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CHAPTER 4:
VEGETATION

Ballona Wetlands Ecological Reserve, Los Angeles, California
Santa Monica Bay Restoration Commission

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

VEGETATION

INTRODUCTION

Long-term monitoring of vegetation is one of the most common methods of evaluating the health and functioning of a wetland system (Zedler 2001). Change in the relative presences of native and non-native plant species may affect the distributions of associated wildlife species. For example, the endangered Belding's Savannah Sparrow preferentially utilizes *Salicornia pacifica* (common pickleweed) or other salt marsh related species, including *Distichlis spicata* (saltgrass) and *Arthrocnemum subterminale* (Parish's pickleweed) (Powell 1993, Zembal and Hoffman 2002, James and Stadtlander 1991; E. Read, pers. Comm. 2010) as nesting habitat. Non-native plant species are present throughout the Ballona Wetlands Ecological Reserve (BWER) (PWA 2006); these non-native species are indicators of past disturbances to the wetland and have potentially reduced the value of the site as habitat for native plants and native wildlife (PWA 2006).

Due to the diverse array of vegetation habitats and communities within the BWER, the Baseline Assessment Program (BAP) vegetation surveys are divided into three distinct types: cover surveys, seed bank surveys, and submerged aquatic vegetation (SAV) and algae surveys. The goals of each survey are:

Cover surveys:

1) Determine areas with high non-native species presence;
2) Summarize the prevalence of native and non-native plant cover in each habitat;
3) Define relative species richness (as number of species) by habitat type;
4) Use percent cover to define dominant species in each habitat.

Seed bank surveys:

1) Summarize the occurrence of native and non-native germinated plant seedlings;
2) Define relative species richness of germinated plant seedlings by habitat type;
3) Determine the potential for future recruitment of plant species within habitat types;
4) Evaluate species propagation at a transect level under ideal conditions.

Algae and submerged aquatic vegetation (SAV) surveys:

1) Continue the long-term monitoring program developed by the Southern California Bight Monitoring Program to assess the algal and SAV cover at the BWER;
2) Compare results to other southern California estuaries.

Taxonomic nomenclature for vegetation species changes constantly and is occasionally in dispute. For consistency and accuracy, species are identified using the Jepson Online Interchange California Floristics (Jepson Flora Project; accessed: April 2012). To avoid confusion, plant species are reported within this section first by their scientific and common names and henceforth by their abbreviated scientific name only. Invasive, exotic, and non-native plant species are henceforth referred to as "non-native" throughout this report.

METHODS

Site Locations and Times

Plant surveys were conducted once during the second Baseline year (2010-2011) during the appropriate season for each habitat type (Table 4.1; Zedler 2001) using a stratified sampling design based on habitat types. Transects were repeated from the first year of baseline vegetation surveys to assess temporal (annual) variability. Fewer transects were included in the second year surveys due to similarity among transects within habitat types. A slight reduction of the total number of transects assessed (122 in the second year versus 144 in the first year) allowed for the implementation of adaptive monitoring and the reallocation of resources to additional monitoring strategies.

Field Methods

Field methods for the second year of vegetation surveys were identical to the first baseline year. For detailed methods and maps, refer to Chapter 4 of the Baseline Assessment Program: 2009-2010 Report (Johnston et al. 2011). 122 transects (854 quadrats) across ten habitats were surveyed (Table 4.1). Muted tidal salt marsh habitats were surveyed using the 0.25m^2 laser quadrat method; the freshwater, brackish, and upland habitats were surveyed using the 1m^2 cover-class survey method. The cover-class vegetation survey method was based on the Daubenmire (1959) cover-class system using a 7-point scale (Table 4.2).

Table 4.1. BAP vegetation sampling details for habitat types within the BWER.

Habitat	Area	Acres	Transects	Quadrats	Methodology	Survey time
Low marsh	B	8.5	10	70	0.25m²-quadrat sampling along transects & 10m-wide area searches	late summer
Mid-marsh	B	16.4	9	63	0.25m²-quadrat sampling along transects & 10m-wide area searches	late summer
High marsh	B	42.9	11	77	0.25m²-quadrat sampling along transects & 10m-wide area searches	late summer
Seasonal wetland	A, B	74.5	16	112	0.25m²-quadrat sampling along transects & 10m-wide area searches	late summer
Salt pan	B	22.4	5	35	0.25m²-quadrat sampling along transects & 10m-wide area searches	late summer
Freshwater marsh	B	26	5	35	1m-quadrat sampling along transects & 10m-wide area searches	spring
Brackish marsh	B	3.1	5	35	1m-quadrat sampling along transects & 10m-wide area searches	spring
Dune	A, B, C	13	10	70	1m-quadrat sampling along transects & 10m-wide area searches	spring
Upland grassland	A, B, C	176.4	28	196	1m-quadrat sampling along transects & 10m-wide area searches	spring
Upland scrub	A, B, C	92.2	23	161	1m-quadrat sampling along transects & 10m-wide area searches	spring
Unvegetated	B	10.9	----	----	None	----

Table 4.2. Cover categories and associated cover class identification numbers used in the BAP surveys (modified from Daubenmire 1959).

Estimated cover category	Mid point	Cover class
> 0 - 1 %	0.5	1
> 1 - 5 %	3	2
> 5 - 25 %	15	3
> 25 - 50 %	37.5	4
> 50 - 75 %	62.5	5
> 75 - 95 %	85	6
> 95 - 100 %	97.5	7

Analysis Methods

Percent cover for each laser quadrat transect was analyzed as the proportion of points (out of a total of 49) hitting a particular plant species. Percent cover for each cover-class quadrat transect was analyzed using the median of each Daubenmire cover-class category and averaged to determine percent cover within each transect and habitat. Plant cover was averaged by transect and then again by habitat type

to analyze the total overall nativity of each habitat; therefore, habitat type averages are grand means. Variability is represented as standard error.

Dominant plant species (>10%) and average percent cover of native and non-native species were reported for each habitat type. Dominant plant species were reported by habitat, using the overall average for each habitat, not as individual transect-level data.

METHODS – SEED BANK SURVEYS

Site Locations and Times

To survey the salt marsh seed bank, soil cores were collected and grown out in a greenhouse and germinated seedlings were identified. Soil cores were collected at ten equally spaced points along 25 m vegetation transects. Two transects were surveyed per habitat [low marsh, mid marsh, high marsh, salt pan, seasonal wetland (Area A), and seasonal wetland (Area B)] for a total of 12 vegetation transects, with four additional 100 m transects from several channel banks. As most wetlands seeds are positively buoyant, the channel banks represent the current seed bank within the wrack lines and are seed accumulation zones. Soil cores were collected during late fall (November – December 2010), after the first rain of the wet season to capture the seed bank at its peak (S. Anderson, pers. Comm. 2009).

Field and Greenhouse Methods

Field and greenhouse methods followed those described in the first Baseline Assessment Report (Chapter 4: Vegetation; Johnston et al. 2011).

Analysis methods

Cores were analyzed by number of germinated seedlings per m^2 and averaged across each habitat type.

METHODS – ALGAE AND SUBMERGED AQUATIC VEGETATION COVER

Site Locations and Times

Algae and submerged aquatic vegetation (SAV) cover surveys (henceforth, 'algae surveys') were conducted along four 30 m transects deployed parallel to the channel bank with the same elevation contour as the muted tidal channel. Surveys were conducted four times during the second Baseline year: January, March, June, and September 2011. Surveys were conducted at the same times and

locations as the *Cerithidea californica* (California horn snail) sampling (Chapter 9: Benthic invertebrates); SAV and algae were identified to species (Abbot and Hollenberg 1976). Algae surveys were conducted using the same methods and sites as the Southern California Bight '08 eutrophication surveys (Bight 2008 Wetlands Sub-Committee 2008) and the first year of baseline surveys (Johnston et al. 2011) with the addition of one transect in an area of high algal growth (Transect 4).

Field Methods

Field methods followed those described in the first Baseline Assessment Report (Chapter 4: Vegetation; Johnston et al. 2011). In addition to the tidal creeks, areas with extensive and accessible mudflats where algae are known to accumulate were searched and submerged vegetation within the tidal channels was also noted.

Analysis Methods

Algae surveys were analyzed by determining percent cover for each quadrat (i.e. number of points for a species / 49 x 100). Quadrats were averaged by transect, and standard error was used to determine variability.

RESULTS

General Results and Overall Trends

All vegetation results are preliminary, part of a long term monitoring program, and should be evaluated as such. Data herein are compiled from transect-level cover data and are not considered a full floristic survey of the BWER. Results are analyzed by habitat types derived from the CDFG plant communities survey conducted in 2007 (CDFG 2007). These habitat types were developed for the distinct conditions at BWER and do not necessarily reflect plant habitat types of other southern California wetlands. For example, the low salt marsh habitat type is generally defined by the presence of *Spartina foliosa* (cordgrass) (Zedler et al. 1999), but this vegetation alliance is absent from the BWER.

Overall, 122 vegetation transects were surveyed including 51 in the salt marsh habitat types and 71 in non-salt marsh habitat types (Table 4.3). The floral compendium in Appendix C.1 includes all plant species surveyed or collected within ten meters of all transects. Some taxa were identified to genus, when taxonomic field identification to species was not possible. These plants are identified as '*sp'*.

Table 4.3. Total number of transects completed in each habitat.

Salt Marsh Habitats	# of Transects		Non-salt Marsh Habitats	# of Transects
Low salt marsh	10		Brackish marsh	5
Mid salt marsh	9		Freshwater marsh	5
High salt marsh	11		Dune	10
Seasonal wetland (Area A)	6		Upland grassland	28
Seasonal wetland (Area B)	10		Upland scrub	23
Salt pan	5		----	----
TOTAL	**51**		**TOTAL**	**71**

Figure 4.1 displays the average non-native vegetative percent cover across each transect surveyed. Non-native vegetation species dispersal pattern was similar to the first baseline year. All transects in Area C had greater than 10% non-native vegetative cover; nine of 13 transects had greater than 50% non-native cover (69.2% of the Area C transects). All transects in Area A except for two had greater than 10% non-native vegetative cover; two additional transects had cover between 11-25%, and the rest (26 transects) had greater than 26% non-native cover. Conversely, the salt marsh habitats had predominantly native cover. The muted tidal marsh of Area B had a higher percent cover of native plant species than either Area A or C. However, the very southwestern corner of Area B was dominated by *Carpobrotus edulis* (hottentot fig), and often had a range of non-native plant species cover between 76-100%. The salt pan transects had low percentages of vegetative cover; they were primarily bare ground with some native plants.

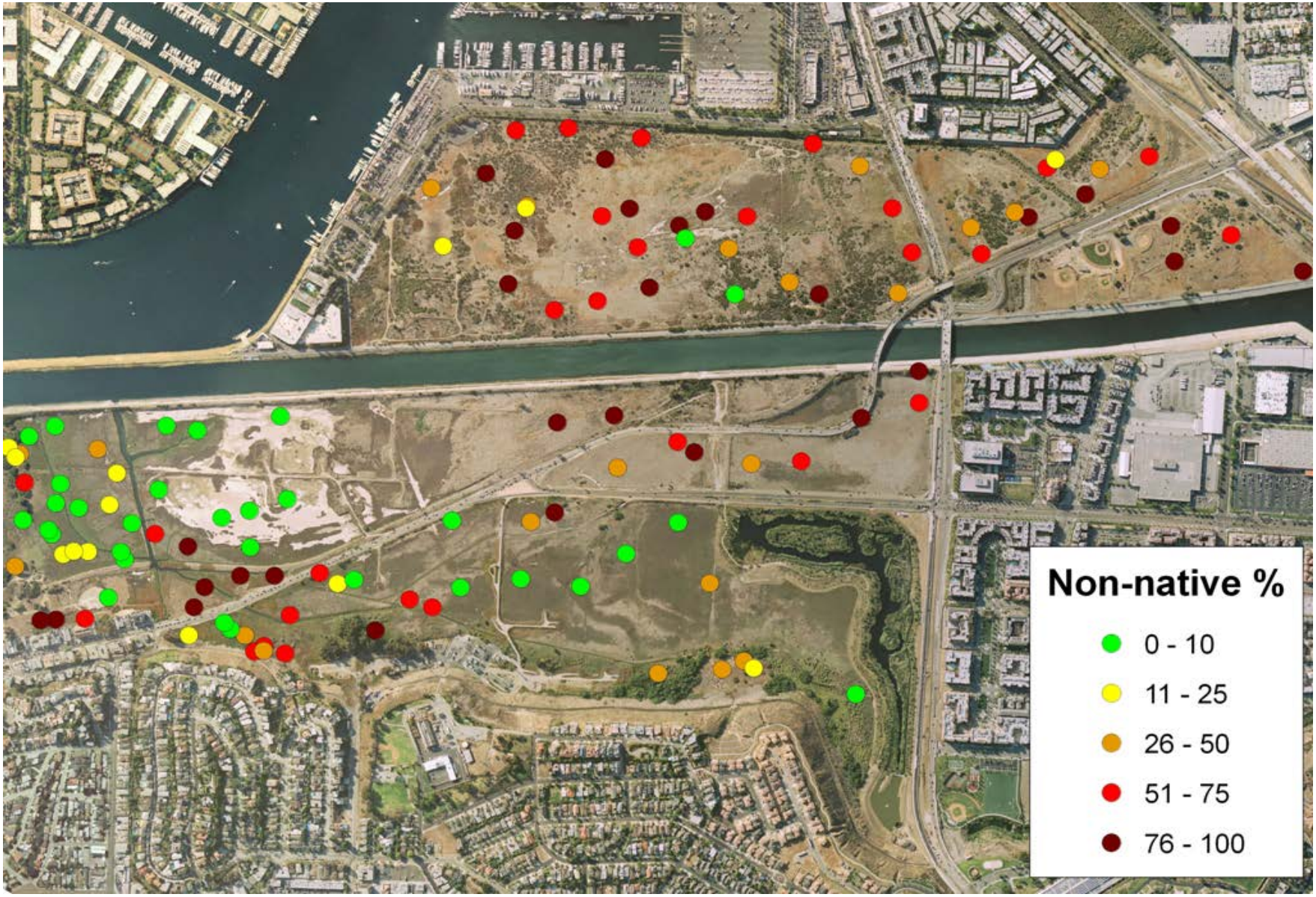

Figure 4.1. Average percent cover of non-native vegetation on each surveyed transect.

Salt Marsh Habitat Results

Results are presented as grand means across the habitat ± standard error (SE). The low salt marsh habitat type had the highest average percent cover of native species at 92.5 ± 2.6% (Figure 4.2), followed by the mid marsh (77.7 ± 8.2%) and the high marsh (65.1 ± 8.8%). The seasonal wetland of Area B also had greater than 50% nativity (56.9 ± 10.9%). Bare ground was highest in the salt pan habitat types followed by the seasonal wetland habitat of Area A (Figure 4.2). The seasonal wetland of Area A had the lowest native percent cover at 12.0 ± 5.5% of all the vegetated salt marsh habitat types and the highest non-native cover (51.6 ± 13.9%). Salt pan habitat had low average vegetation cover for both native and non-native species. Area A seasonal wetland habitats data were analyzed separately from the Area B seasonal wetland habitats because of the difference in plant species composition and elevation.

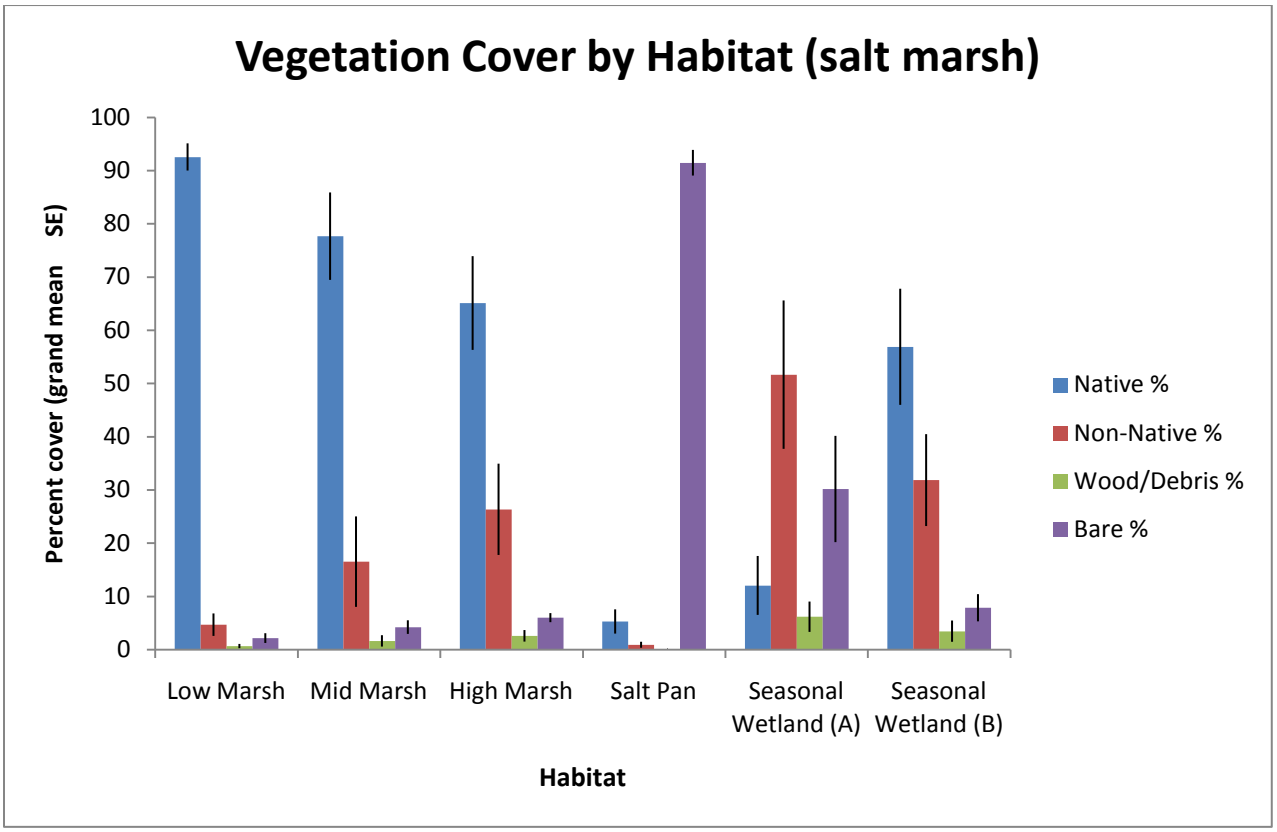

Figure 4.2. Vegetation percent cover (grand mean ± standard error) of native versus non-native species averaged for all transect across each salt marsh habitat type.

In the salt marsh habitats, the highest percent cover for individual plant species averaged across the whole habitat often included native species, such as *S. pacifica*, *Jaumea carnosa* (fleshy jaumea), *D. spicata, A. subterminale,* and *Cressa truxillensis* (spreading alkali weed) (Table 4.4); non-native grasses were also present in the high marsh and seasonal wetlands, especially in Area A. In some cases, a single vegetation species comprised nearly 10%, for example *C. truxillensis* (9.7%) and *Festuca perennis* (Italian

rye grass) (9.4%) in the high marsh habitat. The seasonal wetland (A) habitat had many species of non-native grasses that did not individually account for 10%, for example *Brassica nigra* (common black mustard) (8.8%), *Bromus madritensis* (foxtail chess) (4.2%), and *Melilotus indicus* (sourclover) (2.8%), but that together represented a dominant group (15.8%). Most of the *J. carnosa* in the low marsh was covered by *Cuscuta salina* (saltmarsh dodder), a native parasitic plant that formed the top canopy layer in some instances. The salt pan habitat has very little vegetation, and was dominated by bare ground along all transects (92.2% overall bare ground cover; Table 4.4).

Table 4.4. Percent cover of dominant species (>10%) for each salt marsh habitat type. Non-native plant species are in red.

Species	Low Marsh	Mid Marsh	High Marsh	Salt Pan	Seasonal Wetland (A)	Seasonal Wetland (B)
Salicornia pacifica	63.8	39.2	29.6	----	12.0	41.9
Arthrocnemum subterminale	----	----	11.1	----	----	----
Cressa truxillensis	----	----	----	----	----	11.8
Distichlis spicata	----	14.6	11.0	----	----	----
Jaumea carnosa	14.5	17.4	----	----	----	----
Polypogon monspeliensis	----	----	----	----	----	10.2
Dead unknown grass	----	----	----	----	28.5	----
Festuca perennis	----	----	----	----	----	10.6
Bare ground	----	----	----	92.2	----	10.2

Non-Salt Marsh Habitat Results

Results are presented as grand means across the habitat ± standard error (SE). Non-salt marsh habitats evaluated included brackish and freshwater marshes, dunes, and upland scrub and grasslands. The marsh habitats (brackish and freshwater) had a higher average percent cover of native species (66.6 ± 8.5% and 60.5 ± 11.8%, respectively) than non-native species (Figure 4.3); the brackish marsh habitat had the highest average native percent cover of the non-salt marsh habitats evaluated. The dune and upland (grassland and scrub) habitats had a higher non-native species average percent cover (45.9 ± 6.9%, 73.5 ± 5.1%, and 65.5 ± 5.3%, respectively) than native (Figure 4.3). The upland grassland habitat type had the lowest average native plant species percent cover, at 3.5 ± 2.7% and the highest non-native plant species percent cover at 73.5 ± 5.1%.

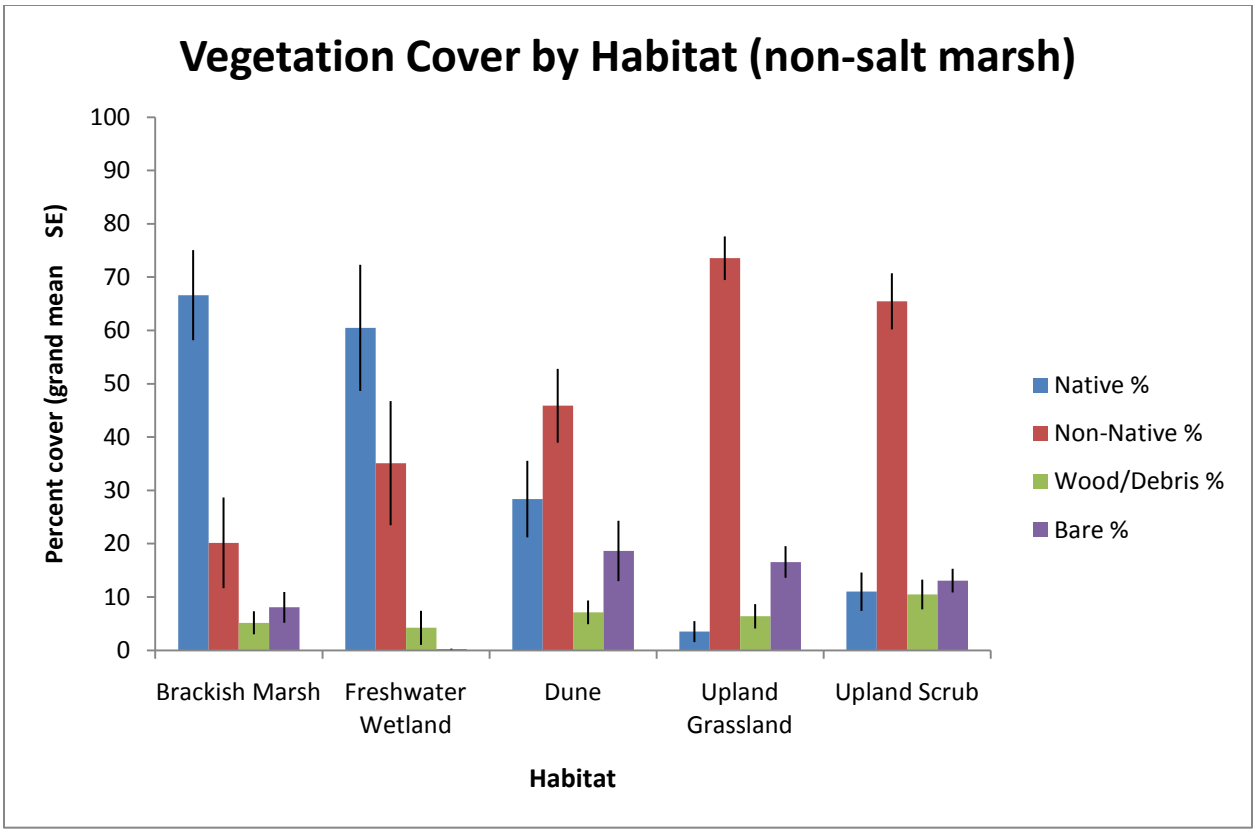

Figure 4.3. Vegetation percent cover (grand mean ± standard error) of native versus non-native plant species for all transects across each non-salt marsh habitat.

The brackish marsh habitat type was dominated by native *Schoenoplectus* spp. (Table 4.5). The freshwater marsh habitat of the southwestern portion of Area B was the only other non-salt marsh habitat type sampled that had a higher percentage of native versus non-native plant species and was dominated by the native plant species *Anemopsis californica* (yerba mansa) and *Juncus mexicanus* (Mexican wire rush) (Table 4.5). Note *J. mexicanus* was mislabeled in the first baseline year report as *Juncus balticus* (Baltic rush); *J. mexicanus* represents a dominant species both baseline years. The plant with the highest average percent cover in the freshwater marsh was the non-native *C. edulis*. The grassland habitat type had several non-natives that averaged greater than 10% cover: *B. nigra*, *Glebionis coronaria* (crown daisy), and dead non-native grasses (Table 4.5).

Similarly to the salt marsh habitats, several of the non-salt marsh habitats had individual species that were not dominant (>10% cover), but that were still present in considerable amounts along most transects. For example, in the dune habitat *Lupinus chamissonis* (fragrant dune lupine), *Lotus scoparius* (common deerweed), *D. spicata*, and *Croton californicus* (California croton) were all present at approximately 5% average cover. In the grassland, *Bromus diandrus* (ripgut brome), *Avena* sp., and *C. edulis* were all approximately 5%. In the scrub habitat, dead unknown grass was 8.9%.

Table 4.5. Percent cover of dominant species (>10% cover) for each non-salt marsh habitat. Note: non-native plant species are highlighted in red.

Species	Brackish Marsh	Freshwater Wetland	Dune	Upland Grassland	Upland Scrub
Anemopsis californica	----	30.0	----	----	----
Brassica nigra	----	----	----	20.6	17.6
Carprobrotus edulis	----	32.6	16.7	----	18.6
Glebionis coronaria	----	----	----	13.0	13.6
Erodium sp.	----	----	11.2	----	----
Juncus mexicanus	----	12.4	----	----	----
Schoenoplectus spp.	25.6	----	----	----	----
Dead non-native grasses	----	----	----	12.5	----
Wood / non-vegetated branches	----	----	----	----	10.5
Bare Ground	----	----	19.9	17.9	14.3

Baseline Vegetation Cover Results across both Years

Figures 4.4 and 4.5 display trends in habitat-level vegetation nativity across both baseline years. Overall, the pattern of percent cover of native species and non-native species in each habitat was similar between both baseline years. In both years the upland habitats were dominated by non-native species, and the salt marsh habitats were dominated by native species. The overall cover (native + non-native) was similar across both baseline years as well (e.g. salt pan had low cover).

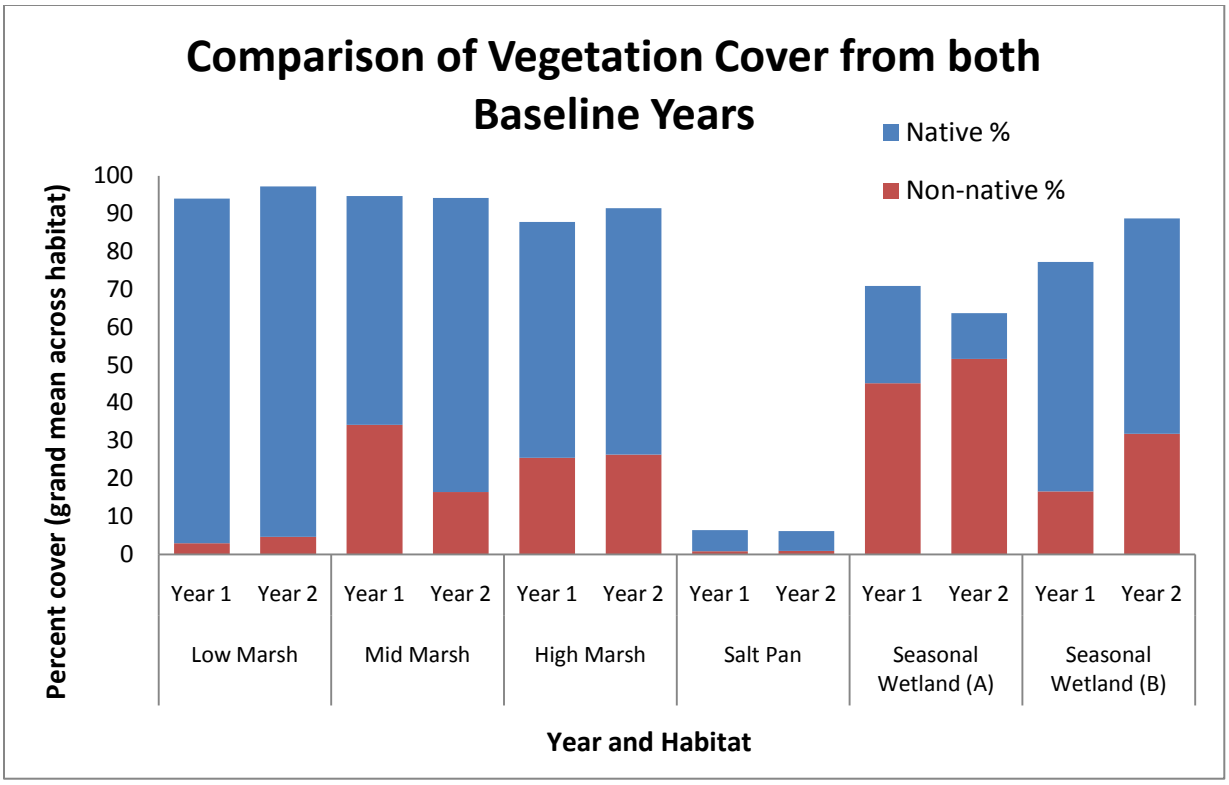

Figure 4.4. Vegetation percent cover comparison for both baseline years in the salt marsh habitats.

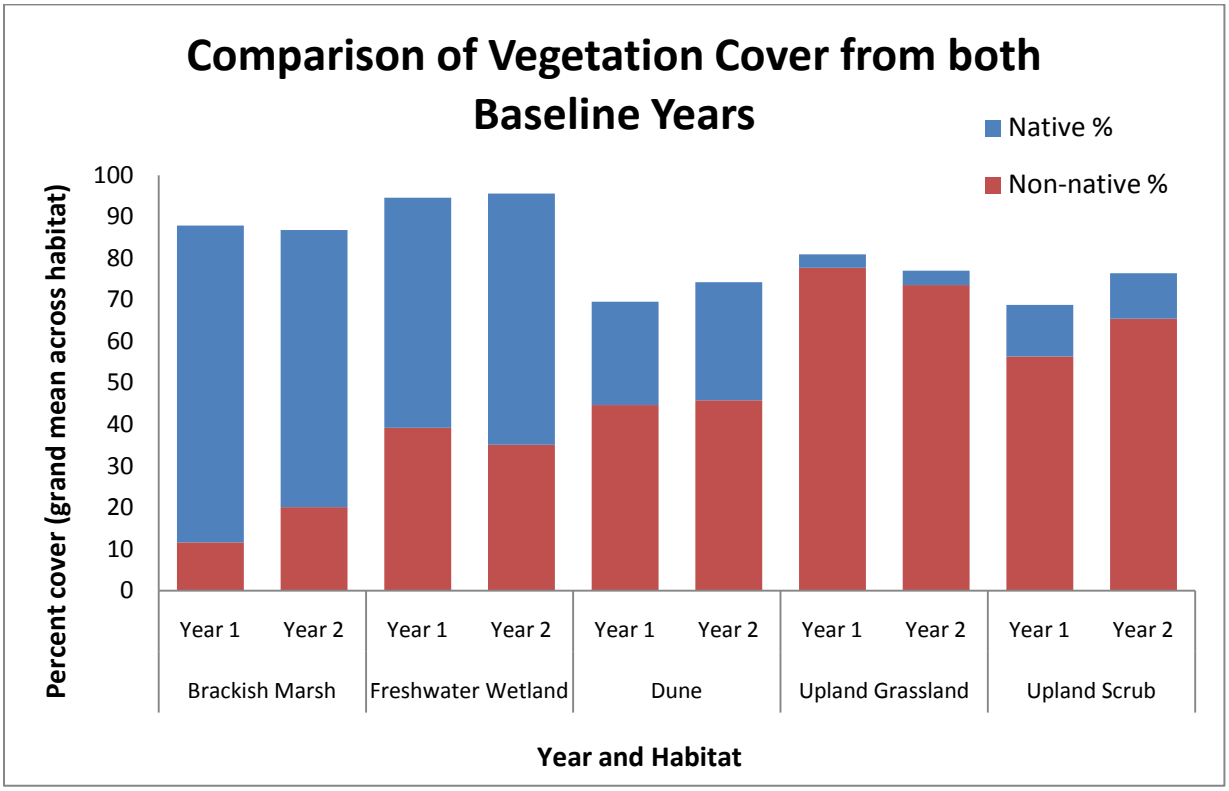

Figure 4.5. Vegetation percent cover comparison for both baseline years in the non-salt marsh habitats.

Seed Bank Survey Results

A total of 160 soil cores were collected from 16 salt marsh transects (i.e. 12 vegetation transects and four channel bank wrack transects). None of the blanks (controls) germinated any seeds. Two categories [i.e. "Unknown (Asteraceae)" and "Unknown (did not flower)"] were created for germinated seedlings that died before they were identifiable, never grew into adult plants, or never flowered.

Overall, 635 seedlings were identified from 120 cores taken from the vegetation transects and 269 seedlings from 40 cores taken from the channel bank transects (Table 4.6). Fifty-six soil cores never germinated any seeds. Nineteen plant species germinated in the soil cores (Table 4.6); six were native species representing 45% of the total number of germinated seedlings on transects. *S. pacifica* represented 42% of the seedlings on the vegetation transects and 47% of the seedlings on the channel bank transects. Non-native grasses accounted for 40% of germinated seedlings along the vegetation transects and 10% of the channel bank germinated seedlings. Table 4.6 lists all species germinated from both the vegetation transects and the channel bank transects.

The most common species on the vegetation transects included the native plant *S. pacifica*. The most common non-native plant species included *F. perennis*, *P. monspeliensis* (rabbit's foot grass), *M. indicus*, and *B. madritensis* (Table 4.6). More than 10 seedlings of each of these species germinated.

Table 4.6. All species and total number of germinated seedlings from seed bank transects. Non-native plant species are highlighted in red.

Scientific Name	Common Name	Transect total	Channel bank total
Atriplex sp.	atriplex	4	1
Bromus carinatus	California brome	3	2
Bromus madritensis	foxtail chess	8	4
Bromus sp.	brome	4	0
Cressa truxillensis	alkali weed	10	4
Distichlis spicata	saltgrass	0	12
Erigeron canadensis	Canadian horseweed	1	0
Festuca perennis	Italian ryegrass	128	20
Hordeum sp.	barley	2	0
Jaumea carnosa	fleshy jaumea	0	65
Juncus bufonius	common toad rush	2	0
Melilotus indicus	sour clover	66	23
Mesembryanthemum nodiflorum	slender leaf ice plant	1	0
Parapholis incurva	sickle grass	5	4
Polypogon monspeliensis	rabbit foot grass	106	0
Salicornia pacifica	pickleweed	264	126
Spergularia sp.	sand - spurrey	7	1
Unknown (Asteraceae)	----	13	3
Unknown (did not flower)	----	11	4
TOTAL # SEEDLINGS	----	**635**	**269**
# TRANSECTS	----	**12**	**4**
# SEEDLINGS PER TRANSECT	----	**52.92**	**67.25**

The seasonal wetland (B) habitat type had the highest average number of native germinated seedlings / m^2 (Figure 4.6); the salt pan and seasonal wetland (A) habitat types had the lowest average numbers of native germinated seedlings / m^2; although in the case of the salt pan, is was due to the fact that only one seedling germinated out of all of the salt pan cores. The high marsh habitat type had the highest average number of non-native germinated seedlings / m^2 (Figure 4.6).

The channel bank transects and the salt pan transects had the lowest average number of non-native germinated seedlings / m^2. Of the individual channel bank transects, Channel-1 had the highest number of seedlings / m^2, and Channel-4 (the salt pan transect) had the least number of seedlings / m^2.

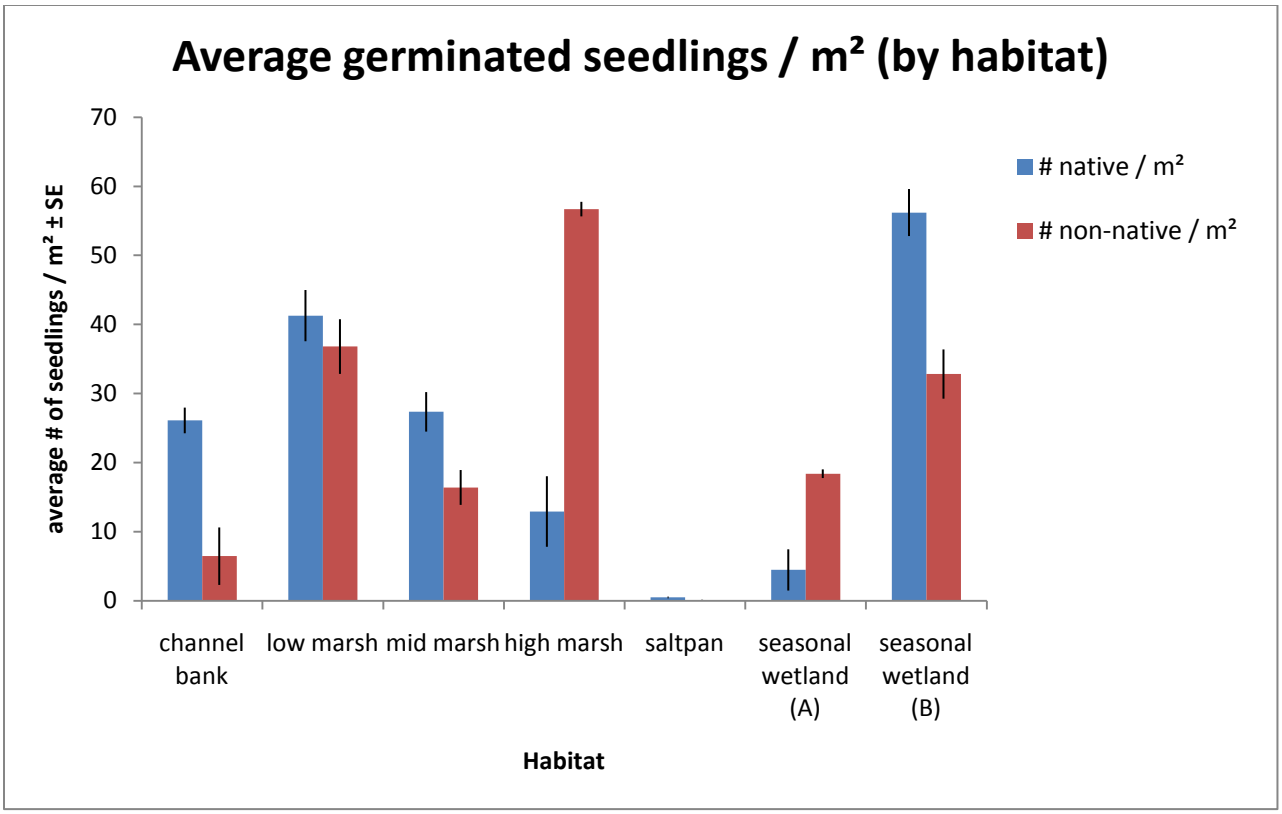

Figure 4.6. Number of germinated seedlings (± SE) averaged across each habitat.

Algae Cover Results

Transects were analyzed to determine if there was a seasonal or a transect-level effect. The September surveys had the highest percent cover of *Ulva intestinalis* (algae) (Figure 4.7). The June surveys had the highest percent cover of *Ulva lactuca.* January had the lowest algal cover of all months surveyed.

When averaged across all months, transect 2 had the highest overall percent cover of algae at 43.3% and the highest cover of *U. intestinalis* at 37.3% (Figure 4.8). Transect 4 had the highest percent cover of both *U. lactuca* at 21.2% and trash at 6.5%. *Ruppia maritima* was observed within the tidal channels, though it was not identified on any transects.

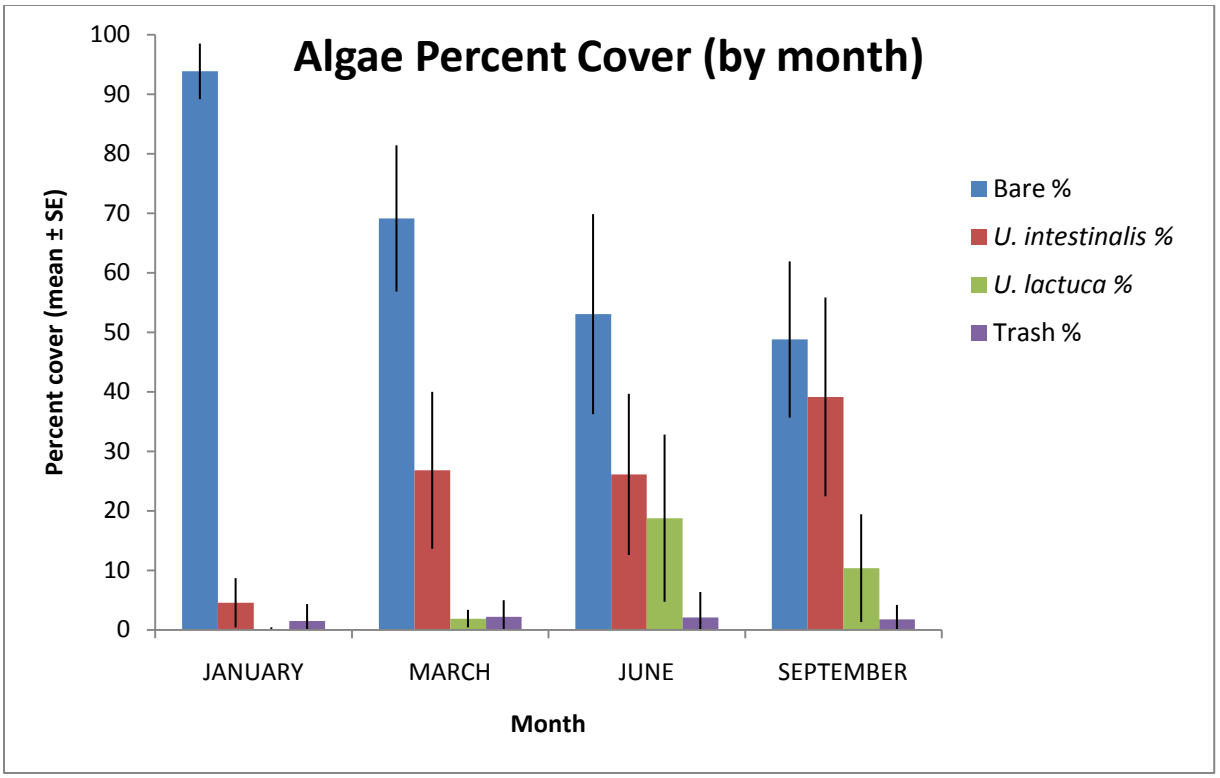

Figure 4.7. Average percent cover of algae/SAV (± SE) by month.

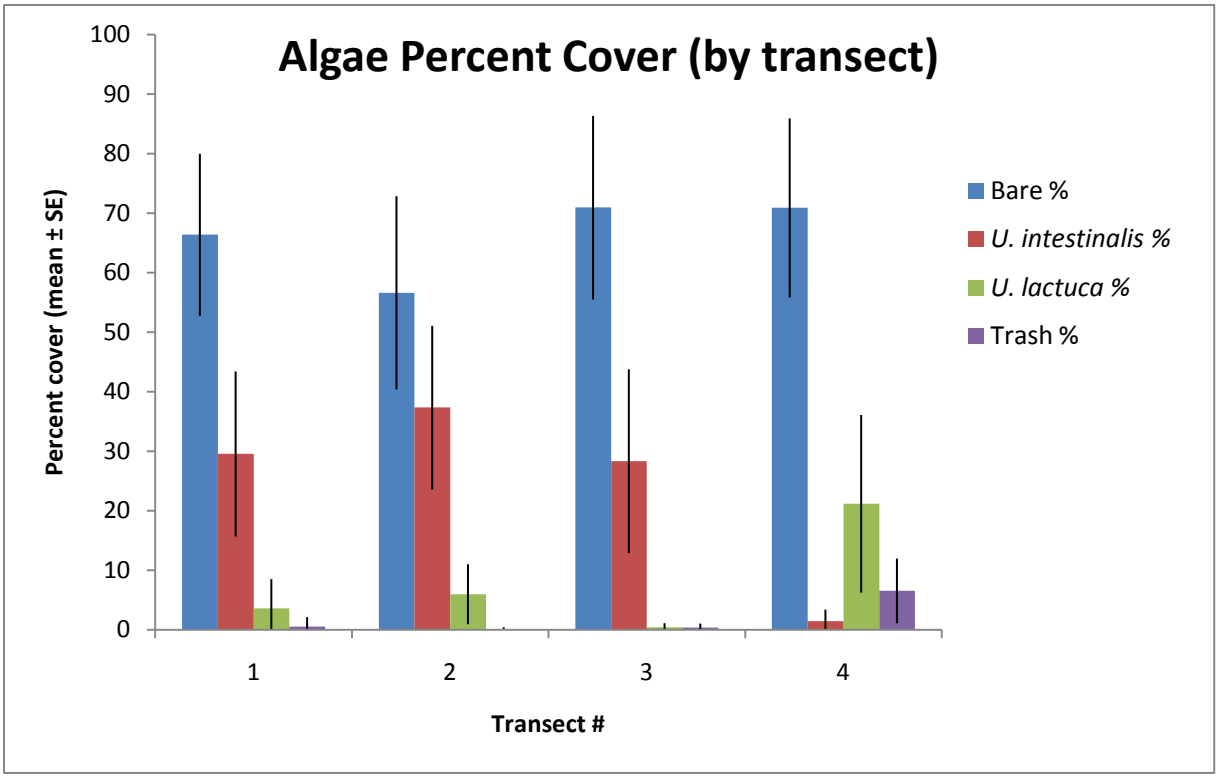

Figure 4.8. Average percent cover of algae/SAV (± SE) by transect.

Figure 4.9 compares percent cover between months surveyed in both baseline years (i.e. March, June, and September). January was excluded from the analysis as there were no January data in the first baseline year. Percent cover was averaged across all transects for each month. There was more bare ground in March of the second baseline year, and more bare ground in June and September during the first baseline year. The highest average percent cover of *U. lactuca* was in June of the second baseline year. The second baseline year also saw a higher percentage of trash cover in all months surveyed.

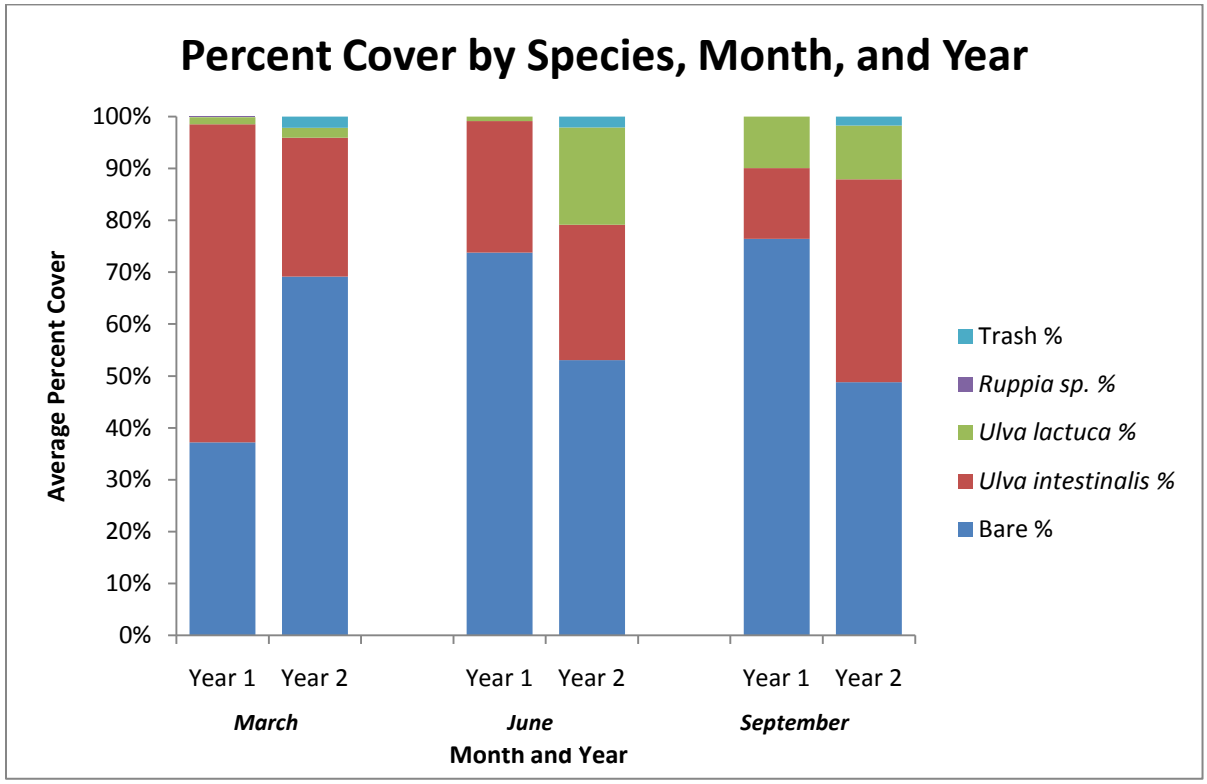

Figure 4.9. Graph of average percent cover by year, month, and species.

Special Status Species

No special status plant species were observed within 10 m of any vegetation transect. A separate targeted survey program was implemented for all listed plant species of special concern (federal, state, and CDFG; Appendix C.2) that may occur within the BWER. The results from special status species plant surveys will be available as separate reports on the BWER website (www.ballonarestoration.org).

ANALYSIS OF BASELINE RESULTS

When evaluating both years of baseline data together, several patterns emerge. The first is that the overall averages of vegetative cover nativity and dominant species within each habitat remained the same across both baseline years, even though different quadrats were evaluated within the transects (transects were fixed and quadrats were random). This provides a clear assessment of the dominant species by habitat type, which further allows an identification of which habitat types are more prone to non-native species (e.g. upland grassland and portions of the dune and seasonal wetland A habitats).

The dominant species tables also identify which habitats tend to have one or only a couple of dominant species (e.g. low marsh) and which habitats have several more co-dominant species (e.g. upland scrub), even if many of them are non-native. The overall cover of the dominant species tended to remain very similar across both baseline years for some species [e.g. *S. pacifica, Artemisia californica* (California sage brush)] and slightly more variable for other, more annual species (e.g. *G. coronaria, B. nigra*). This is often variable based on abiotic conditions such as rainfall during a particular year, especially for annual species, and is why some habitats (e.g. grassland) may be more important to monitor more frequently. The low degree of inter-annual variability in some of the habitats (e.g. low marsh and salt pan) may justify a reduction in sampling frequency, or a reduction in the overall number of transects. Further statistical analyses will better assess the data for this purpose.

Additional analyses should be performed on individual transect data. Some had higher variability and explained much of the error in the average plant nativity for a particular habitat. A third year of monitoring will allow better tracking of temporal variability, and provide additional individual transect points and species cover information. These data may be interpreted with additional metrics of higher ecosystem level function to provide additional insight into variability between (or within) habitats (e.g. plant biomass).

Seed Bank Analysis

The seed bank data from the vegetation transects were highly variable across the two baseline years. The channel bank transect data exhibited the opposite results; they were very similar across both baseline years. Some of the variability in the vegetation transect data can be explained by the low number of transects averaged for each habitat each year (i.e. three transects per habitat in the first baseline year, and two transects per habitat in the second baseline year). Additional variability can be explained by a shift of transect locations within a particular habitat. For example, the randomly chosen mid marsh year two transects were located further from channel banks in areas with more berm and high marsh vegetation (e.g. non-native grasses). Seasonal wetland (A) habitat consistently (across both baseline years) had low germination rates. Seasonal wetland (B) was highly variable and should have additional transects assessed in the next monitoring year. High marsh was dominated by non-natives both years.

FUTURE DIRECTIONS

Cover surveys will continue every two to three years to determine temporal trends. Algal and seed bank surveys will continue annually using the same methods described in this report. Plant tissue and biomass samples will be collected on a subset of the vegetation transects once every five years and three transects will be sampled in each habitat type. Pending funding availability, plant tissue will be collected on each of these transects from the three most common plants in the habitat to test for constituents of concern.

APPENDIX C.1

Plant species identified within 10 meters of permanent vegetation transects at the Ballona Wetlands Ecological Reserve during the first and second year of the Baseline Assessment Program

Family	Scientific Name	Common Name	Saltmarsh		Other Marsh		Upland	
			Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Arecaceae	----	palm tree			X	X	X	X
Fabaceae	*Acacia sp.*	acacia	X	X			X	X
Asteraceae	*Acroptilon repens**	Russian knapweed		X				X
Asteraceae	*Ambrosia chamissonis*	Chamisso's ragweed					X	X
Asteraceae	*Ambrosia psilostachya*	western ragweed			X	X	X	X
Primulaceae	*Anagallis arvensis**	scarlet pimpernel					X	X
Saururaceae	*Anemopsis californica*	yerba mansa			X	X		X
Apiaceae	*Apium graveolens**	common celery						X
Asteraceae	*Artemisia californica*	California sage brush					X	X
Asteraceae	*Artemisia sp.*	mugwort						X
Chenopodiaceae	*Arthrocnemum subterminale*	Parish's pickleweed	X	X				
Poaceae	*Arundo donax**	giant cane					X	X
Chenopodiaceae	*Atriplex lentiformis*	saltbrush			X		X	X
Chenopodiaceae	*Atriplex semibaccata**	Australian saltbush	X	X			X	
Chenopodiaceae	*Atriplex sp.*	atriplex		X				
Chenopodiaceae	*Atriplex prostrata**	spear oracle		X	X	X	X	X
Poaceae	*Avena fatua**	wild oat		X	X		X	X
Poaceae	*Avena sp.*	oat						X
Asteraceae	*Baccharis pilularis*	coyote brush		X	X		X	X
Asteraceae	*Baccharis salicifolia*	mule fat			X	X	X	X
Chenopodiaceae	*Bassia hyssopifolia*	five-hook bassia	X	X		X	X	X
Brassicaceae	*Brassica nigra**	common black mustard	X	X	X	X	X	X
Brassicaceae	*Brassica rapa**	common yellow mustard						X
Brassicaceae	*Brassica spp.*	mustard						X
Poaceae	*Bromus carinatus*	brome grass		X		X	X	X
Poaceae	*Bromus diandrus**	ripgut chess	X	X	X	X	X	X
Poaceae	*Bromus madritensis**	foxtail chess		X			X	X
Poaceae	*Bromus spp.*	brome grass		X				X
Onagraceae	*Camissoniopsis spp.*	sun cup					X	X
Aizoaceae	*Carpobrotus edulis**	hottentot fig	X	X	X	X	X	X
Asteraceae	*Centaurea melitensis**	tocalote					X	X
Euphorbiaceae	*Chamaesyce sp.*	chamaesyce					X	X

Family	Scientific Name	Common Name	Saltmarsh		Other Marsh		Upland	
			Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Poaceae	*Cortaderia selloana**	pampas grass	X	X	X	X	X	X
Convolvulaceae	*Cressa truxillensis*	spreading alkali weed	X	X	X	X	X	X
Euphorbiaceae	*Croton californicus*	California croton					X	X
Cuscutaceae	*Cuscuta salina*	saltmarsh dodder	X	X				
Poaceae	*Distichlis spicata*	saltgrass	X	X	X	X	X	X
Poaceae	*Elymus triticoides*	creeping wild ryegrass		X		X		
Asteraceae	*Encelia californica*	California bush sunflower						X
Asteraceae	*Ericameria ericoides*	California goldenbush					X	X
Asteraceae	*Erigeron canadensis*	Canadian horseweed		X	X	X	X	X
Polygonaceae	*Eriogonum parvifolium*	dune buckwheat			X			X
Geraniaceae	*Erodium spp.*	filaree					X	X
Myrtaceae	*Eucalyptus sp.*	gum tree			X	X		X
Euphorbiaceae	*Euphorbia terracina**	terracina spurge			X		X	X
Asteraceae	*Euthamia occidentalis*	western goldenrod			X	X		X
Poaceae	*Festuca perennis**	Italian rye-grass		X	X	X	X	X
Apiaceae	*Foeniculum vulgare**	common fennel			X	X		X
Frankeniaceae	*Frankenia salina*	alkali heath	X	X	X	X	X	X
Asteraceae	*Glebionis coronaria**	crown daisy		X			X	X
Boraginaceae	*Heliotropium curassavicum*	salt heliotrope			X	X	X	X
Asteraceae	*Heterotheca grandiflora*	telegraph weed			X	X	X	X
Poaceae	*Hordeum depressum*	dwarf barley		X			X	
Poaceae	*Hordeum murinum ssp. leporinum**	wild barley		X			X	X
Asteraceae	*Jaumea carnosa*	fleshy jaumea	X	X			X	X
Juncaceae	*Juncus mexicanus*	Mexican wire rush			X	X		
Juncaceae	*Juncus sp.*	rush wire grass			X	X		
Asteraceae	*Lactuca serriola**	common prickly lettuce					X	
Fabaceae	*Lotus scoparius*	common deerweed			X	X	X	X
Fabaceae	*Lupinus chamissonis*	fragrant dune lupine			X	X	X	X
Malvaceae	*Malva parviflora**	cheeseweed mallow					X	
Malvaceae	*Malvella leprosa*	alkali mallow		X	X	X	X	X
Lamiaceae	*Marrubium vulgare**	horehound					X	X
Fabaceae	*Medicago lupulina**	black medicago					X	
Fabaceae	*Medicago polymorpha**	toothed burclover					X	
Myrtaceae	*Melaleuca citrina**	crimson bottlebrush						X

Family	Scientific Name	Common Name	Saltmarsh		Other Marsh		Upland	
			Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Myrtaceae	*Melaleuca sp.*	melaleuca				X		
Fabaceae	*Melilotus indicus**	sourclover		X	X	X	X	X
Aizoaceae	*Mesembryanthemum crystallinum**	crystalline iceplant			X			
Aizoaceae	*Mesembryanthemum nodiflorum**	slenderleaf iceplant	X	X			X	X
Myoporaceae	*Myoporum laetum**	lollypop tree	X	X			X	X
Solanaceae	*Nicotiana glauca**	tree tobacco					X	X
Poaceae	*Parapholis incurva**	sicklegrass		X			X	
Hydrophyllaceae	*Phacelia ramosissima*	branching phacelia			X	X	X	X
Poaceae	*Phalaris aquatica**	canary grass		X				
Plantaginaceae	*Plantago sp.*	rib grass						X
Poaceae	*Polypogon monspeliensis**	rabbit's foot grass		X	X	X	X	X
Asteraceae	*Pseudognaphalium spp.*	false cudweed		X		X	X	X
Brassicaceae	*Raphanus sativus**	wild radish		X	X	X	X	X
Euphorbiaceae	*Ricinus communis**	castor bean			X	X	X	X
Polygonaceae	*Rumex crispus**	curly dock		X	X	X	X	X
Polygonaceae	*Rumex sp.*	dock		X			X	X
Chenopodiaceae	*Salicornia pacifica*	common pickleweed	X	X	X	X	X	X
Salicaceae	*Salix lasiolepis*	arroyo willow					X	
Salicaceae	*Salix sp.*	willow				X	X	X
Chenopodiaceae	*Salsola sp.*	Russian-thistle		X				
Anacardiaceae	*Schinus terebinthifolius**	Brazilian pepper tree			X	X	X	X
Cyperaceae	*Scirpus spp.*	bulrush			X	X	X	X
Asteraceae	*Silybum marianum**	blessed milk thistle		X				X
Asteraceae	*Sonchus spp.*	sow thistle			X	X	X	X
Juncaginaceae	*Tropaeolum majus**	nasturtium						X
Typhaceae	*Typha sp.*	cat tail				X		
Asteraceae	*Xanthium strumarium*	common cocklebur				X		X
Agavaceae	*Yucca sp.*	yucca						X
	Number of species		16	41	40	42	64	75

Note: 'Saltmarsh' category includes low, mid, and high estuarine marsh habitat types. 'Other marsh' category includes all seasonal, brackish, and freshwater wetland habitat types. 'Upland' category includes all upland scrub, dune, and grassland habitat types.

Asterisks denote non-native species, not including those categories only identified to genus.

APPENDIX C.2

Special status plant species that ***may*** occur, or are known to occur in habitats similar to those found in the Ballona Wetlands Ecological Reserve. Note: List compiled from the U.S. Fish and Wildlife Service (USFWS) Species Lists (September 2010), California Native Plant Society (CNPS) Electronic Inventory (September 2010) and California Natural Diversity Database (CNDDB) (September 2010) searches of the Venice, Redondo Beach, Beverly Hills, and Topanga USGS 7.5 minute quadrangles. Appendix reproduced from WRA 2011.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Red sand verbena *Abronia maritima*	List 4	Coastal dunes. Elevation range: 0 – 325 feet. Blooms: February – November.	**Moderate Potential.** The Reserve contains restored coastal dune habitat that may support this species.	**Not Observed.** Focused rare plant survey in October did not observe this species in the Reserve.
Aphanisma *Aphanisma blitoides*	List 1B	Coastal bluff scrub, coastal dunes, coastal scrub. Typically located on bluffs and slopes near the ocean on sandy or clay soils. Elevation range: 1 – 990 feet. Blooms: March – June.	**Unlikely.** Although the Reserve contains restored coastal dune and coastal scrub habitat, this species is known primarily from the Channel Islands and drier, steeper bluff sites not present in the Reserve.	No further actions are recommended for this species.
Marsh sandwort *Arenaria paludicola*	FE, SE, List 1B	Marshes and swamps. Typically located in dense mats of emergent marsh vegetation. Elevation range: 485 – 3965 feet. Blooms: May – August.	**Unlikely.** Although the Reserve contains coastal salt marsh habitat, this species is closely associated with freshwater wetland habitat.	No further actions are recommended for this species.
Braunton's milk-vetch *Astragalus brauntonii*	FE, List 1B	Closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland. Often in recent burns or disturbed areas on gravelly clay soils overlying granite or limestone. Elevation range: 10 – 2075 feet. Blooms: January – August.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from more inland sites.	No further actions are recommended for this species.
Ventura milk-vetch *Astragalus pycnostachyus* var. *lanosissimus*	FE, SE, List 1B	Coastal salt marsh, coastal dune, coastal scrub. Typically located within reach of high tide protected by barrier beaches and near seeps on sandy bluffs. Elevation range: 1 – 115 feet. Blooms: June – October.	**Moderate Potential.** The Reserve contains coastal salt marsh, restored coastal dune, and coastal scrub habitat that may support this species. Nearest known occurrence is less than 1.5 miles to the north.	**Not Observed.** Focused rare plant surveys in July and October did not observe this species in the Reserve.
Coastal dunes milk-vetch *Astragalus tener* var. *titi*	FE, SE, List 1B	Coastal bluff scrub, coastal dunes. Located on moist, sandy depressions of bluffs and dunes along or near the ocean. Elevation range: 1 – 165 feet. Blooms: March – May.	**Moderate Potential.** The Reserve contains restored coastal dune habitat that may support this species.	**Not Observed.** Focused rare plant surveys in April did not observe this species in the Reserve.
South Coast saltscale *Atriplex pacifica*	List 1B	Coastal scrub, coastal bluff scrub, playas, chenopod scrub. Located on alkali soils. Elevation range: 0 – 460 feet. Blooms: March – October.	**Moderate Potential.** The Reserve contains coastal scrub habitat that may support this species.	**Not Observed.** Focused rare plant surveys in April, July, and October did not observe this species in the Reserve.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Parish's brittlescale *Atriplex parishii*	List 1B	Alkali meadows, vernal pools, chenopod scrub, playas. Typically located on alkali flats with finely textured soils. Elevation range: 80 – 6160 feet. Blooms: June – October.	**Moderate Potential.** The Reserve contains playa-like and alkali meadow habitat that may support this species.	**Not Observed.** Focused rare plant surveys in July and October did not observe this species in the Reserve.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	List 1B	Coastal bluff scrub, coastal scrub. Located on alkaline soils. Elevation range: 30 – 650 feet. Blooms: April – October.	**Moderate Potential.** The Reserve contains coastal scrub habitat underlain by alkaline substrate that may support this species.	**Not Observed.** Focused rare plant survey in October did not observe this species in the Reserve.
Brewer's red maids *Calandrinia breweri*	List 4	Chaparral, coastal scrub. Located on sandy or loamy soils, often in disturbed areas. Elevation range: 30 – 3695 feet. Blooms: March – June.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from more inland sites at higher elevations.	No further actions are recommended for this species.
Seaside red maids *Calandrinia maritima*	List 4	Coastal bluff scrub, coastal scrub, valley and foothill grassland. Elevation range: 15 – 975 feet. Blooms: sometimes February, March – June, sometimes August.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from the Channel Islands.	No further actions are recommended for this species.
Plummer's mariposa-lily *Calochortus plummerae*	List 1B	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Located on rocky and sandy sites derived from granitic or alluvial material; often occurs following fires. Elevation range: 320 – 5510 feet. Blooms: May – July.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from sites with higher elevation and further inland.	No further actions are recommended for this species.
Santa Barbara morning-glory *Calystegia sepium* ssp. *binghamiae*	List 1A	Coastal marshes. Elevation range: 0 – 65 feet. Blooms: April – May.	**Moderate Potential.** The Reserve contains coastal salt marsh habitat that may support this species.	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
Lewis' evening-primrose *Camissoniopsis lewisii* [*Camissonia lewisii*]	List 3	Coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland. Elevation range: 0 – 975 feet. Blooms: March – May, sometimes June.	**High Potential.** The Reserve contains restored coastal dune and coastal scrub habitat that may support this species. Known occurrence from previous studies suggest this species is present in the Reserve.	**Present.** Focused rare plant survey in April located this species in Areas A and C1.
Southern tarplant *Centromadia parryi* ssp. *australis*	List 1B	Marshes and swamps margins, valley and foothill grassland. Often located on disturbed sites near the coast on alkali soils. Elevation range: 0 – 1385 feet. Blooms: May – November.	**High Potential.** The Reserve contains coastal salt marsh habitat that may support this species. Known occurrence from previous studies suggest this species is present in the Reserve.	**Not Observed.** Focused rare plant survey in July did not observe this species in the Reserve.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Orcutt's pincushion *Chaenactis glabriuscula* var. *orcuttiana*	List 1B	Coastal bluff scrub, coastal dunes. Located on sandy soils. Elevation range: 10 – 330 feet. Blooms: January – August.	**High Potential.** The Reserve contains restored coastal dune habitat that may support this species. Known occurrence from previous studies suggest this species is present in the Reserve.	**Present.** Focused rare plant survey in April located this species in Area B1.
Coastal goosefoot *Chenopodium littoreum*	List 1B	Coastal dunes. Located on sandy soils. Elevation range: 30 – 95 feet. Blooms: April – August.	**Moderate Potential**. The Reserve contains coastal dune habitat that may support this species.	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
San Fernando Valley spineflower *Chorizanthe parryi* var. *fernandina*	FC, SE, List 1B	Coastal scrub. Located on sandy soils. Elevation range: 490 – 4000 feet. Blooms: April – July.	**Moderate Potential.** The Reserve contains coastal scrub habitat that may support this species. Known occurrence from Ballona Harbor less than 1 mile to the north.	**Not Observed.** Focused rare plant survey in July did not observe this species in the Reserve.
Small-flowered morning-glory *Convolvulus simulans*	List 4	Chaparral, coastal scrub, valley and foothill grassland. Located in openings on clay soils and serpentine seeps. Elevation range: 95 – 2275 feet. Blooms: March – July.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from sites with higher elevation and further inland.	No further actions are recommended for this species.
Salt marsh bird's-beak *Cordylanthus maritimus* ssp. *maritimus*	FE, SE, List 1B	Coastal salt marsh, coastal dunes. Located on the higher zones of salt marshes. Elevation range: 0 – 100 feet. Blooms: May – October.	**Moderate Potential.** The Reserve contains coastal salt marsh habitat that may support this species.	**Not Observed.** Focused rare plant surveys in July and October did not observe this species in the Reserve.
Paniculate tarplant *Deinandra paniculata*	List 4	Coastal scrub, valley and foothill grassland, vernal pools. Typically located on vernally mesic sites. Elevation range: 80 – 3055 feet. Blooms: April – November.	**Moderate Potential.** The Reserve contains coastal scrub habitat that may support this species.	**Not Observed.** Focused rare plant surveys in July and October did not observe this species in the Reserve.
Western pony's-foot *Dichondra occidentalis*	List 4	Chaparral, cismontane woodland, valley and foothill grassland, coastal scrub. Elevation range: 160 – 1625 feet. Blooms: sometimes January, March – July.	**High Potential.** The Reserve contains coastal scrub habitat that may support this species. Reported occurrences from previous studies suggest this species is present in the Reserve (Existing Conditions citing Hendrickson 1991 EIR).	**Not Observed.** Focused rare plant surveys in April and July did not observe this species in the Reserve.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Beach spectaclepod *Dithyrea maritima*	ST, List 1B	Coastal dunes, coastal scrub. Located at sea shores on sand dunes and sandy places near the shore. Elevation range: 10 – 165 feet. Blooms: March – May.	**Moderate Potential.** The Reserve contains restored coastal dune and coastal scrub habitat that may support this species. Additionally, the nearest known occurrence is from "vicinity of Ballona Marshes" (CNDDB 2010).	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
Santa Monica dudleya *Dudleya cymosa* ssp. *ovatifolia*	FT, List 1B	Chaparral, coastal scrub. Located in canyons on sedimentary conglomerates on primarily north-facing slopes. Elevation range: 485 – 5430 feet. Blooms: March – June.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from sites with higher elevation and further inland.	No further actions are recommended for this species.
Many-stemmed dudleya *Dudleya multicaulis*	List 1B	Chaparral, coastal scrub, valley and foothill grassland. Located on clay soils. Elevation range: 45 – 2560 feet. Blooms: April – July.	**Moderate Potential.** The Reserve contains coastal scrub habitat that may support this species.	**Not Observed.** Focused rare plant survey in July did not observe this species in the Reserve.
Island green dudleya *Dudleya virens* ssp. *insularis*	List 1B	Coastal bluff scrub, coastal scrub. Located on rocky sites. Elevation range: 15 – 975 feet. Blooms: April – June.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species typically is known from rocky, bluff sites in coastal scrub.	No further actions are recommended for this species.
Suffrutescent wallflower *Erysimum insulare* ssp. *suffrutescens*	List 4	Coastal bluff scrub, coastal scrub, valley and foothill grassland. Elevation range: 0 – 490 feet. Blooms: January – July.	**High Potential.** The Reserve contains coastal scrub habitat that may support this species. Known occurrence from previous studies suggest this species is present in the Reserve.	**Present.** Focused rare plant survey in July and April observed this species in the Area B1.
Los Angeles sunflower *Helianthus nuttallii* ssp. *parishii*	List 1A	Coastal salt and freshwater marshes and swamps. Elevation range: 30 – 5445 feet. Blooms: August – October.	**Moderate Potential.** The Reserve contains coastal salt marsh habitat that may support this species.	**Not Observed.** Focused rare plant survey in October did not observe this species in the Reserve.
Vernal barley *Hordeum intercedens*	List 3	Coastal dunes, coastal scrub, valley and foothill grassland, vernal pools. Located on saline flats and depressions. Elevation range: 15 – 3240 feet. Blooms: March – June.	**Moderate Potential.** The Reserve contains coastal scrub and restored coastal dune habitat that may support this species.	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
Mesa horkelia *Horkelia cuneata* ssp. *puberula*	List 1B	Chaparral, cismontane woodland, coastal scrub. Elevation range: 225 – 2625 feet. Blooms: February – July, sometimes September.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from sites with higher elevation and further inland.	No further actions are recommended for this species.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Southwestern spiny rush *Juncus acutus* ssp. *leopoldii*	List 4	Coastal dunes, meadows and seeps, coastal salt marshes. Located on mesic, alkali sites. Elevation range: 10 – 2925 feet. Blooms: May – June.	**Moderate Potential.** The Reserve contains coastal salt marsh and restored coastal dune habitat that may support this species.	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	List 1B	Coastal salt marshes, playas, valley and foothill grassland, vernal pools. Typically located on alkaline soils in playas, sinks, and grasslands. Elevation range: 1 – 3955 feet. Blooms: February – June.	**High Potential.** The Reserve contains coastal salt marsh habitat that may support this species. Although last observed in 1934, the nearest known occurrence of this species is known from "Ballona Marshes".	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
California spineflower *Mucronea californica*	List 4	Chaparral, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland. Located on sandy soils. Elevation range: 0 – 4550 feet. Blooms: March – July, sometimes August.	**Moderate Potential.** The Reserve contains restored coastal dune and coastal scrub habitat underlain by sandy substrate that may support this species.	**Not Observed.** Focused rare plant surveys in April and July did not observe this species in the Reserve.
Mud nama *Nama stenocarpum*	List 2	Marshes and swamps. Located on lake shores, streams banks, and intermittently wet areas. Elevation range: 15 – 1620 feet. Blooms: January – July.	**Moderate Potential.** The Reserve contains freshwater marsh margins that may support this species. Additionally, the nearest known occurrence of this species is from less than four miles to the north.	**Not Observed.** Focused rare plant survey in July did not observe this species in the Reserve.
Gambel's watercress *Nasturtium gambellii*	FE, ST, List 1B	Brackish and freshwater marshes and swamps. Located on lake and stream margins at or immediately above the water line. Elevation range: 15 – 1075 feet. Blooms: April – October.	**Unlikely.** Although the Reserve contains coastal salt marsh habitat, this species is known from freshwater and brackish marshes with lower salinity.	No further actions are recommended for this species.
Moran's nosegay *Navarretia fossalis*	FT, List 1B	Vernal pools, chenopod scrub, marshes and swamps, playas. Located on hardpan soils in swales, depressions, and pools. Elevation range: 95 – 4225 feet. April – June.	**Unlikely.** Although the Reserve contains marsh habitat, this species is known from more inland sites with lesser salinity and higher elevation.	No further actions are recommended for this species.
Prostrate vernal pool navarretia *Navarretia prostrata*	List 1B	Coastal scrub, valley and foothill grassland, vernal pools. Elevation range: 45 – 2270 feet. Blooms: April – July.	**Unlikely.** Although the Reserve contains coastal scrub, this species is requires freshwater vernal pool habitat not present in the Reserve.	No further actions are recommended for this species.
Coast woolly-heads *Nemacaulis denudata* var. *denudata*	List 1B	Coastal dunes. Elevation range: 0 – 325 feet. Blooms: April – September.	**Unlikely.** Although the Reserve contains restored dune habitat, this species is known only from south of Rancho Palos Verdes.	No further actions are recommended for this species.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
California Orcutt grass *Orcuttia californica*	FE, SE, List 1B	Vernal pools. Elevation range: 45 – 2145 feet. Blooms: April – August.	**No Potential.** The Reserve does not contain vernal pool habitat.	No further actions are recommended for this species.
Lyon's Pentachaeta *Pentachaeta lyonii*	FE, SE, List 1B	Chaparral, valley and foothill grassland. Located on the edge of openings at the ecotone between chaparral and grassland. Elevation range: 95 – 2050 feet. Blooms: March – August.	**No Potential.** The Reserve does not contain chaparral or intact grassland habitat.	No further actions are recommended for this species.
South Coast branching phacelia *Phacelia ramosissima* var. *austrolitoralis*	List 4	Chaparral, coastal dunes, coastal scrub, coastal salt marshes. Located on sandy, often rocky soils. Elevation range: 20 – 975 feet. Blooms: March – August.	**High Potential.** The Reserve contains restored coastal dune, coastal scrub, and coastal salt marsh habitat that may support this species. Additionally, the nearest documented occurrence is from within the Reserve.	Focused rare plant surveys in July, October, and April located this species; however, recent taxanomic descriptions do not recognize varieties (Jepson 2011).
Brand's star phacelia *Phacelia stellaris*	FC, List 1B	Coastal scrub, coastal dunes. Located in open areas. Elevation range: 1 – 1300 feet. Blooms: March – June.	**Moderate Potential.** The Reserve contains coastal scrub and coastal dune habitat that may support this species. Additionally, the nearest known occurrence of this species from less than one mile to the south.	**Not Observed.** Focused rare plant survey in April did not observe this species in the Reserve.
Ballona cinquefoil *Potentilla multijuga*	List 1A	Brackish meadows and seeps. Elevation range: 0 – 10 feet. Blooms: June – August.	**Moderate Potential.** The Reserve contains brackish grassland sites. The Reserve is the type locality of this species; however, it is presumed extinct.	**Not Observed.** Focused rare plant survey in July did not observe this species in the Reserve.
White rabbit-tobacco *Pseudognaphalium leucocephalum*	List 2	Riparian woodland, cismontane woodland, coastal scrub, chaparral. Elevation range: 0 – 6825 feet. Blooms: sometimes July, August – November, sometimes December.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known primarily from sites further inland.	No further actions are recommended for this species.
Salt Spring checkerbloom *Sidalcea neomexicana*	List 2	Alkali playas, brackish marshes, chaparral, coastal scrub, lower montane coniferous forest, Mojavean Desert scrub. Located on alkali springs and marshes. Elevation range: 45 – 4960 feet. Blooms: March – June.	**Moderate Potential.** The Reserve contains brackish marsh and coastal scrub habitat that may support this species.	**Not Observed.** Focused rare plant surveys in April did not observe this species in the Reserve.

APPENDIX C.2

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN PROJECT AREA	RESULTS AND RECOMMENDATIONS
Estuary seablite *Suaeda esteroa*	List 1B	Coastal salt marshes. Located on clay, silt, and sand substrates. Elevation range: 0 – 15 feet. Blooms: May – October.	**High Potential.** The Reserve contains coastal salt marsh habitat. Reported occurrences from previous studies suggest this species is present in the Reserve (Existing Conditions citing Hendrickson 1991 EIR).	**Not Observed.** Focused rare plant surveys in July and October did not observe this species in the Reserve.
Woolly seablite *Suaeda taxifolia*	List 4	Coastal bluff scrub, coastal dunes, margins of coastal salt marshes. Elevation range: 0 – 165 feet. Blooms: January – December.	**High Potential.** The Reserve contains coastal salt marsh and coastal dune habitat. Known occurrences from previous studies suggest this species is present in the Reserve.	**Present.** Focused rare plant surveys in April, July, and October located this species in Area B1.
San Bernardino aster *Symphyotrichum defoliatum*	List 1B	Meadows and seeps, marshes and swamps, coastal scrub, cismontane woodland, lower montane coniferous forest, grassland. Located in mesic grassland near ditches, streams, and springs. Elevation range: 5 – 6630 feet. Blooms: July – November.	**Unlikely.** Although the Reserve contains coastal scrub habitat, this species is known from sites further inland.	No further actions are recommended for this species.
Greata's aster *Symphyotrichum greatae*	List 1B	Chaparral, cismontane woodland. Located in mesic canyons. Elevation range: 975 – 6535 feet. Blooms: June – October.	**No Potential.** The Reserve does not contain chaparral or woodland habitat to support this species.	No further actions are recommended for this species.

APPENDIX C.2

*** Key to status codes:**

FE	Federal Endangered
FT	Federal Threatened
FC	Federal Candidate
FD	Federal De-listed
BCC	USFWS Birds of Conservation Concern
SE	State Endangered
SD	State Delisted
ST	State Threatened
SR	State Rare
SSC	CDFG Species of Special Concern
CFP	CDFG Fully Protected Animal
WBWG	Western Bat Working Group High or Medium Priority species
List 1A	CNPS List 1A: Plants presumed extinct in California
List 1B	CNPS List 1B: Plants rare, threatened or endangered in California and elsewhere
List 2	CNPS List 2: Plants rare, threatened, or endangered in California, but more common elsewhere
List 3	CNPS List 3: Plants about which CNPS needs more information (a review list) *[not special status]*
List 4	CNPS List 4: Plants of limited distribution (a watch list) *[not special status]*

Species Evaluations:

No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

Present. Species was observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

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