass		Avena fatua	1		X
Annual Grass		Briza minor	1		X
Annual Grass		Bromus diandrus	1		X
Annual Grass		Holcus lanatus	1		X
Annual Grass		Hordeum murinum ssp. leporinum	1		X
Annual Grass		Lolium temulentum	1		X
Annual Grass		Vulpia bromoides	1	X	
		Total Species Per Polygon		9	33

Table 30

Non-Indigenous Life Forms Occurring in Coastal Terrace Prairie

Annual Grass	11
Annual Herb	15
Perennial Grass	2
Perennial Herb	6
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	1
Tree	2
(Wetland)	1
Total	**38**

		Non-Indigenous Species Occurring in Northern Coastal Bluff Scrub Natural Communities									
LIFE FORM		SPECIES		POLYGON							
			Freq.	4	35	161	180	674A	674B	674C	676
Annual Herb		Erodium cicutarium	5			X	X	X	X	X	
Annual Herb		Senecio vulgaris	5			X	X	X	X	X	
Perennial Herb		Carpobrotus edulis	4		X			X		X	X
Perennial Herb		Plantago coronopus	4	X				X	X	X	
Perennial Herb		Plantago lanceolata	4			X	X		X	X	
Vine		Senecio mikanoides	3	X					X	X	
Tree		Cupressus macrocarpa	3	X					X		X
Tree		Pinus radiata	3	X					X	X	
Shrub		Ceanothus griseus	3					X	X	X	
Perennial Herb		Senecio elegans	3					X	X	X	
Perennial Grass		Cortaderia jubata	3					X	X		X
Annual Herb		Anagallis arvensis	3			X	X			X	
Annual Herb	(W)	Erechtites minima	3					X	X	X	
Annual Herb		Poa annua	3					X	X	X	
Tree		Acacia longifolia	2					X			X
Shrub		Myoporum laetum	2					X		X	
Perennial Herb		Plantago major	2					X			X
Perennial Grass	(W)	Agrostis gigantea	2					X		X	
Annual Herb		Carduus pycnocephalus	2					X		X	
Annual Herb		Chrysanthemum coronarium	2			X	X				
Annual Herb		Cotula australis	2					X		X	
Annual Herb	(W)	Cotula coronopifolia	2					X		X	
Annual Herb		Raphanus sativus	2					X		X	
Annual Herb		Rumex acetosella	2					X		X	
Annual Herb		Sonchus oleraceus	2					X			X
Annual Herb		Stellaria media	2	X						X	
Annual Grass		Lolium multiflorum	2					X	X		
Annual Grass		Polypogon monspeliensis	2					X		X	

Table 31

LIFE FORM		SPECIES		POLYGON						
			Freq.	4	35	161	180	674A	674B	674C	676
Annual Grass		Vulpia bromoides	2					X			X
Vine		Muehlenbeckia complexa	1	X							
Shrub		Cotoneaster pannosa	1		X						
Shrub		Escallonia macrantha	1	X							
Perennial Herb		Conicosia pugioniformis	1							X	
Perennial Herb		Hypochaeris radicata	1								X
Perennial Herb		Lobularia maritima	1					X			
Perennial Herb		Oxalis pes-carpae	1							X	
Perennial Herb		Ranunculus muricatus	1	X							
Perennial Herb		Rorippa nasturtium-aquaticum	1					X			
Perennial Herb		Tropaeolum majus	1	X							
Perennial Herb		Vinca major	1	X							
Perennial Grass		Agrostis capillaris	1		X						
Perennial Grass		Hainardia cylindrica	1					X			
Annual Herb		Cakile edulenta	1							X	
Annual Herb		Chenopodium murale	1					X			
Annual Herb		Cirsium vulgare	1					X			
Annual Herb		Coronopus didymus	1						X		
Annual Herb		Lotus corniculatus	1							X	
Annual Herb		Melilotus indica	1					X			
Annual Herb		Rumex crispus	1		X						
Annual Herb		Sinapis arvensis	1					X			
Annual Grass		Aira caryophylla	1		X						
Annual Grass		Avena barbata	1		X						
Annual Grass		Avena fatua	1		X						
Annual Grass		Bromus diandrus	1							X	
Annual Grass		Bromus hordaceus	1							X	
Annual Grass		Holcus lanatus	1		X						
Annual Grass		Hordeum murinum ssp. leporinum	1							X	
		Total Species per Polygon		10	8	5	5	29	14	28	8

Table 31

Non-Indigenous Life Forms in Northern Coastal Bluff Scrub

Annual Grass	10
Annual Herb	21
Perennial Grass	4
Perennial Herb	13
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	4
Vine	2
Tree	3
(Wetland)	3
Total Species	**0**

Table 32

Non-Indigenous Species Occurring in Northern Coastal Scrub Natural Communities

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Tree		Cupressus macrocarpa	6	X	X	X		X	X	X
Vine		Senecio mikanioides	5	X	X			X	X	X
Annual Herb		Raphanus sativus	5	X	X			X	X	X
Annual Herb		Sonchus oleraceus	5		X	X		X	X	X
Annual Herb		Stellaria media	5	X	X			X	X	X
Tree		Acacia longifolia	4	X	X	X		X		
Shrub		Cotoneaster pannosa	4		X	X	X			X
Perennial Herb		Carpobrotus edulis	4			X		X	X	X
Perennial Herb		Conium maculatum	4		X			X	X	X
Perennial Herb		Plantago lanceolata	4		X		X	X	X	
Perennial Grass		Cortaderia jubata	4	X		X	X	X		
Annual Herb		Galium aparine	4		X			X	X	X
Annual Herb		Geranium dissectum	4		X			X	X	X
Annual Herb		Rumex acetosella	4	X	X		X	X		
Annual Grass		Bromus diandrus	4		X			X	X	X
Annual Grass		Hordeum murinum ssp. leporinum	4		X			X	X	X
Perennial Herb		Brassica nigra	3		X		X	X		
Perennial Herb		Erechtites glomeratus	3			X	X	X		
Perennial Herb		Hypochaeris radicata	3		X		X	X		
Perennial Herb		Oxalis pes-carpae	3		X				X	X
Annual Herb		Anagallis arvensis	3		X			X	X	
Annual Herb		Carduus pycnocephalus	3		X	X		X		
Annual Herb		Malva parviflora	3					X	X	X
Annual Grass		Holcus lanatus	3			X	X	X		
Tree		Pinus radiata	2						X	X
Subshrub		Echium candicans	2	X	X					
Perennial Herb		Foeniculum vulgare	2			X		X		
Perennial Herb		Lobularia maritima	2		X				X	

Table 32

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Annual Herb		Cirsium vulgare	2			X		X		
Annual Herb		Erodium cicutarium	2		X				X	
Annual Herb		Medicago polymorpha	2		X		X			
Annual Herb		Melilotus indica	2				X	X		
Annual Herb		Poa annua	2		X				X	
Annual Herb		Vicia sativa	2		X		X			
Annual Grass		Avena barbata	2		X	X				
Annual Grass		Avena fatua	2		X			X		
Annual Grass		Polypogon monspeliensis	2		X		X			
Vine		Hedera helix	1					X		
Vine		Rubus discolor	1					X		
Tree		Eucalyptus globulus	1						X	
Shrub		Ceanothus griseus	1							X
Shrub		Coprosma repens	1		X					
Shrub		Genista monspessulanus	1		X					
Shrub		Lavatera arborea	1		X					
Shrub		Myoporum laetum	1					X		
Shrub		Pittosporum crassifolium	1		X					
Perennial Herb		Plantago coronopus	1				X			
Perennial Herb		Plantago major	1					X		
Perennial Herb		Tropaeolum majus	1		X					
Perennial Herb		Vinca major	1							X
Perennial Grass		Allium triquetrum	1						X	
Perennial Grass		Festuca arundinacea	1				X			
Annual Herb		Anthriscus caucaulis	1		X					
Annual Herb		Brassica rapa	1		X					
Annual Herb		Centranthus ruber	1			X				
Annual Herb		Cerastium glomeratum	1		X					
Annual Herb		Chamomilla suaveolens	1		X					
Annual Herb		Cotula australis	1							X
Annual Herb	(W)	Cotula coronopifolia	1				X			

Table 32

LIFE FORM		SPECIES		POLYGONS						
			Total	8	14	62W	66W	675A	675B	675C
Annual Herb		Gnaphalium luteo-album	1					X		
Annual Herb		Hypochaeris glabra	1			X				
Annual Herb		Malva sylvestris	1		X					
Annual Herb		Rumex conglomeratus	1					X		
Annual Herb		Rumex crispus	1		X					
Annual Herb		Senecio vulgaris	1						X	
Annual Herb		Silene gallica	1					X		
Annual Herb		Sinapis arvensis	1					X		
Annual Grass		Aira caryophylla	1					X		
Annual Grass		Briza maxima	1					X		
Annual Grass		Bromus stamineus	1		X					
Annual Grass		Lolium multiflorum	1		X					
Annual Grass		Lolium perenne	1					X		
Annual Grass		Vulpia bromoides	1					X		
		Total Species per Polygon		8	41	14	15	38	22	18
	Non-Indigenous Life Forms Occurring in Northern Coastal Scrub Natural Communities									
		Annual Grass	12							
		Annual Herb	30							
		Perennial Grass	3							
		Perennial Herb	13							
		Geophyte	0							
		Fern	0							
		Sub-Shrub	1							
		Shrub	7							
		Vine	3							
		Tree	4							
		(Wetland)	1							
		Total	**73**							

Table 33

Non-Indigenous Species Occurring in Coastal Terrace Prairie Communities

LIFE FORM		SPECIES		POLYGONS	
			Freq.	263	266
Perennial Herb		Plantago lanceolata	2	X	X
Annual Herb		Anagallis arvensis	2	X	X
Annual Grass		Bromus hordaceus	2	X	X
Annual Grass		Lolium perenne	2	X	X
Vine		Senecio mikanoides	1		X
Tree		Cupressus macrocarpa	1		X
Tree		Pinus radiata	1		X
Shrub		Cotoneaster pannosa	1		X
Perennial Herb		Brassica nigra	1		X
Perennial Herb		Carpobrotus edulis	1		X
Perennial Herb		Erechtites glomeratus	1		X
Perennial Herb		Hypochaeris radicata	1		X
Perennial Herb		Silybum marianum	1	X	
Perennial Grass	(W)	Agrostis gigantea	1		X
Perennial Grass		Cortaderia jubata	1		X
Annual Herb		Carduus pycnocephalus	1		X
Annual Herb		Cirsium vulgare	1		X
Annual Herb		Erodium cicutarium	1	X	
Annual Herb		Galium aparine	1	X	
Annual Herb		Geranium dissectum	1		X
Annual Herb		Hypochaeris glabra	1		X
Annual Herb		Medicago polymorpha	1		X
Annual Herb		Melilotus indica	1		X
Annual Herb		Raphanus sativus	1		X
Annual Herb		Rumex acetosella	1		X
Annual Herb		Rumex crispus	1		X
Annual Herb		Silene gallica	1		X
Annual Herb		Sonchus oleraceus	1		X
Annual Herb		Vicia sativa	1		X
Annual Grass		Aira caryophylla	1		X
Annual Grass		Avena barbata	1	X	
Annual Grass		Avena fatua	1		X
Annual Grass		Briza minor	1		X
Annual Grass		Bromus diandrus	1		X
Annual Grass		Holcus lanatus	1		X
Annual Grass		Hordeum murinum ssp. leporinum	1		X
Annual Grass		Lolium temulentum	1		X
Annual Grass		Vulpia bromoides	1	X	
		Total Species Per Polygon		9	33

Table 33

Non-Indigenous Life Forms Occurring in Coastal Terrace Prairie Communities

Annual Grass	11
Annual Herb	15
Perennial Grass	2
Perennial Herb	6
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	1
Tree	2
(Wetland)	1
Total	**38**

Table 34

Non-Indigenous Life Forms in Serpentine Bunchgrasss Natural Communities

Annual Grass	19
Annual Herb	24
Perennial Grass	2
Perennial Herb	17
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	4
Vine	3
Tree	10
(Wetland)	2
Total	**79**

Table 35

Non-Indigenous Species Occurring in the Dune Wildflower Field Natural Community

LIFE FORM	SPECIES		POLYGONS								
		Total	341	354	391	436	557	578	586	598	649
Perennial Herb	Carpobrotus edulis	6	X	X		X			X	X	X
Annual Herb	Rumex acetosella	5		X		X		X		X	X
Annual Grass	Hordeum murinum ssp. leporinum	5	X	X				X	X	X	
Annual Herb	Senecio vulgaris	4				X		X		X	X
Perennial Herb	Oxalis pes-carpae	4		X		X		X		X	
Annual Grass	Bromus diandrus	4	X	X						X	X
Annual Grass	Avena fatua	4	X	X						X	X
Annual Herb	Vicia sativa	3		X						X	X
Annual Herb	Stellaria media	3	X	X		X					
Annual Herb	Sonchus oleraceus	3	X	X						X	
Annual Herb	Hypochaeris glabra	3	X							X	
Perennial Herb	Conicosia pugioniformis	3			X		X				X
Annual Herb	Spergularia arvensis ssp. arvensis	2						X		X	
Annual Herb	Raphanus sativus	2							X	X	
Perennial Herb	Plantago coronopus	2				X				X	
Tree	Pinus radiata	2		X						X	
Annual Herb	Malva parviflora	2				X				X	
Annual Grass	Lolium perenne	2	X		X						
Annual Herb	Erodium cicutarium	2						X		X	
Annual Herb	Erodium botrys	2								X	X
Tree	Cupressus macrocarpa	2	X						X		
Annual Grass	Briza maxima	2	X				X				
Annual Grass	Avena barbata	2						X	X		
Annual Grass	Vulpia myuros var. hirsuta	1								X	
Annual Grass	Vulpia myuros var myuros	1	X								
Annual Grass	Vulpia bromoides	1									X
Perennial Herb	Tetragonia tetragonioides	1				X					

Table 35

LIFE FORM	SPECIES	POLYGONS									
		Total	341	354	391	436	557	578	586	598	649
Annual Herb	Polygonum arenastrum	1					X				
Annual Herb	Poa annua	1								X	
Perennial Herb	Plantago lanceolata	1								X	
Annual Herb	Medicago polymorpha	1								X	
Annual Grass	Lolium temulentum	1	X								
Annual Herb	Gnaphalium luteo-album	1				X					
Annual Herb	Geranium dissectum	1		X							
Annual Herb	Galium aparine	1				X					
Perennial Herb	Conium maculatum	1				X					
Shrub	Ceanothus griseus	1	X								
Annual Herb	Cakile edulenta	1									X
	Total Species per Polygon		13	11	2	11	3	7	5	21	11

Non-Indigenous Life Forms in Dune Wildflower Field Natural Communities

Annual Grass	10
Annual Herb	18
Perennial Grass	0
Perennial Herb	7
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	0
Tree	2
(Wetland)	0
Total	**38**

Non-Indigenous Species in Serpentine Wildflower Field Natural Community			
Life Form	**Wet**	**Species**	**Polygons**
			679
Annual Grass		Avena barbata	X
Annual Herb		Cotula australis	X
Annual Herb		Erodium moschatum	X
Annual Grass		Hordeum marinum ssp gossoneanum	X
Perennial Herb		Hypochaeris radicata	X
Annual Grass		Lolium multiflorum	X
Annual Grass		Lolium perenne	X
Annual Herb		Medicago polymorpha	X
Perennial Herb		Plantago lanceolata	X
Annual Herb		Polygonum arenastrum	X
Annual Herb		Spergularia rubra	X
Annual Herb		Stellaria media	X
Annual Herb		Vicia sativa	X
			13

Non-Indigenous Life Forms in Serpentine Wildflower Field Natural Community

Annual Grass	4
Annual Herb	7
Perennial Grass	0
Perennial Herb	2
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	0
Vine	0
Tree	0
(Wetland)	0
Total	**13**

Non-	genous Species Occurring in the Dune Non-Native Gras		l Community					
LIFE FORM		**SPECIES**		**POLYGONS**				
			Total	594	538	570	588	648	652
Annual Herb		Raphanus sativus	6	X	X	X	X	X	X
Annual Herb		Vicia sativa	5	X	X	X	X	X	
Perennial Herb		Carpobrotus edulis	4		X		X	X	X
Perennial Herb		Oxalis pes-carpae	4	X	X		X	X	
Annual Herb		Geranium dissectum	4		X	X	X	X	
Annual Herb		Malva parviflora	4	X	X	X		X	
Annual Herb		Rumex acetosella	4		X		X	X	X
Annual Herb		Stellaria media	4		X	X	X	X	
Perennial Herb		Conium maculatum	3	X	X	X			
Perennial Herb		Plantago lanceolata	3	X	X			X	
Annual Herb		Cotula australis	3	X		X		X	
Annual Herb		Poa annua	3		X		X	X	
Vine		Hedera helix	2	X				X	
Tree		Pinus radiata	2		X			X	
Perennial Herb		Bellis perennis	2	X				X	
Perennial Herb		Conicosia pugioniformis	2					X	X
Perennial Herb		Taraxacum officinale	2	X				X	
Annual Herb		Capsella bursa-pastoris	2	X				X	
Annual Herb		Medicago polymorpha	2	X				X	
Annual Grass		Bromus diandrus	2					X	X
Vine		Rubus discolor	1	X					
Vine		Senecio mikanoides	1	X					
Tree		Acacia mearnsii	1		X				
Tree		Cupressus macrocarpa	1		X				
Tree		Eucalyptus globulus	1	X					
Shrub		Myoporum laetum	1		X				
Perennial Herb		Hirschfeldia incana	1					X	
Perennial Herb		Plantago coronopus	1					X	
Perennial Herb		Solanum aviculare	1	X					
Perennial Grass		Allium triquetrum	1		X				
Annual Herb		Anagallis arvensis	1	X					
Annual Herb		Cerastium glomeratum	1	X					

LIFE FORM	SPECIES	POLYGONS						
		Total	594	538	570	588	648	652
Annual Herb	Conyza floribunda	1			X			
Annual Herb	Erodium botrys	1					X	
Annual Herb	Erodium cicutarium	1					X	
Annual Herb	Erodium moschatum	1					X	
Annual Herb	Euphorbia peplus	1					X	
Annual Herb	Galium aparine	1		X				
Annual Herb	Hypochaeris glabra	1					X	
Annual Herb	Rumex pulcher	1						X
Annual Herb	Spergularia arvensis ssp. arvensis	1					X	
Annual Herb	Trifolium repens	1					X	
Annual Herb	Veronica filiformis	1	X					
Annual Grass	Aira caryophylla	1					X	
Annual Grass	Avena barbata	1			X			
Annual Grass	Avena fatua	1					X	
Annual Grass	Briza minor	1		X				
Annual Grass	Hordeum murinum ssp. leporinum	1					X	
Annual Grass	Vulpia myuros var myuros	1					X	
	Total Species per Polygon		19	18	9	8	32	6

Non-Indigenous Life Forms in Dune Non-Native Grassland Communities

Annual Grass	7
Annual Herb	23
Perennial Grass	1
Perennial Herb	10
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	1
Vine	3
Tree	4
(Wetland)	0
Total	**49**

on-Indigenous Species in Serpentine Non-Native Grassland

Life Forms		Species	Polygon
			281
Perennial Herb		Hypochaeris radicata	X
Perennial Herb		Plantago lanceolata	X
Perennial Grass	(W)	Agrostis gigantea	X
Perennial Grass		Agrostis tenuis	X
Perennial Herb		Conium maculatum	X
Tree		Cupressus macrocarpa	X
Perennial Grass		Ehrharta erecta	X
Vine		Hedera helix	X
Annual Grass		Holcus lanatus	X
Tree		Pinus radiata	X
Annual Herb		Raphanus sativus	X
Annual Herb		Rumex acetosella	X
			12

Non-Indigenous Life Forms in Serpentine Non-Native Grassland

Annual Grass	1
Annual Herb	2
Perennial Grass	3
Perennial Herb	3
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	0
Vine	1
Tree	2
(Wetland)	1
Total	**12**

Table 39

Non-Indigenous Species Occurring in Dune Native Woodland Natural Communities									
LIFE FORM		**SPECIES**		**POLYGONS**					
			Total	585	587	595	653W	643	563
Perennial Herb		Carpobrotus edulis	4	X	X			X	X
Vine		Hedera helix	3			X	X	X	
Tree		Pinus radiata	3	X				X	X
Annual Herb		Raphanus sativus	3			X		X	X
Vine		Senecio mikanoides	2			X		X	
Tree		Acacia longifolia	2		X			X	
Tree		Eucalyptus globulus	2			X		X	
Perennial Herb		Conium maculatum	2			X	X		
Annual Herb		Carduus pycnocephalus	2			X		X	
Annual Herb		Geranium dissectum	2	X					X
Annual Herb		Vicia villosa	2			X		X	
Annual Grass		Avena barbata	2			X			X
Vine		Muehlenbeckia complexa	1			X			
Vine		Rubus discolor	1				X		
Tree	(W)	Alnus rubra	1			X			
Perennial Herb		Conicosia pugioniformis	1		X				
Perennial Herb		Nasturtium officionalis	1			X			
Perennial Herb		Plantago coronopus	1						X
Perennial Herb		Plantago lanceolata	1						X
Perennial Herb		Solanum aviculare	1				X		
Perennial Herb		Tropaeolum majus	1			X			
Perennial Herb	(W)	Zantedeschia aethiopica	1			X			
Perennial Grass	(W)	Agrostis viridis	1				X		
Perennial Grass		Festuca arundinacea	1						X
Annual Herb		Galium aparine	1	X					
Annual Herb		Gnaphalium luteo-album	1		X				
Annual Herb		Malva parviflora	1			X			
Annual Herb		Rumex acetosella	1	X					

LIFE FORM		SPECIES		POLYGONS					
			Total	585	587	595	653W	643	563
Annual Herb		Rumex conglomeratus	1				X		
Annual Herb		Sonchus oleraceus	1				X		
Annual Herb		Stellaria media	1	X					
Annual Grass		Anthoxanthum oderatum	1						X
Annual Grass		Avena fatua	1					X	
Annual Grass		Briza maxima	1					X	
Annual Grass		Cynosorus echinatus	1				X		
Annual Grass		Holcus lanatus	1				X		
		Total Species per Polygon		6	4	14	9	11	9
Non-Indigenous Life Forms Occurring in Dune Native Woodland Natural Communities									
		Annual Grass	6						
		Annual Herb	11						
		Perennial Grass	2						
		Perennial Herb	9						
		Geophyte	0						
		Fern	0						
		Sub-Shrub	0						
		Shrub	0						
		Vine	4						
		Tree	4						
		(Wetland)	3						
		Total	**36**						

Non-Indigenous Species Occurring in Serpentine Native Woodland Natural Communities

LIFE FORM		SPECIES	POLYGONS
			502W
Tree	(W)	Acer macrophyllum	1
Perennial Grass	(W)	Agrostis viridis	1
Annual Grass		Cynosurus echinatus	1
Annual Herb		Lactuca saligna	1
		Total	**4**

Non-Indigenous Life Forms in Serpentine Native Woodland Natural Communities

Annual Grass	1
Annual Herb	1
Perennial Grass	1
Perennial Herb	1
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	0
Vine	0
Tree	0
(Wetland)	2
Total	**4**

Indigenous Species Occurring in Dune Non-Indigenous Forest Communities								
LIFE FORM		**SPECIES**		**POLYGONS**				
			Total	C119	CP170	C140	E201	P120
Annual Grass		Bromus diandrus	5	X	X	X	X	X
Annual Grass		Hordeum murinum ssp. leporinum	5	X	X	X	X	X
Tree		Cupressus macrocarpa	4	X	X		X	X
Tree		Eucalyptus globulus	4		X	X	X	X
Perennial Herb		Carpobrotus edulis	4	X	X	X		X
Annual Herb		Anthriscus caucaulis	4	X	X	X	X	
Annual Herb		Galium aparine	4		X	X	X	X
Annual Herb		Stellaria media	4	X		X	X	X
Annual Grass		Avena fatua	3	X	X			X
Vine		Hedera helix	2		X		X	
Tree		Acacia longifolia	2		X	X		
Perennial Herb		Conicosia pugioniformis	2	X	X			
Perennial Herb		Oxalis pes-carpae	2			X	X	
Perennial Herb		Plantago lanceolata	2			X	X	
Perennial Grass		Ehrharta erecta	2	X	X			
Annual Herb		Euphorbia peplus	2		X	X		
Annual Herb		Geranium dissectum	2		X		X	
Annual Herb		Raphanus sativus	2			X	X	
Annual Herb		Rumex acetosella	2	X				X
Annual Herb		Sonchus oleraceus	2	X				X
Annual Grass		Lolium perenne	2	X				X
Vine		Rubus discolor	1				X	
Vine		Senecio mikanoides	1				X	
Tree		Pinus radiata	1					X
Shrub		Lavatera arborea	1		X			
Shrub		Pittosporum crassifolium	1				X	
Perennial Herb		Brassica nigra	1			X		
Perennial Herb		Conium maculatum	1				X	
Perennial Herb		Lathyrus latifolius	1			X		

LIFE FORM		SPECIES		POLYGONS				
			Total	C119	CP170	C140	E201	P120
Perennial Herb		Oxalis rubra	1				X	
Perennial Herb		Parietaria judaica	1				X	
Perennial Herb		Solanum aviculare	1				X	
Perennial Herb		Tropaeolum majus	1				X	
Perennial Herb		Vinca major	1				X	
Perennial Herb	(W)	Zantedeschia aethiopica	1				X	
Perennial Grass		Allium triquetrum	1				X	
Perennial Grass		Ammophila arenaria	1		X			
Perennial Grass		Cortaderia jubata	1		X			
Perennial Grass		Festuca arundinacea	1	X				
Annual Herb		Carduus pycnocephalus	1			X		
Annual Herb		Cerastium glomeratum	1		X			
Annual Herb		Cirsium vulgare	1				X	
Annual Herb		Cotula australis	1		X			
Annual Herb		Malva parviflora	1			X		
Annual Herb		Medicago polymorpha	1		X			
Annual Herb		Melilotus indica	1		X			
Annual Herb		Rumex pulcher	1			X		
Annual Herb		Silene gallica	1		X			
Annual Herb		Vicia sativa	1				X	
Annual Grass		Briza maxima	1	X				
Annual Grass		Bromus stamineus	1				X	
Annual Grass		Dactylis glomerata	1			X		
Annual Grass		Lagurus ovatus	1		X			
Annual Grass		Lolium multiflorum	1	X				
Annual Grass		Lolium temulentum	1					X
Annual Grass		Polypogon monspeliensis	1				X	
Annual Grass		Vulpia bromoides	1	X				
Annual Grass		Vulpia myuros var. hirsuta	1		X			
		Total Species per Polygon		16	24	18	27	13

Table 41

Life Forms of Non-Indigenous Species Occurring in Dune Non-Indigenous Forest Communities

Annual Grass	13
Annual Herb	18
Perennial Grass	5
Perennial Herb	13
Geophyte	0
Fern	0
Sub-Shrub	0
Shrub	2
Vine	3
Tree	4
(Wetland)	1
Total Species	**0**

Non-Indigenous Species Occurring in Serpentine Non-Indigenous Forests									
LIFE FORM		**SPECIES**	**POLYGONS**						
			Total	C131	C139	E(14)	E130	P135	CP(675)W
Tree		Cupressus macrocarpa	6	X	X	X	X	X	X
Vine		Hedera helix	5	X	X	X	X	X	
Tree		Pinus radiata	4	X		X		X	X
Perennial Herb		Plantago lanceolata	4	X	X			X	X
Annual Herb		Sonchus oleraceus	4	X	X		X	X	
Tree		Acacia longifolia	3	X	X				X
Tree		Eucalyptus globulus	3	X		X	X		
Perennial Herb		Conium maculatum	3	X			X	X	
Perennial Herb		Hypochaeris radicata	3	X	X			X	
Perennial Herb	(W)	Zantedeschia aethiopica	3	X		X	X		
Annual Herb		Anagallis arvensis	3	X	X			X	
Annual Herb		Carduus pycnocephalus	3	X	X			X	
Annual Herb		Galium aparine	3	X			X	X	
Annual Herb		Raphanus sativus	3	X	X			X	
Annual Herb		Rumex acetosella	3	X	X			X	
Annual Herb		Stellaria media	3	X			X	X	
Annual Herb		Vicia sativa	3	X	X			X	
Annual Herb		Poa annua	3	X				2	
Annual Grass		Bromus diandrus	3	X			X	X	
Annual Grass		Holcus lanatus	3		X			X	X
Annual Grass		Hordeum murinum ssp. leporinum	3	X			X	X	
Vine		Senecio mikanoides	2	X		X			
Tree		Pseudotsuga menziesii	2	X				X	
Shrub		Cotoneaster pannosa	2		X			X	
Shrub		Cytisus scoparius	2	X				X	
Shrub		Genista monspessulanus	2	X	X				
Perennial Herb		Oxalis incarnata	2	X			X		
Perennial Herb		Oxalis pes-carpae	2	X			X		
Perennial Grass		Allium triquetrum	2	X			X		
Annual Herb		Anthriscus caucaulis	2	X	X				

Table 42

LIFE FORM		SPECIES	POLYGONS						
			Total	C131	C139	E(14)	E130	P135	CP(675)W
Annual Herb		Geranium dissectum	2	X	X				
Annual Herb		Scandix pecten-veneris	2	X			X		
Annual Grass		Avena fatua	2		X			X	
Annual Grass		Cynosorus echinatus	2		X			X	
Annual Grass		Dactylis glomerata	2	X				X	
Annual Grass		Lolium perenne	2	X				X	
Vine		Rubus discolor	1	X					
Tree		Acacia retinodes	1		X				
Tree	(W)	Salix babylonica	1			X			
Tree		Sequoia sempervirens	1	X					
Tree		Sequoiadendron giganteum	1	X					
Subshrub		Echium candicans	1	X					
Shrub		Ceanothus griseus	1	X					
Shrub		Coprosma repens	1				X		
Shrub		Myoporum laetum	1				X		
Perennial Herb		Bellis perennis	1	X					
Perennial Herb		Borago officinalis	1	X					
Perennial Herb		Carpobrotus edulis	1						X
Perennial Herb		Convolvulus arvensis	1					X	
Perennial Herb		Geranium robertianum	1				X		
Perennial Herb		Lathyrus latifolius	1					X	
Perennial Herb		Plantago major	1	X					
Perennial Herb		Ranunculus muricatus	1	X					
Perennial Herb		Rorippa nasturtium-aquaticum	1			X			
Perennial Herb		Silybum marianum	1	X					
Perennial Herb		Taraxacum officinale	1	X					
Perennial Herb		Tradescantia fluminensis	1				X		
Perennial Herb		Tropaeolum majus	1			X			
Perennial Herb		Vinca major	1			X			
Perennial Grass		Cortaderia jubata	1					X	
Annual Herb		Cirsium vulgare	1						X
Annual Herb		Euphorbia peplus	1	X					

Tal

LIFE FORM		SPECIES	POLYGONS						
			Total	C131	C139	E(14)	E130	P135	CP(675)W
Annual Herb		Fumaria parviflora	1	X					
Annual Herb		Hypochaeris glabra	1		X				
Annual Herb		Rumex crispus	1		X				
Annual Herb		Rumex pulcher	1					X	
Annual Herb		Silene gallica	1	X					
Annual Herb		Sinapis arvensis	1				X		
Annual Grass		Aira caryophylla	1		X				
Annual Grass		Avena barbata	1	X					
Annual Grass		Briza maxima	1	X					
Annual Grass		Briza minor	1	X					
Annual Grass		Bromus hordaceus	1	X					
Annual Grass		Bromus stamineus	1	X					
		Total Species Per Polygon		51	22	10	19	30	7

Non-Indigenous Life Forms Occurring in Serpentine Non-Indigenous Forests

Annual Grass	13
Annual Herb	20
Perennial Grass	2
Perennial Herb	20
Geophyte	0
Fern	0
Sub-Shrub	1
Shrub	6
Vine	3
Tree	9
(Wetland)	1
Total	**74**

Table 43

mber of Indigenous Community Polygons Per Presidio Planning Area						
Planning Areas	**Polygons**	**Area**	**Ind Spp**	**N-Ind Spp**	**Total Spp**	**Ind/Tot Spp**
Coastal Bluffs	18	77.48	27.28	18.61	45.89	0.59
Presidio Forest	10	12.89	12.10	12.70	24.80	0.49
Fort Point	7	11.24	17.29	12.29	29.57	0.58
Lobos Creek	5	10.57	13.80	9.80	23.60	0.58
Presidio Hill	6	5.53	20.67	17.17	37.83	0.55
PHS Hospital	6	3.46	11.17	9.33	20.50	0.54
Crissy Field	2	2.66	6.50	18.00	24.50	0.27
Total	**54**					